

MANUFACTURING COMPETITIVENESS IN AEROSPACE & DEFENCE - OPPORTUNITIES

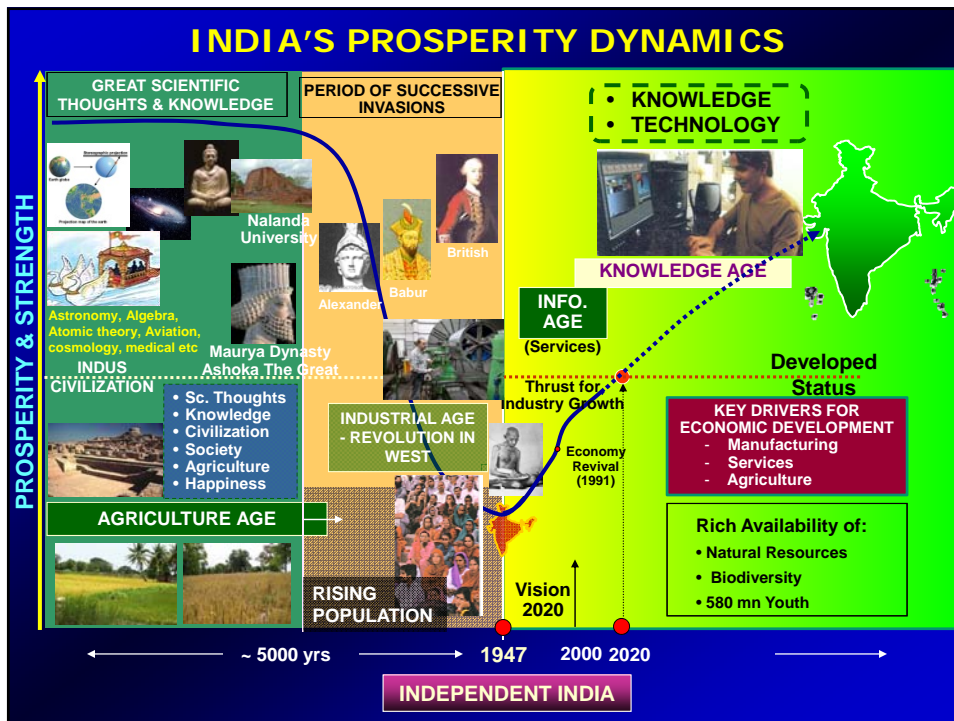
Presentation in
The Tamil Nadu Manufacturing Summit
"Raising the Manufacturing eco-system to the next level" Organised by CII

