KSA SPACE MARKET INVESTMENT OPPORTUNITIES REPORT

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Introduction

• FOREWORD
• EXECUTIVE SUMMARY
Governor’s Foreword

The rapidly evolving space market offers exceptional opportunities for the Saudi space sector, which has much to offer and develop.

In recent years the space sector has undergone profound and unprecedented transformations impacting the entire global ecosystem. With the advent of Newspace, space has become democratized: nearly 90 nations are now investing in space, and no less than 840 start-ups have entered the space business in the last 10 years, raising over $40 billion. The promise of significant socio-economic benefits and high commercial returns encourage a growing number of players to embark in the space business.

Space has also become more profitable: by 2030, the global space economy is expected to reach a record $738 billion, with growth driven mainly by downstream applications and services. This strong market potential is attracting a new generation of entrepreneurs and investors, leading to the rapid expansion of the commercial space sector.

Finally, space has become more strategic than ever in an increasingly complex geopolitical environment. Countries are investing massively in their space infrastructures to support their national security and sovereignty. In 2030, a record $56 billion will be spent on space-based defense and security programs worldwide.

The Kingdom’s history is deeply linked to space, from the study of astronomy to the provision of state-of-the-art connectivity to underserved areas. The successful mission of our two astronauts to the International Space Station in May 2023 shows how space can inspire the nation and motivate the younger generation to pursue space careers.

The government space ambitions will open a new era for Saudi Arabia in the space sector, paving the way for the creation of an attractive Saudi space market and a dynamic national space sector. Looking ahead to 2030, the space sector is expected to generate a significant number of employment opportunities and make a substantial economic contribution to the GDP of Saudi Arabia, confirming the sector’s growth potential for the country.

This Space Market Opportunities Report published by the Communications, Space and Technology Commission identifies the growth prospects for our national space sector in a rapidly changing global environment. The transformations taking place in the space sector offer tremendous opportunities to capitalize on our national strengths and meet the challenges of tomorrow. As the report shows, the Saudi space sector has much to offer and develop.
Executive summary
A fast growing and changing space sector

The global space economy is experiencing strong market dynamics

With $464 billion generated in 2022, the space sector accounts for 0.46% of the world’s GDP and grows at a fast rate of over 7% per year. It is expected to reach an all-time-high of $738 billion by 2030. Space is attracting a remarkable growing interest from an ever more diverse set of public and private actors seeking to seize the commercial and strategic opportunities offered by this fast-evolving economic sector.

The Middle East is showing high growth in an increasingly diversified space environment

4 times more countries are investing in space today than in the early 2000s, as nations are motivated to generate the socio-economic benefits offered by space technologies and applications. As Newspace transforms the space sector, many nations have revised their national space strategies with greater ambitions to capitalize on technological advances, boost their local ecosystems and move into more advanced space playing fields.

Government investment in space in 2022

<table>
<thead>
<tr>
<th>Worldwide</th>
<th>Middle East</th>
</tr>
</thead>
<tbody>
<tr>
<td>86 Countries</td>
<td>9 Countries</td>
</tr>
<tr>
<td>$100Bn invested</td>
<td>$1.2Bn invested</td>
</tr>
</tbody>
</table>
## Executive summary

Space applications and services drive market opportunities

### Space markets upstream account for $44Bn in 2022

<table>
<thead>
<tr>
<th>Segment</th>
<th>2022</th>
<th>2030</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>$29.4Bn</td>
<td>$29Bn</td>
<td>0.01%</td>
</tr>
<tr>
<td>Launch Services</td>
<td>$10Bn</td>
<td>$11Bn</td>
<td>1.7%</td>
</tr>
<tr>
<td>Ground Segment</td>
<td>$4.5Bn</td>
<td>$5Bn</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Fast changing commercial market environment and prominent role of governments

### Space markets downstream account for $380Bn in 2022

<table>
<thead>
<tr>
<th>Segment</th>
<th>2022</th>
<th>2030</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite navigation</td>
<td>$227Bn</td>
<td>$474Bn</td>
<td>9.2%</td>
</tr>
<tr>
<td>Satellite communications</td>
<td>$147Bn</td>
<td>$175Bn</td>
<td>2.2%</td>
</tr>
<tr>
<td>Earth Observation</td>
<td>$6Bn</td>
<td>$8Bn</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Large B-to-C applications driving growth and new business models to address new market drivers

### Emerging Markets

<table>
<thead>
<tr>
<th>Segment</th>
<th>2022</th>
<th>2030</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism</td>
<td>$0.35Bn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSA(^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td>$1.3Bn</td>
<td></td>
<td>18.7%</td>
</tr>
</tbody>
</table>

Innovations and new use cases are transforming the space environment as a new market dimension

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(1) Space Situational Awareness
Executive summary
Paving the way for a dynamic and attractive Saudi space marketplace

The Saudi space sector stands at a emerging phase with several companies active, upstream to downstream. The establishment of a comprehensive plan for capability build up, the launch of ambitious programs and the deployment of favorable targeted incentives shall create the conditions for the expansion of the Saudi space marketplace.

Average Annual value

$US 1.17Bn
2015 - 2022

$US 2.2Bn
2023-2030

Downstream
1.2B

Upstream
0.9B

Government
0.9B

Commercial
1.2B
Executive summary
Promising opportunities for the Saudi space ecosystem

There are many opportunities for the development of the Saudi space sector, both upstream and downstream. Setting coherent priorities for market development, capitalizing on Saudi heritage and acting on key growth levers will be key to the successful transformation of the Saudi space ecosystem.

Key Enablers
- Financing
- Regulation
- Workforce
- Governance
- Equipment & infrastructure
- Cross-sectors collaboration
- International partnerships
- Local demand

Opportunities
- Manufacturing
- Launch Services
- Ground Segment
- Satellite Communications
- Earth Observation
- Space Science & exploration
- Emerging Space
Outlook of the Global Space Sector

- THE SPACE SECTOR IN TRANSITION
- THE SPACE ECONOMY TODAY
- THE GOVERNMENT LANDSCAPE
- SPACE SECTOR MEGATRENDS
The space sector in transition

The space sector has gone through several stages since it became a global commercial industry in the 1990s. The paradigmatic changes brought by NewSpace over the last 15 years has led to structural changes in the space industry that is entering now a phase of consolidation.

The global space industry emerged in the 90s, matured in the 2000s
In two decades, the global space sector has evolved from a government centric activity to a commercially driven, interconnected, industry. The introduction of commercial satellite applications in the late 1990s (pushed by Direct-To-Home Television) and their tremendous expansion in the 2000s led to structural changes in the space sector that has become a fully globalized industry. This period also saw the inception of the first generation of emerging space nations that expanded globally motivated by the variety of socio-economic returns they could generate from space. In 20 years, the number of countries undertaking space activities has tripled, to reach 86 nations in 2022.

The paradigm shifts brought by Newspace
The paradigmatic changes brought about by NewSpace over the last 15 years have accelerated the transformation of the sector thanks to wide open access to increasingly affordable space technologies and services. New drivers such as broadband connectivity, satellite data collection for change detection and emerging space solutions (such as in-space logistics) have given rise to a new ecosystem of market players and business models. Space start-ups have proliferated across applications, leveraging low-cost production and short development cycles. Over the last 10 years, no less than 840 start-ups entered the space business globally raising over $40 billion. Following a phase of great dynamism, the space sector is now entering a consolidation phase as market players need to scale up to boost their competitiveness and finance their next growth cycle.

