Aerospace: Productivity & Efficiency Benchmarking

In this section various parameters that are critical to achieve competitiveness in the manufacturing sector are studied along with progression of India vis-à-vis competing countries on the competitiveness protocol

Detailed benchmarking results are formulated below:

Cost Structure

A major disadvantage that India faces in the context of aerospace manufacturing is the availability of appropriate grade raw materials, whether it is metals like aluminium and titanium or plastics and composites among many others. In the absence of the availability of such critical raw materials, the sector is dependent on imports. Key to cost savings is the ability to develop manufacturing processes using more labour than automation while ensuring quality standards.

There has been a significant shift in the type of raw materials that are being used in airframe structures. The composition of materials used in aircraft manufacturing is migrating towards new advanced materials. The use of composite materials is rapidly becoming a mainstay since they result in lower maintenance costs; make the aircraft lighter and more fuel efficient. The demand for composites in the aerospace market is expected to grow in future. Currently, almost all raw materials are being imported by Indian suppliers.

The U.S aerospace industry is the largest in the world and the industry continued to show reasonable strength in 2011 despite the lingering effects of global economic downturn. Major players include Boeing, UTC, Raytheon Company, Northrop Grumman and Lockheed martin. The private sector aerospace manufacturing workforce I 2008 earned an average wage of US$79,700, or about 47% more than the annual average manufacturing wage in USA.

On the other hand, India's skilled labour wage rates are almost 60% lower as compared to USA and European countries like France or Germany. India also has strong competitive advantage by way of availability of a large low cost engineering and skilled talent pool

Productivity

Indian companies are primarily tier-3 suppliers. Most manufacture parts per specifications provided, with limited focus on design and development. Further, there are few companies in this segment, as the component industry is fairly new. Likewise, several Indian information technology firms have been operating in the aerospace sector over the past few years. These firms have been providing low end design and integrated software development services to major aircraft companies. So, on an overall basis the overall value addition by Indian companies is low as compared to competing countries.

India has a disadvantage in terms of low labour productivity in the sector. Extensive training is required to become DERs (Direct Engineering Representatives) for Boeing-related work and Authorized Signatories for Airbus-related work. Both in terms of quality of education and relevance of course, there

is much that needs to be done to truly exploit India's huge demographic advantage**.** Also in the manufacturing segment labours lack the required skills such as production planning, supply chain management, quality, and maintenance. Further, India has very strict labour laws as compared to competing countries like China which impacts overall labour productivity. China's labour policies are perceived as more employer friendly than India's labour policies. As a result, there are reported issues of long absenteeism from work, lower levels of efficiency in work, and other issues which impact overall productivity of the labour force.

However, in MRO production India offers cost advantages that vary in magnitude across the value chain. According to a survey by PWC, savings are highest for IT and systems implementation activities in the value chain. Cost savings can range between 15 to 25% for manufacturing, depending on the type of component. These savings are expected in labour intensive processes with import of raw materials. In fact, in some cases local sourcing of raw materials and parts can increase the cost savings by an additional 10 to 20%. The low costs of production ultimately transform into increased productivity.

Process Time

Process time is a very important parameter for competitiveness as it is indicative of the overall time a firm uses for production and reach to the target market. Countries which are able to achieve faster turnaround time and have quicker time to market will enjoy competitive advantage in the market.

Indian stands at a point of disadvantage in terms of average time to production as well as average time to market as compared to the competing countries. The former is lower because of several reasons like: Less working hours in India, inconsistency in raw material availability, lower labour productivity, inconsistent power supply and lower order size.

There is lack of a developed robust infrastructure in terms of availability of land, which is a major problem faced by MRO players, quality power and water. All these factors lead to a delay in the production process.

Public sector enterprises such as DRDO and HAL have developed capabilities in most parts of value chain, but they still struggle to master some high end technologies. The rest of the industry is short of technological capabilities and experience. Hence most of the business can be characterized as low tech and low volume.

Quality Accreditition

Quality accreditation is an important parameter for competitive advantage as it would enable a firm to increase its market reach. Most of the buyers use quality accreditation as a parameter to evaluate a supplier and in some cases has a mandate to buy only from firms with desired accreditation. Further, quality accreditation has direct impact on productivity as it would require tightening up of processes and giving away inefficiencies.

AS9100 is a widely adopted and standardized quality management system for the aerospace industry. It was released in October, 1999, by the Society of Automotive Engineers and the European Association of Aerospace Industries. AS9100 replaces the earlier AS9000 and fully incorporates the entirety of the current version of ISO 9000, while adding additional requirements relating to quality and safety. Major

aerospace manufacturers and suppliers worldwide require compliance and/or registration to AS9100 as a condition of doing business with them.