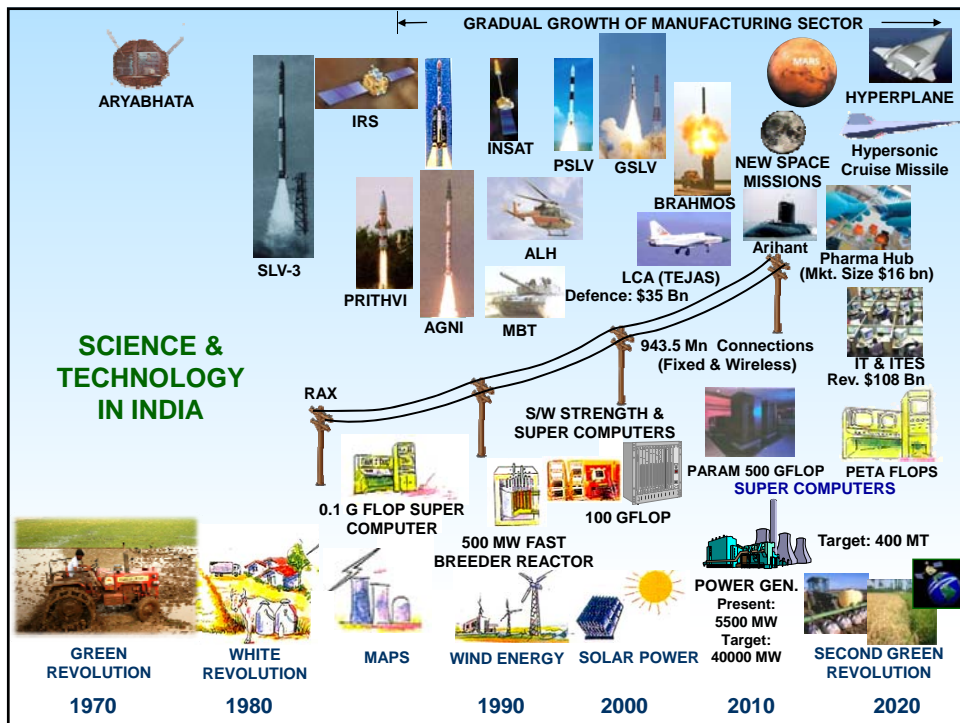
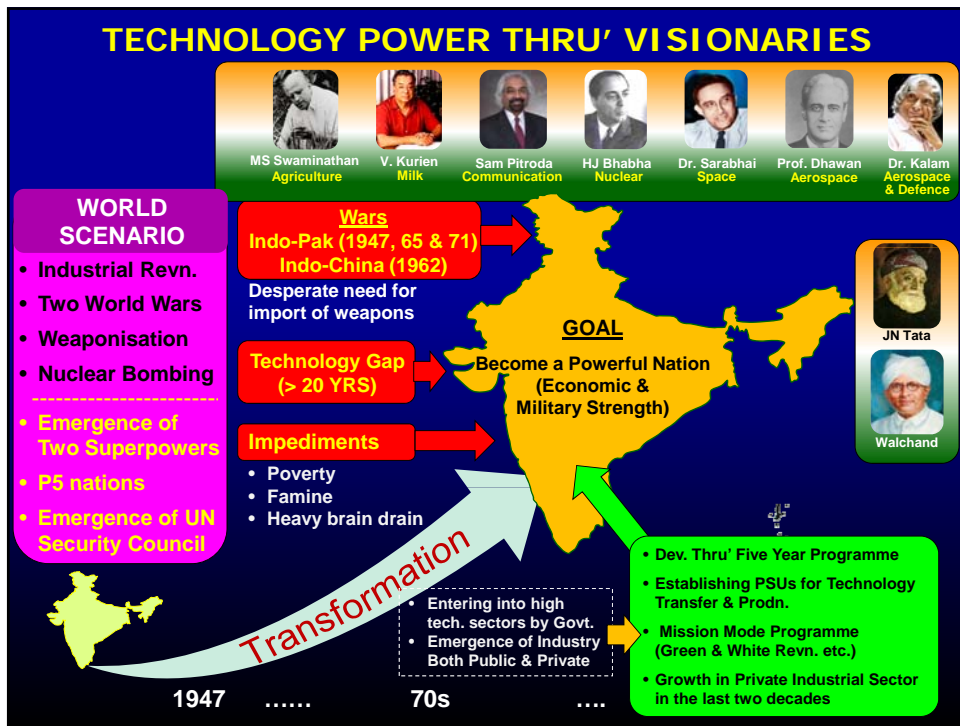
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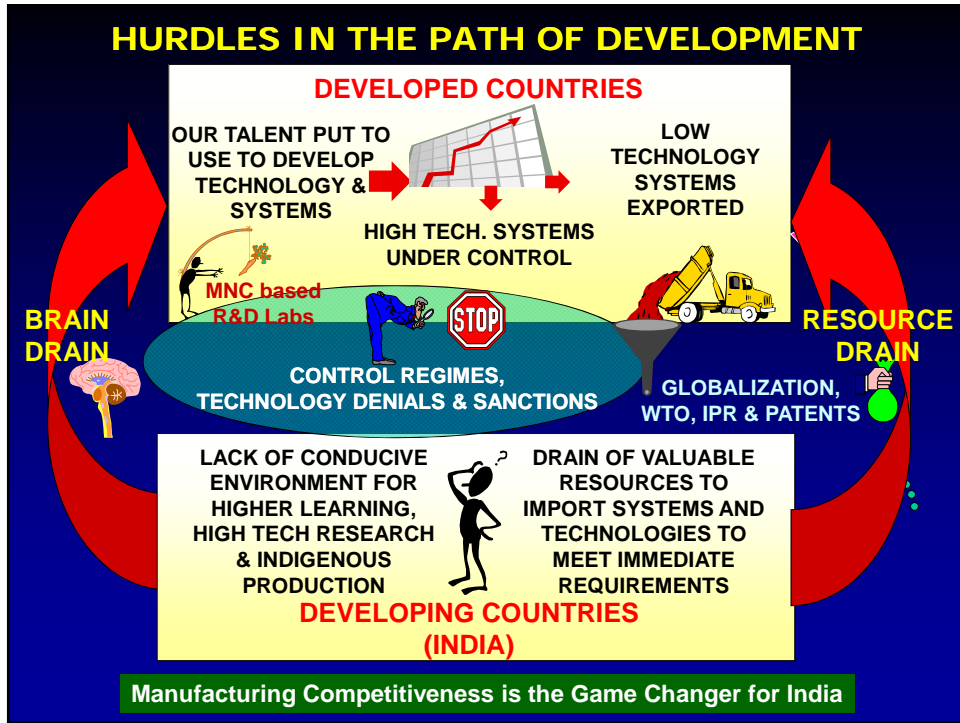
Dr. A. SIVATHANU PILLAI

