

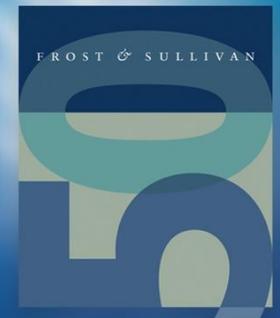
Aviation Outlook

Growth Opportunities in Asia Abound

Q1 2016

Aerospace & Defense Practice

Frost & Sullivan



Five Big Takeaways

1

3X Growth of APAC -

APAC is going to be largest region of operating aircraft fleet by 2034 superseding North America and Europe with triple the volume of aircraft fleet of what it is flying today

2

Regional Aircraft Entry -

Regional aircraft (< 150 seater aircraft market) is witnessing many aircraft entries such as ARJ, MRJ, C Series, Regioprop (Indonesia) with very short haul point to point airports to be served

3

MRO Operators to adopt to next generation aircraft -

Though MRO markets have witnessed global migration from west to east due to lower costs, new generation aircraft with composite usage will confront MRO operators on a new playing field

4

More than 50% of new airport investments in APAC -

Out of 346 new airport developments globally more than half of them are going to be in APAC, which opens huge opportunity for airport support industry

5

Aerospace is an early adopter of 3D printing -

Aerospace has been an early adopter of 3D printing with industry primes such as Airbus, GE, Boeing and various government agencies putting active investments

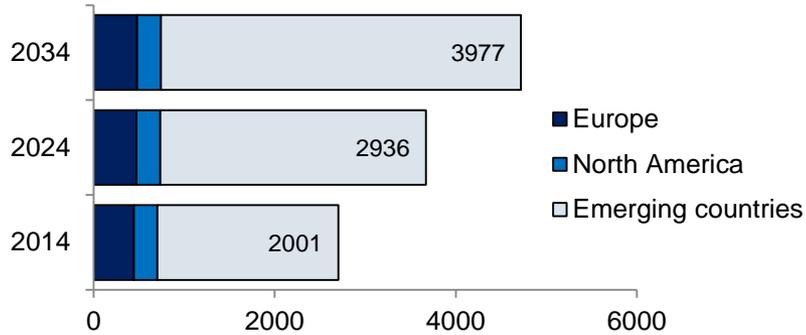
In the next 15 years, globally we are set to see as many flights as we have witnessed in the last 100 years.....



Global Macroeconomic factors

Various drivers have been identified which are key to the global market growth such as growth of global middle class composition followed by aviation mega cities, long haul passenger growth etc.

Middle class composition 20 years from 2014 (million)



Mega-Cities in 2030



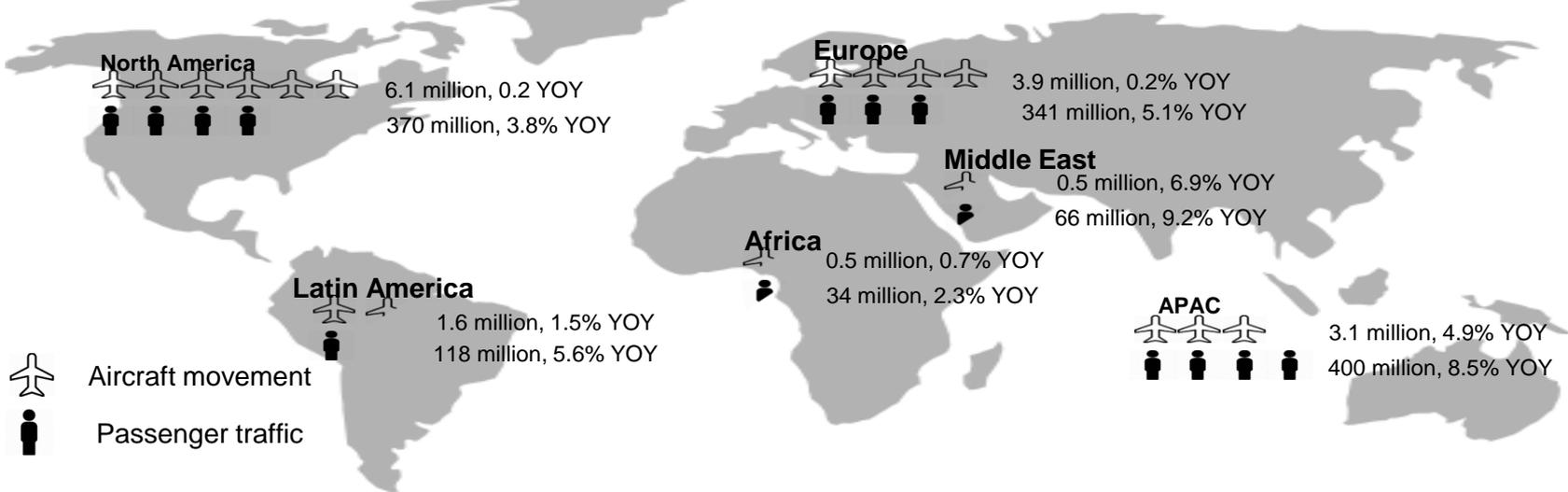
	2014	2034	Growth
Aviation mega city			93%
Daily long haul passengers			155%
Industry of world GDP			56%
Share of private consumption in emerging countries			87%
% people taking a trip a year in emerging countries			221%

The global middle class is to double in 2034 in emerging countries. The rise in spending power will see a further growth of tourism. Moreover, with further economic integration and labour mobility the Asian and Latin America region are also to see a consistent growth of travel within and between regions

