



**SERVICES MARKET
OUTLOOK** 2020–2029



The Boeing Services Market Outlook (SMO) provides an overview of projected performance and anticipated market trends for key life-cycle service capabilities currently serving aerospace customers. The SMO is a 10-year forecast intended to guide business planning and to share Boeing's analysis of services industry trends in the commercial; business and general aviation (BAGA), which includes civil helicopters; and government markets based on past performance, current economic and environmental factors, and customer demand and opinion. The Boeing models for projecting the size of services markets are analytically linked to proprietary models used to forecast the global commercial airline fleet and government budgets, as well as independent assessments of specific services market drivers.

Boeing expects the support and services 10-year market to be worth \$3 trillion between 2020 and 2029. This is a decrease of 2.2% from the 2019 forecast, driven by near-term impacts to travel demand caused by the COVID-19 pandemic. The pandemic's impact on the aviation sector caused an immediate and sharp decline in the demand for services supporting commercial airplanes and increased demand for services supporting government readiness objectives. The near-term commercial services forecast will realize the biggest impact, with a nearly 10% decline. Commercial services represents \$1.6 trillion of the forecast and includes services to support the BAGA market. Government services represents \$1.4 trillion of the forecast. Support and services capabilities are diverse in terms of sales, activity scope, capital intensity and competitive environment. Boeing segments the services market into four key capability areas based on customer requirements: parts and supply chain; engineering, modifications and maintenance; training and professional services; and digital solutions and analytics.

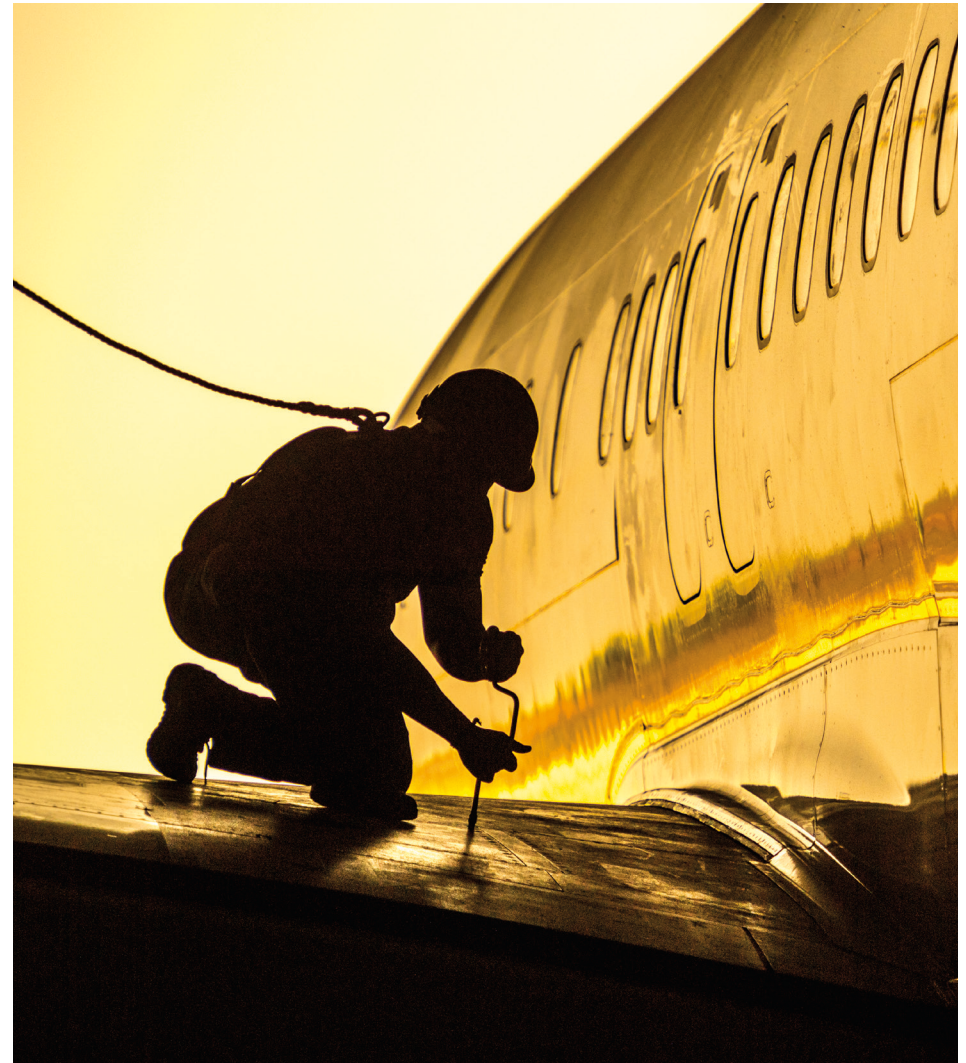
The International Air Transport Association (IATA) projects the expenditures and revenues of airlines globally, which totaled \$795 billion and \$838 billion in 2019, respectively. For 2020, IATA forecasts a decline in expenses of more than 30% and an even larger deterioration in revenues as a result of COVID-19. This indicates that the strain on the industry is profound and widespread. However, the aviation industry has proven resilient over time and in the face of past crises. The ingenuity and determination of millions of people working in aerospace will undoubtedly allow the industry to navigate near-term challenges.