**DISTINGUISHED SCIENTIST & CHIEF CONTROLLER (R&D), DRDO &
CHIEF EXECUTIVE & MANAGING DIRECTOR, BrahMos Aerospace**

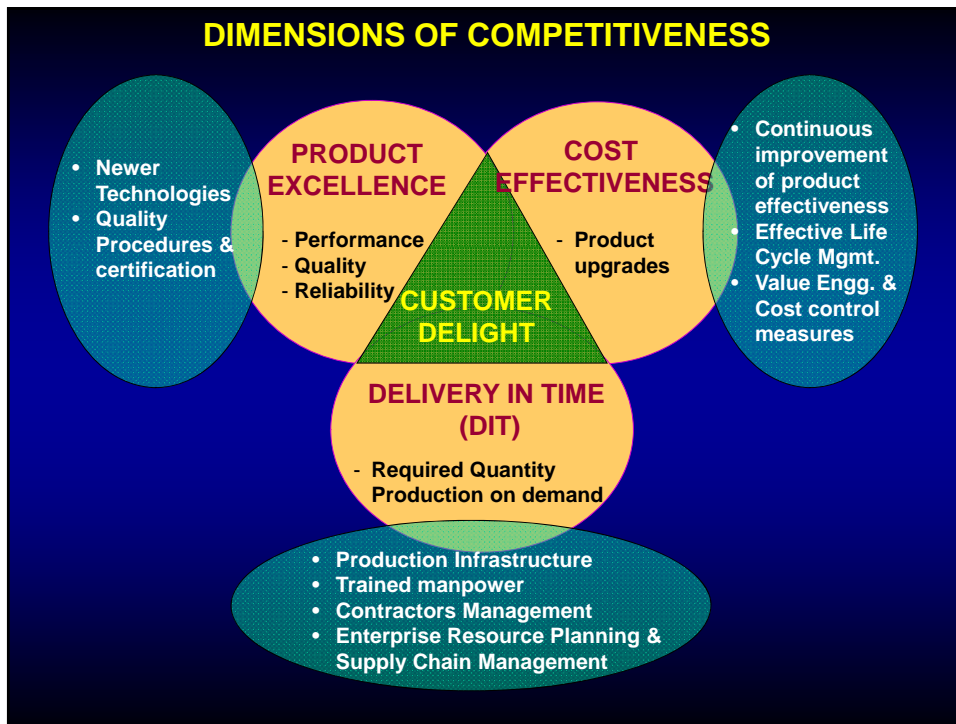