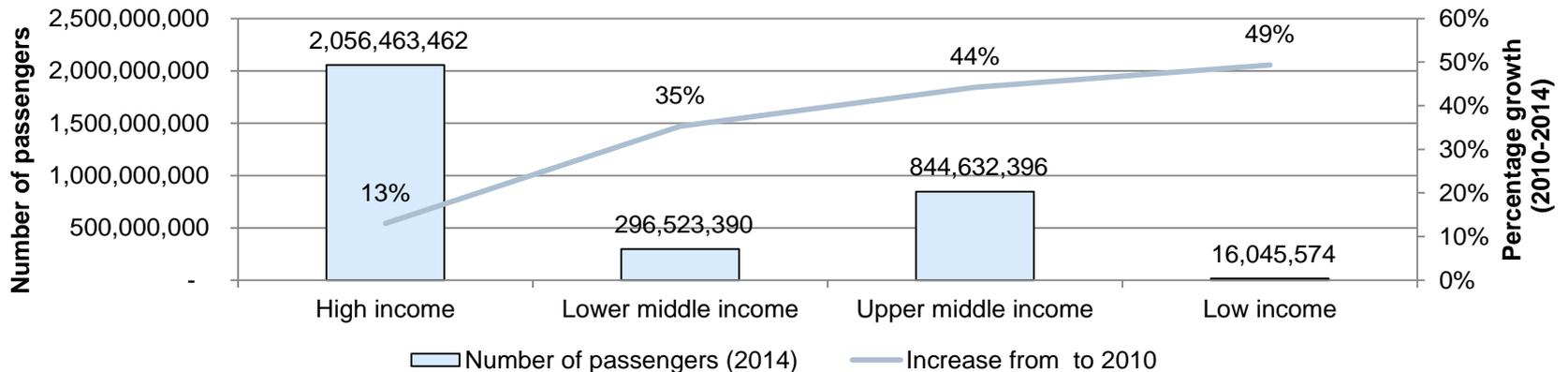
Air traffic Overview

Strong growth in "upper middle income group" followed by "lower middle income group" have paved the way for strong passenger numbers with highest growth in APAC and Middle East region

2015 1st quarter performance by region



2014 number of passengers and 2010-2014 growth rate

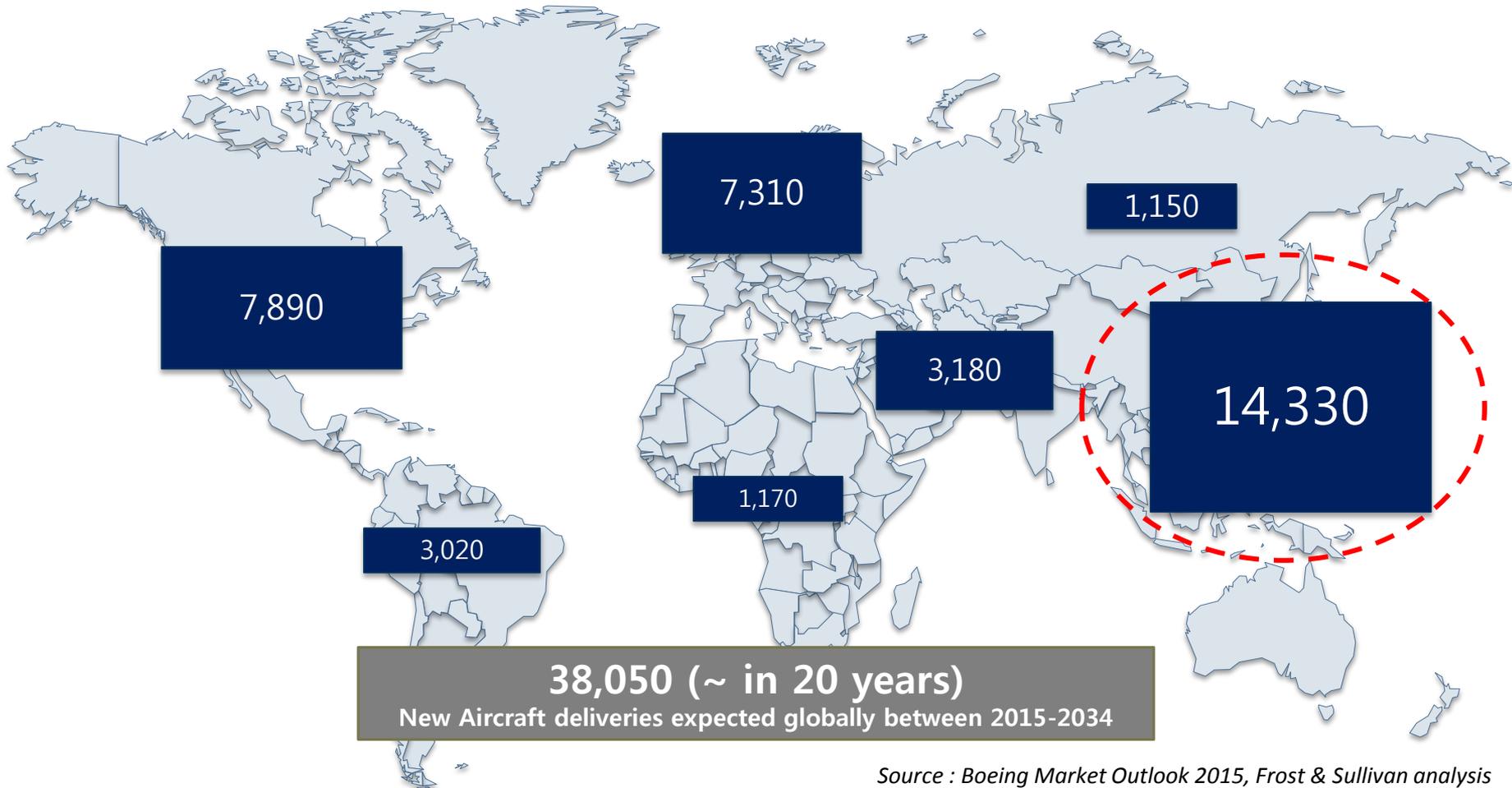


Source: Frost & Sullivan Analysis, ACI annual world airport traffic report; 2014 ATRS Global Airport Performance Benchmarking Project. World Bank

Global aircraft fleet dynamics

Globally 38,050 aircraft deliveries are going to be done in 20 years between 2015-2034 ; majority of which will be in APAC hence MRO markets will shift towards APAC in next 20 years

