Critical Analysis of Productivity of Indian Defence MSMEs

A Dissertation submitted to the Panjab University, Chandigarh for the award of Master of Philosophy in Social Sciences, in partial fulfilment of requirement of Advanced Professional Programme in Public Administration (APPPA)

By

Air Commodore Karthikeyan Natarajan
(Roll No 4817)

Under the guidance of

Dr Sachin Chowdhry

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CERTIFICATE

I have the pleasure to certify that Air Commodore Karthikeyan Natarajan has pursued his research work and prepared the present dissertation titled "Critical Analysis of Productivity of Indian Defence MSMEs" under my guidance and supervision. The dissertation is the result of his own research and to the best of my knowledge, no part of it has earlier comprised any other monograph, dissertation, or book. This is being submitted to the Panjab University, Chandigarh, for the purpose of Master's in Philosophy in Social Sciences in partial fulfilment of the requirement for the Advanced Professional Programme in Public Administration of Indian Institute of Public Administration (IIPA), New Delhi.

I recommend that the dissertation of Air Commodore Karthikeyan Natarajan is worthy of consideration for the award of M.Phil. degree of Panjab University, Chandigarh.

(Dr Sachin Chowdhry)
Indian Institute of Public Administration
I.P. Estate, Ring road, New Delhi-110002

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DISCLAIMER

The findings, interpretations, views, and conclusions in the dissertation are those of the author and should not be attributed in any manner to any authority, organisation or individual.

March 2023 Air Cmde N Karthikeyan

TABLE OF CONTENTS

ABSTRACT

The success of government of India's ambitious 'Make in India' flagship initiative is dependent on the contribution of the Small and Medium Enterprises (SMEs) which performs the role of ancillary units for large manufacturing plants. As defence equipment become more technology intensive, SMEs need to raise their bar and graduate to become a source of innovation and become reliable supplier for defence supply chain.

India has attempted to meet the defence requirement through licensed production, joint ventures (JV) with foreign original equipment manufacturers (OEM), transfer of technology (ToT) and concurrently progressed indigenous Research and Development (R&D) to acquire and absorb critical defence technologies. Also, offset clause obligation was imposed on Global buy category purchases that required foreign vendors to invest 30% of the acquisition cost in Indian market. Defence Micro Small and Medium Enterprises (MSME) has not been able to propel the defence production and indigenisation to the desired extent. Productivity of defence MSMEs has been impeded due to different factors that includes problem related to availability of funds, access and assimilation of technology, quality of infrastructure, inability to leverage government schemes, availability of skilled manpower, testing facilities and certification and qualification issues etc. Few of these factors were put to primary research based tests in order to ascertain the truth.

There is a definite need to support non-defence MSMEs entering this sector to safely navigate the stringent operational compliances and regulatory requirements which are a

hallmark of the sector. The factors that impact the productivity of defence MSMEs have been studied and remedial measures suggested. The effectiveness of government schemes was examined. This paper recommends additional measures that may be considered for implementation by Government of India (GoI) for propelling MSME growth in the defence manufacturing sector.

LIST OF ABBREVIATIONS / ACRONYMNS

AHSP	Authority Holding Sealed Particulars
ALH	Advanced Light Helicopter
APC	Armoured Personnel Carrier
ARRV	Armoured Repair and Recovery Vehicle
AS	Aerospace Standards
ASQR	Air Staff Qualitative Requirements
ASWC	Anti Submarine Warfare Corvette
ASEAN	Association of South East Asian Nations
AVANI	Armoured Vehicle Nigam Limited
AWE	Advanced Weapons and Equipment Ltd
A&D	Aerospace and Defence
BG	Bank Guarantee
BMCS	Bi Modular Charge System
CCI	Competition Commission of India
CEMILAC	Centre for Military Airworthiness and Certification
CGTMSE	Credit Guarantee Funds Trust for Micro and Small Enterprises
CII	Confederation of Indian Industries
CNC	Computer Numerical Control
CPSE	Central Public Sector Enterprises
DAP	Defence Acquisition Procedure
DDP	Department of Defence Production
DGAQA	Directorate General of Airborne Quality Assurance
DGQA	Directorate General of Quality Assurance

DISC	Defence India Startup Challenge
DPSU	Defence Public Sector Unit
DPP	Defence Procurement Procedure
DRDO	Defence Research and Development Organisation
ED	Electrophoretic Deposition
EMI	Equated Monthly Instalments
E&Y	Ernest and Young
FCCI	Federation of Indian Chamber of Commerce
FDI	Foreign Direct Investment
FY	Financial Year
GDP	Gross Domestic Product
GeM	Government e Market
GERD	Gross Expenditure on Research and Development
GoI	Government of India
GSDP	Gross State Domestic Product
GST	Goods and Service Tax
HAL	Hindustan Aeronautics Limited
IACCS	Integrated Air Command and Control System
IAF	Indian Air Force
IDDM	Indian Designed Developed & Manufactured
iDEX	Innovation for Defence Excellence
INS	Indian Naval Ship
IOP	Indian Offset Partners
IPR	Intellectual Property Right

IT	Information Technology
JV	Joint Venture
KRA	Key Result Area
LC	Local Certificate
LCA	Light Combat Aircraft
LD	Liquidated Damage
LTPP	Long Term Perspective Plan
MAFI	Modernisation of Airfield Infrastructure
MBPV	Medium Bullet Proof Vehicle
MBT	Main Battle Tank
MDA	Market Development Assistance
MHA	Ministry of Home Affairs
MLU	Mid Life Upgrade
MMP	Mentor Mentee Program
MNC	Multi National Company
MOQ	Minimum Order Quantity
MoD	Ministry of Defence
MRO	Maintenance Repair and Overhaul
MSE	Micro and Small Enterprises
MSME	Micro Small Medium Enterprises
MTCR	Missile Technology Control Regime
NABL	National Accreditation Board for Testing and Calibration Laboratories
NBFC	Non Banking Financing Companies

NPA	Non Performing Assets
NSG	Nuclear Supplier Group
NSS	National Sample Survey
OEM	Original Equipment Manufacturer
OF	Ordinance Factory
OFB	Ordnance Factory Board
OPV	Offshore Patrol Vessel
PMEGP	Prime Minister Employment Generation Programme
PPP	Public Private Partnership
PSU	Public Sector Units
PTA	Pilotless Target Aircraft
QMS	Quality Management System
RQ	Research Question
R&D	Research and Development
SA	Scientific Advisor
SAE	Society of Automotive Engineers
SAM	Surface to Air Missile
SDR	Software Defined Radio
SGST	State Goods and Services Tax
SIDM	Society of Indian Defence Manufacturers
SIPRI	Stockholm International Peace Research Institute
SME	Small and Medium Enterprises
SP	Strategic Partnership
SRI	Self Reliance Index