We are confident in the long-term growth of the services market. We expect our industry to recover following several years of volatility for the commercial services sector, with the government services sector providing critical stability.

As the commercial aviation industry navigates the challenging near-term environment, the underlying long-term fundamentals for growth remain strong.

The services and supply chain needs that underpin the industry will continue to grow and adapt alongside it. The current downturn has caused near-term declines in demand for some services, while demand for others is expected to increase as airlines adjust to their new operational environment. Discretionary spending, including modifications and upgrades, will be most affected as airlines seek to replace older aircraft with more-efficient platforms. Services dependent on aircraft utilization, such as maintenance and part supply, will also be heavily affected. However, there will be expansion opportunities for services where quick investment returns can be attained in the current environment, such as digital solutions and analytics that yield high operational efficiency gains. Other areas, such as training, will see a near-term increase in demand as personnel transition to new aircraft types, maintain certifications and are recalled from furlough.

The market for commercial services represents \$1.6 trillion of the forecast and includes the services to support the BAGA market. Despite near-term challenges, we expect the industry to generally recover by the middle of the decade. It will likely take three years for air travel to return to 2019 levels, another 12 months for flight-hours and longer for the industry to return to long-term growth trends. However, we are confident in the long-term strength of commercial aviation services. An airline's ability to focus on its core business and adjust operations over time has proven an effective strategy to reduce overall spending. The COVID-19 pandemic is a unique crisis that has caused a near-term demand shock, but it is not indicative of an underlying weakness in market fundamentals. Airlines and service providers are adopting and delivering services that ensure the flying experience is safe and efficient. As we move beyond the crisis, the flying public will return to the skies and the industry will gain new insights and innovations from this experience.



The underlying forces driving \$1.4 trillion of demand for government services vary across market, customer and geographic segments.

Similar to commercial, government services often grow on pace with relevant fleets but vary based on operating tempo, regionalized threats and aircraft age. In 2019, many governments spent record amounts on military aftermarket services, which may decrease in the medium-term as the economic cycle enters a period of tempered growth.

In 2020, the western-designed, piloted military aviation fleet consists of over 39,000 aircraft globally and will grow through 2029, with a compound annual growth rate of 1%. Over this period, approximately 14,000 new aircraft platforms will be delivered and more than 10,000 will be retired.

The growth rate of the government services market is predominantly driven by fleet increases because of economic growth in the Middle East and India. Larger, more established countries such as the United States, United Kingdom, Australia and Japan

have growth rates similar to the global average or slightly below.

Approximately 25% of the worldwide fleet of military aircraft will be retired and replaced over the next 10 years, driving increased demand for services to maintain aging aircraft, extend service life and enhance aircraft capability. Aircraft services often correlate with government budgets, regional threats and operational use. Governments consistently seek to balance upgrade and sustainment of older aircraft with replacement of newer, more capable platforms. Because of COVID-19, national budgets may be challenged in the near-to-medium term. As such, governments may choose to reduce flight-hours, retire fleets and postpone modernization programs. Trends also support significant investment in digitally enabled services that enhance operational readiness and reduce life-cycle costs.



This photo was taken before Boeing implemented COVID-19 pandemic safeguards.

Parts and supply chain is the largest aftermarket segment, directly correlated with maintenance, repair and overhaul (MRO) activity that is driven by fleet growth, fleet utilization and aircraft age.