Aircraft Fleet Delivery Forecast *



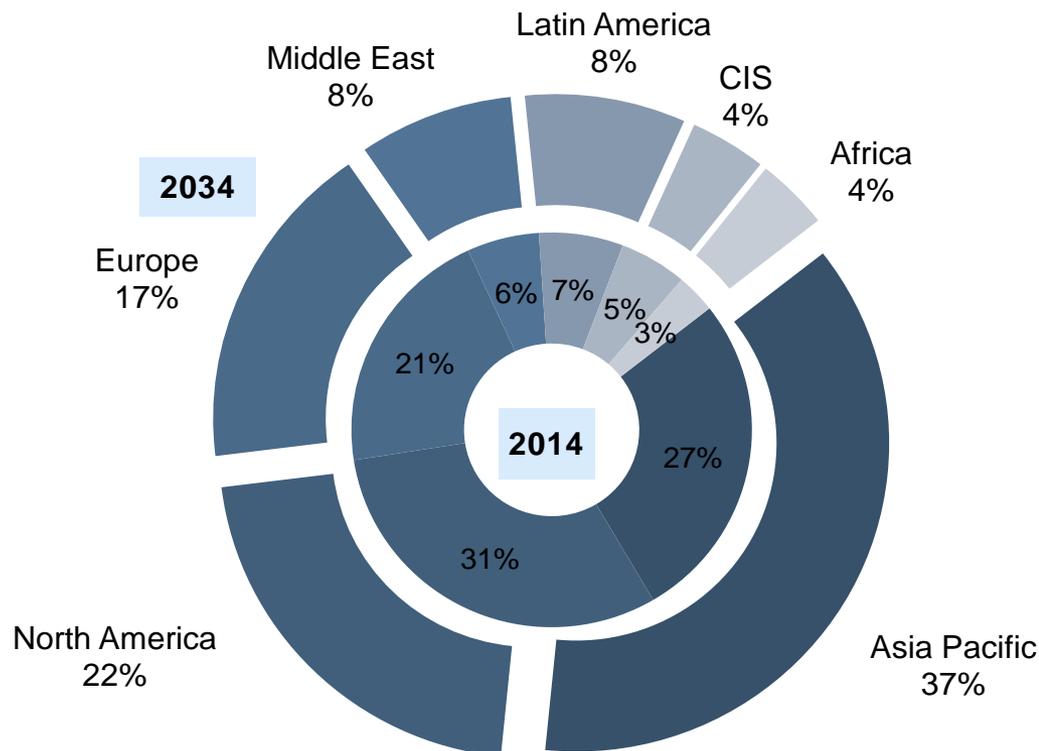
Source : Boeing Market Outlook 2015, Frost & Sullivan analysis

Global aircraft fleet dynamics

Nearly half of the world's air traffic growth will be driven by travel to, from, or within the Asia-Pacific region in the next 20 years

Shift in global fleet market share in next 20 years

Global Market Share of Aircraft Operating Fleet by Region (2014-2034)



Source : Boeing Market Outlook, Frost & Sullivan analysis

Key Insights

Decline of North America

- Today North America is still the region with largest operating fleet which will move to the 2nd spot by 2034

APAC comes to 1st position

- Currently APAC is the 2nd largest region of operating fleet with 27% market share which will change to 37% by 2034

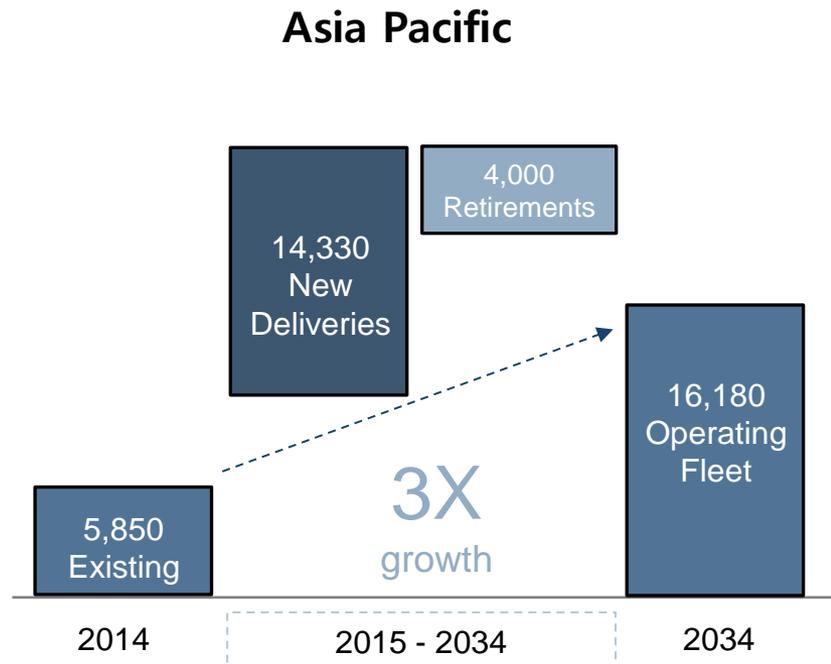
Emerging regions (Middle East & Latin America)

- Middle East fleet share is growing aggressively by 3 major airlines such as Qatar airways, Emirates and Etihad
- Latin America will grow at a healthy pace of 4.6% CAGR