TDF	Technology Development Fund
TIDE	Technology Incubator Development for Entrepreneur
TNDIC	Tamilnadu Defence Industrial Corridor
ToT	Transfer of Technology
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicle
VARTM	Vacuum Assisted Resin Transfer Moulding
VFJ	Vehicle Factory Jabalpur
VMC	Vertical Machining Centre
WLR	Weapon Location Radar
ZED	Zero Defect Zero Effect

CHAPTER 1

INTRODUCTION

India is realizing its potential in becoming one of the leading economies in the world in the light of a positive political and economic scenario. The Micro, Small & Medium Enterprises (MSME) segment is playing a significant role in realizing this objective. MSMEs are considered as backbone of Indian economy. In recent years, the significance of MSME has been recognized for its significant contribution in achieving various socio-economic objectives, economic growth, employment generation, encouraging entrepreneurship and aid exports. According to Annual report of Ministry of MSME 2021-22, "the Micro sector with 630.52 lakh estimated enterprises accounts for more than 99% of total estimated number of MSMEs. Small sector with 3.31 lakh and medium sector with 0.05 lakh estimated MSMEs accounts for 0.52 % and 0.01 % of total estimated MSMEs, respectively. Out of 633.88 estimated numbers of MSMEs, 324.88 lakh MSMEs (51.25%) are in the rural area, and 309 lakh MSMEs (48.75%) are in the urban areas". On the job creation front, employment as per data available in the National Sample Survey (NSS) 73rd round conducted during the period 2015 – 16, "MSME sector has been creating 11.10 crore jobs (360.41 lakh in Manufacturing, 387.18 lakh in Trade and 362.22 lakh in other Services and 0.07 lakh in Non-captive Electricity Generation and Transmission) in the rural and the urban areas across the Country". The micro sector with 630.52 lakh estimated enterprises employed 1076.19 lakh persons, which account for around 97% of total employment in the industry. The small sector with 3.31 lakh and the medium sector with 0.05 lakh estimated MSMEs employed 31.95 lakh (2.88%) and

1.75 lakh (0.16%) persons of total employment in the MSME sector, respectively (Ministry of MSME Annual report 2021-22)

Defence MSMEs

Defence MSMEs are those which provide product support to Defence Public Sector Units (DPSU), Defence Research and Development Organisations (DRDO), and armed forces. "Achieving self-reliance in defence technology has been a national goal pursued by India from the mid-1960s" (Kevin, 2017). "The importance of developing critical technologies in the defence sector was first highlighted by the committee headed by Dr APJ Abdul Kalam, the then Scientific Advisor (SA) to Government of India on 27 October 1993. The report stated that this would act as a safeguard against technology denials by developed countries and that 'technology power will raise the nation to a position of greater strength, militarily and economically'. The committee, underscored the need to improve India's Self-Reliance Index (SRI) from 30% in 1992 to 70% by 2005" (Indian Defence Review, 21 Feb 23). Though we are far from achieving this SRI goal, the above stated endeavour has resulted in entry of large number of MSMEs (approximately 10000), more than 50 private firms, DPSUs and 41 Ordnance factories, manufacturing defence equipment. According to the reply given in Rajya Sabha by MSME Minister "there has been an increase in the number of MSME vendors supplying the Defence Public Sector Units (DPSUs) from 7,591 in FY18 and 8,643 in FY19, the number went up to 10,506 till Quarter 2 (Q2) FY20. By December 2021, the total MSME count in defence PSUs had spiked to 12,000" (Financial Express, 01 Aug 22)

Defence Indigenization Challenges

India has attempted to meet the defence requirement through licensed production, joint ventures (JV) with foreign original equipment manufacturers (OEM), transfer of technology (ToT) and concurrently progressed indigenous Research and Development (R&D) to acquire and absorb critical defence technologies. Also, offset clause obligation was imposed on Global buy category purchases that required foreign vendors to invest 30% of the acquisition cost in Indian market. Despite these efforts the defence MSMEs have not been able to capitalise and achieve desired indigenisation level. "A combination of factors like ability to assimilate technology, financing problems, test facilities, skill development for manpower, regulatory guidelines and inadequate product prototype facility have been a hindrance in realising the defence sector MSMEs growth potential" (Patel S K and Tripathi R 2022).

Impact due to Pandemic

The MSMEs sector has been one of the most vulnerable sectors during pandemic because of its size, scale of business and availability of financial resources. "An average 11% decline in business volume of Indian MSMEs has been recorded because of lockdown in 2021 in comparison to 46% decline during nationwide lockdown in year 2020" (Times of India, 21 Oct 2021).

Based on the representations from MSME associations and to give a boost to the sluggish economy, the Ministry of Micro, Small and Medium Enterprises (MSME) rolled out various programmes/ MSME schemes for the development and promotion of MSMEs across the country. To provide immediate relief to the MSME sector, various

announcements (in addition to the various MSME schemes) have been made under the Atmanirbhar Bharat Package (Ministry of MSME website) as follows: -

(a) "INR 3 lakh crore collateral-free automatic loans for MSMEs to buy raw material, meet operational liabilities and restart businesses

(b) Revision of MSME definition to extend maximum benefits to the sector

(c) Disallowing global tenders in procurements up to INR 200 crore to create attractive opportunities for domestic players

(d) Clearing of MSME dues by the Government and Public Sector Units (PSUs) within 45 days."

Schemes announced by Government of India. Apart from the Atmanirbhar package few of the relevant schemes for defence MSMEs are listed below from the ministry of MSME website: -

(a) **"**Schemes for credit and financial assistance for MSMEs

(i) PM Employment Generation Scheme. Financing: The maximum cost of the project/ unit admissible under manufacturing sector is Rs.25 lakh and under business/service sector is Rs.10 Lakh.

(ii) Credit Guarantee Trust Fund for MSMEs. Collateral free lending to Micro and Small Enterprises through banks and financial institutions.

(c) Credit Linked Capital Subsidy for Technology Upgradation

(b) Schemes for skill development and training

(i) A Scheme for Promotion of Innovation Rural Industrialization and Entrepreneurship, Entrepreneurship and Skill Development Programme. Create new jobs, promote entrepreneurship culture, facilitate business solutions, and promote innovation.

