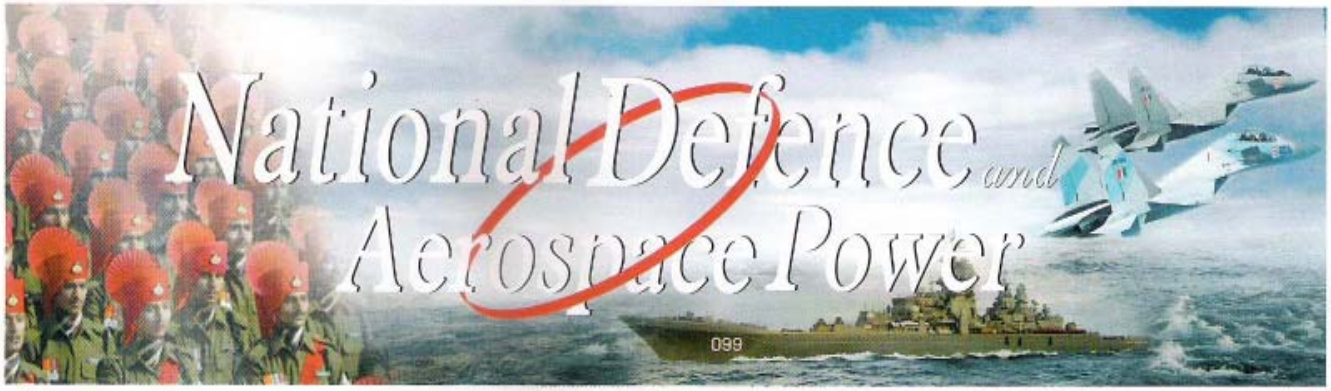

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TECHNOLOGY: UNDERWRITER FOR CHINA'S SECURITY

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Since mid-1990s China actively pursued a strategy rooted in spin-in, as a result China's defence economy started to reap benefits from microelectronics, space systems, material sciences, semi-conductors, propulsion, missiles, information technology and computer aided manufacturing. While China in 2012 continues to lag behind in high technology sector and is decades away from carrying-out path-breaking discoveries in field of natural science and engineering, however, it is fast closing the gap with developed countries through indigenous innovation. Innovation has become the new mantra in China's soul for modernisation and reforms in the 21st century which beyond doubt is witnessing a gradual shift away from imitation. The challenge would however be to move up in the technology ladder by enforcing fundamental changes in the socio-economic structure, build capacity and develop imaginative and future technology across spectrum. Though upgrading knowledge in natural science and engineering is critical, transforming organisation and management structure has also been extremely vital in China's rubric to step-up in the technology domain. Over the years China has been extremely diligent and unrelenting to develop a modern state with state of art defence industry backed with robust infrastructure and advanced research and development through integration with global markets and access to capital.

Chinese leadership does acknowledge that while growth in the past was propelled by a combination of low cost manufacturing, imported technology and substantial flows of foreign investment; however, future has many challenges and these alone would not be sufficient to carry China to the next stage in its development cycle unless propped up with path-breaking innovation.

The Chinese leaders acknowledge the limitations of inherent dependence on technology residing in the West. They accept that high-end technology cannot be acquired off the shelf and therefore has to be indigenously nurtured and developed over a period of time. Medium and Long Term Science and Technology Development Plan, 2006-2020 (MLP) became the cornerstone in Chinese philosophy to upgrade its defence economy. An outcome – increase in arms exports by 95% since 2002 (majority of arms exported to Pakistan) and China ranks as the sixth largest arms supplier in the world trailing behind UK in 2011.[1]

Chinese Academy of Sciences has drawn-out a road map to 2050 for S&T in China. The document pointedly looks at different types of technology to address diverse layers in socio-economic development. It also refers to other areas where technology is perceived as an elixir with potential to make significant difference to the outcome of a result.[2] While China aggressively increased year on year expenditure on defence, it was also looking at technology as panacea and guarantor for security and sovereignty. The report lists out an exhaustive strategy to develop a range of technology in advanced manufacturing, new materials, lasers, intellectual broadband wireless networking, network supercomputing, sensors & displays, information technology, nano-science and technology, aerospace, agriculture, bio-technology, space and ocean exploration and also renewable and green systems. China aims to bankroll a coherent S&T development strategy to transform from its earlier stereotypical image of an imitator and elevate its status to an innovator in near future. Hu Jintao in January 2006 put forth a tenacious argument to state that *By the end of 2020... China will achieve more science and technological breakthroughs of great world influence, qualifying it to join the ranks of the world's most innovative countries*. China's tenacity to step-up as the next hub of new technologies is backed by scientists, engineers and world's largest technocracy. Chinese leadership does acknowledge that while growth in the past was propelled by a combination of low cost manufacturing, imported technology and substantial flows of foreign investment;

however, future has many challenges and these alone would not be sufficient to carry China to the next stage in its development cycle unless propped up with path-breaking innovation.