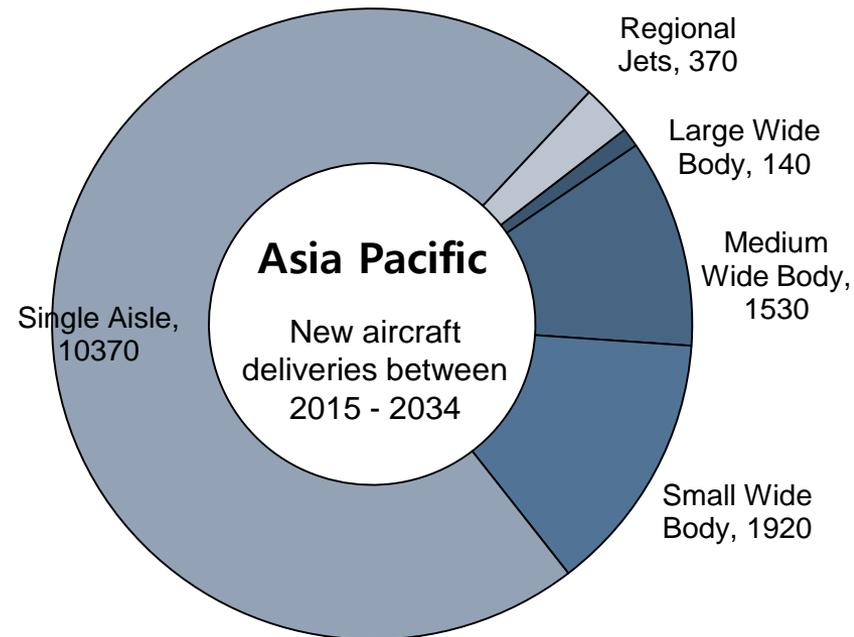
APAC aircraft fleet dynamics

APAC's operating fleet stood close to 5,850 by end of 2014 which is expected to add 14,330 new aircraft deliveries to reach the operating fleet size of 16,180 (after retirements) by 2034

New Aircraft Deliveries (20 yr forecast)



New Aircraft Deliveries (20 yr forecast) by type



- APAC fleet is estimated to grow at 5.21% CAGR over the period (2015 – 2034) in the next 20 years
- The fleet size is forecasted to grow to thrice the current fleet size in 20 years time

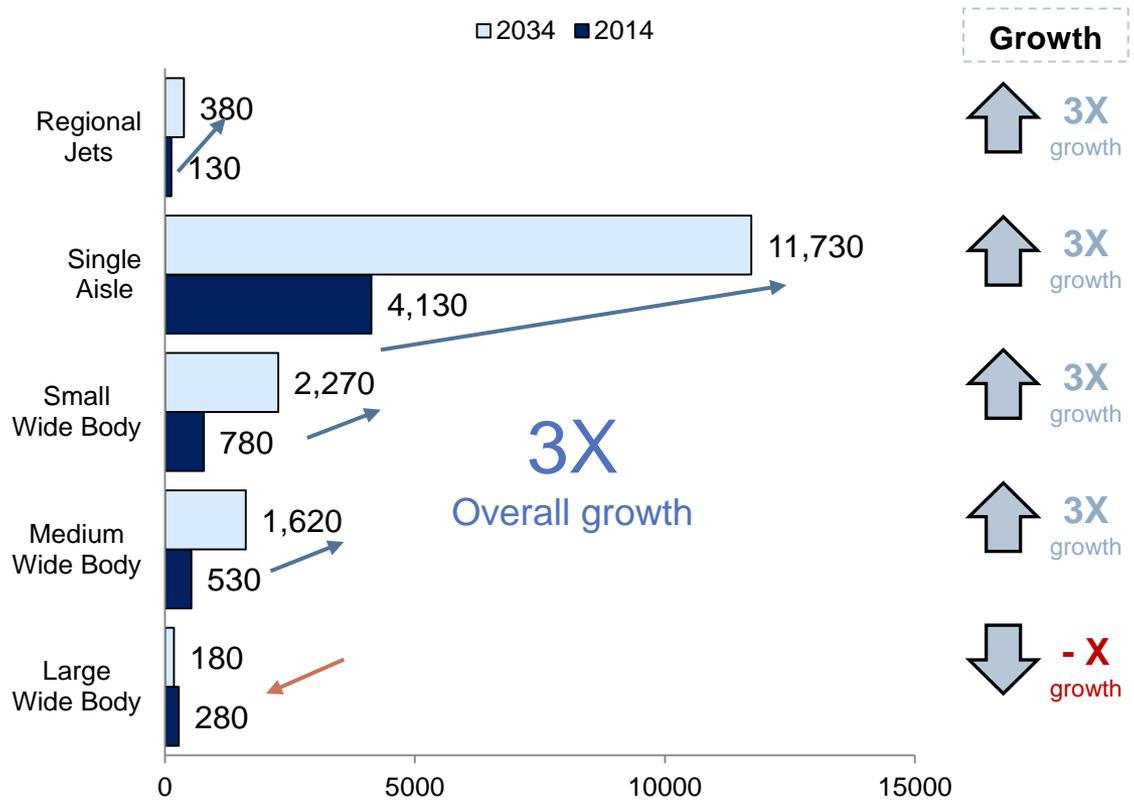
- Majority of the addition is in single aisle aircraft across Asia Pacific
- Markets for wide body are smaller in number but nevertheless prominent in terms of value

Source : Boeing Market Outlook, Frost & Sullivan analysis

APAC aircraft fleet dynamics

APAC's operating fleet is estimated to grow x3 the current size with growth expected in almost all aircraft segments apart from large wide body segment such as A380 and B747

Aircraft Operating Market Share by aircraft type



Key Insights

- Almost all segments expected to grow by 3 times
- Large wide body segment (A380 and B747) is not expected to grow
- Prominent growth is forecasted to be witnessed in Single Aisle
- Intra-Asia Pacific routes are estimated to get thicker over time and hence there is a huge anticipated demand of medium wide body and small wide body aircraft to almost triple of what they stand today in 2014