3 decades evolution of the global space sector

**COMMERCIAL EXPANSION**
- Privatization of the commercial satellite industry followed by M&As
- 1st generation of emerging space countries
- US DoD expands its space program to support global operations

**DISRUPTED ECOSYSTEM**
- NewSpace drive innovations, investment and industry trends
- Fast growth of new entrants with high capital needs
- Some historical markets slowdown while new markets emerge
- 2nd generation of emerging space countries

**MATURITY PHASE**
- New competitive environment brought by mega-constellations and new players
- Consolidation stage as market players need to scale up
- Space exploration and defense as government drivers
- China and US shaping global space agenda
A thriving global space economy

The global space economy is experiencing strong market dynamics pushed by new supply and demand drivers, disruptive innovations and transforming business models. With $464 billion in 2022, it accounts for 0.46% of the world's GDP and grows at a fast rate of over 7% per year.

A fast-growing sector attracting private and public investors

With a value increasing from $307 billion in 2016 to $464 billion in 2022, the global space economy has experienced a consistent annual growth rate of over 7% which is much faster than the world economy in the same period (4.7%). As part of this $464 billion, the industry has secured revenues estimated at $424 billion from both government and commercial activities. In addition, government civil and defense agencies retain some of their budgets for internal operations estimated at around $40 billion in 2022 worldwide (non contracted to industry).

Looking ahead, the global space economy is set to continue its upward trajectory, with an average annual growth rate of 7% over the decade. By 2030, it is anticipated to reach an all-time-high value of $738 billion with growth primarily fueled by advancements in downstream applications and services that account for 90% of industry’s revenues.

Space is attracting a remarkable and growing interest from an ever more diverse set of public and private actors seeking to seize the commercial and strategic opportunities offered by this fast-evolving economic sector.

With advancements in technologies, the cost of launching payloads into space has significantly decreased, opening new possibilities for businesses to leverage space-based assets and services. The potential for high returns on investment in these sectors has attracted a wave of entrepreneurs and investors, supported by governments, leading to the rapid expansion of the commercial space sector.

Key metrics of the space economy in 2022

- **$464Bn**: 2022 space economy value
- **$424Bn**: contracted to the industry
- **86**: Countries investing in space
- **2,490**: Satellite launched

[Source: Euroconsult Analyses]
The space value chain allows the delivery of space-based services reliant on space technologies and includes a wide diversity of stakeholders, active at five main levels of the chain:

- **The space industry (upstream)** that includes a limited number of players who design and manufacture space systems and their launch vehicles;
- **The satellite operators**, government organizations or commercial companies, who own the satellite systems and market their capacities (bandwidth for communications, data for Earth observation, signal for navigation).
- **The ground segment network** (upstream) and terminal suppliers (downstream), who design and deliver a large variety of software and equipment for both the management of satellite infrastructure, and for the access to services by the users;
- **The service providers (downstream)** who deliver communications, navigation and geographic information services to the final users by integrating the satellite signal into packaged solutions;
- **The final users**, whether government, enterprises or individuals who do not ask for the satellite technology per se but for solutions tailored to their needs, whether for better communications, navigation or geographic information services.
Market players on the move

The space industry is going through a unique and profound period of change, driven by market and technological mutations that are leading to the emergence of a new ecosystem of players and forcing traditional players to rethink their business models.

<table>
<thead>
<tr>
<th>Manufacturing</th>
<th>Launch services</th>
<th>Ground segment</th>
<th>Satellite operations</th>
<th>Satellite services</th>
</tr>
</thead>
<tbody>
<tr>
<td>~100</td>
<td>~50</td>
<td>~50</td>
<td>~200</td>
<td>&gt;1000</td>
</tr>
</tbody>
</table>

Sample of established players:
- AIRBUS
- ThalesAlenia Space
- Northrop Grumman
- Spacex
- Anasazi Aerospace
- CPI
- Hughes
- Iridium
- Intelsat
- Maxar
- Anuvu
- HughesNet
- Panasonic

Sample of newcomers:
- Tyvak
- RocketLac
- Infostellar
- Skyloom
- Globalstar
- Leafspace
- Avanti
- Abbe
- York Space Systems
- Astra
- Azure
- OneWeb
- Gogo
New opportunities and challenges for market players

The transformations of the global space sector is impacting all its verticals upstream to downstream creating new kinds of opportunities and challenges for market players.

### Selected opportunities

**Upstream**
- Mass production model induced by smallsat constellations
- Technical innovations to optimize capex and adapt to market shifts
- Vertical integration to secure supply chain in critical domains
- As-a-service business models increasing flexibility and affordability

**Downstream**
- Market drivers for investments in new generation of satellite systems
- Digitalization of satellite networks fostering cloud integration
- Exponential demand for broadband connectivity
- AI and data analytics unlock new use cases for EO

### Selected challenges

**Upstream**
- Disruptions in the supply chain impacting production processes
- Hyper concentration of incumbents vs. fragmentation of new entrants
- Market complexity pushing players to find alternative revenue streams
- Complex trade-off between cost reduction v. total quality of service

**Downstream**
- Historical driving markets reaching maturity and declining
- Oversupply of capacity causing high price pressure
- Strong consolidation induced by new drivers and suppliers
- Race to achieve global scale and streamline distribution channels
Dynamics in the space ecosystem

While vertical integration has always been part of the strategy of the largest space incumbents, the Newspace ecosystem is pushing market players to accelerate their business growth and diversification strategies by taking up new positions in the value chain.

Moves along the value chain to diversify revenue streams

The space sector is not static; on the contrary, it is constantly on the move, with players developing their positions according to their endogenous or exogenous growth strategies. This moving competitive environment is resulting in some kinds of crisscrossing between upstream players going downstream and downstream players going upstream to catch additional market opportunities and/or integrating critical technologies or competencies.

Vertical integration is not new in the space business and satellite manufacturers have a long history of moving downwards to operate satellite systems and ultimately deliver data or services directly to end-users in order to catch growth opportunities from the service business. It is never easy for market players to go downstream as this requires international scale, the integration of complex capabilities and the ability to reach customers. This is why this strategy has traditionally been the domain of the biggest incumbents.

More recently, the opposite trend has occurred with vertically integrated satellite constellation players having their own manufacturing capability moving up in the value chain to extend their business to space systems supply. These market players often propose satellite-as-a-service solutions to their customers as a complementary set of revenues. The last few years have also seen launch companies going downstream to operate their own constellations and deliver services (e.g. SpaceX Starlink) or upstream to manufacture satellites (e.g. RocketLab). All these moves show the importance of diversifying revenues in an extremely competitive and globalized market environment.

Crisscrossing over the value chain: The example of Earth observation
Size of the global space market

In 2022, the global space industry generated an estimated revenue of US$424 billion, an 8% growth over the previous year. The prevalent role of domestic governments and an ever-growing service market remain foundational features driving space industry's revenues and strategies.

Space markets upstream
Upstream activities represent the core of the space industry with the manufacturing of space systems, their launch and the deployment of their ground infrastructure. These three segments account for roughly 10% of the total space market value, i.e., $44 billion in 2022. As an infrastructure business, revenues upstream follow the cycles of deployment of space systems from government and commercial operators. Revenues from space systems manufacturers and launch service providers remain largely dependent on government (civil and defense) missions that represent more than two-thirds of their revenues, hence showing the crucial importance of domestic governments as anchor clients to the industry.

Space markets downstream
Downstream activities include operations, services and end-users' terminals. They account over 90% of the space sector's overall revenues ($380 billion in 2022) driven by satellite communications and navigation that benefit from large Business-To-Consumers (B-to-C) services (such as satellite television, consumer broadband, personal navigation services etc.). These large and global B-to-C applications fuel revenue size and growth with a constant 7% annual growth expected for the decade. Other markets represent a more modest share of the services market, with specific dynamics: despite growth, Earth observation only represents a modest 2% of space markets downstream due to the absence of large consumer applications.

