

Aerospace Manufacturing in Emerging Countries

Threats & Opportunities for Western SMEs

Presentation at



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Advisory Aerospace OSC

Founded 2017

Expertise

- Transaction Support
 - Market due diligence
 - OSC due diligence
 - Integration planning & execution
- Operations Transformation
 - Strategy, Planning & Execution
 - Cost, delivery & quality
 - Affordable Data Analytics
 - Additive Manufacturing
 - Advanced Materials
 - Interim Executives
 - Leadership Coaching

Experience



Questions for North American and West European SMEs


What is your long term cost management plan?

How do you plan to benefit from global aviation growth in the long term, especially in Asia?

How do you plan to leverage technology to grow profitably? Can technology help you compete globally?

Does your enterprise value maximization strategy account for globalization?

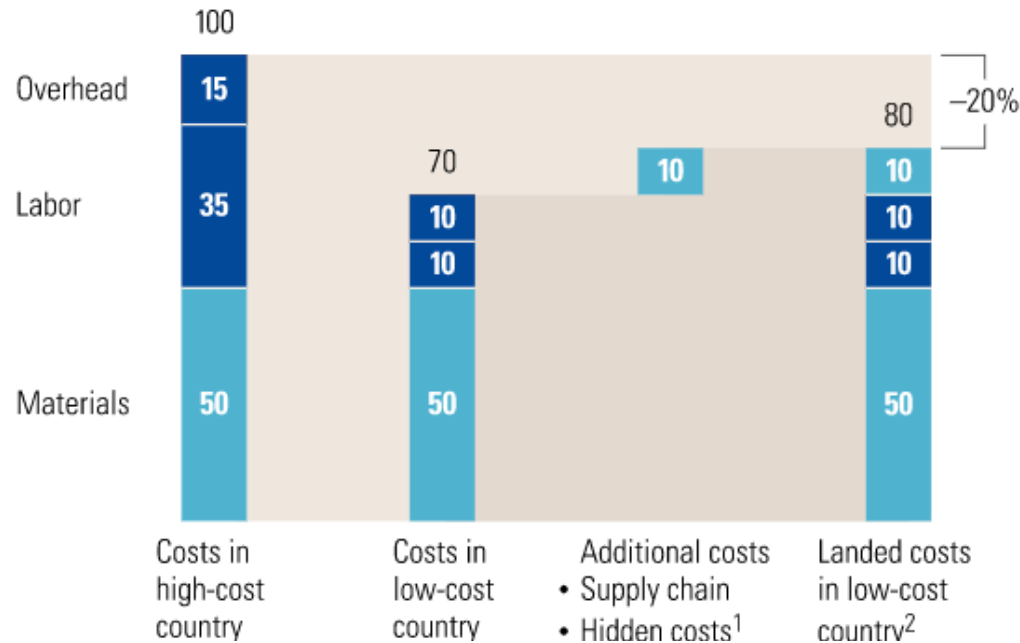
How do you address your skill / capacity shortfall in the long run?



Do you have a global competitive strategy?

Background : Outsourcing aerospace manufacturing to emerging countries has not been an unmitigated success.....

Conventional Wisdom



¹Management complexity, risk, supply chain complexity.

²Landed costs include inbound transportation costs—eg, duties, taxes.

Source - McKinsey

Ground Reality

Fallacy of labor arbitrage
First mover disadvantage

- Inconsistent quality
- Poor productivity
- Wage escalation
- Employee turnover
- Ongoing training & support
- Gaps in supply chain (e.g. special processes)
- Commodity dependence / capital intensity

...yet, manufacturing in emerging countries continues to grow inevitably

Drivers

- Access to growing aviation markets
- Local aftermarket support
- Offset / mandatory requirements
- Cost reduction
- Capacity & Expertise

Country	Mexico	Poland	Morocco	India
Exports to the West (2017)	\$7B	\$2B	\$1B	\$2B by 2025