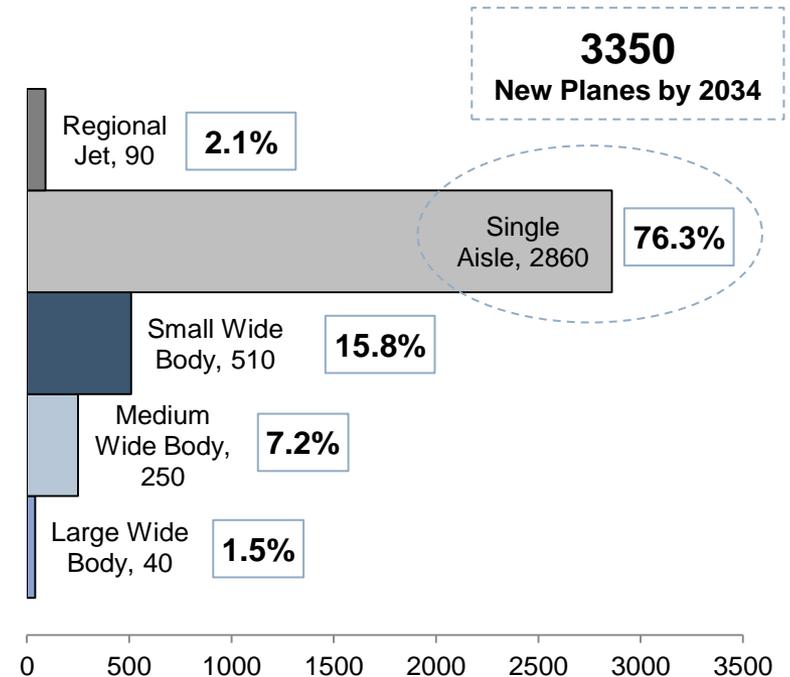
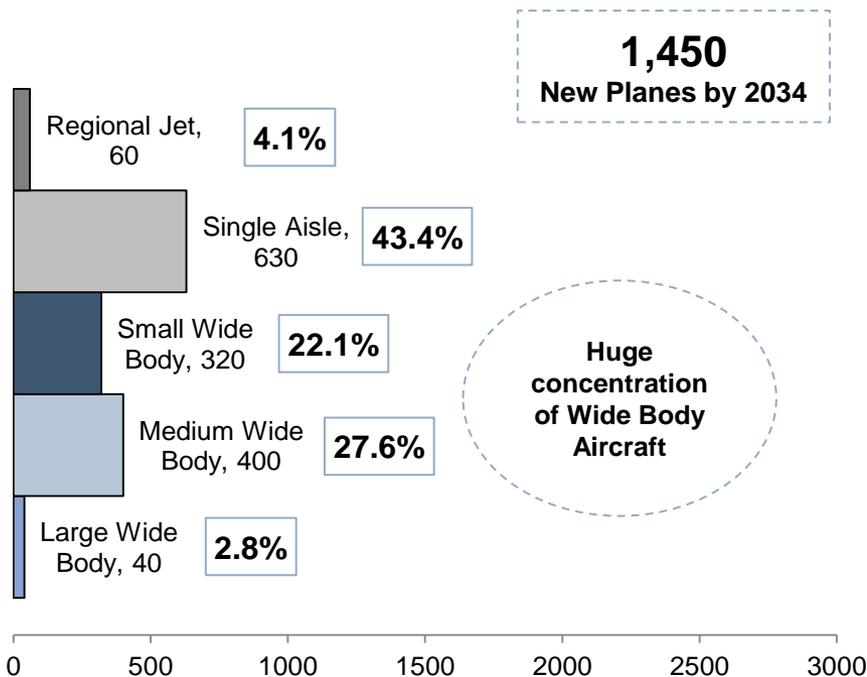
Source : Boeing Market Outlook, Frost & Sullivan analysis

North Asian fleet dynamics

North East Asia has overall smaller market potential compared to South East Asia ;
 Stark difference in fleet composition where North East Asia will have higher % of wide body aircraft and South East Asia will have more of single aisle aircraft

North East Asia (New Aircraft Deliveries)

Vs. South East Asia (New Aircraft Deliveries)



- 49.7% concentration of wide body in new aircraft deliveries for North East Asia
- MROs should concentrate on wide body segment in North East Asia

- Single aisle is dominant with 76.3% of all new aircraft deliveries in South East Asia
- Wide body constitutes for only 20.4% of all new deliveries in South East Asia ; MROs could focus mainly on single aisle aircraft

Source : Boeing Forecast, Frost & Sullivan analysis

Global MRO demand forecast

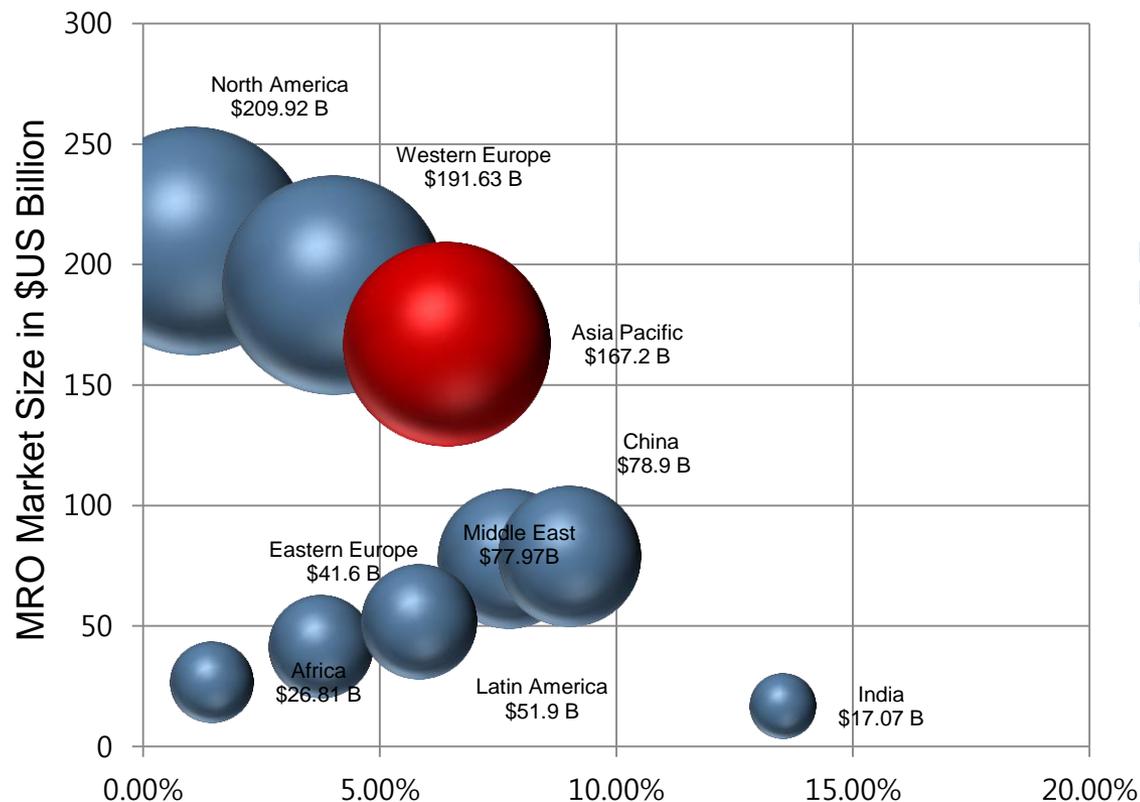
With increasing labor costs, MRO activities are moving towards low cost nations like Mexico, Brazil, Malaysia, and North Africa. This is particularly seen in labor intensive heavy maintenance checks