14 February 2014



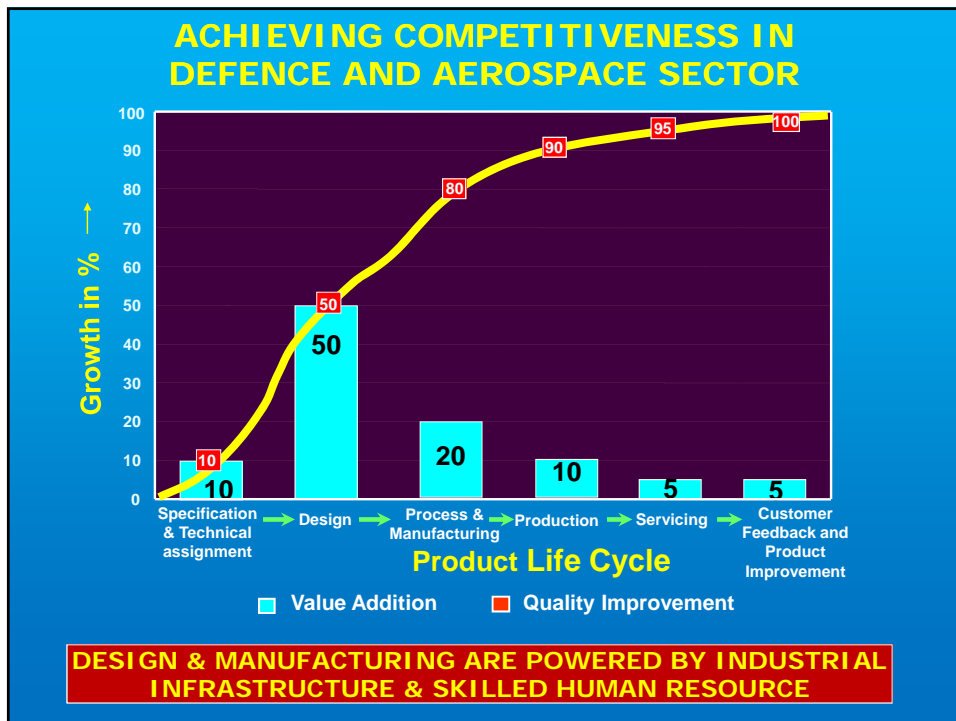


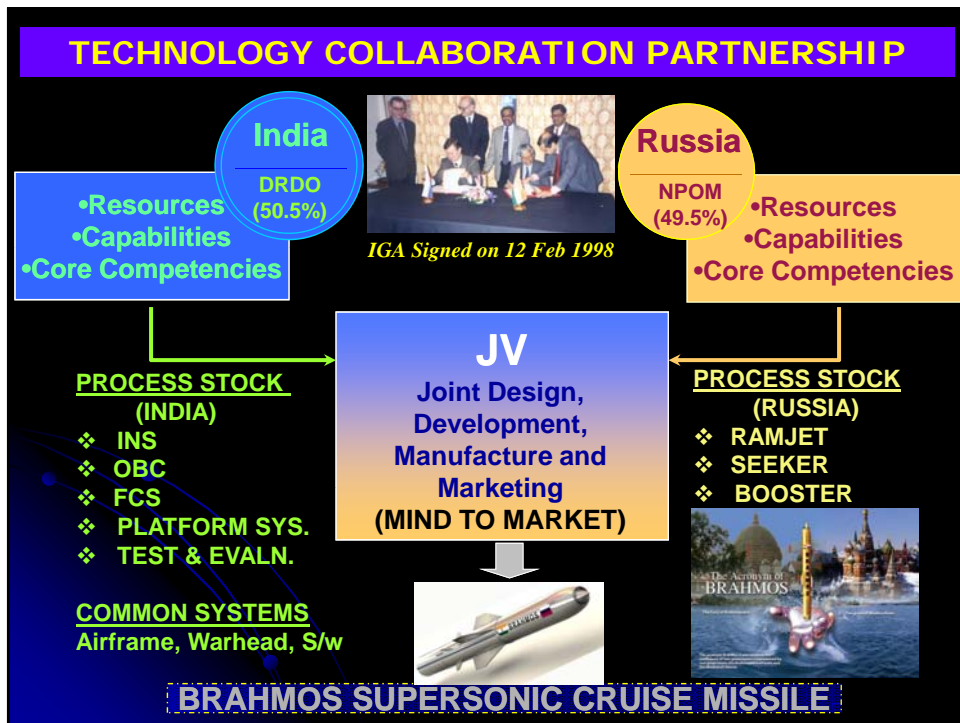
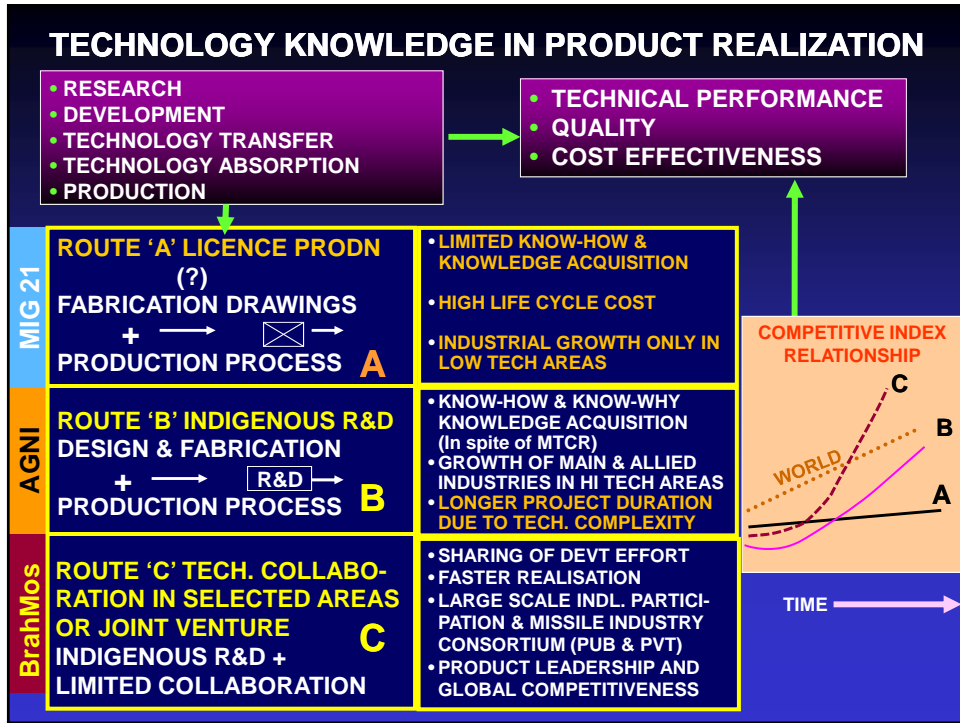