(c) Scheme for marketing assistance

(i) Market Development Assistance. A flexible, growth stimulating and artisan-oriented Market Development Assistance (MDA) scheme.

(d) Scheme for technology upgradation and competitiveness

(i) MSME Champions scheme.

(aa) MSME-Sustainable, Zero Defect Zero Effect (ZED) practices.

(ab) MSME-Competitive (Lean), implementation of Lean Tools and Techniques.

(ac) MSME-Innovative (for Incubation, Intellectual Property Rights (IPR), Design and Digital MSME).

(ii) Technology & Quality Upgradation Support

(iii) National Manufacturing Competitiveness Program

(e) MSME Cluster Development Programme

(f) Entrepreneurial and Managerial Development of SMEs through Incubators and Technology Incubator Development for Entrepreneur (TIDE)."

Statement of Problem

A country that wants to become a regional power should build a platform for a domestic and globally competitive defence industry. India is currently one of the countries that imports the most conventional defence hardware. Roughly 60 percent of India's defence requirements are met through imports (SIPRI, 11 March 2019). With the appropriate kinds of governmental interventions, India has the potential to become a major worldwide hub for supply chain sourcing, software development, and defence research and production. For these major efforts to be successful, notably the "Make in India" initiative, the Small and Medium Businesses (SMEs) sector is essential because it provides a sizable portion of the ancillary units for massive industrial facilities. If SMEs can graduate to become dependable suppliers for the defence supply chain and emerge as

a source of innovation, they would be able to meet aspirations for a technologically advanced India.

India has achieved significant self-reliance in the production of weaponry and equipment for the Navy, including the manufacturing of aircraft carriers, nuclear submarines, radars, etc. But, the Air Force and Army till date significantly rely on imported equipment. The Army and Air Force do not procure as many indigenously developed equipment as that of imported equipment. A number of factors, including technological shortcomings, gaps in the marketplace, and the perceived superiority of foreign items, contribute to this. Only by changing one's fundamental perspective can the existing order be altered. The primary reliance on the import route for technology acquisition means that, as of yet, "Make in India" for defence has not significantly changed. The procedure is time-consuming, there is a general reluctance among technology leaders to share critical technologies with Indian partners, and there is a relative inability of the Indian counterparts to absorb and upgrade the technology.

In May 2015, the Ministry of Defence established a Committee of Experts, headed by Shri Dhirendra Singh, to develop a framework for "Made in India" policy and make recommendations for the necessary changes to DPP 2013. The committee delivered its findings, in which it noted that MSMEs, who are involved in supply chains, manufacture about 80% of the components, aggregates, and assemblies of complex weapon systems and aircraft. The research also noted that there are about 6,000 MSMEs operating all over the nation that provide parts and subassemblies to the DRDO, commercial businesses, Ordnance Factories (OFs), and DPSUs. The few Original Equipment Manufacturers

(OEMs) that dominate the global defence industry closely coordinate with SMEs and their prime contractors.

Because of its very nature, MSMEs confront specific problems. Two factors present them with fierce competition: imports and the larger, more established firms on the market. Because of these, MSMEs are forced to innovate and either fill the market gap left by the larger firms with new products or services, or they must cut costs and simplify operations to compete on an even playing field with them.

With a few notable exceptions, the MSME sector in India is characterised by a lack of technology, which is seen as a major disadvantage in the developing global market. In light of import competition, many MSMEs would consequently face challenges to their viability. The MSMEs are found in industrial parks that date back many years, operate in cities, or have sprung up haphazardly in rural areas. Such areas have poor and unreliable infrastructure, including roads, water, power, etc. India has a vast population, but the formal skilled labour needed for manufacturing, marketing, servicing, etc. continues to be lacking. In order to implement Industry 4.0, it is important not only to upskill existing workers but also to find qualified candidates for the design and development of new goods and procedures.

Defence MSMEs potential to propel the industrial growth has not been as much as desired. Productivity of defence MSMEs has been impeded due to different factors that includes problem related to availability of fund, access and assimilation of technology, quality of infrastructure, inability to leverage government schemes, availability of skilled

manpower, testing facilities and certification and qualification issues etc. This study aims to analyse the issues behind the inability of defence MSMEs to live up to their potential.

Objectives

The research objectives are as follows: -

(a) To examine the factors affecting the productivity of Indian Defence MSMEs.

(b) To assess the efficacy of government schemes in enhancing the productivity of Indian defence MSMEs.

Research Strategy and Design

Research Methodology is based on Quantitative and Qualitative research. Research design is exploratory in nature conducted primarily through review of available literature including reports /articles on the subject by the Ministry of MSME, research articles in the subject area and report of expert study groups of MSMEs in India. Data from the survey of the MSME firms involved in the defence sector has been utilized to understand the performance of the sector and also the perception of the industry on the lacunae that inhibits the participation of the sector in the defence industry.

Rationale

The results are expected to be of interest to the Government, Policy makers, MSMEs, banking and financial institutions, Industry, and the members of the eco-system and economists.

Research Questions.

Research questions relevant for the study are given below: -

(a) What is the effect of following on productivity of Defence MSMEs: -

(i) Assimilation of technology

(ii) Infrastructure availability

(iii) Quality of skill development program and availability of skilled manpower.

(iv) Test facilities and

(v) Quality certification (Quality Assurance and Air worthiness certification)

(b) What is the performance of different schemes of government of India for defence MSMEs?

(c) What is the impact of government schemes on above mentioned factors (sub para (a)) affecting productivity?

Scope

The MSME sector is grouped (as per activity) by 73rd NSS survey into four main categories which are manufacturing, trade, other services and electricity. The scope of current study would be limited to the manufacturing sector with emphasis on defence industry technologies. Information and data on defence industrial and technical capabilities due to security considerations, availability of policy makers and key stake

holders (Govt of India, Army, Navy, Airforce, DRDO and Industry leaders) for interview and limited availability of detailed data due to sensitivity of the subject matter would also be the other limitation. Also, government schemes announced during the last five years and applicable to defence MSMEs only have been considered.