BusinessLine

ECONOMY > LOGISTICS

Tata, Lockheed Martin set up metal-to-metal bonding facility for aerospace sector

V RISHI KUMAR Updated on April 18, 2018

BUSINESS DEALS

Godrej, Rolls-Royce boost production in India on expanded partnership

Indian group seals \$30m contract to make aviation engine parts

ROSEMARY MARANDI, Nikkei staff writer
March 21, 2018 20:27 JST

GE and Tata Group enter into strategic partnership to manufacture LEAP engine components in India

Will also jointly pursue military engine and aircraft system opportunities

December 14, 2017

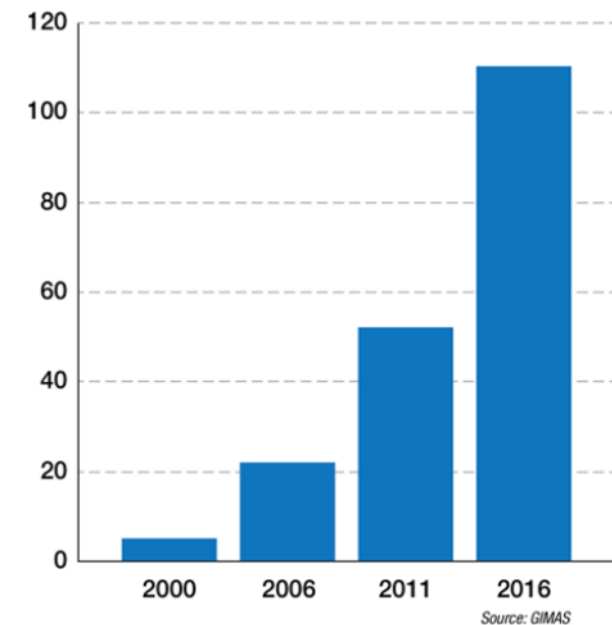
Boeing joins hands with HAL, Mahindra for manufacturing the F/A-18 Super Hornet in India