DIMENSIONS OF COMPETITIVENESS



ACHIEVING COMPETITIVENESS IN DEFENCE AND AEROSPACE SECTOR





BRAHMOS UNIVERSAL MISSILE SYSTEM


<h3 style="text-align: center; background-color: yellow;">MULTI PLATFORM</h3> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%; text-align: center;">  <p>Aircraft</p> </div> <div style="width: 50%; text-align: center;">  <p>Submarine</p> </div> <div style="width: 50%; text-align: center;">  <p>Silo</p> </div> <div style="width: 50%; text-align: center;">  <p>Vertical Launch</p> </div> <div style="width: 50%; text-align: center;">  <p>Mobile Autonomous Launcher</p> </div> <div style="width: 50%; text-align: center;">  <p>Inclined Launch</p> </div> <div style="width: 50%; text-align: center;">  <p>Naval Warship</p> </div> </div>	<div style="text-align: center;">  <p>SPECIFICATION Range : 300 Km Speed : 3 Mach</p> </div> <h3 style="text-align: center; background-color: yellow;">MULTI TRAJECTORY</h3> <div style="text-align: center;">  <p>High altitude trajectory Low altitude trajectory 290 km</p> </div> <h3 style="text-align: center; background-color: yellow;">DIVERSE ENVIRONMENT</h3> <ul style="list-style-type: none"> - SNOW/MOUNTAIN - DESERT - TROPICAL 	<h3 style="text-align: center; background-color: yellow;">MULTI TARGET</h3> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%; text-align: center;">  <p>Frigate</p> </div> <div style="width: 50%; text-align: center;">  <p>Corvette</p> </div> <div style="width: 50%; text-align: center;">  <p>Command Centre</p> </div> <div style="width: 50%; text-align: center;">  <p>Ammunition Dump</p> </div> <div style="width: 50%; text-align: center;">  <p>Railway Yard</p> </div> <div style="width: 50%; text-align: center;">  <p>Airbase</p> </div> <div style="width: 50%; text-align: center;">  <p>Bridges</p> </div> </div>
ONLY OF ITS KIND IN THE WHOLE WORLD		

BRAHMOS PRODUCTS BY TAMIL NADU INDUSTRIES

 <p>Power Supply Unit</p>	 <p>FCS</p>	 <p>RTS</p>	 <p>Metallic Parts</p>
<p>Electronic Packages (Data Patterns)</p>			 <p>Rubber Parts (Aerospace Engineers, Salem)</p>
 <p>Launcher (BHEL)</p>		 <p>Precision Machining Facility (L&T)</p>	
<p>MOBILE AUTONOMOUS LAUNCHER</p>		 <p>Batteries (HEB)</p>	
Missile Industry Complex consists of 205 Pub-Pvt Industries			


EVOLUTION OF WAR WEAPONRY

LAND, SEA




L=250 mm; D=60mm; Range:900 m
Guides: Sword Blade (1m)
WORLD'S FIRST WAR ROCKET
(India, 1792 AD)

Human Centric




AIR, UNDERWATER


New Weapons
& Platforms




First Air Plane




First Tank



First Warship
Made of Steel




First Submarine




World's First
Guided Missile

SPACE & DEEP SEA


High Technology
Systems



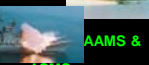
MIL SATS & ASATS




B2 BOMBER



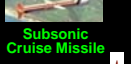
ASMS



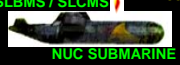
AAMS &



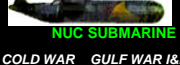
Anti Tank Missiles




Subsonic
Cruise Missile



SLBMS / SLCMS




NUC SUBMARINE




World's Best
Supersonic
Cruise Missile

INTELLIGENT & AUTONOMOUS SYS.