The Global Space Market in 2022
Size of the global space market per region

The key upstream players of the industry are situated in the North American, European and Asian regions, being supported by a sizeable domestic institutional demand. Growth in MENA’s space markets shall accelerate sharply over the next decade driven by investments from public stakeholders motivated by business opportunities and strategic considerations.

Unveiling Global Market Sizes Across Regions

Space market revenues are predominantly generated in North America, Europe, and Asia. Over the next 10 years, North America’s annual growth rate is projected to reach 3%, while Europe is expected to reach 2%, indicating maturing markets compared to the dynamic Asian region, with a forecasted 11% annual growth rate.

Their growth is bolstered by significant domestic institutional demand, encompassing research and development initiatives, along with public programs that align with national needs. Additionally, a well-established national/regional commercial market stimulates the demand for advanced satellite systems, further contributing to the industry’s overall growth.

The remaining three regions collectively contribute to a smaller portion of the space market, accounting for a total of 22%. These regions also exhibit lower levels of dynamism, propelled by national aspirations.

The Middle East and Africa space market is valued at $35 billion in 2022, expected to grow at a 10% average annual growth over the decade. Upstream, growing procurement programs for space systems spurred by new national ambitions drive the market growth. Overall, the region’s market value is largely driven by downstream applications, especially Satcom and Satnav Services ($16 billion and $17 billion respectively). Despite being smaller in scale, the field of Earth observation ($360 million estimated in 2022) is also expected to exhibit notable growth over the course of the decade and generates essential strategic value for governments.

The Global Space Market per Region in 2022 ($US)

Note: Regional distribution is excluding ground segment valuation and maritime areas.
**Snapshot on space market trends: upstream**

**Manufacturing**
Growth of satellite demand in unit does not translate into proportional growth in revenues due the prevalence of low-cost, small, satellites. Still, the manufacturing market will grow by 44% between last decade ($200B) and next decade ($289B). Despite the transition towards NGSO constellations architecture (97% of satellites launched in 2022) the GEO market (a third of total revenues in the decade) remain relevant and governments (65% of revenues) prevalent.

**Launch Services**
The launch market will grow from $57 billion over the past decade to $86 billion next decade as the decrease in average launch prices is compensated by a larger number of satellites to be launched. As the market has now reached its peak stage with constellations being deployed, the market is expected to remain pretty much stable within the decade. Small launchers proliferate but only capture a small fraction of the market so far accounting for 1% of the total satellite mass.

**Ground Segment**
The ground market experiences a relatively slow growth, with a temporary spike in the last years driven by new projects, satellite constellations and new solutions offered by market players. This market shall come back to its usual moderate, but sustained, growth over the coming years (+7% over the next decade). Most of the market is dominated by commercial entities mostly active on the satcom market.
**Satellite navigation**
Satnav has become the first commercial satellite application market driven by a large consumer market. The satellite navigation market is highly fragmented as system integrators and service providers who often provide application-specific services mostly for commercial clients (95%). The market’s annual growth of 9% will be primarily driven by consumer applications creating value from a GNSS signal.

**Satellite communications**
The satcom market has experienced significant transformations with the transition from the established broadcast market to the emerging connectivity business. The advent of NGSO constellations and flexible GEO satellites designed for connectivity service will satellite operators to recover growth following a tough transition period. Voice and data applications shall contribute to ~80% of the total market value by 2030.

**Earth observation**
The improvement in imagery precision and cost reduction will drive the market to higher precision images. Defense and government users will remain the first customer for EO data (82%) with exquisite requirements for premium services. The demand for satellite imagery and its associated analytics is experiencing steady growth, with a 2% CAGR. The commercial market is also fueled by new technologies that enhance the value of EO data and its associated services.
**Snapshot on space market trends: emerging markets**

### Space tourism

In recent years, space tourism has gained prominence as multiple companies (such as Virgin Galactic, Axiom, Blue Origin SpaceX) strive to provide these services. The market benefits from the growing interest from nations to launch astronauts for science and prestige, as well as the trend from historical space agencies to outsource some orbital activities to commercial solution. Still, the market remains at its infancy stage with significant remaining market risks.

- **2022**: $0.2Bn
- **2030**: $0.6Bn
- **CAGR**: 12%

### Space situational awareness

The commercial SSA market is getting traction due to increasing concerns about sustainability of the operating environment in outer space, the proliferation of debris and potential direct threats in orbit. Presently, almost all SSA data and services are produced from ground-based systems while an increasing number of emerging and legacy suppliers plan to expand their solutions with next generation ground and space-based systems.

- **2022**: $0.1Bn
- **2030**: $0.3Bn
- **CAGR**: 17.7%

### Space logistics

Space logistics encompasses various in-orbit services, ranging from last mile delivery to life extension services. Those businesses have gained significant traction in recent years, with some solutions already operational and multiple market players aiming to conduct demonstration flights in the coming years. However, most markets are still very immature, and their potential remains to be proven.

- **2022**: $0.03Bn
- **2030**: $0.4Bn
- **CAGR**: 34%
An evolving institutional landscape

Governments are key space actors with a variety of roles including policy-makers, pathfinders for cutting-edge technologies and partners/customers for commercial space players.

Circle of governments active in space is expanding but still concentrated

For decades, only a handful large economy governments could afford to undertake space activities and develop space-related capabilities. The last 20 years have brought massive changes in the global institutional space landscape: space has become more democratic, with emerging players engaging with space, drawn by the promise of generating socio-economic benefits, developing sovereign capabilities to reduce foreign reliance, spurring technological innovation and building a space ecosystem to capture a share of the expanding global space market. In 2022, 86 countries invested US$100B in space, up from 21 countries and US$40B in 2000. Despite the appearance of many new players and global diversification, space leadership remains largely concentrated: the top five countries still account for 85% of government space investments worldwide in 2022, with the US representing 60% of the total by itself.

Governments adapting to a changing sector and geopolitical landscape

The space sector is transforming rapidly, and so too are the roles that governments play in it. While emerging players focus on securing space capabilities to deliver direct benefits for their nation, leading agencies are increasingly focused on more ambitious space exploration initiatives that form a new horizon following decades of cooperation with the International Space Station. Diplomacy, sovereignty, science and new types of commercial opportunities drive missions to the Moon, Mars and beyond that will shape international cooperation and public-private partnerships for the next decades. Space defense programs have also grown rapidly as the role of space as an enabler and force multiplier for armed forces is recognized in the defense doctrines of countries around the world. The proliferation of sovereign EO and Satcom satellites in emerging players and massive investments in complex space defense systems and cutting-edge technologies from leaders have doubled defense budgets over the past 10 years.

Top 5 country budgets

<table>
<thead>
<tr>
<th>Country</th>
<th>Budget ($)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>$61Bn</td>
<td>01</td>
</tr>
<tr>
<td>CHINA</td>
<td>$14Bn</td>
<td>02</td>
</tr>
<tr>
<td>JAPAN</td>
<td>$5Bn</td>
<td>03</td>
</tr>
<tr>
<td>FRANCE</td>
<td>$4Bn</td>
<td>04</td>
</tr>
<tr>
<td>RUSSIA</td>
<td>$3Bn</td>
<td>05</td>
</tr>
</tbody>
</table>
A new generation of dynamic entrants have begun engaging with space, characterized by ambitious space programs aiming to leapfrog the traditional development model and investing in space exploration and human spaceflight.

Emerging players traditionally seek short term benefits from space

The traditional model for new entrants was to focus on basic space R&D and science before eventually transitioning to investing in own assets, focusing on applications able to deliver immediate, concrete socio-economic benefits, typically in satellite communications or Earth observation. These programs often relied on a partnership with a foreign manufacturer and were accompanied by technology and knowledge transfer agreements. More ambitious emerging players would gradually seek to expand their local industries capabilities to reduce reliance, while others would continue to procure from abroad.