Research Methods and Data Sources

A set of research questions was formulated and served to the target defence MSME industry segment (50 MSMEs) distributed across the country to respond in a 5-level Likert Scale. Questions seeking qualitative response was also included. The instrument of collecting primary data was structured questionnaire in google form. The uncorrelated stratified random sample responses was quantitatively analysed for their acceptance/ rejection. Secondary data comprised research papers published by eminent authors with regard to the capability and limitations of the MSME sector in India, data from periodicals/professional literature. Interviews with stakeholders like DRDO project directors, Director Indigenisation Air Headquarters, senior executives of HAL and BEL, MSME representatives, bank managers, senior officials of DGAQA and CEMILAC provided insight into the problems faced by the stakeholders.

Hypotheses Formulation. From the literature review, the key factors / attributes affecting productivity of defence sector MSMEs were identified and hypotheses formulated for test. The null hypotheses and alternate hypotheses to test are stated below:

Hypothesis - 1

H_{10} (Null Hypothesis) – Ability to assimilate technology is not a concern.

H_{1A} (Alternate Hypothesis) – Ability to assimilate technology is a concern.

Hypothesis 2

H_{20} – Adequate infrastructure available for production requirement.

H_{2A} – Adequate infrastructure not available for production requirement.

Hypothesis 3

H_{30} – Skilled manpower available for production requirement

H_{3A} – Skilled manpower not available for production requirement.

Hypothesis 4

H_{40} – Quality assurance activity does not hinder productivity.

H_{4A} – Quality assurance activity hinders productivity.

Hypothesis 5

H_{50} – Airworthiness clearance activity does not hinder productivity.

H_{5A} – Airworthiness clearance activity hinders productivity.

Hypothesis 6

H_{60} – MSME Champion scheme helpful in enhancing productivity

H_{6A} – MSME Champion scheme not helpful in enhancing productivity

Chapter Scheme. The chapter scheme is as given below: -

(a) Chapter 1: Introduction. This chapter provides background of the subject, an overview of defence MSMEs and the problems encountered by them post COVID lockdown and salient schemes introduced by government for MSMEs. It outlines the problem statement, research objective, research questions, scope and limitations.

(b) Chapter 2: Literature Review. This chapter gives a detailed review of the existing literature on the subject and research papers published on the subject.

(c) Chapter 3: Government Policy Initiatives and Outlook for Defence Sector MSMEs. In this chapter a summary of government policy initiatives for rejuvenating MSME sector and an overview of defence sector MSME and their future opportunities is brought out.

(d) Chapter 4: Indigenization Challenges. This chapter brings out the drivers and challenges for Maintenance Repair Overhaul (MRO) of military equipment.

(f) Chapter 5: Factors affecting Defence MSME productivity. Various factors impacting productivity are brought out.

(g) Chapter 6: Research Findings. Summary of research findings is presented.

(h) Chapter 7: Recommendations and Conclusion

CHAPTER 2

LITERATURE REVIEW

The literature review was carried out to ascertain the various factors that are affecting the realization of growth potential of MSMEs and various problems and challenges faced by the MSMEs were examined. There are more than 50 literatures in this topic and endeavour is made to present the extract of literature summary on few of the relevant MSME topics here.

(a) Balbadra K and Kalidas K (2019) in their article have examined the whole extent of defence production with respect to strategic electronics for our scenario and have discussed various factors that would aid India to become a nodal centre for research and development of cutting edge technology and systems. The paper proposes that DPSUs and DRDO should concentrate on high end technologies and system integration while encouraging the MSME sector to be part of the whole supply chain in the development of mission critical technologies. The MSMEs need to maintain close association with the Research and Development (R&D) and academia in the development of niche technologies that would create a vibrant eco system for defence manufacturing.

(b) Biswas K (2006) has explained airworthiness philosophy, certification and concurrent development process. Process for design approval has been elaborated. With quantum jump in the design and development activities, it has been extremely difficult for the regulatory bodies to cope up with the demand of

certification. Delegating this responsibility to a few approved firms has proven to be very effective in maintaining the design control through approved agencies and personnel. According to the expert committee's judgement, more than 50 enterprises have already received clearance for their designs. They cover a wide range of topics, including the development of hardware with embedded software, avionics, electrical and instrument design, software verification and validation, structural design, and computational fluid dynamics analysis. Due to these approvals, a portion of the project work can now be delegated, freeing up the main contractor to focus on turnkey projects.

(c) Chopade K and Lad Jagruti (2016) in their article had identified the challenges facing the MSMEs operating in defence sector as access to finance / debts, access to markets, access to information and business development services, non-recovery of receivables from large scale buyers and increased competition from international and private sector companies. Certain challenges highlighted by study conducted by Federation of Indian Chamber of Commerce (FCCI) had brought out basic infrastructure availability, access to recent technologies and regulatory challenges. The authors have identified current MSME participation and the required level of participation. To bridge the gap they have recommended formation of public private partnership and formation of SME clusters, streamlining information access points, aggregating sources across three services (army, navy and air force) and streamlining would result in low cost and would be profitable for SMEs, exclusive procurement from MSMEs by Defence Public Sector Units (DPSU), government support for skill development for MSME employees, enabling technology transfer for MSME from DRDO labs,

formation of special body to look into financing aspects of MSMEs and leverage IT base of India.

(d) Das S P (2019) analyses the existing capability of defence industry. India must restructure not only its armed forces (by lowering military manpower), but also the organisations and structures that support them, including the Ministry of Defence (MoD), DPSUs, Ordnance Factories, DRDO, Directorate General of Quality Assurance (DGQA), and Defence Accounting Department. It must overhaul its entire defence R&D and production infrastructure. Therefore, it becomes crucial to fully advance indigenization and expand the capacities and capabilities of India's indigenous defence industrial base. This will therefore assist in meeting domestically the needs of the defence forces for the modernization and upgrading of military systems and equipment. Resultantly, it will help reduce India’s huge import bill and will also assist in the growth of many other ancillary industries and in generation of employment in the country.