MoneyControl • Apr 12, 2018 06:23 PM IST
By PTI

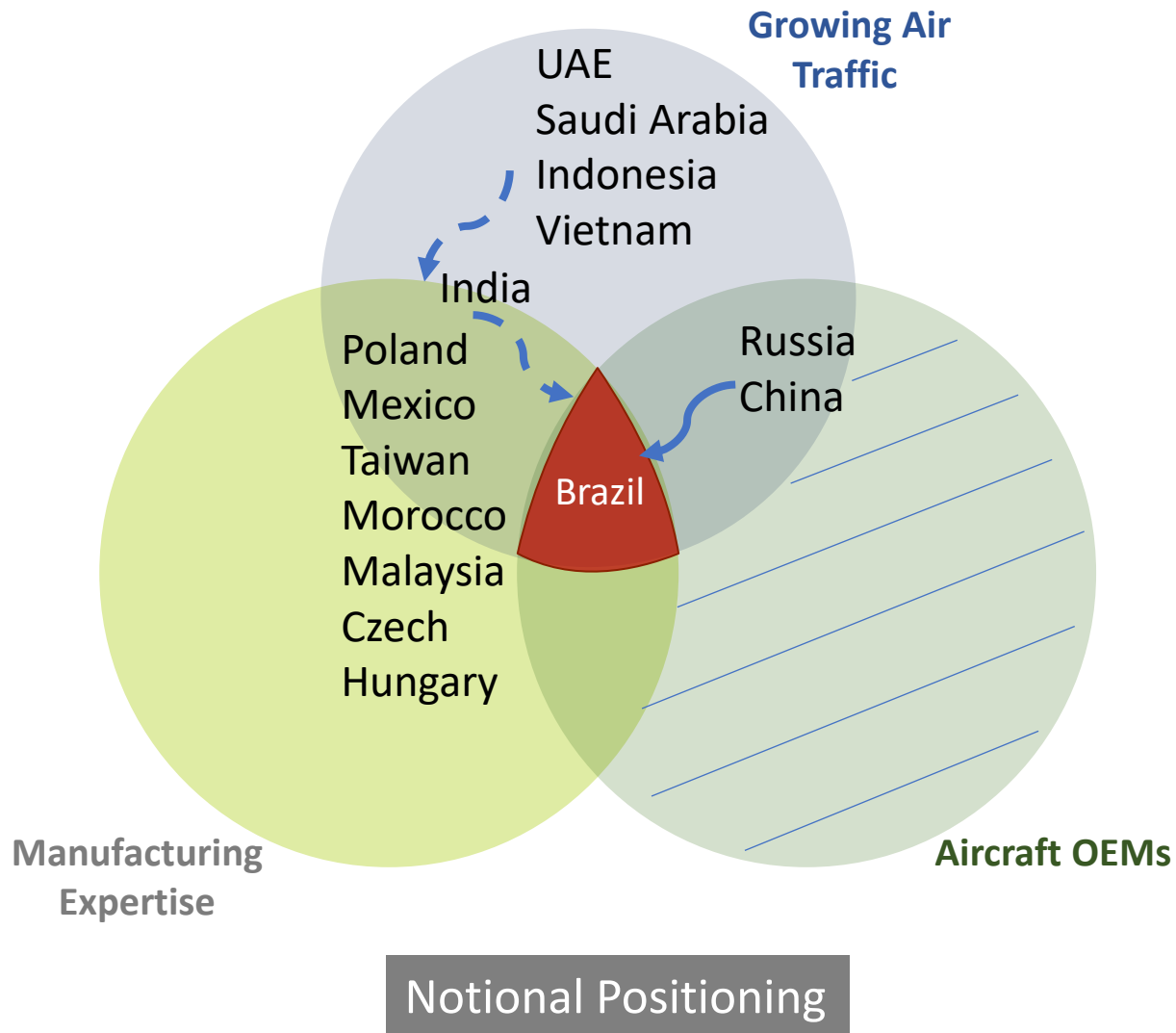
Foundation stone of Rs 6,500 cr Dassault-Reliance aerospace facility laid in Nagpur SEZ