Global MRO demand forecast

A 10 year market sizing which is important to decide investment horizon shows that Asia Pacific region is ripe for investment and amounts to USD \$167.2 Billion over next 10 years

Global MRO Forecast by regions (2015-2024)



Source : Aviation Week Database, Frost & Sullivan analysis

~ 10 year market forecast

Region	* Market Size	CAGR
• North America	\$ 209.9B	1.03%
• Western Europe	\$ 191.6B	4.02%
• Asia Pacific	\$ 167.2B	6.40%
• China	\$ 78.9B	9.00%
• Middle East	\$ 77.9B	7.71%
• Latin America	\$ 51.9B	5.82%
• Eastern Europe	\$ 41.6B	3.75%
• Africa	\$ 26.8B	1.45%
• India	\$ 17.0B	13.51%

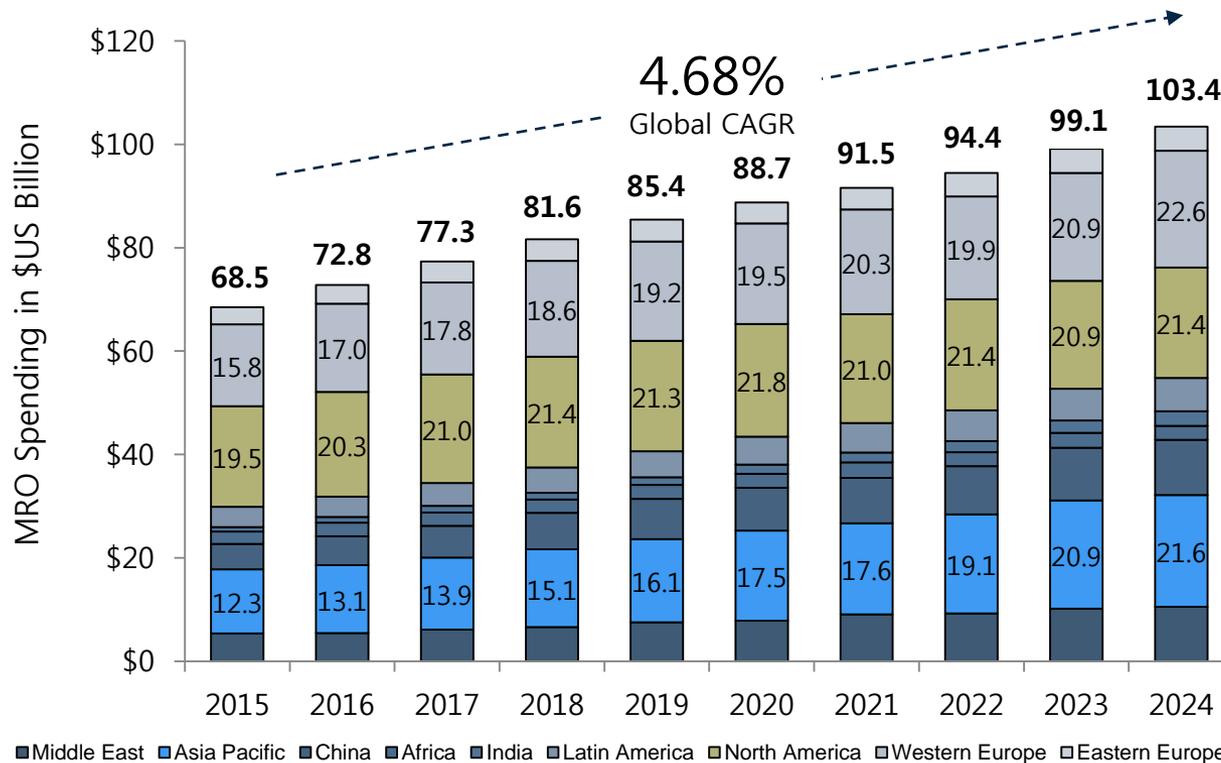
* 10 year consolidated market size

Global MRO demand forecast

Asia Pacific will become the second largest region for MRO services by 2024.