(e) Dash J P and Kumar D (2018) in their article state that Given that a significant portion of the ancillary units for big manufacturing plants are produced in this sector, the success of flagship initiatives, like the "Make in India," depends on the small- and medium-sized business sector. If SMEs can graduate to become dependable suppliers for the defence supply chain and emerge as a source of innovation, they would be able to meet aspirations for a technologically advanced India. The primary reliance on the import route for technology acquisition, the lengthy process, the general reluctance of technology leaders to share critical technologies with Indian partners, and the relative inability of Indian counterparts

to absorb and advance the technology are the reasons why "Make in India" for defence has not yet made a significant difference. The transformation required is enormous, necessitating support from the government as well as proactive effort from MSMEs in maximising opportunities through various defence corridor and DPP initiatives (DPP). With certain exceptions, the MSME sector in India is characterised by low levels of technology, which is a significant disadvantage in the developing global market. In light of import competition, many MSMEs would consequently face challenges to their viability. The biggest barriers to technology adoption in SMEs are inadequate technology adoption, lack of knowledge of beneficiaries, lack of advice and reliable support from governmental organisations, and unfamiliarity with technology. The performance of SMEs is primarily boosted by tailoring research and technology transfer to the requirements of research-driven SMEs, providing access to markets, financing, and venture capital, strengthening the regulatory environment, and lowering costs and burden for SMEs.

(f) Dash M M and Mishra B B (May 2021) in their article analyse the MSME issues in general. This paper outlines the growth of MSMEs and outlining the opportunities available for the MSMEs in the Indian economy. Authors bring out the close link between growth of Indian economy and various factors like Digital India, Make in India, Public Procurement Policy, Indigenization, Skill India, Infrastructure, Regulatory, funding etc. Also, areas to be focused to strengthen MSME sector like focus on latest technology, market accessibility, infrastructure availability, mentoring support, credit accessibility, simplification of government and bank procedures and a sound exit policy has also been proposed. Authors

recommend steps that need to be taken for Strategic intervention and growth of MSMEs.

(g) Kant R and Agarwal P (2021) in their article have analysed government policies and legal position in regard to the status of Micro, Small and Medium Enterprises from the perspective of the Competition Act, 2002, especially with respect to their cartel behaviour. MSMEs are currently not specifically excepted from the scope of the Competition Act of 2002 by any particular legal provision. Yet, several government initiatives encourage collaboration between MSMEs. In other nations, small businesses are more or less exempted under the guise of de-minimis. De-minimis cartel is applicable when cooperation between MSMEs has an insignificant effect on market. A similar solution may be considered to support MSME to resort for cartel without violating Competition Commission of India (CCI) provisions. Government measures encouraging MSMEs' cooperation require consideration, ideally through a review of the Competition Act of 2002's legislative provisions.

(h) Kavitha S and Selvmohana K (2021) in their article have measured the utilization of government schemes and initiatives by small and medium scale enterprises in Tuticorin district particularly from manufacturing sector. According to their survey, the majority of respondents (29%) have profited from the Prime Minister Employment Generation Programme (PMEGP) initiative and have gained exposure to new machinery by taking part in various government activities. According to the study's findings, the majority of MSMEs profited from government initiatives and were able to boost their productivity.

(i) Mukherjee S (2018) in her article has analysed the case of Indian Coir Industry, a traditional export-oriented industry facing tough competition from the other synthetic products produced by its rivals. According to the export trend over the past five years, there hasn't been a significant increase in the export value. Competition can be improved through technology. Technology and export competitiveness, as well as pathways for technology transfer, have been the subject of some theoretical analysis. The potential of MSMEs will be reduced by the lack of adequate technology, which will also result in decreased sales, a transition to better quality (from competitors), and a decrease in profit margin (sometimes loses). Through raising awareness, applying best practises, creating (indigenous technology), and collaborating on technology with other countries, there should be a major emphasis on incorporating new age technology. Author concluded by stating that "more efforts in the form of higher investment in advanced technology and research and development, higher usage of digital and technology enabled platform, transfer of technology, more investment in human resources, improved access to finance, reduced infrastructural gaps, lesser stringent business regulations can help in improving the competitiveness of the MSMEs"

(j) Patel S K and Tripathi R (2022) in their article have stated that based on secondary data, MSMEs have issues with finances, marketing, technology, human resources, operations, the potential for exports, a lack of strategic management, financial literacy, and talent retention. Poor-quality products, a lack of foreign quality certifications, inefficient logistics, weak bargaining power, informational and infrastructure gaps, complex laws, policy uncertainty, etc. are

some of these issues. Others include complicated documentation, lack of consultancy support, need-based research programmes, lack of the newest technological skills, low ICT literacy, lack of motivation, high employee attrition, and lack of the latest technological skills. In order to establish the truth, some of these crucial elements were subjected to initial research-based examinations. Several of the factors were not taken for research-based tests and these has been identified as research gaps.

(k) Patel S K and Tripathi R (2022) in their article analyze the techno-economic status of Indian industry, the reality of technology adoption, and the degree of success of organisations focused on technology like the government-funded Defense Research and Development Organization. The complexity of ToT, the availability of a sufficient technology base and skilled labour, the level of support from domestic technology intensive / R&D organisations, MSMEs' contribution to innovation and technology absorption, and the cost of global ToT are assessed as the factors affecting the success of global Transfer of Technology (ToT) to India for defence electronics. It is determined that the complexity and high cost of global technology transfer are the main causes of India's substandard global ToT in the area of defence electronics. A significant technical base, skilled labour, substantial domestic R&D organisation assistance, and a sufficient level of innovation and technology absorption capabilities among MSMEs are few of the encouraging facts that have been established.

(l) Prakash P (2016) in his article has brought out the likely changes that could materialise with the new Defence Procurement Procedure DPP-2016. The

article brings out the transition of the country from raw material supplier during colonial period, Non-Aligned period antagonising the west, Technology denial regime (NSG, Wassenaar Arrangement, Australian group, MTCR) denied access to modern technology to our defence Industries. Also, R&D in defence technology and scientific research received lesser attention. DPSUs and OF did not benefit from technology transfer. Lack of competition and monopoly of defence market led to complacency and left little room for product innovation, technology upgradation and export promotion. The article brings out the successful projects undertaken by private industry since introduction of 'Make" option in DPP. The author proposes Public Private Partnership (PPP) as a viable model to build partnership between public and private sector units. According to the author, the public sector should serve as a catalyst for the development of the private sector's skills and should be viewed and regarded as a partner rather than a rival.

(m) Dr Ramana A V and Nandeeswaraiah (2019) in their article have brought out an overview on the performance of MSMEs and their effect on thirteen sectors to furthering of GDP, rise of output, employment generation and overcoming the regional imbalances. The article analyses the various challenges faced by the MSMEs and brings out the various tangible and intangible contributions of the MSME sector. It recommends that the government should continue to provide financial and infra-structure support and encourage collective bargaining towards strengthening of the GDP of the economy.