Space investments worldwide in 2022 with the US representing 60% of the total by itself.

A new generation of space nations showing ambitious, long-term plans

Newspace developments and broader business opportunities have motivated a number of regional players to revise their national space strategies with more ambitious plans to capitalize on technological advances, boost their local ecosystems and move into more advanced space fields such as access to space, space exploration and human spaceflight, which were traditionally the playground of the leading space nations. Breaking the usual development model, these new entrants aim to reap the dividends of these advanced programs: national prestige, regional leadership, high visibility, inspiration, and attracting global talent to help build a dynamic national space ecosystem. Other rationales for strong space engagement include the desire for strategic autonomy, national security considerations, economic diversification and boosting local human capital.

New or re-emerging regional players following this model include, among others, Saudi Arabia and the UAE in the Middle East, and South Korea and Australia in the Indo-Pacific.

Key investment rationales for new entrants

- **ECONOMIC GROWTH**: Space investments create high-skill jobs, boost socio-economic development and diversify the economy.
- **TECHNOLOGY DEVELOPMENT**: Space programs boost R&D and generate positive spillovers in space-adjacent sectors.
- **INSPIRE & MOTIVATE**: High-visibility space achievements inspire the population and encourage young people to pursue STEM degrees.
- **DIPLOMACY & SOVEREIGNTY**: Sovereign space capabilities reduce or eliminate dependence on foreign powers.
Drivers & inhibitors
for government space investments

A number of external and internal factors and rationales determine the degree to which governments engage in space activities, which differ between leading and emerging space players. Some of these factors are universal, while others are more specific to the Middle East.
Changing dynamics in the Middle East

The Middle East is one of the world’s most dynamic regions regarding space activities, as nations look to establish themselves as regional space hubs to attract innovative space companies, support their legacy space champions, upskill their workforce, and diversify their economies.

One of the world’s most dynamic regions for space

In 2022, 9 Middle East countries invested $1.2 billion in space, up from $650 million a decade ago. Investments are expected to keep growing in the coming years are driven by space’s ability to diversify the economy, create high-value, high-skill jobs, inspire and instil a sense of pride in the population, attract youth to STEM degrees and boost sovereignty.

The Middle East and Africa’s total space market is estimated at $35 billion, capturing about 2% of the world’s $44 billion upstream market and 9% of the $380 billion downstream market, with continued growth forecasted.

Complex geopolitical landscape

Defense space spending has tripled over the past decade, growing from 20% to 35% of total space investments. Middle East countries focus essentially on Earth observation and satellite communications to reduce their foreign reliance, secure their borders and ensure safety and security for their population. There are also growing interest for acquire some level of sovereign assets in the domains of satellite navigation and space situational awareness.

Diversified strategies to capture opportunities

Compared to a decade ago when strategies focused on satellite applications and technology development, Middle East nations today embrace the diversity of space domains including applications, access to space, science, exploration and human spaceflight, which help boost investments and secure key partnerships.

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**GOVERNMENT SPACE INVESTMENTS (US$ in millions)**

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>650</td>
<td>1,030</td>
<td>1,820</td>
</tr>
</tbody>
</table>

**SATELLITES LAUNCHED**

- 6 average y
- 17 average y

**TRENDS FOR SERVICES DOWNSTREAM**

**SATELLITE COMMUNICATIONS**

- Growing HTS capacity
- HTS enhancing CBB growth
- Upcoming satellite launches
- VHHTS and NGSO introduction might help reduce costs

**EARTH OBSERVATION**

- Growing demand for IMINT services, especially defense-related applications
- National plans fuel EO services for urban growth and transportation
- Energy and resource protection applications remain important EO services
The space sector is undergoing an unprecedented transformation, affecting all its market segments. 10 megatrends have been selected to highlight the main opportunities and risks for the coming years.

- Space Exploration
- Defense & Security
- Mega-constellations
- Access to space
- Cost reductions & affordability
- Space sector consolidation
- Digitalization
- Space as-a-service
- Upside service markets
- Space sustainability
Trend 1
Space exploration

**Space nations** worldwide pursue increasingly ambitious exploration missions, targeting the Moon, Mars and beyond. To reach their long-term objectives, governments rely on partnerships paving the way for a new era in space exploration.

**Space exploration is opening a new era for the global space sector**

**Historical space powers** reaffirm and expand their global leadership through ambitious space exploration plans. A new race to the Moon is happening between the U.S. via the Artemis program and China through the International Lunar Research Station (ILRS), and their respective partners. Encouraged by the search for national prestige, as well as scientific and industrial benefits, space exploration is not longer reserved for the most advanced space nations. Around 30 countries are now investing in the field driving investments up to $25 billion, expected to surpass $30 billion by 2030.

**A new playing field for the commercial space sector**

While **space exploration** was historically a government playground, the private sector is now playing a key role in fulfilling national ambitions for Earth orbital and Moon activities. As nations are refocusing to the Moon as their key target, orbital stations in LEO will progressively transition to the private sector sharing both commercial and scientific missions. Beyond, private partners initiate their own projects to the Moon and, later, Mars placing themselves as key partners of space agencies. No less than 22 commercial Moon missions are expected to fly by the next decade. This rise of the commercial sector redistributes the cards between the public and private sectors, creating opportunities for new entrants willing to join the exploration race without necessary a locally-based industry.

**Strengthening partnerships to reconquer the Moon**

**Rising number of commercial exploration missions (2022-2030)**

- 25 partners
- 10
- 74 Commercial Exploration Missions
- 4 LEO Stations
- 51 Moon missions
- 1 Mars mission
- 6 Other deep space missions
Trend 2
Defense & Security

With an increasingly complex geopolitical environment and the growing integration of space in military operations, defense and security space programs expand dramatically worldwide. Partnerships between countries and with commercial players are used to leverage strategic capabilities.

Space confirmed as a warfighting domain
In an increasingly contested global environment, space assets are essential to support ground, air, sea and cyber operations driving governments to invest more in sovereign, secured and resilient space-based capabilities for intelligence, communications and positioning. To illustrate this growing appetite, more than 1,100 military satellites will be an increase of more than 200% compared to the previous decade. Conflicts gradually shift towards orbits leading to growing hostile operations ranging from reversible to potential irreversible damages. This aggravated militarization of orbits pose fundamental threats to the continuity of outer space as a public good.

Reinforcing alliances to ensure the protection of key space assets
In order to improve the efficiency of their military space activities, a growing number of countries have decided to set up a fully dedicated governance with the creation of space forces or space commands that integrate all space operations within their military. In addition, countries are strengthening their alliances in order to share assets and intelligence about the space domain. Beyond inter-governmental partnerships, countries will intensify their relationship with private companies to reinforce their capabilities and ensure access to cutting-edge technologies. This growing reliance place commercial players as strategic partners on the geopolitical chessboard.

Forecasted government space defense expenditures by 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Space Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$29.8Bn 4%</td>
</tr>
<tr>
<td>2022</td>
<td>$41.2Bn 11%</td>
</tr>
<tr>
<td>2030</td>
<td>$56.3Bn 13%</td>
</tr>
</tbody>
</table>

Potential hostile attacks on space assets

[Diagram showing various types of space threats and attack vectors including directed energy weapons, orbital threats, denial and deception, cyber attacks, electronic warfare, nuclear detonation, and kinetic energy threats.]

27 KSA SPACE MARKET INVESTMENT OPPORTUNITIES - REPORT
Mega-constellations disrupt the entire space sector providing new types of opportunities and challenges for all stakeholders, from manufacturers to end-users. Projects show varied business models with none of them yet proven, but all of them shaking up the satellite communication market.