China's focus on S&T in 2006 is evident from the scale of investment and priorities set by MLP to increase expenditure on R&D to 2.5% of GDP by 2020. China's innovation system is almost reaching a tipping point – though there are a few who continue to question China's capability, at the same time there are many more who believe that China is ready to step-up to the next level in the innovation cycle but in a calibrated manner with greater degree of coherence between the industry, educational institution and the state.

However as science and innovation capabilities grow rapidly relying largely on imported technology, the central question, whether the next decade will witness a shift towards autarky and global collaboration in China.[3] Will science follow the same trajectory like the Olympics? Do the trends indicate that a similar story could replicate in laboratories and help China evolve as a disruptive innovator before the dawn of 2032 Olympics? If so, in five decades after economic take-off, will China once again lift-off as a global technological hub as a result of diffusion, adaptation and innovation of new technology to become elixir in the process of overall transformation.

It is inevitable that future growth story in the global defence economy will have to lie in the realm of the two great emerging economies- China and India; expected to represent major source of demand, likely to grow exponentially in the coming decade.

China in early years realised that it was futile to reinvent the wheel when technology available elsewhere could be transferred. It was therefore quick to take advantage of the changing geopolitics as a consequence of the end of cold war and break-up of the Soviet Union. They studied contemporary wars to extract lessons for future application. China also defined technology transfer as the process by which technology due to circumstances would transit from one geographical location to another and it was then the responsibility of the recipient country to create an environment for investment and innovation capacity to absorb and adapt to new technologies. They were also aware that process could only be completed with active participation of local workers to help and understand the nuances of adapting to new technology. Hence to effectively take advantage of transfer, recipient was bound not only to create a healthy environment for innovation and investment but also supporting infrastructure. Other channels for effective transfer included license production and foreign investment. Flow of foreign investments into the aviation sector automatically became a vehicle for transfer of technology which helped upgrade the industry to become part of the global supply chain. While China in the new millennium started deriving benefits from technology, it was smart to proactively initiate key changes in the organisation structure and culture through better management practices, improve efficiency and become the cradle for all forms innovation. Since technology was not a commodity and hence could not literally be picked off the shelf; China was willing to travel the extra mile by initiating changes in its structure and accepting mechanisms that would help bring technology to its doorstep.

It is inevitable that future growth story in the global defence economy will have to lie in the realm of the two great emerging economies- China and India; expected to represent major source of demand, likely to grow exponentially in the coming decade. The Indian defence aviation sector is also poised at a point of inflection in its expansion cycle driven by modernisation plans; and India is being perceived not only as an attractive but a preferred market and a future defence sourcing hub. However unlike China, where R&D and innovation are likely to become primary pathway in the defence economy; the Indian defence economy continues to be founded on acquisitions.

The Achilles' heel for India since independence has been its progress in the field of science and technology and hence the capability to carry out path breaking R&D. Many of our graduates, who blossom in India, have had to travel to the more liberal environment of West and transform as innovators and pioneers of path-breaking technology. Unfortunately, the Indian system, plagued by its inherent limitation has not been able to absorb this extremely vital human resource essential to energise modern S&T. As a result, trajectory of our economic growth has been dwarfed by the lack of technological prowess; reflected in the inadequacy to optimally utilize modern S&T to enhance the defence capability essential guarantor for national security. Also in the field of social sciences; our institutions have not focused adequately in the areas of strategic studies; which could have enabled us to enlarge our understanding of the regional and global security architecture because of the continuous changing weight of geopolitics. This in turn would have helped in better understanding of defence requirements through the process of debates and discussions in establishing relationship between defence sciences; military strategy and the industrial policy.[4]

India, today being the 10th largest defence spender, continues to procure over 70% of its equipment needs from abroad and therefore is unable to extract the maximum benefit for its economy from the expansion cycle driven by the modernisation plan of its defence economy. The self reliance index (SRI), estimated at 0.3 in the early 1990s was envisaged to grow to 0.7 by 2005 but has remained unchanged.[5] Nevertheless, if India, at all wants to reverse this imbalance and indigenously manufacture 70% of its defence equipments, it would have to bring in innovative and creative reforms by increasing focus on R&D both by DPSUs and private contractors. While on the one hand, DPSUs cannot be privileged to enjoy monopoly, on the other hand, private contractors too will have to look at business from a long term perspective without being risk averse. Also the focus of our defence economy must shift from acquisitions to developing capabilities by becoming an active part of the global supply chain. The sector must strategize through effective synergy between both government and private players to focus on R&D on components in denial list rather than investing on R&D on developing capabilities across spectrum.