(n) Ritu R (2021) in her article has brought out dichotomy between traditional MSME clusters and newly established cluster in the context of their emergence, evolution and growth. The analysis indicated that the Kanpur Nagar District has the potential to become the engine of cluster-based economic growth, hence it has been chosen as a resource region. The study examines the regional economy's underlying principles, innovation's comparative advantages, and market technology aspects that have contributed to the expansion and sustainability of the MSME cluster in Kanpur Nagar District.

(o) Thomas K T (2006) in his article has brought out the essential features of an effective Quality Management Service (QMS). There have been discussions on a number of current QMS standards for the defence aerospace industry, including QCSR: 2002 (DGAQA, India), Def Stan (MOD, UK), ISO, AQAPs (NATO), and Society of Automotive Engineers (SAE) aerospace standards (AS). To fulfil the needs of the industry and regulatory bodies, the existing standards have undergone evolution, relevance assessments, and reviews to highlight their unique characteristics. The study concludes that SAE-AS-9100 is the most suitable standard (Rev B). When followed, the standard will fully satisfy both the regulatory authority's and the Indian defence aeronautical supply organisations' QMS requirements with the appropriate revisions to include the regulatory requirement of assistance for government quality assurance. Minor reorientation of the regulatory functions and inclusion of the QMS in the defence aeronautical supply orders are also suggested.

Literature Summary

The literature survey unambiguously brings out that the following remain a challenge for MSMEs:

(a) Financing

(b) Technology

(c) Skilled manpower

(d) Testing facilities

(e) Quality and certification

(f) Infrastructure

Accordingly, research questions were formulated around these themes for the conduct of primary research, through stratified random survey of a pre-designed questionnaire among the sample population.

CHAPTER 3

GOVERNMENT POLICY INITIATIVES AND OUTLOOK FOR DEFENCE SECTOR MSMES

Introduction.

By introducing and actively supporting the "Made in India" initiative in the defence sector over the past few years, the Indian government has constantly shown its dedication to the advancement of domestic defence design, development, and manufacturing capabilities. Through a number of policy changes and reforms, which on the one hand lower entry barriers and simplify the process of teaming between foreign OEMs and Indian entities, and on the other, promote indigenously designed, developed, and manufactured (IDDM) products and move towards level playing fields across segments of Indian Industry, significant progress has been made towards this goal. The Government of India recently announced the establishment of defence corridors, the introduction of a Strategic Partnership model, the simplification of export procedures, and the liberalisation of Foreign Direct Investment (FDI) procedures, among other initiatives. These initiatives include a number of business reforms in the defence procurement procedure that demonstrate a strong commitment to ground-breaking reforms. Additionally, the government has adopted regulations for the development of a defence industrial ecosystem that fully integrates and skill-ups the workforce in the field of Micro, Small, and Medium-Sized Businesses. Although major private businesses have started to get increasingly involved in the development of defence manufacturing capabilities across the tiers of the supply chain, this only serves to emphasise the criticality of MSMEs in the production and life cycle support of the defence industry.

Increasing the participation of MSMEs in the defence supply chain is one of the primary goals of the Make in India initiative of the Indian government. This will increase the nation's defence self-reliance and support the expanding defence exports market. MSMEs are an important part of every economy. With thousands of high-quality products, mostly at the sub-system and component level, MSMEs already make a substantial contribution to the defence manufacturing industry. According to MoD press release PRID 1884817 dated 19 Dec 22, "Our defence industry is now capable of manufacturing wide variety of high-end requirements e.g. Tanks, Armoured vehicles, Fighter aircrafts, Helicopters, warships, Submarines, Missiles, Electronic equipment, Special alloys, special purpose steels, and variety of ammunition. Rapid progress has been made towards achieving complete Aatmanirbharta in the manufacturing of defence equipment required by our Armed Forces within the country. As a result of these initiatives, many State-of-the-art products including 155 mm Artillery Gun system 'Dhanush', Light Combat Aircraft 'Tejas', Surface to Air Missile system 'Akash', Main Battle Tank 'Arjun', T-90 Tank, T-72 Tank, Armoured Personnel Carrier 'BMP-II/IIK', Su-30 MK1, Cheetah Helicopter, Advanced Light Helicopter, Dornier Do-228, High Mobility Trucks, INS Kalvari, INS Khanderi, INS Chennai, Anti-Submarine Warfare Corvette (ASWC), Arjun Armoured Repair and Recovery Vehicle, Bridge Laying Tank, Bi-Modular Charge System (BMCS) for 155 mm Ammunition, Medium Bullet Proof Vehicle (MBPV), Weapon Locating Radar (WLR), Integrated Air Command and Control System (IACCS), Software Defined Radios (SDR), Lakshya Parachute for Pilotless Target Aircraft, Opto Electronic Sights for Battle Tanks, Water Jet Fast Attack Craft, Inshore Patrol Vessel, Offshore Patrol Vessel, Fast Interceptor Boat, Landing Craft Utility, 25 T Tugs, etc. have been produced in the country during the last few years.".

Role of Defence Sector MSMEs

According to Dhirendra Kumar committee report, "MSME contribution is approximately 80% in the defence projects. As much as 50% of the manpower engaged in manufacturing in India is engaged in MSMEs. However, the MSME units within the country are not fully integrated like the chambers in developed nations". "The value addition by the MSMEs in India is also comparably low. Therefore, despite having immense potential, in terms of know-how and technical expertise, lack of clear policy and organised hand-holding has prevented the full exploitation of MSMEs".

The robustness of supply networks, in which MSMEs are tightly entwined, is the foundation for the defence and aerospace industry's capabilities and viability. Around the nation, a significant number of MSMEs provide parts, subassemblies, and systems to the Defense Public Sector Undertakings, Ordnance Factories, Defense Research and Development Organization, and private sectors. Government has been putting special focus to provide special incentives to MSMES in the policies; be it Offsets[1], MAKE Procedure[2], reservation in procurements. Interaction with vendors and concerned

[1] Offset Policy - According to this, any capital acquisition categorised as "Buy (Global)" or "Buy and Make with Transfer of Technology (ToT)", with a value of INR 2000 crores or more the OEMs are required to discharge a minimum of 30% of the contract value as offsets . The offset discharge can be done through 06 different avenues such as direct purchase of defence products, FDI to Indian enterprise, ToT to Indian enterprise, ToT/Transfer of equipment to government institutions and Technology acquisition by DRDO.