By Shaurya Karanbir Gurung, ET Bureau | Updated: Oct 27, 2017, 11:52 PM IST

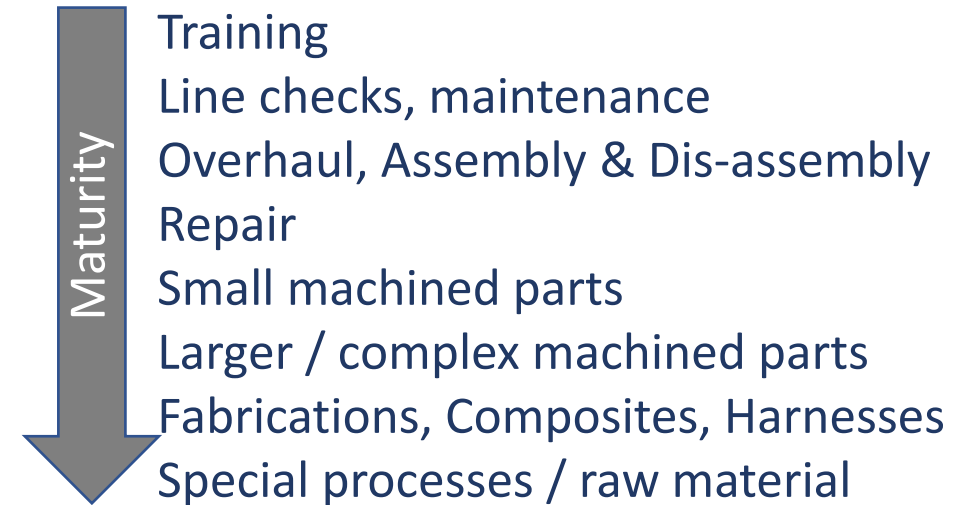
Moroccan Aerospace Companies



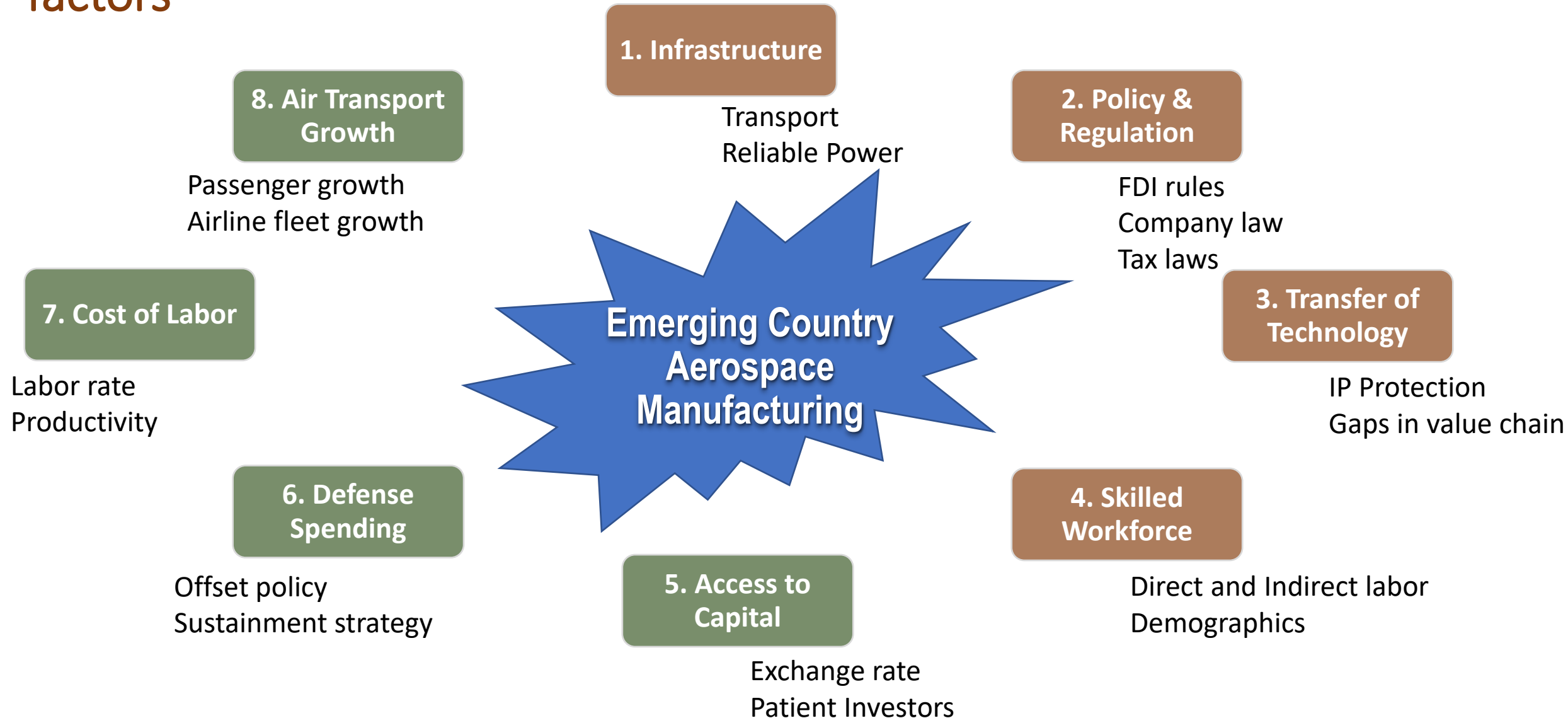
Understanding Emerging Country Dynamics for an SME strategy