Despite near-term challenges, it remains a healthy and growing market in the long term. Now more than ever, airlines are seeking data analytics tools and processes to help deliver the right part to the right place at the right time. While disrupted in the very near term, airlines will continue to invest in people, processes and tools as a way to reduce or prevent unplanned maintenance and to subsequently reduce disruptions and prevent aircraft-on-ground issues. Striving to replicate commercial best practices, some larger BAGA operators and government customers continue to seek capabilities that significantly reduce unplanned maintenance. Spending and expertise in this area are expected to grow in the long term.

The parts and supply chain market is facing near-term challenges because of COVID-19. Commercial flight-hours were down more than 50% in the first half of 2020, and the ripple effect of economic uncertainty and reduced

passenger traffic is causing liquidity issues for airlines, manufacturers and suppliers across all MRO segments. In the near term, planned and early retirements may enable a boom in the availability of used serviceable material parts. Line maintenance and associated parts and supply chain spend are likely to recover in line with flight-hour recovery over the next three years, while heavy and component maintenance may lag slightly as airlines defer depot-level maintenance events through aircraft rotation.

The BAGA market will also be affected by the broader economic uncertainty and low fuel prices, as they trend closely together. However, segments of the BAGA market will vary in the scope of their recovery. For example, the civil helicopter market is heavily tied to the oil and gas sector, which will likely remain low given the current price of oil. Recent flight-hour data shows that the overall business aviation sector has recovered close to pre-COVID-19 levels.

The government market faces relatively mild headwinds. The majority of near-term impacts are from supply chain constraints and shortages. Many suppliers are being flexible to meet demand, including adjusting shifts, supporting their suppliers with funding and improved payment terms, and consolidating manufacturing facilities as needed. We expect the parts and supply chain market to recover and return to a healthy, growing market across the commercial, BAGA and government markets by the middle of the decade.



This photo was taken before Boeing implemented COVID-19 pandemic safeguards.

The COVID-19 pandemic has forced commercial operators to look for ways to reduce their spending on engineering, modifications and maintenance (EMM).

Depot-level maintenance is being deferred as long as feasible to preserve cash flow, and modifications are being delayed years or foregone entirely as fleet sizes contract in the short term. Operators are likely to minimize discretionary modifications, instead focusing on modifications that have shorter investment returns in order to grow ancillary revenues. Similarly, some operators are performing niche interior modifications to adjust to current market realities and provide near-term financial relief. While line maintenance will return with flight-hours over the next three years, a full EMM recovery can be expected toward the middle of the decade.

As the EMM market recovers, we expect airlines to return to investing in diverse cabin layouts to facilitate customized product offerings, including the rising popularity of

premium economy class. By the end of the next decade, we also expect that two-thirds of aircraft will have some form of connectivity, whether through retrofit or an off-the-line capability.

Shifts in how maintenance is performed on commercial aircraft will align with changing demographics of the fleet. Fleet renewal was already highly anticipated prior to the COVID-19 pandemic and, in many cases, is now being accelerated as airlines park or retire their oldest, least-efficient aircraft. This will lead to some significant shifts for MRO providers as they acclimate to handling new materials, such as the composite structure, and the increasing flow of data generated by the 787, 777X and other next-generation airplane models. Newer fleets will also affect the scope of maintenance and maintenance intervals, especially for heavy checks

and engine maintenance. MRO providers will need to invest in training, digital capabilities and infrastructure upgrades to support these types of aircraft. The BAGA market will also experience the introduction of next-generation aircraft and are expected to face similar MRO challenges. The emergence of digitally-engineered government aircraft, especially in the United States, has the potential to create parallel information technology shifts in the government services market.

Government customers have large defense budgets and are seeking to balance new aircraft purchases with upgrades to their existing fleet. U.S. and European militaries are seeking to increase aircraft availability and are investing in direct MRO costs, as well as cost-reduction efforts and mission-enabling digital tools.

Additionally, governments continue to emphasize long-term engineering support for military fleets. This can be accomplished through organic, contractor or original equipment manufacturer methods but is critical for highly integrated aircraft, such as fighters, or new aircraft fleet introductions. An expansionary period for aircraft modernization and upgrades is likely, driven by budgetary constraints, functional obsolescence and limits for service life. As government budgets face increased pressure because of spending on COVID-19 stimulus packages around the world, militaries may be forced to choose between modifying and extending current fleets or procuring new platforms. The largest categories of modifications are for service-life extensions, midlife upgrades and radar subsystem upgrades.