**A breakthrough in satellite infrastructure**
Characterized by very large capital expenditures (between $5 and $10 billion) and a large number of satellites in Low Earth Orbit (LEO), mega-constellations are generating major shifts within the space industry. Almost two-thirds of the 24,500 satellites to be launched by 2030 will be for just five mega-constellations, namely Starlink operated by SpaceX, GuoWang by the China Satellite Network Group, Lightspeed by Telesat, Kuiper by Amazon and OneWeb. Potential other broadband projects are expected to emerge in the coming years, notably in Asia. Dominating total supply, these Non-Geostationary Orbit (NGSO) constellations have led to paradigm changes in the manufacturing and launch sectors. However, not all projects might materialize for various reasons including financing, supply chain issues as well as external factors.

**New giants of HTS capacity disrupting the market**
While the vast majority of High-Throughput Satellite (HTS) capacity was supplied by GEO satellites until 2020s, the current decade will be marked by a massive shift towards NGSO HTS constellations offering broader coverage, lower latency and higher redundancy. Accounting for around 95% of the total satcom capacity available worldwide by 2030, mega-constellation operators shall spend over $30 billion of capital expenditures to deploy their satellite infrastructure. These new giants of the satcom sector disrupt the market, first impacting GEO operators’ businesses before potentially competing with terrestrial telco players, notably in upside services markets.

**Overview of leading mega-constellations**

<table>
<thead>
<tr>
<th>Company</th>
<th>Satellites</th>
<th>Throughput</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starlink</td>
<td>4,408 sats</td>
<td>22 Tbps</td>
<td>2021</td>
</tr>
<tr>
<td>OneWeb</td>
<td>648 sats</td>
<td>12 Tbps</td>
<td>2022</td>
</tr>
<tr>
<td>mPower</td>
<td>11 sats</td>
<td>1.9 Tbps</td>
<td>2023</td>
</tr>
<tr>
<td>Lightspeed</td>
<td>198 sats</td>
<td>5 Tbps</td>
<td>2021</td>
</tr>
<tr>
<td>Kuiper</td>
<td>3,236 sats</td>
<td>41 Tbps</td>
<td>2026</td>
</tr>
<tr>
<td>Guo Wang</td>
<td>&gt;2,500 sats</td>
<td>6.4 Tbps</td>
<td>2028</td>
</tr>
</tbody>
</table>
Trend 4
Access to Space

The sector is seeing the multiplication of launchers and spaceports projects to serve an exponentially rising number of satellites to be launched. Although growing, the market is not likely to absorb all these offers, with only a few market winners expected in the coming years.

The launch sector between diversification and consolidation
24,500 satellites are expected to be sent in orbit over 2022-2030, driving requirements for flexible and adaptable launch solutions. With more than 70 new launchers under development, supply is expanding to address all types of requirements from micro, small, medium, heavy and super-heavy launchers. This diversification of available launchers is further encouraged by lunar missions and the development of inter-orbit mobility opportunities, both calling for new space transportation solutions. Although the market is growing, it will not absorb all these new projects as the economics of small launchers remain challenging. As the risk of oversupply is real, consolidation will almost certainly occur in the coming years.

The diversity of the requirements in terms of launch site infrastructure is driving changes in the spaceport landscape. Interest in spaceport development is growing across the world as nations eye new launcher projects (often developed without a connected launch site) as a quick win opportunity to obtain national capabilities and boost their commercial space ecosystem. As of today, 25 orbital launch bases are active worldwide and around 25 more spaceport projects have emerged in different regions of the world. As with launchers, not all of them will come to fruition, as there is stiff competition to attract the best tenants, not to mention the particular economic, technical and political issues involved in developing launch sites.
Trend 5
Cost reductions and affordability

While Newspace has made a major contribution to lowering the price of space solutions and making them more affordable, margin protection and long-term commercial viability are likely to guide the strategy of market players in all segments of the space sector.

Complex trade-off between affordability and profitability

Disruptive innovations in key technological areas of space and satellite systems (such as miniaturization, digitization, mass production, reusability, and more) and the development of innovative business models (such as the development of "as-a-service" businesses) have made space more affordable than ever. Satellite manufacturing prices have fallen as they have moved from a bespoke to a mass-production model. Launchers’ reusability, rideshares and supply diversification have pushed price down in space transportation too, opening up access to space to an ever-wider range of potential customers. Downstream, High Throughput and Flexible Software Defined GEO Satellites together with the new generation of satellite constellations are bringing massive capacity in the market and dramatically driving down the average cost of satellite capacity which is a key condition for satellite’s competitiveness in the connectivity markets.

In this price-intensive competitive environment, market players have seen their operational margins largely affected which creates issue of long-term business sustainability for newcomers but also for historical players who need to rethink their financial model in this new market context. External factors might also impact the sector and force market players to review their prices, including the effects of inflation or supply chain shortage. These trends are driving market players to protect their positions through consolidation and vertical integration, which should lead to the creation of new industry giants and the stabilization of prices in all segments of the value chain.
Driven by the dynamics of NewSpace, the last fifteen years have been marked by a tremendous expansion of the space sector, both in terms of public or private actors and of space activities conducted. The need to rationalize supply and market growth strategies are naturally leading the sector towards a new development cycle with a consolidation phase that has already begun. In addition, the changing global macroeconomic and geopolitical environment is creating new and tougher market conditions that are accelerating this transition, with smaller fundraising opportunities for smaller players and more generally a reduced window of opportunity for new entrants.

The next few years should be marked by a process quite similar to that experienced by the satellite industry in the early 2000s, with a consolidation cycle that will favor the strengthening of the major players and the formation of new giants. Through active M&As, these actors of the next consolidation phase of the space industry will shape its competitive environment that should be ever more consolidated, vertically integrated and linked to high technology sectors. Along with space industry’s legacy and emerging global leaders, companies from digital, AI, connectivity and defense sectors are expected to be key players in shaping the space conglomerates of tomorrow.

**Fundraising evolution in the Earth observation sector**

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>$7.6 M</td>
</tr>
<tr>
<td>2017</td>
<td>$524 M</td>
</tr>
<tr>
<td>2022</td>
<td>$1.8 Bn</td>
</tr>
</tbody>
</table>

**Mergers & acquisitions in the space sector worldwide**

- **2020**: 5 Mergers & Acquisitions
- **2023**: 41 Mergers & Acquisitions

(1) as of 30/06/2023
Trend 7
Digitalization

Digital transformation is changing the core business of all economic sectors. Space is no exception. The space sector is progressively embracing digitalization resulting in significant disruptions across its value chain and making large digital companies critical players of the space ecosystem.

Digital at the heart of the space industry’s transformations
The rise of Newspace is shaking up business models in the space sector. Historic players and new entrants must rethink their innovation strategies and their commercial approach in a more open and therefore more competitive context. The digital lever must above all enable companies to meet their customer’s key requirements and to develop new production models for more cost-effective products and services. Software-defined satellites have become a new standard in the satellite industry enabling satellite operators to adapt to evolving market demand over time. The virtualization of satellite networks progressively enable new applications and seamless roaming across orbits. Down in the value chain, the virtualization of ground segments will avoid any unnecessary hardware refreshment cycles while improving the orchestration of the network. In the specific case of Earth observation, cloud-based platforms will allow a better use of operators’ capacity and are seen as a real revolution for the customer experience.

Cloud giants as central players of the space value chain
The digital transition of the space value chain will reinforce the position of cloud giants including Google, Amazon, Microsoft and others. By the assets they detained and their corporate size and influence, these cloud giants shall become central players of the global space sector and control access to many of its verticals.
The rise of the Space-as-a-service model will revolutionize the entire value chain, allowing new entrants to join the market and develop new space activities. This growing business is an opportunity for existing operators and cloud providers, reinforcing the position of Tech Giants.