SPACE BASED SYS, EMB

Network Centric




HPM & EW



ANTI MISSILE
DEFENCE

- Supersonic Cruise Missile
- Precision Strike
- Kinetic Energy Weapons
- Cyber Warfare

INTEGRATED WAR



Early Warfare I-WORLDWAR -II COLD WAR GULF WAR I&II 2000




SUDHARSHAN CHAKRA

Venturing into the Hypersonic World

...where Speed is the POWER !

There is nothing like a dream to create the future.

DEFENCE SYSTEM REQUIREMENT FOR NEXT 5 YEARS

(\$150 Billion Business)

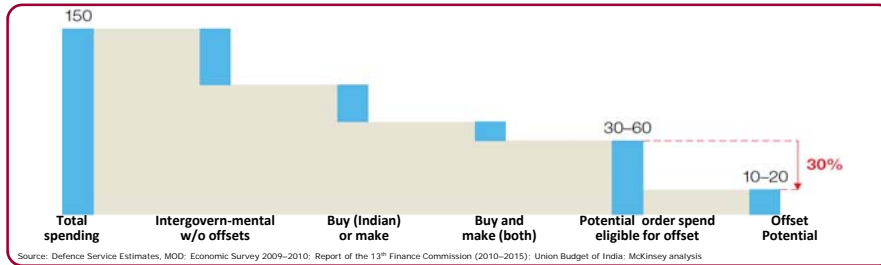
Plat form		Spending (\$bn)	Main orders expected
Air	Combat / trainer	26.3	Medium multirole combat aircraft and other fifth-generation aircraft, Mirage upgrade, MiG-29 upgrade, Jaguar engine upgrade, basic trainer
	Support	15.8	Transport aircraft, aerial tankers, long-range maritime patrol aircraft, midrange maritime reconnaissance aircraft, Phalcon AWACS, mini AWACS
	Rotary	9.1	Light-utility helicopters replacing Chetaks for Navy, multirole helicopters for Navy, attack, heavy lift, light utility, light combat
LAND	Fighting Veh.	15.8	Arjun main battle tank (MBT), T-90 MBT, light tank, futuristic ICV
	Artillery	4.2	155 mm towed guns, 155 mm ultra light guns, 155 mm self-prop. tracked guns, 155 mm self-prop. wheeled guns
	Missiles	3.4	Antitank missiles, CBU-105 sensor-fuzed weapon, short- to medium-range SAM, Agni-V, MICA
	Infantry Sys	1.1	Futuristic Infantry Soldier as a System (eg, weapons, helmet, visor, clothing)
SEA		20.8	A/c carrier: P-71; Destroyer: P-15B; Frigates: P-17A & 17B; corvette: P-28A
		46.7	Nuclear: Arihant follow-on, Scorpene, P-75I, spl midget
		4.1	Landing platform dock, landing ship tank, landing craft utility
C4I2SR		0.3	Navy 3-D radar, radar-jamming integrated electronic warfare systems

Source: Literature search; McKinsey analysis

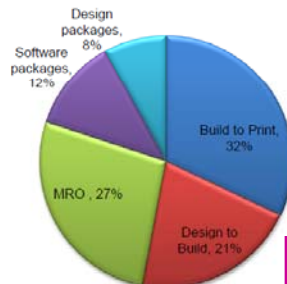
SHAPING THE PROCUREMENT POLICY BY GOVT. TOWARDS SELF-RELIANCE



DEFENCE SYSTEM REQUIREMENT FOR NEXT 5 YEARS (\$150 Billion Business)



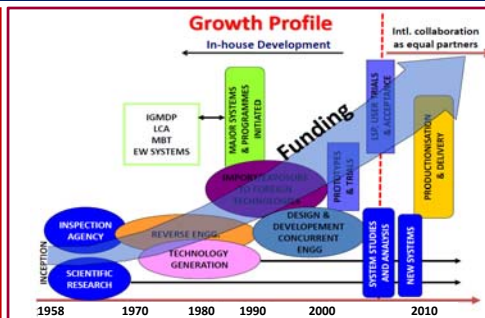
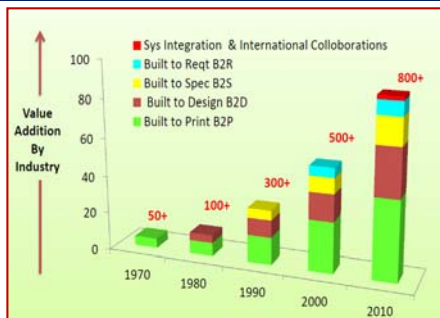
Offset Opportunities for Manufacturing