Typical capability development path for emerging countries –



An emerging country strategy must consider maturity of eight macro factors



Eastern Europe benefits from long aviation history and skilled workforce – good opportunity for West European SMEs

Poland



- 30,000 employees, \$2B exports
- P&W acquired WSK in Rzeszow
- Sikorsky acquired PZL Mielec
- Augusta acquired PZL Swidnik
- MTU setting up greenfield
- Goodrich, Honeywell, Moog, GE, Eaton, BAE
- 25 SMEs

Czech Republic



Main Foreign Investors



Hungary, Slovenia, Slovakia, Georgia are other emerging, low cost and skilled countries

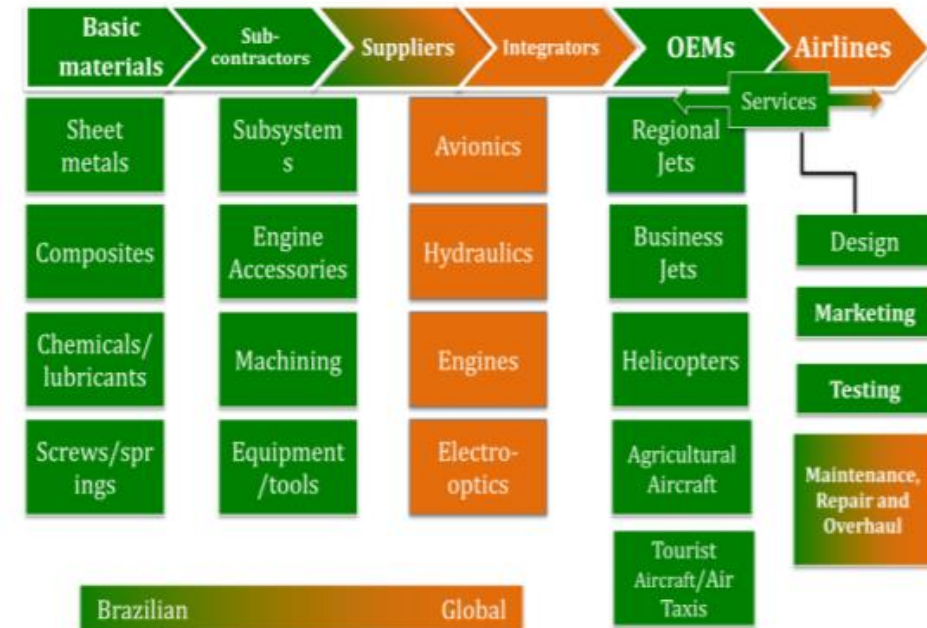
Brazil will be an opportunity for SMEs as Embraer becomes less vertically integrated

- Expect Embraer to become less vertically integrated with / without Boeing
- Expect Boeing to bring its supply base to help Embraer
- Expect new commodities to be outsourced due to capacity constraints.

BUSINESS NEWS APRIL 12, 2018 / 10:19 AM / 18 DAYS AGO

Boeing-Embraer proposal brings tie-up closer, not imminent: sources

Embraer's historic sourcing strategy



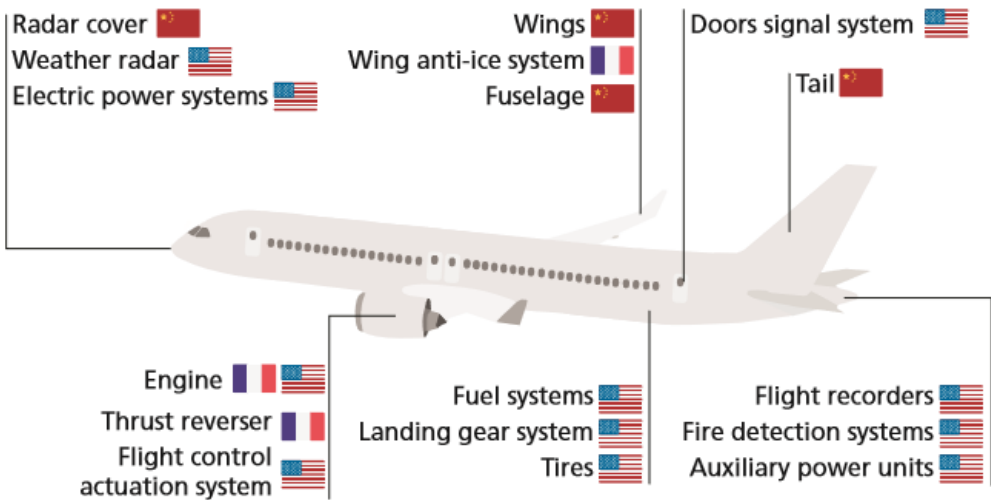
SMEs prefer to stay at an arm's length in China