- North American market will lose its position to Western Europe over the period and move to the 3rd position by 2024 in terms of MRO spending

Global MRO Forecast by Region (2015-2024)



Key Insights

1 Global MRO Demand

- Current global MRO spending amounts to USD \$68.5 Billion for 2015
- Global MRO spending will increase at a rate that equals 4.68% CAGR in next years

2 APAC MRO Demand

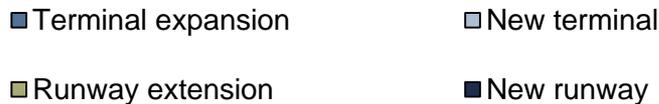
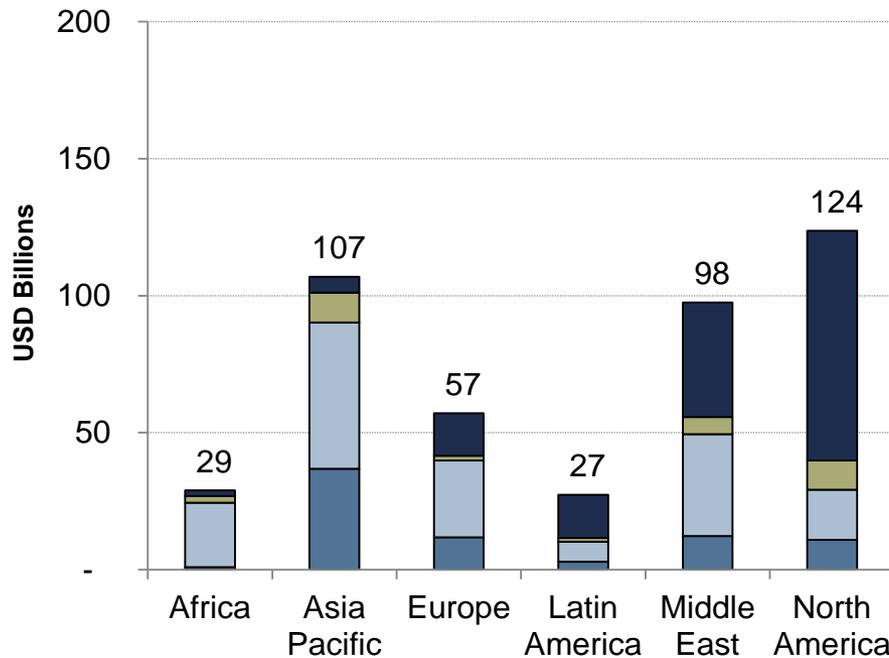
- Current APAC MRO spending amounts to USD \$12.34 Billion for 2015
- By the end of 2024 it will become world's 2nd largest MRO spending market after WE

Source : Aviation Week Database, Frost & Sullivan analysis

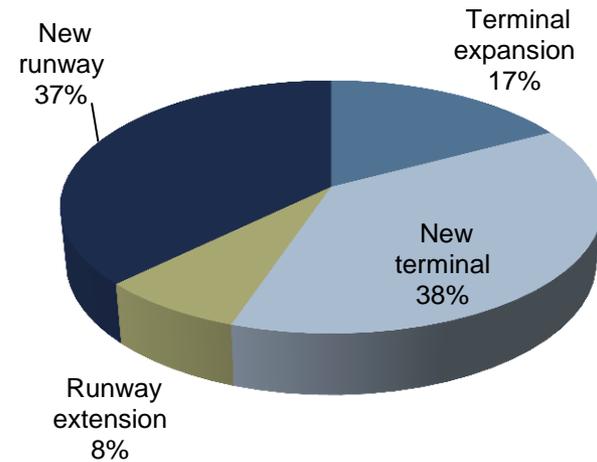
Global Airport Business

As of 2015, 741 airport related airport construction investments totaling USD \$442 billion were underway globally, the majority of which are either new terminal or new runway projects

Overview investments by region



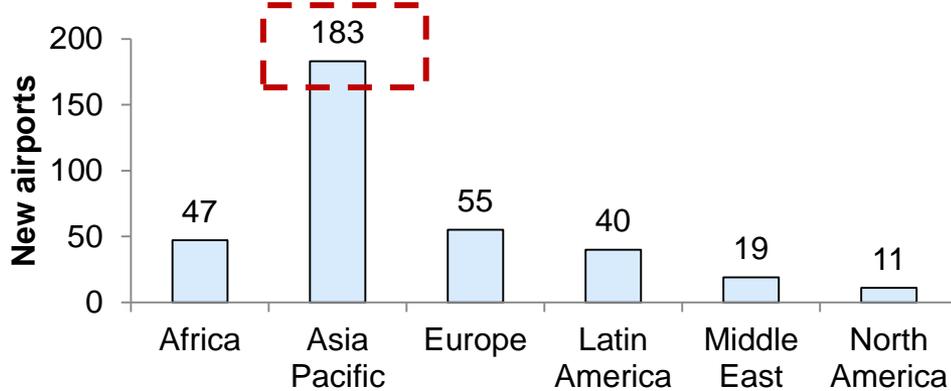
Distribution of investments



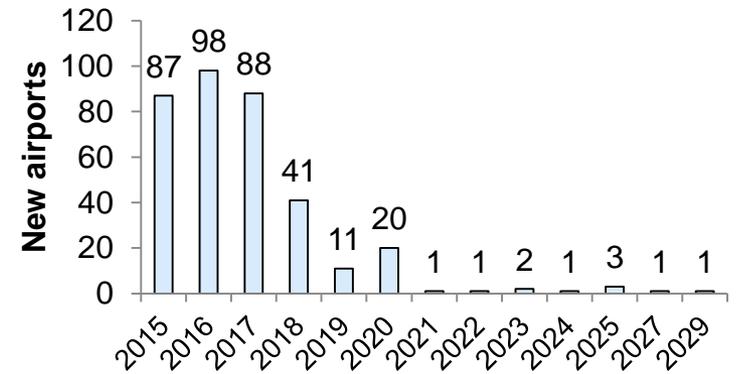
Global Airport Business

As of 2015, 346 new airports have been identified as being at various stages of development with a total investment value of USD157 billion between now and 2029.