More than \$100 Bn available for Indian Manufacturing sector

Types of offsets

DEFENCE R&D CAPABILITY BUILD UP & PRODUCTION



Production values of Systems (Inducted & Under Induction) by DRDO

SYSTEMS	Cost (Rs. In Crores)		
	Inducted	Under Induction	Total
Missile Systems	4668	60606	65273
Electronics and Radar Systems	7606	21514	29120
Advanced Materials & Composites	3505	139	3644
Armament Systems	8304	4340	12644
Aeronautical Systems	3049	23700	26750
Combat Vehicles & Engg Systems	12686	8237	20923
Life Sciences Systems	247	286	533
Naval Systems	873	330	1203
Total	40940	119150	160090

Rs.160000 Crs worth Products;

22,53,500 man years job created


DEFENCE INDUSTRY

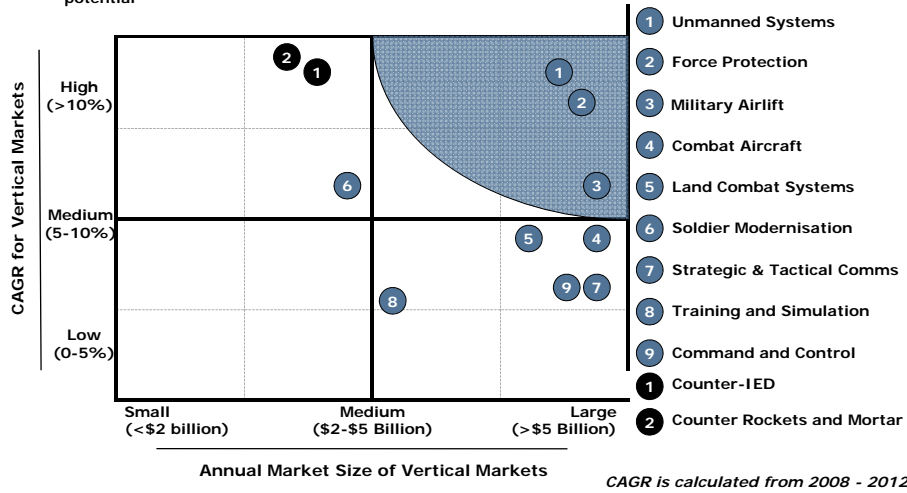
OPPORTUNITY AREAS

- ❖ **Aerospace**
 - Civil & military aircraft systems and components, missiles, UAVs etc
- ❖ **Structures**
 - Launchers, Bridges etc
- ❖ **Software related to Aerospace & Defence**
- ❖ **Electronics**
 - Military avionics electronics etc
- ❖ **Maintenance, Repair & Operating Supplies**
 - Maintenance opportunities for Defence Sys. including aircraft
- ❖ **Materials**
 - Aerospace & Defence standard materials



GLOBAL OPPORTUNITIES

 Sectors with highest total growth potential

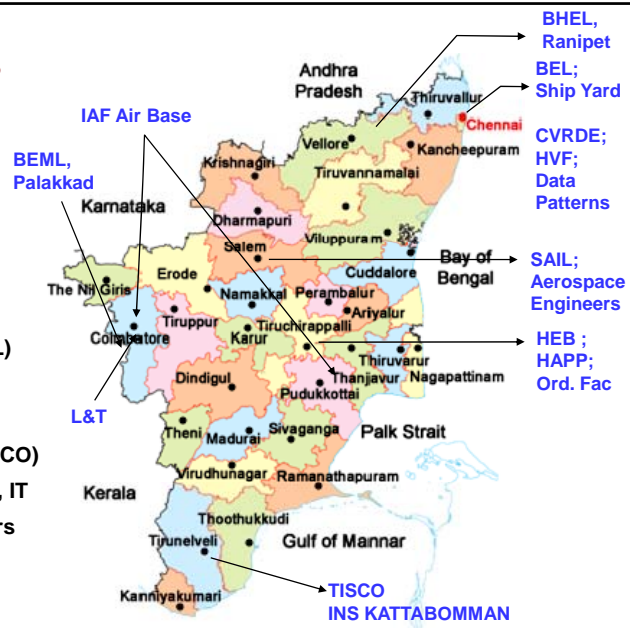


Source: Frost & Sullivan

TAMIL NADU CAPABILITIES

KEY INDUSTRIES

- ❖ Aerospace & Defence (CVRDE, HVF, BEL, BHEL)
- ❖ Kattupalli Ship Yard (TIDCO & L&T JV)
- ❖ Steel Complex (SAIL, TISCO)
- ❖ Special Economic Zones, IT Parks, Industrial Corridors
- ❖ 760,000 MSME Industries