[2] Make Projects - Subcategories under the Make category of Make-I and Make-II are funded by the government and the industry respectively. Under the Make-I category, projects with estimated cost of prototype development phase not exceeding Rs. 10 crore and cost of subsequent procurement not exceeding Rs. 50 Cr/year based on delivery schedule at the time of seeking AoN will be earmarked for MSMEs subject to meeting selection criteria such as rating of SME-4 or above and positive net worth. Similarly, in the MakeII category, projects with prototype development phase not exceeding Rs. 3 Crore and cost of subsequent procurement not exceeding Rs. 50 Crore/year based on delivery schedule at the time of seeking AoN, will be earmarked for MSMEs and there are no commercial or financial criteria for such earmarked projects. However, if no MSME for Make-II and at least two MSME for Make -I do not express interest then the projects may be opened for all enterprises along with preference given to MSMEs over non MSMEs during the selection stage.

stakeholders are organized regularly at various levels to understand their issues and decisions are taken to address their concerns.

Government Policy Initiatives

Revision of MSME Classification. The union cabinet of India took a significant decision in the year 2018 and modified the basis of categorizing the MSMEs. The erstwhile MSME classification was based on the criteria of investment in plant and machinery or equipment. So, to enjoy the MSME benefits owners were constrained to limit their investment to a lower limit, as mentioned below: -

Table 3.1: Earlier MSME Classification

Sector	Criteria	Micro	Small	Medium
Manufacturing	Investment	< Rs 25 lakh	< Rs 5 crore	< Rs 10 crore
Services	Investment	< Rs 10 lakh	< Rs 2 crore	< Rs 5 crore

These lower limits were providing incentives to keep the business small. In order for them to continue expanding their operations and receiving MSME benefits, there was a long-standing need for the reform of the MSME classification. Under Atmanirbhar Bharat Abyan, the government has updated the MSME categorization by adding composite criteria that take annual turnover and investment into account. The MSME definition has also eliminated the divide between manufacturing and services. With its removal, the manufacturing and service sectors are treated equally. The following is the updated MSME classification, which is based on the yearly turnover and investment when determining an MSME, according to the MSME ministry's website.

Table 3.2: Revised MSME Classification

Criteria	Micro	Small	Medium
Investment and Annual turnover	< Rs 1 crore and < Rs 5 crore	< Rs 10 crore and < Rs 50 crore	< Rs 50 crore and < Rs 250 crore

Source: Ministry of MSME website accessed on 23 Feb 23

The revision of MSME classification allows for further scaling of business and also increases a healthy competition among businesses.

Additionally, after the introduction of GST, it would be simpler for the controlling and supervising entities to conduct a more accurate and objective valuation of the revenue and business of a project and micro, small, and medium-sized businesses than it would be to value the assets used by an organisation in its plant, equipment, and tools. The action made to amend the MSMED Act, 2006 is a step in the right direction and has a positive impact on the businesses that are categorised as micro, small, and medium enterprises.

Summary of Announcements: Aatma Nirbhar Bharat Abhiyaan

According to PRS legislative research website accessed on 10 Mar 23, the summary of announcements of Aatma Nirbhar Bharat Abhiyan is appended below

"On May 12, the Prime Minister, Mr. Narendra Modi, announced a special economic package of Rs 20 lakh crore (equivalent to 10% of India's GDP) with the aim of making the country independent against the tough competition in the global supply chain and to help in empowering the poor, labourers, migrants who have been adversely affected by COVID. Following this announcement, the Finance Minister, Ms. Nirmala Sitharaman,

through five press conferences, announced the detailed measures under the economic package. This note summarises the key measures proposed under the economic package.

Government Reforms

Policy Highlights

- **Increase in borrowing limits:** The borrowing limits of state governments will be increased from 3% to 5% of Gross State Domestic Product (GSDP) for the year 2020-21. This is estimated to give states extra resources of Rs 4.28 lakh crore. There will be unconditional increase of up to 3.5% of GSDP followed by 0.25% increase linked to reforms on - universalisation of 'One Nation One Ration card', Ease of Doing Business, power distribution and Urban Local Body revenues. Further, there will be an increase of 0.5% if three out of four reforms are achieved.[5]
- **Privatisation of Public Sector Enterprise (PSEs):** A new PSE policy has been announced with plans to privatise PSEs, except the ones functioning in certain strategic sectors which will be notified by the government. In strategic sectors, at least one PSE will remain, but private sector will also be allowed. To minimise wasteful administrative costs, number of enterprises in strategic sectors will ordinarily be only one to four; others will be privatised/ merged/ brought under holding companies.[3]

Measures for businesses (including MSMEs)

Financial Highlights

- **Collateral free loans for businesses:** All businesses (including MSMEs) will be provided with collateral free automatic loans of up to three lakh crore rupees.[1] MSMEs can borrow up to 20% of their entire outstanding credit as on February 29, 2020 from banks and Non-Banking Financial Companies

(NBFCs). Borrowers with up to Rs 25 crore outstanding and Rs 100 crore turnover will be eligible for such loans and can avail the scheme till October 31, 2020. Interest on the loan will be capped and 100% credit guarantee on principal and interest will be given to banks and NBFCs.

- **Corpus for MSMEs:** A fund of funds with a corpus of Rs 10,000 crore will be set up for MSMEs. This will provide equity funding for MSMEs with growth potential and viability. Rs 50,000 crore is expected to be leveraged through this fund structure.[1]
- **Subordinate debt for MSMEs:** This scheme aims to support to stressed MSMEs which have Non-Performing Assets (NPAs). Under the scheme, promoters of MSMEs will be given debt from banks, which will be infused into the MSMEs as equity. The government will facilitate Rs 20,000 crore of subordinate debt to MSMEs. For this purpose, it will provide Rs 4,000 crore to the Credit Guarantee Fund Trust for Micro and Small Enterprises, which will provide partial credit guarantee support to banks providing credit under the scheme.[1]
- **Schemes for NBFCs:** A Special Liquidity Scheme was announced under which Rs 30,000 crore of investment will be made by the government in both primary and secondary market transactions in investment grade debt paper of Non-Banking Financial Companies (NBFCs)/Housing Finance Companies (HFCs)/Micro Finance Institutions (MFIs). The central government will provide 100% guarantee for these securities. The existing Partial Credit Guarantee Scheme (PCGS) will be extended to partially safeguard NBFCs against borrowings of such entities (such as primary issuance of bonds or commercial papers (liability side of balance sheets)). The first 20% of loss will be borne by

the central government. The PCGS scheme will facilitate liquidity worth Rs 45,000 crores for NBFCs.[1]