- 20% of worldwide aircraft demand for the next 20 years
- Targeted acquisitions - FACC (2009) and Gardner Aerospace (2017)
- Increased scrutiny of new deals, e.g. Cotesa (2017)
- Joint Ventures with Boeing, UTC, GE, Airbus & some Tier 1s
- Growth opportunity in the short term for western SMEs
- MA60, ARJ21 and C919 platforms

German government gives Chinese AT&M's takeover of Cotesa green light: Report

Xinhua | Updated: 2018-04-27 13:35

Infographic of C919 Partners



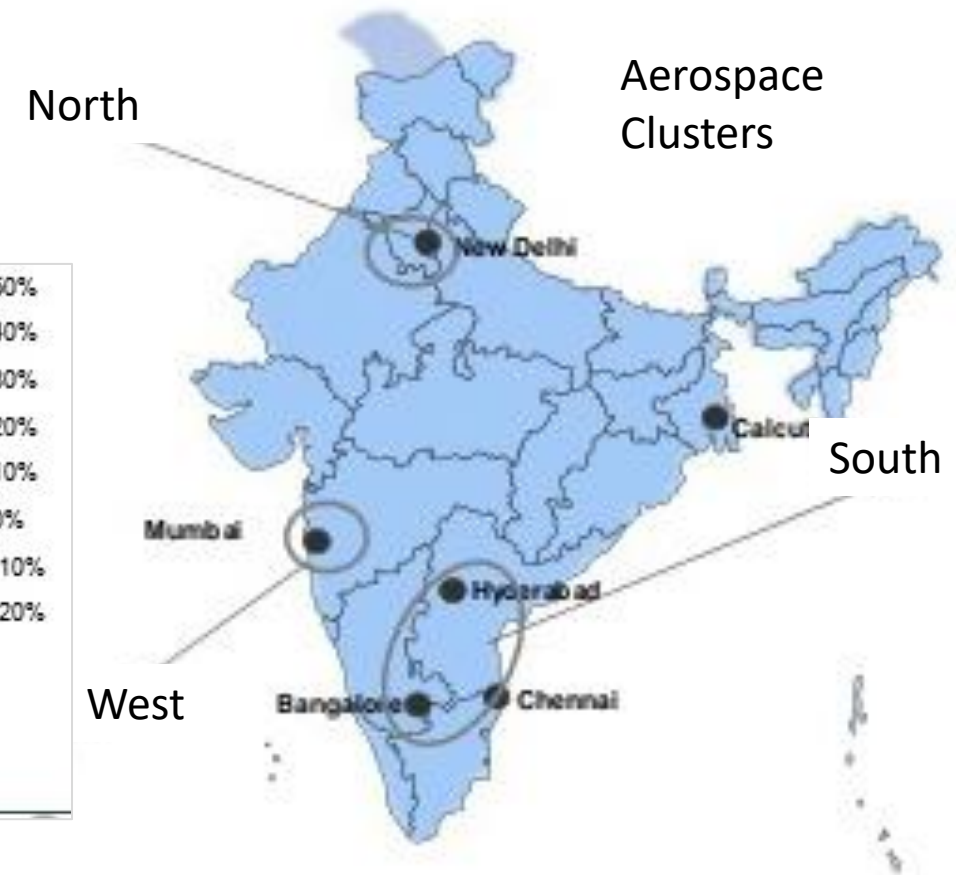
C919 Program Partners	Contribution
U.S. partners	
Alcoa	Fasteners, metal castings, and components
Eaton Corporation	Pipelines for fuel and hydraulic systems
General Electric	Engines (CFM International); engine nacelle, thrust reversers (Nexcelle); avionics system core processing and display; onboard maintenance and flight-data recording
Goodrich Corporation	Exterior lighting; landing gear and engine nacelle components
Hamilton Sundstrand	Electric-power generation and distribution; cockpit pilot controls (e.g., side sticks, pedals)
Honeywell International	Flight-control system; auxiliary power unit; wheels and tires, braking system; inertial reference and air-data systems
Kidde Aerospace (Hamilton Sundstrand subsidiary)	Fire and overheat protection systems
Parker Aerospace	Fuel and hydraulic systems (NEIAS Parker); flight-control actuation (Parker FACRI)
Rockwell Collins	Communication and navigation systems; integrated surveillance system; cabin core system
Non-U.S. partners	
Fisher Advanced Composite Components (Austria)	Cockpit, cabin interior, kitchens, restrooms
Liebherr Aerospace Toulouse (France)	Air-management system
Safran (France)	Engines (CFM International), in-flight entertainment
Thales (France)	Electrical wiring interconnection system (Shanghai SAIFEI); engine nacelle, thrust reversers (Nexcelle); propulsion (CFM International)
Liebherr Aerospace	Undercarriage system; landing-gear system (Liebherr)