**A service model revolutionizing the entire value chain**

For years, the space business has essentially revolved around product sales. The expansion of the sector, the growing commercialization of space applications as well as the exponential development of cloud-based technologies and solutions have cleared the way for new types of ‘as-a-service’ models. Space-as-a-service (SaaS) is a model under which operators provide end-to-end services for satellite management, from the design of the spacecraft to data processing and analysis. This trend is observed across the entire value chain with new concepts as ‘Ground segment-as-service’, ‘Satellite-as-a-service’ and ‘Data-as-a-service’. These new businesses open doors for new entrants. By purchasing subscription services, customers transform CapEx into OpEx, and avoid the necessary time in developing complex space missions from end-to-end. Using SaaS facilitate go-to-market strategies and enable stakeholders to focus their efforts on their core business, encouraging further innovation based on satellite data.

By attracting new clients, SaaS is seen as a growth driver for satellite and ground segment operators, expanding their addressable market. Relying on existing assets (satellites, Earth stations or analytic software), SaaS vendors leverage on their infrastructure, amortize their CapEx and improve their margins. As they require high-performance connectivity, SaaS also places Tech Giants (Gafam and BAXT), at the heart of their business models, which further strengthen the position of companies such as Microsoft, Google and Amazon in the space sector.
Trend 9
Upside service markets

The growing appetite for anywhere, anytime connectivity and information opens up new growth opportunities for the space sector over the next decade, stimulated and facilitated by technological innovation, digitization and the integration of satellite solutions.

Satellite is a key enabler for Non-Terrestrial-Networks applications
The next 15 years are expected to bring significant growth in the satcom industry, today valued at over $160 billion. The market for 5G networks holds great potential, offering high security, reliability and scalability, making it well-suited for manufacturing, education, and energy, among others. Satcom will also play a crucial role in next-gen 6G networks. The satellite direct-to-cellphone market is emerging with projections indicating over 50 million subscribers and $2 billion in annual service revenues within five years. The expansion of cloud services and the demand for decentralized computing power in remote areas are driving growth of micro data centers. Moreover, land mobility, previously limited but accelerated by new offerings (e.g. Starlink's RV), anticipates the extension of satellite connectivity to trains, buses, trucks, and cars, facilitated by technology strides and cost reductions.

The defense sector opening the growth path to other EO applications
The EO market is expected to reach more than $8 billion by 2030 depending on the ability of market players to expand their customer base for higher value-added solutions. Growing demand for premium datasets (such as 3D models, ultra-resolute imagery and near real-time acquisitions is expected to drive the market. Primarily requested by the defense sector to develop immersive training and to support ground operations, these datasets will progressively foster the development of new applications (i.e., digital twins, metaverse, parametric models) opening up new market opportunities (autonomous driving, supply chain monitoring, disaster resilience) allowing end users to tackle new challenges (including climate change, geopolitical risks and natural resource scarcity).
Trend 10
Space sustainability

The intensification of space activities leads to an increased congestion of orbits, threatening the long-term sustainability of activities around the Earth. If this issue raises serious challenges, it also creates new business opportunities as commercial players look to provide solutions.

A Tragedy of Commons threatening future access to space
Lowered barriers to access outer space, the diversification of actors joining the sector as well as large constellation projects are some of the factors that lead to the dramatic increase of the launch of space objects. With more than 24,500 satellites to be launched during the decade, the number of space debris will rise exponentially, not to mention the growing threat posed by the militarization of space. Therefore, the risk of in-orbit collisions is a major concern for all operators, forcing stakeholders to undertake perilous maneuvers to protect their in-orbit assets. This shift towards a space tragedy of commons has become a true threat to future human space activities, challenging the very concept of access to space.

Growing market opportunities to find solutions
Facing these challenges, international organizations and countries are taking actions to prevent the proliferation of debris in orbit, including stricter regulations. Besides, the need to mitigate risks in-orbit is boosting demand for Space Situational Awareness (SSA) and Space Domain Awareness (SDA) with a growing number of commercial and government stakeholders offering data to inform about in-orbit activities. In addition, new market opportunities are emerging for solutions looking to remedy debris pollution such as Active Debris Removal (ADR), extend life of space assets (Life Extension services or LES) and more generally provide optimized solutions for space logistics.
Opportunities for KSA’s Space Sector

- VISION & AMBITIONS
- CASE STUDIES
- OUTLOOK OF KSA SPACE SECTOR
- KSA SPACE MARKET SELECTED OPPORTUNITIES
Building on centuries of astronomical innovation in the Islamic world, Saudi Arabia’s history is deeply linked to space. Over the past decades, the Kingdom fostered this long heritage in space science by contributing to cutting-edge missions in cooperation with other leading space nations. These efforts eventually led to Prince Sultan bin Salman’s mission onboard NASA’s space shuttle, the first Arab and Muslim reaching outer space.

The Kingdom has also made significant achievements in space applications serving its citizens and the whole Arab world with 29 satellites launched since 2000. Reflecting the country’s new ambitions to develop a globally competitive national space sector, the government is developing a strategic vision in the space sector that marks the beginning of a new era for Saudi Arabia in the field of space, offering critical guidance and direction for the years ahead.
Why should KSA invest in space?

The profound changes taking place in the global space sector offer Saudi Arabia tremendous opportunities to capitalize on its national strengths and meet the challenges of today and tomorrow. However, as the window of opportunity gradually closes, new space players need to act quickly.

Why space?
- Fast growing and sizeable industry
- Economic impacts and spillovers
- Driving innovation globally
- Critical international partnerships
- Enabler to climate change ambitions

Why KSA?
- Local demand for space solutions
- Align with G20 space practices
- KSA geographical advantages
- Cross-sector synergies with space
- Geopolitical and national context

Why now?
- Fast changing marketplace
- Space becoming congested
- Growing competition
- Lower barriers to entry
- Sovereign capability needed
The new orientations of KSA’s space program have been accompanied by a reorganization of its governance to enable achieving new ambitions and support the development of Saudi’s national ecosystem.

Develops policies and approves strategies

- Approves space program related policies and strategies
- Endorses annual plans and oversees strategy implementation
- Ensures alignment with diverse sectors and national requirements
- Facilitates coherence among various sectors and national demands

Regulates the sector and issues licenses

- Updates and issues space-related regulations, including frequencies and orbital locations, while coordinating space and licensing regulations
- Serves as the Kingdom’s international representative in pertinent organizations and acting as the primary liaison with space sector regulators
- Authorizes the issuance of licenses

Builds the industry, stimulates research, innovation and program implementation

- Fosters research and development, nurturing innovation, and directing endeavors towards seizing opportunities and addressing global challenges
- Cultivates the space market, expediting growth through international collaborations with the private sector
- Nurtures the nation’s future generation in space, science, and emerging technologies
Case study

Saudi National Astronaut Program

A historic moment in Saudi history – The Saudi Space Commission’s Human Space Flight program launched its inaugural mission on 21 May. Two Saudi astronauts spent 10 days on the International Space Station, the first Saudis to go to space since Prince Sultan bin Salman in 1985.

Saudi’s strategic, sustainable Human Spaceflight Program is aligned with the goals of Vision 2030. The Program will conduct science to benefit all of humanity, as well as boost KSA’s human capital, develop skills, and inspire the nation.