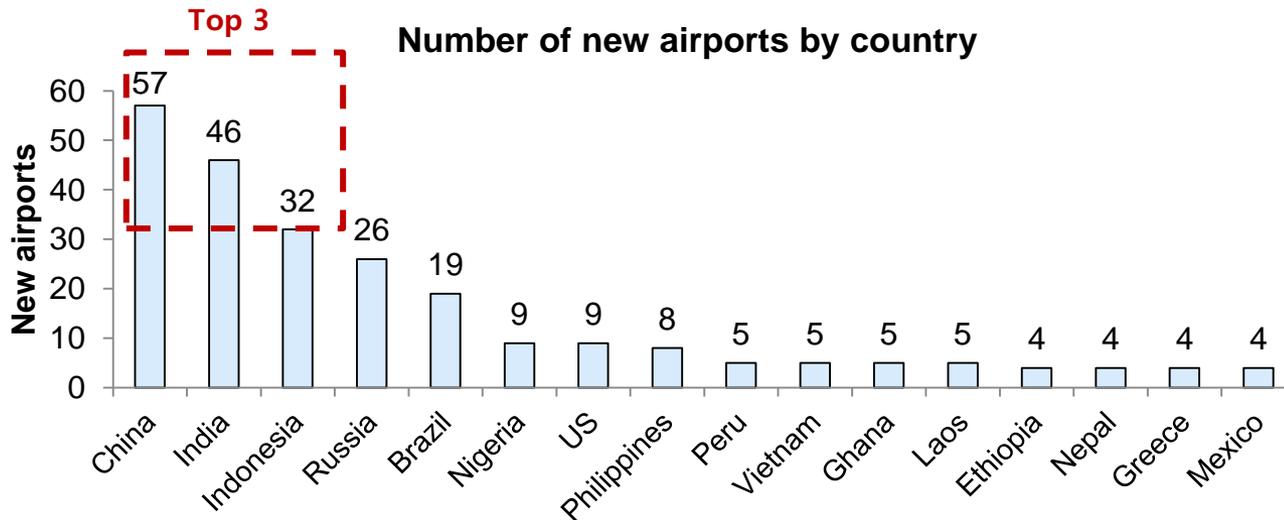
Number of new airports by region



Expected year of completion of airport projects



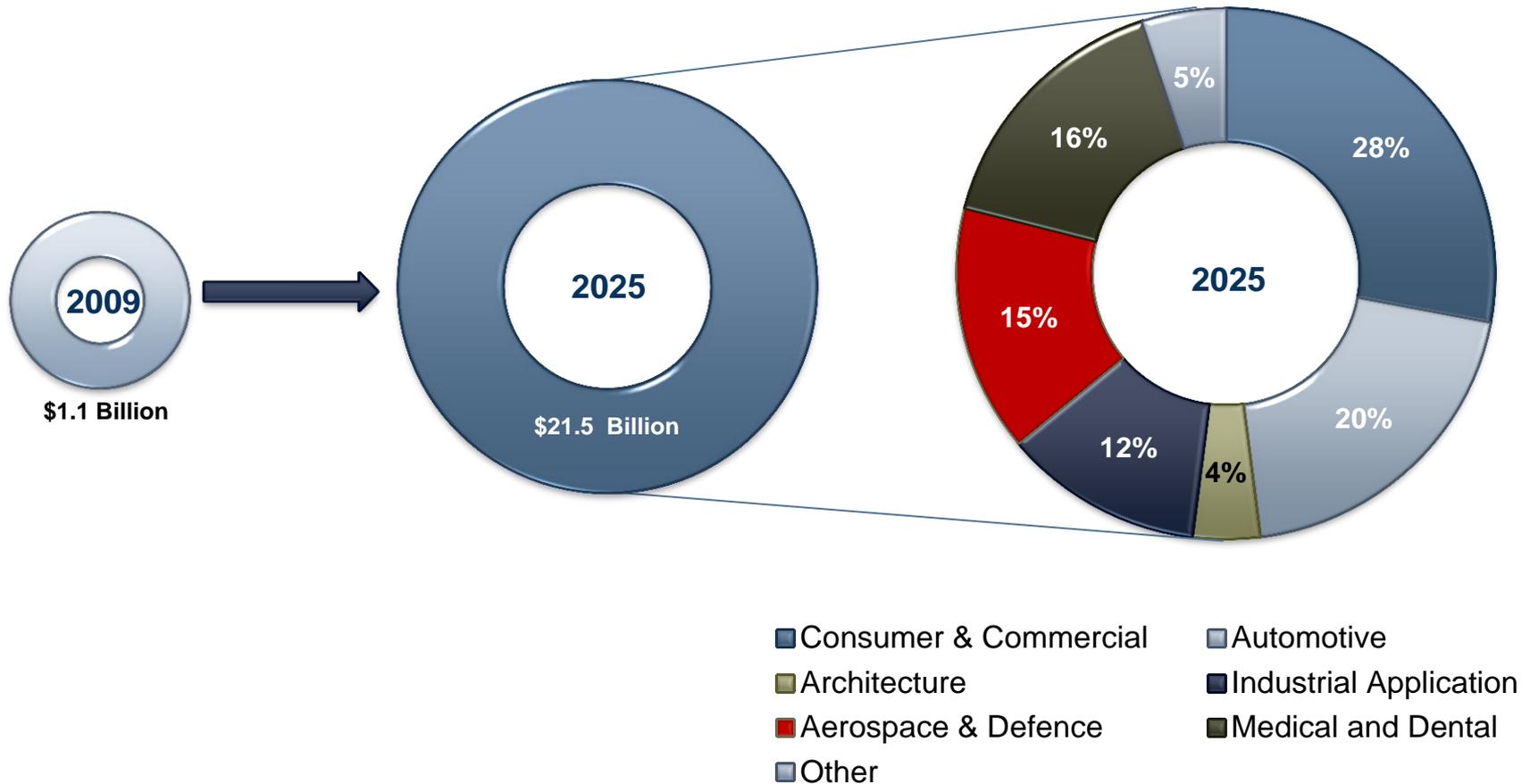
Number of new airports by country



Aerospace Manufacturing

The consumer and commercial products are expected to account for 28% of 3D printing market by 2020 which is expected to grow at a CAGR of 19.1% between 2009-2025

Global 3D Printing Market, Segment Breakdown, 2020



Thank You

The logo for Frost & Sullivan, featuring the company name in a serif font with a stylized ampersand symbol between the words. The text is centered within a dark blue rectangular box, which is flanked by thin horizontal lines extending to the left and right.

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