Indian SMEs are aggressively pursuing western partners

- \$16B aviation market; 10% CAGR in the last decade
- Boeing projects 20 year demand of 2100, valued at \$290B
- Biggest importer of western defense aerospace
- \$2B in Boeing offsets & \$2B Airbus procurement target by 2020
- Growing local SME sector
- European SMEs aggressively pursuing Indian partnerships

Category	Name	Quantity
Combat aircraft	MMRCA	126
	Fifth generation fighter	214
	Advance medium combat	250
	Tejas LCA	264
Transport aircraft	Sukhoi 30 MK 1	29
	Multi-role transport	45
	C17 Globemaster	10
	Medium lift transport	56
Trainer aircraft	PC-7 Pilates Trainer	150
	Hawk AJT	20
	Multi-role tanker	6
	P-8I Poseidon	12
Specialist	Awacs	2

Source - PwC



Near to Medium Term
Defense Procurement ~ \$40B

Two years in a row
Passenger traffic growth ~ 20% YOY

A decade of learning & hiccups – India V2.0 now ready for rapid growth

2007 – 2010

Peak of the hype cycle; ‘sexy’ industry; much publicity

State agencies like HAL in the driver’s seat

Lack of appreciation of Aerospace Business Case

Lack of Manufacturing Talent

Lack of appreciation of Quality Requirements

Unclear Offset Policy

Unreasonable Limits on FDI (26%)