Historic milestone
1st
Saudi female astronaut in space

SAUDI ASTRONAUTS ON AX-2 MISSION
Official mission patch

Pioneering science
14
Microgravity experiments, with a global first

Inspiring & engaging
12,000
Saudi students engaged in space science

International cooperation
6
SSC enhancing cooperation with international partners

Rayyanaah Barnawi
Biomedical researcher and mission specialist

Ali Alqarni
Fighter pilot and mission specialist

Sources: Saudi Space Agency, Human Space Flight program, Vision 2030
Case study

Narrowing the Digital Divide

KSA connecting the unconnected – In today’s hyper-connected world, bridging the digital divide is more important than ever. Yet over a third of the world’s population remains unconnected.

Saudi Arabia has been exploring the viability of Non-Terrestrial Networks (NTN) to boost access to—and affordability of—connectivity. KSA has conducted pioneering trials to enable greater connectivity, promote investment and incentivize deployment of NTN technologies. KSA’s “Connecting the World from the Skies” forum brings together leading stakeholders from around the world. It also sponsors cutting-edge research, including its Beyond5G and 6G competition.

Sources: “On the Path to 6G”, MCIT, 2022 CST “Non-Terrestrial Networks Program”
The KSA space sector

An emerging sector with strong development potential

The Saudi space sector stands at an emerging phase with an increasing number of both upstream and downstream space companies generating $400M of revenues in 2022. Saudi space sector revenues correspond to 0.04% of its GDP, which reflects the huge growth potential of the Saudi space sector when looking at global standards.

An upcoming national strategic vision aims to create a dynamic and globally competitive Saudi space ecosystem, increase its share of commercial space markets and generate wider socio-economic value for the country.

The establishment of a comprehensive plan for capability build up, the launch of ambitious programs and the deployment of favorable targeted incentives shall create the conditions for the expansion of the Saudi space marketplace.

Key players of the KSA space sector

Established and emerging players contribute to the dynamic development of the Saudi space sector. The government’s space ambitions pave the way for the creation of an attractive market in Saudi Arabia, favorable to the expansion of the local space industry.

GOVERNMENT SPACE STAKEHOLDERS

Various entities with a variety of mandates to support the development of Saudi Arabia’s space sector

SPACE INDUSTRY PLAYERS

An emerging ecosystem of diverse commercial players, from legacy to startup players

Not exhaustive and does not include users of space data and services or very recently created companies
KSA space science and research sector

Initiated through the King Abdulaziz City for Science and Technology (KACST), space-related research activities are growing in the country through different authorities and academic entities supporting innovation and promoting the sector among the young generation.

King Abdulaziz City for Science and Technology (KACST)
KACST is KSA’s historical plyer in the field of space science and research. Established in 1977, KACST supports innovation and research, notably in the space sector.

Nebula Research & Development Company
Nebula is the first Saudi company specialized in space medicine. To achieve global leadership in this field, the company conducts various research activities, notably in space neuroscience.

King Saud University (KSU)
KSU covers space technology via its College of Engineering. Its CubeSat project trains students to space technology and sciences. A first unit was launched in 2021.

Saudi Research Development and Innovation Authority (RDIA)
RDIA is responsible for encouraging and supporting research, development, and innovation in various sectors including in the space field.

King Abdullah University of Science and Technology (KAUST)
KAUST owns and operates different centers and laboratories which can be used for space-related activities as the Clean Combustion Research Center. The university also organizes space training activities.

King Fahd University of Petroleum and Minerals (KFUPM)
KFUPM hosts the Interdisciplinary Research Center for Aviation & Space Exploration (IRC-ASE) aimed at advancing space-Based research through the development of innovative technologies and approaches.
The KSA space industry

Upstream in the value chain
Saudi capabilities have mainly been concentrated in a few government-owned entities or companies involved in connected sectors. The development of Saudi commercial players in the manufacturing, launch and ground segment sectors is seen as a key objective of the national space strategy to achieve economic and sovereignty goals.

Downstream in the value chain
Saudi capabilities have mainly focused on satellite communications, with legacy capabilities from government entities and commercial service providers. The strong market potential of the satellite applications sectors makes them an attractive target for both incumbent Saudi players and start-ups.

Enablers in the value chain
Saudi policy makers, regulators and funding providers are key to structure and expand the national space ecosystem. Their role will be even more critical to support the development of capabilities at the inception phase of KSA new space strategy.
Space market opportunities in KSA

The Saudi space market is expected to grow rapidly as initiatives are implemented to pursue new ambitions for the coming decades. These efforts will stimulate the emergence of a thriving Saudi space ecosystem with increased requirements across all applications.

The Saudi space market will grow by 87% in the coming years

- The size of the Saudi space market corresponds to the demand of Saudi government and commercial customers for space-related infrastructure and solutions. This domestic demand can be met by both domestic and foreign suppliers and must therefore be distinguished from KSA’s space sector revenues.

- While the Saudi space market was relatively limited in the past and focused primarily on services (especially satcom), the country’s market landscape is expected to change rapidly in the coming years, with significant new requirements for space solutions across the entire value chain to fulfill renewed national space ambitions. An upcoming strategic vision will incentivize the advancement of domestic space activities in the country, catalyze its growth and call for a wide range of capabilities from domestic and international suppliers, both established and newcomers.

- To enable the development of commercial solutions, several key levers will be implemented to promote cross-sector collaboration and facilitate capability-building. Beyond the procurement of space-based solutions, additional investments will be committed to nurture the Saudi ecosystem and build partnerships along the value chain.

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The Saudi Space Market

- $US 2.2Bn
- Average Annual Value
- 2015 - 2022
- 2023-2030

- $US 1.17Bn
- Downstream 1.2B
- Upstream 0.9B
- Government 0.9B
- Commercial 1.2B
Opportunities & challenges: the stakeholder perspective

Saudi space stakeholders provided their views on key opportunities and challenges they see for the future development of the country in space. Their feedback has been integrated to select key business opportunities along the space value chain, further detailed in the following pages.

### Opportunities
Areas of promising growth for Saudi space sector companies

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallsat payload manufacturing</td>
<td>95%</td>
</tr>
<tr>
<td>Commercial and secured Satcom</td>
<td>90%</td>
</tr>
<tr>
<td>Domestic EO constellation</td>
<td>85%</td>
</tr>
<tr>
<td>Ground infrastructure</td>
<td>80%</td>
</tr>
<tr>
<td>Space Situational Awareness</td>
<td>80%</td>
</tr>
<tr>
<td>Sovereign launch capabilities</td>
<td>70%</td>
</tr>
<tr>
<td>New emerging space markets</td>
<td>70%</td>
</tr>
<tr>
<td>LEO activities / space exploration</td>
<td>60%</td>
</tr>
</tbody>
</table>

### Challenges
Factors which inhibit the growth of Saudi space sector companies

- Limited access to key technologies
- Limited technical skills and knowledge
- Limited access to finance
- Government investing in KSA space sector growth vs. importing foreign solutions
- Legal, regulatory and licensing processes not streamlined
Opportunity Description

**Develop sovereign, targeted capabilities for spacecraft manufacturing** to ensure national players can meet KSA’s needs and catch commercial opportunities on the global market. Skills can be developed by building on domestic players’ capabilities as well as by localizing international talents.

<table>
<thead>
<tr>
<th>2,400</th>
<th>$68Bn</th>
<th>148</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellites to be launched per year by 2030 worldwide</td>
<td>Value of the smallsat market by 2030</td>
<td>Satellites to be launched in the Middle East by 2030</td>
</tr>
</tbody>
</table>

Opportunity Rationale

**While there are no established satellite manufacturing** capabilities in KSA yet, the country benefits from a strong base in space-adjacent sectors such as aircraft, defense and electronics, and players have successfully developed first small satellites and payloads. Localizing selective capabilities will increase national resilience, sovereignty and boost STEMs.