Effective, high-quality training will remain critical to ensure safe and efficient operations.

The training market is expected to remain relatively resilient throughout the 10-year forecast period, driven by regulatory-mandated recurrent training requirements and military personnel readiness targets. However, there are significant near-term challenges resulting from COVID-19-related border closures, travel restrictions and social distancing requirements. Trainees cannot physically access training centers, and local jurisdictions may have mandates restricting the ability to conduct training in confined spaces. These challenges have forced training providers to rapidly transition their offerings to online and virtual formats where possible and are likely to lead to a long-term, fundamental shift in how people are trained.

The industry downturn has temporarily shifted the labor market dynamics in the commercial aviation sector to one with a surplus of qualified personnel. Some furloughed personnel will find similar positions in government and BAGA sectors, which have struggled with shortages amid surging commercial personnel demand. As commercial traffic demand returns in upcoming years, aspiring aviators

will have the opportunity to fill open positions created by a combination of personnel retirements and fleet growth.

Governments and training providers are increasingly evaluating new technologies and training methods to leverage vast amounts of historical and real-time data. Evidence- and competency-based training programs are gaining traction, which would enable a shift from task-based training to training methods that focus on developing and demonstrating the competencies required to operate safely and effectively. Advances in adaptive learning capabilities, artificial intelligence and learner analytics will personalize training to the individual student so that more emphasis can be placed on closing knowledge gaps. On the government side, implementation of live virtual constructive training will allow personnel to train together in a large-scale immersive simulation despite being geographically dispersed. Continuous advancement and innovation in training will result in improved training outcomes and produce well-trained and operationally ready personnel.



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Within the digital solutions and analytics market are products and services to generate, analyze and leverage data in a safe and secure way.

Solutions range from flight navigation software to aircraft health management systems to enterprise resource planning solutions.

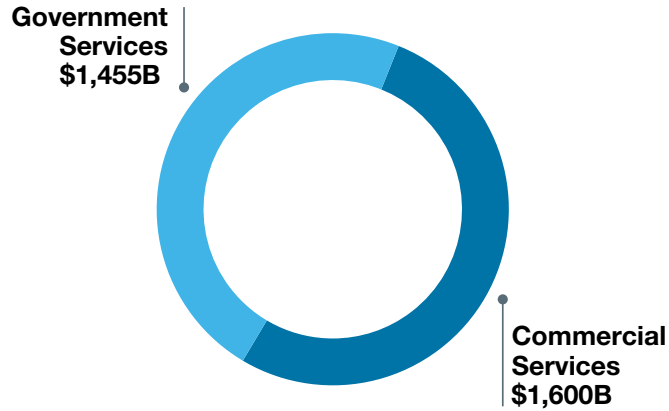
Digital offerings will emerge as critical enablers for operators as they adjust to future market demand and develop leaner operations. The growing desire for touchless travel will drive increased demand for software apps and virtual solutions for airlines, passengers and airports. Trends that were well underway across commercial, BAGA and government customers — such as the desire to completely remove paper from flight operations and the flight briefing process to strengthen

efficient operations — will now be important enablers to the near-term recovery from the COVID-19 pandemic. The continued growth and adoption of easy-to-use digital solutions will provide holistic insights into life-cycle maintenance data, such as the ability to shift operators from unscheduled to scheduled maintenance. The tech industry will continue to explore opportunities to bring about rapid digital transformation to the aerospace industry and address core areas of interest, including business intelligence, prognostic solutions and integrated software solutions.