Getting international air worthiness certifications for processes and parts has been a challenge for India-based suppliers. It is also a deterrent for OEMs to outsource some of their components to India since the approval for parts made in India can sometimes take too long and become cost inefficient (when their logistics costs are also considered).

Quality assurance and reliability are essential in aerospace technologies due to stringent requirements of weight-to-strength considerations and the need for highly reliable systems. The industry works on a zero defect target. While Indian manufacturing has improved significantly in quality control, a mature supplier base is still developing in India and the inability of smaller suppliers to keep abreast with the rising quality issues could become a problem for the Indian aerospace companies.

Capacity Utilisation

Capacity utilization is a metric used to measure the rate at which potential output levels are being met or used. Displayed as a percentage, capacity utilization levels give insight into the overall slack that is in the economy or a firm at a given point in time and refers to the extent to which an enterprise or a nation actually uses its installed productive capacity. Thus, it refers to the relationship between actual output that 'is' produced with the installed equipment and the potential output which 'could' be produced with it, if capacity was fully used.

Technology expertise was ranked as the most critical challenge faced by the Indian companies. India needs to keep pace with the increasingly high use of technology across the design lifecycle. Foreign companies are reluctant to transfer cutting edge technologies with limited management control in the Indian entity and in the past, have given licenses for older technologies. In case of Tier-3 suppliers especially, which are generally small family-owned businesses in US and Europe, there is little incentive to transfer know how or invest in local Indian companies.

In the field of advanced materials, novel processing and material characterization methodologies are still not fully developed .Also, in the MRO sector technology for repair and maintenance of composite and metallic parts for still underutilized.

Currently, there is a technology gap in Indian aerospace industry as compared to developed nations as the Indian aerospace industry lacks strong supply chain. This is the primary reason for under-utilization of capacity of Indian firms.

System Improvement

This section would examine the extent of innovation and technology being employed by the firms which would lead to overall improvement in production systems and have direct impact on productivity and ensure sustainability of the same in long run.

Till recently, the Indian aerospace industry has been dominated by government owned R&D organizations and aircraft development and manufacturing units, which are primarily focused on domestic defence needs. Not a lot of work has been done in India for the aerospace industry, and the private sector likewise has done little for Indian aerospace.

The aviation industry requires advanced, high-quality products that are produced at the minimum possible cost. Simply having cheap labour available is in most cases not sufficient to be competitive. The technologies for the most advanced products, such as turbine blades, composite materials, and complete integrated systems, are closely held by the companies that developed them. Designs and production technologies for other types of products may be more widely available or easier to develop, but here, the key is being able to produce them with sufficient precision, quality, and efficiency to be competitive.

Foreign firms have played an important role in the development of China's capabilities in these areas. Local firms in China have acquired the knowledge that comes from repeatedly manufacturing the same product and from being forced to continuously improve quality and cost-efficiency in order to remain competitive.

Manufacturing and R&D joint ventures have provided additional opportunities for Chinese firms to learn. In a manufacturing joint venture, the foreign partner typically supplies the production design and management expertise, while the Chinese partner provides the facility and labour. Thus, the Chinese partner has an opportunity to learn how to efficiently produce a line of products it was previously unable to produce.

On the other hand, French Aerospace industry, whose competitiveness has been founded through numerous European cooperation programs, is renowned throughout the world. The industry is involved in all sectors, with a significant impact on R&D, growth and the creation of jobs. French aerospace companies invest more than 15% of their turnover in R&D activities, which is more than their counterparts in other major competing countries. Sectors in which French research excels include propulsion and combustion, composite materials, aerodynamics, acoustics and embedded electronics and IT systems.

Similarly, in USA aerospace industry, research & development activities lies at the core of the America's technological leadership. In USA, Government and companies have invested in the necessary research, development, and commercialization of next generation technologies and materials to support the U.S. aerospace industry. In the United States, every state supports aerospace manufacturing at some level and is eager to attract the high-level business investment and good-paying jobs aerospace provides.

While the number of engineering students graduating every year is very large, an issue that arises is their lack of employability. Consequently, companies have to invest significantly to make fresh recruits "industry-ready" with the right kind of skills and training. For instance, extensive training is required to become DERs (Direct Engineering Representatives) for Boeing-related work and Authorized Signatories for Airbus-related work. Both in terms of quality of education and relevance of course, there is much that needs to be done to truly exploit India's huge demographic advantage.

On the other hand, competing countries selected for benchmarking, i.e. USA, France and Germany have paid emphasis on the aerospace industry through consistent programs and policies that support a robust aerospace economic sector. Adequate measures are provided to ensure that the aerospace workforce has the skills and training that are vital to the aerospace industry by promoting education and workforce development programs that prepare them for careers in the aerospace industry.