**OPPORTUNITIES**

- Small satellite capabilities for domestic and int’l markets
- Large satellite capabilities for domestic and int’l markets
- Lunar rovers and habitats
- Orbital stations and modules

**CHALLENGES**

- Highly competitive global market
- R&D supporting costs and programs required
- Personnel skills and know-how
- Upgrade of local equipment and infrastructures

**KEY ENABLERS**

- Space sectoral fund for local industry players
- Space-tailored incentive program for global players
- Space-tailored programs to upskill local and localize international talent
- Develop the NEOM Space Development Center
Launch Services

Opportunity Description

Acquiring sovereign launch capabilities is a key objective of the national space strategy. There are many possible ways of achieving this goal, from the creation of the region’s first spaceport to the development of KSA launch capabilities through partnerships and national capacity building.

Opportunity Rationale

Sovereign access to space will reduce KSA's dependency on foreign launch solutions and act as a catalyst for the development of the national space ecosystem. By building the first spaceport in the Middle East, KSA can drive efforts to diversify launch supply globally and build leadership roles for the country.

Opportunities

- Develop and operate a national spaceport
- Localize small launcher operations
- Localize heavy launcher operations
- Localize manned spaceflight operations

Challenges

- Competing spaceports and launchers projects
- Long and costly capability building
- Regulations for technology acquisition
- Accessing global markets outside Saudi Arabia

Key Enablers

- Saudi Space Agency to coordinate initiatives
- Develop a space regulatory framework
- International partnerships (government and commercial ventures)
- Aggregate local demand for launch services
Ground Segment

Opportunity Description
Extend KSA ground segment industry base and technical skills to leapfrog next-gen infrastructures and build a leading regional hub for modern, cutting-edge ground station infrastructure and services. Would enable KSA to take part in the transformation of the space industry through its virtualization and digitalization.

Opportunity Rationale
A natural extension of existing skills in KSA: domestic players already possess expertise in satellite/terrestrial networks, satellite operation, cloud services, data centers and more. KSA also benefits from unique geographical features to become a key host partner for foreign ground stations and international missions.

<table>
<thead>
<tr>
<th>Opportunties</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner with ground networks giant for capability building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host ground stations for satellite constellations</td>
<td></td>
<td></td>
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<tr>
<td>Host ground stations for Earth observation missions</td>
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<tr>
<td>Host ground stations for SSA and space science missions</td>
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<thead>
<tr>
<th>Challenges</th>
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<tr>
<td>Uncertain domestic market size and requirements</td>
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<td>Shortage of skilled personnel</td>
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<td>Upgrade of local equipment and infrastructures</td>
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<tr>
<th>Key Enablers</th>
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<td>Optimize utilization of capabilities and infrastructure across the ecosystem</td>
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<td>Launch a funding program for Development Activities in the Space Sector</td>
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<td>Update mandates of local entities in line with the sector governance</td>
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<td>Activate partnerships (governments and ground segment companies)</td>
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**Satellite Communications**

**Opportunity Description**
KSA is already a regional leader in Satcom, with multiple satellite connectivity and broadcasting players, such as Arabsat. Satcom offers a significant upside potential for KSA as demand surges and new LEO constellations transform the sector. KSA is well-positioned to modernize its sector and generate revenues.

<table>
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<tr>
<th>$175Bn</th>
<th>$30Bn</th>
<th>95%</th>
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<tbody>
<tr>
<td>Satcom service market value by 2030</td>
<td>Capex investment on mega-constellations</td>
<td>Share of satcom capacity supply by mega-constellations by 2030</td>
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**Opportunity Rationale**
Satellite connectivity services are a valuable resource for both businesses and governments. They offer a wide range of commercial possibilities, such as enabling new products and services and expanding into new markets. They also play a critical role in national security and sovereignty, providing reliable and secure communications in remote and hostile environments.

**OPPORTUNITIES**
- Boost satcom connectivity services (KSA and Middle East markets)
- Expand domestic satcom GEO capabilities
- Acquire domestic satcom multi-orbit capabilities
- Boost satcom connectivity services (KSA and Middle East markets)

**CHALLENGES**
- Highly competitive international market
- Government commitment for capacity use
- Cost of satellite infrastructure
- Personnel skills and know-how

**KEY ENABLERS**
- Refresh spectrum roadmap/regulatory framework for non-terrestrial networks
- Government aggregating civil and defense users’ satcom demand
- Offer targeted support to drive localization of talent
- Partnerships with satellite operators
Earth Observation

Opportunity Description
Foster a globally competitive end to end earth observation ecosystem in KSA, from domestic multi-sensor satellite infrastructure to advanced services and applications development. This should include business solutions to foster space added-value service startups & SMEs.

Opportunity Rationale
Earth observation is a fast developing sector allowing to leverage connections with the digital industry for the development of advanced applications using AI, machine learning and VR technologies. It will be an essential catalyst for achieving and monitoring Net Zero 2060 climate change, and for supporting national security and sovereignty.

Opportunities
- EO satellite for defense and security purposes
- Geo-spatial platform for multisourcing
- Data analytics capabilities to develop advanced services
- EO constellation to supply data to national & int’l markets

Challenges
- Capability building and technology transfer
- Competitive international market
- Government commitment for data and services usages
- Funding support for commercial projects developments

Key Enablers
- Streamlined national regulatory framework
- Partnerships with EO data and service companies
- Establish a spin-in-/offs office to streamline transfer of technology
- Develop space tailored programs to create local space engineering talent
Space Science & Exploration

Opportunity Description

Undertake comprehensive space science and exploration activities to boost KSA international space positioning and capabilities. There are a range of activities that KSA can pursue including astronomy, sending Astronauts to space stations and contributing to upcoming missions to the Moon, Mars and beyond.

Opportunity Rationale

Space science and exploration contribute to a deeper understanding of the universe and enhance technical expertise to support ambitious missions. Space exploration offers great potential to galvanize and unite the nation, to inspire younger generations to pursue space careers, and its strong international dimension will contribute to KSA’s diplomatic agenda.

Opportunities

- Join international flagship Lunar missions
- Recurring Astronaut program through partnerships
- Domestic small to large scale space science missions
- Prepare future Mars missions

Challenges

- Advanced capabilities and skills required
- Potentially complex international partnerships
- Long term sustained commitment from government
- Large programs costs

Key Enablers

- Engage scientific community in space mission ideation for KSA research needs
- Develop space RDI topics & roadmap for KSA
- Participate in international space regulations, initiatives & treaties, reinforcing KSA’s position in global space map
Emerging Space

Opportunity Description
Position KSA as a key player in the latest innovations and transformations of the space sector. From space sustainability to logistics and tourism, there are many opportunities to be seized. A careful assessment shall be carried out to select the most promising emerging applications that will bear fruit in the future.

Opportunity Rationale
As capabilities develop and use cases evolve, new generations of space solutions and technologies are emerging. By positioning itself early on these applications, KSA has the opportunity to accelerate its technological development, and play a pioneering role in tomorrow’s markets.

Opportunities
- Space Situational Awareness capability
- Recurring Astronaut program through partnerships
- Domestic small to large scale space science missions
- Prepare future Mars missions

Challenges
- Advanced capabilities and skills required
- Potentially complex international partnerships
- Long term sustained commitment from government
- Large programs costs

Key Enablers
- Dedicated emerging space VC fund
- Space entrepreneurship center to build and foster local space startups
- International partnerships with governments and private companies
Acknowledgement

As part of this report, we acknowledge numerous Saudi space organizations encompassing the entire value chain. We reached out to them to glean their invaluable insights and comprehend their requirements, and their feedback informed the contents of this report.
CST contact

For any further inquiries or to explore investment opportunities in Saudi Arabia's thriving space sector, please contact: SEA@cst.gov.sa
Thank You