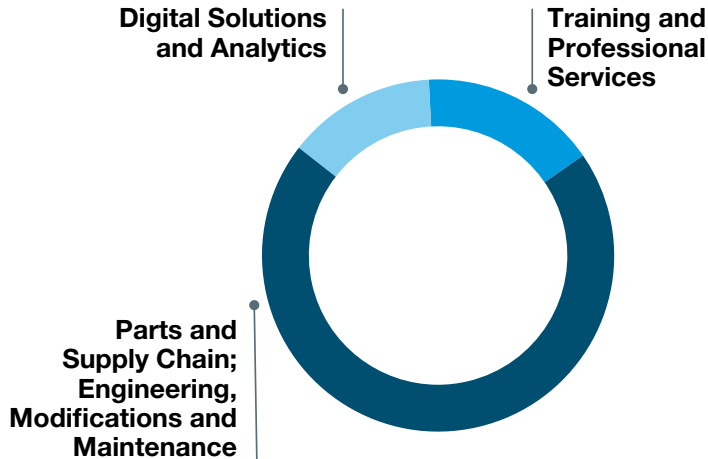


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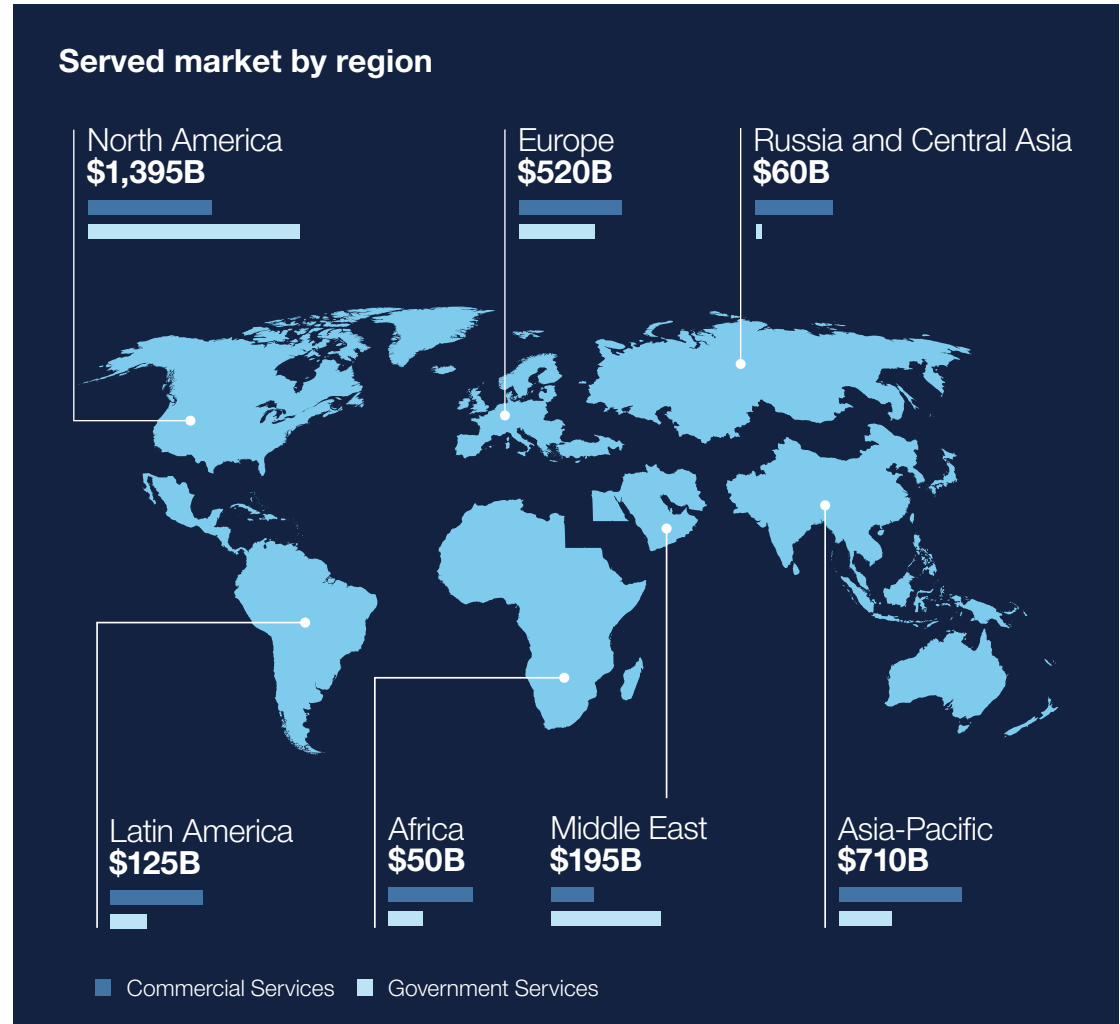
Served market by segment



Served market by service type



Served market by region





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