Critical gaps in value chain

2017 – 2020

Expectations are more realistic; more global exposure

Strategic Private Partnerships, SME Entrepreneurs

ROI & breakeven better understood & realized by some

Partnerships, expat talent & indigenous growth of skills

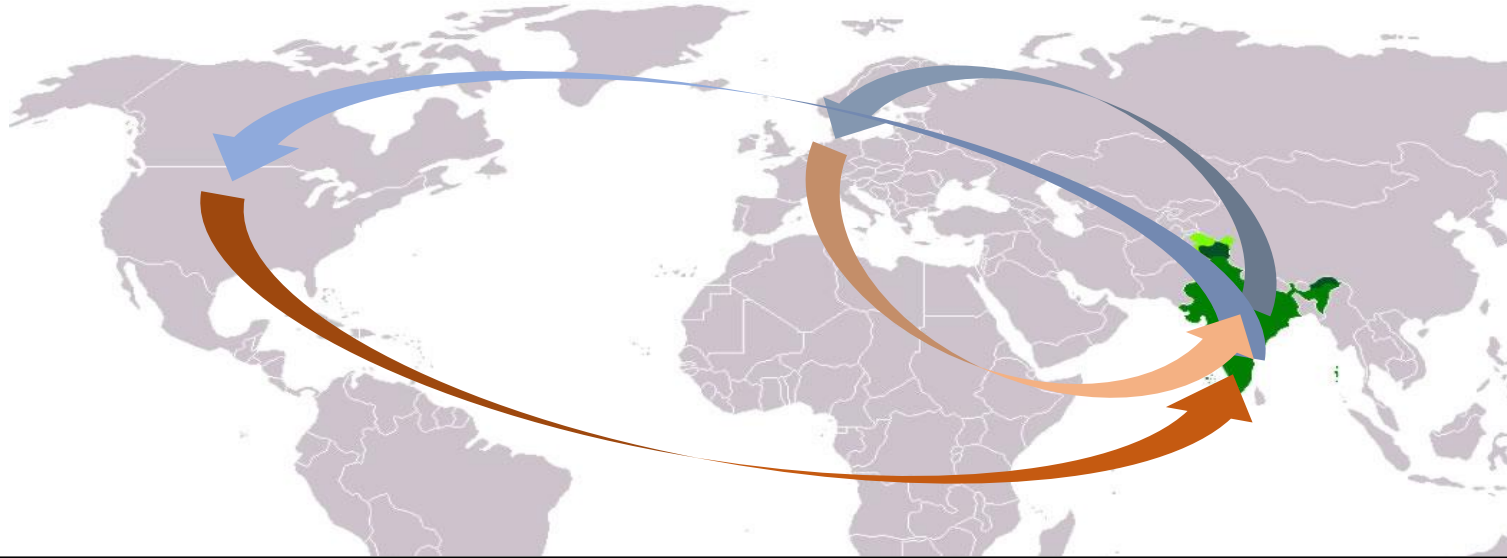
A decade of experience is starting to pay off in Quality

Revised & improved offset requirements

49% FDI for Defense JVs and up to 100% for Civil JVs

Fuller value chain but gaps in special processes /
castings / forgings

Cross Border Investments at SME Level in India are increasing



SME Entrepreneur	Global Strategy	Product	Customers
Aequs	JVs – Magellan, SAAB, Auburt Duval Acquisitions – T&K Machines, SIRA Group, Investment in Spartacus3D	Machined Parts Fabrications Forgings	Airbus, UTC, Boeing, Honeywell, Premium Aerotek, Safran
Dynamatics	Acquisition – Oldland UK Partnerships – Aerovironment, IAI	Sheet metal, Aerostructures Composites	Airbus, Boeing, GKN, Bell, GE, Augusta, Spirit
SASMOS	JV – Fokker Elmo (now GKN Aerospace)	Wire harnesses, Electro-mechanicals, Panels, Boxes	Boeing, MBDA, Honeywell, Meggitt
Jaivel	HQ in Midlands (UK) , Manufacturing in India & UK, Skills training with Boeing	Aerostructures, Engine components, Landing gear parts	Mettis, Pilatus, Hondajet, Augusta, ITP

Summary / Takeaways

- Western SMEs should develop an emerging country strategy
- A pure cost reduction play in Mexico for North American SMEs and in Morocco / East Europe for European SMEs makes sense
- China is a growth opportunity in the short run but will generate intense competitive pressure in the long term
- Brazil, especially if Boeing / Embraer deal happens, will present new opportunities for western SMEs
- India is a big opportunity where European & Israeli SMEs are already taking the lead
- Greenfield new technology ventures (e.g. Additive) in emerging countries can be quite attractive – labor arbitrage in high tech skills is more impactful





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