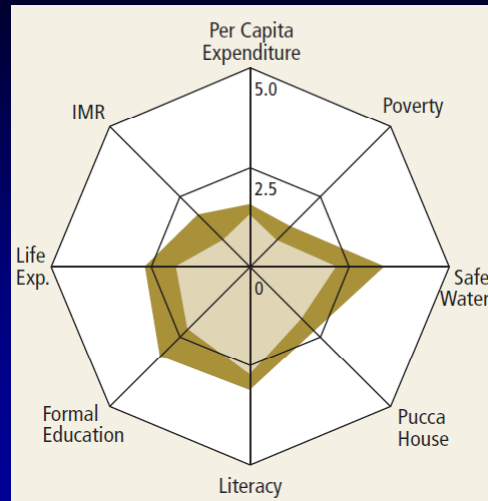
Huge Aerospace & Defence Market is available. Opportunity is knocking our doors. To avail Tamil Nadu Industries should cater themselves to utilise

Core competencies of TN for Industrial Buildup

- Highly Skilled and Efficient Human Resource (Ranks no.1 in India)
- Matured Manufacturing sector with Govt.'s thrust on manufacturing
- Industrial Parks, MEPZ, SEZs with supporting infrastructure
- Research institutions
 - Space & Defence
 - Academia : IIT, NIT, Universities

Thrust areas in "VISION 2023"

HUMAN DEVELOPMENT RADAR



TITANIUM SPONGE PROCESSING TECHNOLOGY

500T Titanium Sponge Production Plant is now operational in Kerala (DMRL Tech.)



PROPERTIES

- High Strength to Wt. Ratio
- Superior Corrosion Resistance
- Exceptional Erosion Resistance
- Low Thermal Co-efficient of Expansion
- Superior Biocompatibility

Reproducible at 1.0 kg
Currently scaling up to 5.0kg



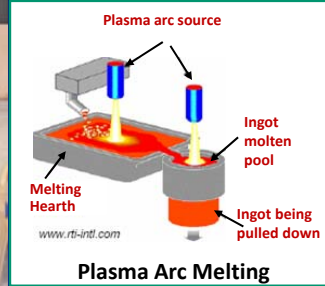
ELECTROCHEMICAL PROCESS



Metal Production Plant (Inside View)



FIRST BATCH OF TITANIUM SPONGE PRODUCED AT TSP, KMML
Weight : 3000 Kg
Date : 06.09.2011
Technology : DMRL / DRDO
Funded By : VSSC / ISRO



TN Mineral Availability: 5,000,000 T.

AEROSPACE & DEFENCE INDUSTRY COMPLEX



- Proposed Aero Park at Chennai can become Industrial Complex
- Existing skills of auto Industry will complement the Aviation in utilizing highly skilled & qualified manpower
- UAVs, Civil aircraft – Production and Maintenance opportunities
- Existing IT Skills can be utilized for CAD & CAM
- Deposits of Titanium ore – highly used in aerospace industry
- World-class research facilities to be tapped for industrial appln.
- An alternative to Bangalore as an aerospace hub



AEROSPACE INDUSTRIAL COMPLEX
– Comprehensive solution for space & defence sectors

R&D CENTRE IN AIRCRAFT MAINTENANCE

- Aircraft Maintenance Management
- Maintenance Network
- Electronic Documents
- Computer based training
- New generation Training Tools (Simulation tools, Virtual Reality with Virtual aircraft)

R&D CENTRE IN SMART MANUFACTURING

- Micro machining technologies
- Automated Process Design & Simulation
- Automation, robotics & intelligent manufacturing systems
- Model Driven Virtual Prototyping
- Common Globally Shared Product Data
- Computer aided manufacturing
- Flexible manufacturing system
- Modular Manufacturing Equipments
- Self Diagnosis/ Healing Machine Tools

Less Production Costs, Better Quality & Higher Profits

Facilitating growth in industry and services through Industrial Complex Clusters

ADVANTAGE - STATE

- Desire for more knowledge
- Skill oriented employment
- Strategic Plan for Infra. Devt.

NRI Investment
Possible Industrial Climate (Thru'
Tech Parks & SEZs)
Strong manufacturing sector &
raising Services sector



- These sectors will have the potential to contribute further boost the state's economy.
- Growth in these sectors would throw up a number of job opportunities to the people in the state.

Thank you

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