India today is at a major crossroads with opportunities beckoning at its doorsteps. While, the government has put in place certain processes to incentivize the industry; it is also an opportunity for the industry to strategize and effectively leverage off the defence procurement cycle.

India today is at a major crossroads with opportunities beckoning at its doorsteps. While, the government has put in place certain processes to incentivize the industry; it is also an opportunity for the industry to strategize and effectively leverage off the defence procurement cycle. The approach will necessarily have to be multi-pronged by utilizing both the inherent skills and capabilities of the DPSUs and synergising with the capacity of the private contractors. The private contractors on the other hand will have to participate from 'cradle to the grave' and develop a culture to support the equipment through its life cycle.

While private contractors would expect macro economics reforms through tax holidays; financial assistance, better procurement procedures and transparent defence industrial strategy; at the same time contractors will have to aspire for financial independence through better management ethics, financial practices and integration with the global supply chain. As a strategy, the private contractors entering the domain of defence production could consider the *'civil route'* through joint ventures by first becoming '*home markets*' for the civil aviation sector and subsequently, few of these contractors could step into the defence aviation industry. The civil aircraft industry in India is expected to generate capacity to absorb more than 1300 aircraft in the next two decades. The experience of private contractors in civil aircraft production would help them leapfrog as 'Raksha Udhyog Ratnas' (RUR) and compete with existing DPSUs. The bottom line is that the opportunity is up for grabs and capacity for growth is humongous. Whilst private contractors cannot afford to be risk averse at this juncture, they would have to show greater character; interest and concerns pertaining to matters of national and international security to win the confidence of the government. Like in the past, the private sector had been an integral part of India's growth story, in the same way, it has to show the same grit and determination to become an inseparable part of the Indian defence industrialization process. Innovation and technology will become major factors affecting India's security dilemma and therefore India will have to enhance expenditure on R&D from the present 0.9% of GDP to at least a level of 2-3% of GDP.

Sports are a reflection of culture and quality of institutions prevalent in the country. India has shown a level of consistency since 1980 Olympics, where it won a solitary gold in hockey and 10metres air rifle in 2008; whilst China during the same period China stepped up to 51 top podium finishes! Certainly there is a correlation, thus, India need to upgrade the quality of institutions evident from the gap in technology competitiveness between India and China which has widened six folds over the past five years. The Indian system is and continues to be plagued with poor infrastructure, inefficient bureaucracy and absence of tax and regulatory incentives; which have been identified as major impediments in attracting business in India. As a result, India has slipped to 56th rank while China has jumped to 26th according to the Global Competiveness Report (GCR)[6]! Hence, the story emerging is that opportunities in the defence sector are knocking at India's doorsteps in midst of *western disturbance*. However, if India fails to capitalise, then they would be *Gone with the Wind* to be swallowed by the dragon, which is not only waiting but

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appears to be well prepared to absorb and integrate it into its own system.

China's defence industry is on an upward trajectory with perceptible fall in arms imports and substantial rise in exports to countries like Pakistan, Iran, Egypt, Myanmar, Sudan and North Korea. China however continues to rely on the advanced countries for designs and technologies and therefore the donor countries will have to be extremely cautious in sharing technology before China not only catches up but snatches substantial chunk of pie from the European and Russian arms market. China's defence capabilities continue to grow with the pace of growth accelerating by the decade. The balance of arms trade in all probability appears to be shifting in favour of China, which in a decade or two could not only emerge as leading arms exporter but also as a cradle for future science and technology.

Notes

1 "The India World's Largest arms Importer Outguns China in Weapons Purchase Due to Lack of Indigenous Industry",*Times of India,* March 20, 2012

2 Youngxiang Lu ed., *Science& Technology in China: A Roadmap to 2050*, Chinese Academy of Sciences, (Science Press, Beijing,2010)

3 James Wilson and James Keeley, China: The next science superpower, the Atlas of ideas: Mapping the new geography of science, *Demos Publication* (2007),at http://www.naider.com/upload/82_china_final.pdf, accessed on March 22, 2012

4 Air Cmde Jasjit Singh, *Indian Aircraft Industry* (KW Publishers, New Delhi, 2011), pp.81

5 SRI is the ratio of indigenous content of defence procurement to total expenditure on defence procurement in a given financial year. According to G Balachandran, 'In Defence of our Defence R&D', *Indian Express*, May 21, 2010

6 Sheila Mathrani, *"S*witzerland tops, India, US slide in competiveness" *Times of India*, September 8, 2011

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