- **Employee Provident Fund (EPF):** Under the PM Garib Kalyan Yojana, the government paid 12% of employer and 12% of employee contribution into the EPF accounts of eligible establishments for the months of March, April and May. This will be continued for three more months (June, July and August). This is estimated to provide liquidity relief of Rs 2,500 crore to businesses and workers.
- **Statutory PF contribution:** Statutory PF contribution of both the employer and employee will be reduced from 12% to 10% each for all establishments covered by EPFO for next three months. This scheme will apply to workers who are not eligible for the 24% EPF support under PM Garib Kalyan Package and its extension. However, Central Public Sector Enterprises (CPSEs) and State Public Sector Units (PSUs) will continue to contribute 12% as employer contribution.[1]"

"Policy Highlights

- **Expediting payment of dues to MSMEs**: Payments due to MSMEs from the government and CPSEs will be released within 45 days.[1]
- **Insolvency resolution**: A special insolvency resolution framework for MSMEs under the Insolvency and Bankruptcy Code, 2016 will be notified.
- **Disallowing global tenders:** To protect Indian MSMEs from competition from foreign companies, global tenders of up to Rs 200 crore will not be allowed in government procurement tenders.[1]
- **Reduction in TDS and TCS rates:** The rates of Tax Deduction at Source (TDS) for the non-salaried specified payments made to residents and Tax Collected at Source (TCS) will be reduced by 25% from the existing rates. This reduction will

apply from May 14, 2020 to March 31, 2021. This is estimated to provide liquidity of Rs 50,000 crore.[1]

- **Ease of doing business for corporates:** Direct listing of securities by Indian public companies in permissible foreign jurisdictions will be allowed. Private companies which list Non-Convertible Debentures (NCDs) on stock exchanges will not be considered listed companies. NCDs are debt instruments with a fixed tenure issued by companies to raise money for business purposes. Unlike convertible debentures, NCDs cannot be converted into equity shares of the issuing company at a future date.[3]

Legislative Highlights

- **Definition of MSME:** The definition of MSMEs will be changed by amending the Micro, Small and Medium Enterprises Development Act, 2006. As per the proposed definition, the investment limit will be increased from Rs 25 lakh to Rs 1 crore for micro enterprises, from Rs 5 crore to Rs 10 crore for small enterprises, and from Rs 10 crore to Rs 20 crore for medium enterprises. A new criteria of annual turnover will be introduced. The turnover limit for Micro, Small and Medium enterprises will be Rs 5 crore, Rs 50 crore, and Rs 100 crore, respectively. The current distinction between manufacturing and services MSMEs (to provide different investment limits for each category) will be removed.[1]
- **Initiation of insolvency proceedings:** The Insolvency and Bankruptcy Code, 2016 will be amended to provide for the following: (i) minimum threshold to initiate insolvency proceedings will be increased from one lakh rupees to one crore rupees; (ii) suspension of fresh initiation of insolvency proceedings up to one year, depending upon the pandemic situation; (iii) COVID-19 related debt

will be excluded from the definition of 'default' under the Code for triggering insolvency proceedings.[3]

- **Amendments to Companies Act, 2013:** The Companies Act, 2013 will be amended to provide for the following:[3]

    i. Certain offences under the Companies Act, 2013 will be decriminalised. These include minor technical and procedural defaults such as shortcomings in CSR reporting, inadequacies in Board report, filing defaults, delay in holding of AGM. Several compoundable offences will be shifted to internal adjudication mechanism.[3]

    ii. Currently, certain provisions from the Companies Act, 1956 continue to apply to producer companies. These provisions will be included in Companies Act, 2013. The National Company Law Appellate Tribunal (NCLAT) will be granted powers to create additional/specialised benches. All defaults by small companies, one-person companies, producer companies, and start-ups will be subject to lower penalties".

Public Procurement Policy Amendment Order - 2018

The public procurement policy for Micro and Small Enterprises (MSEs) Amendment Order, 2018 increased the minimum limit of procurement from MSMEs for all central PSU to 25% (https://msme.gov.in/public-procurement-policy accessed on 10 Mar 23). The salient features of this policy as per the website are: -

- "Every Central Ministry /Department / PSUs shall set an annual target for 25% procurement from MSE Sector.

- A sub-target of 4% out of 25% target of annual procurement earmarked for procurement from MSEs owned by SC/ST entrepreneurs.
- Overall procurement goal of minimum 25% has become mandatory from 1st April 2015.
- Special provision for Micro and Small Enterprise owned by women. Out of the total annual procurement from Micro and Small Enterprises, 3 per cent from within the 25 per cent target shall be earmarked for procurement from Micro and Small Enterprises owned by women.
- Tender sets free of cost and exemption from payment of earnest money to registered MSEs.
- MSEs quoting price within price band L-1 + 15%, when L1 is from someone other than MSE, shall be allowed to supply at least 25% of tendered value at L-1 subject to lowering of price by MSEs to L-1.
- 358 items are reserved for exclusive procurement from MSEs.
- Ministry /Department/CPSUs shall prepare their annual procurement plan to be uploaded on their official website.
- For enhancing participation of MSEs in government procurement, Ministry /Department/CPSUs shall conduct Vendor Development Programmes or Buyer Seller Meets for MSEs especially for SC/ST entrepreneurs.".

According to sambandh website of ministry of MSME, "MoD has mandated the public sector entities, which includes 09 DPSUs and 41 factories under OFB, to outsource 25% of their work to the private sector especially MSMEs. The overall opportunity basis the target of 25% procurement is ~INR 3,000 crore per year (USD 500 million per year) only for the MSMEs". MoD procurement details for FY 2022-23 is given below: -

Table 3.3: Ministry of Defence Procurement details for FY 2022-23

S.No.	Name	Total Annual Target (Crore)	Achieve -ment (Crore)	Target MSEs(25%) (Crore)	Achieve ment (Crore)	Target For SC/ST MSEs(4%) (Crore)	Achieve ment (in Crore)	Target For Women MSEs(3%) (Crore)	Achieve ment (Crore)
1	Department of Defence	427.0000	517.9290	106.7500	310.7528	17.0800	31.7394	12.8100	4.3210
2	Department of Defence Production	12635.0485	13777.1458	3158.7600	5222.4125	505.4000	61.1705	379.0500	249.0157

Source: https://sambandh.msme.gov.in/DepartmentWiseReport.aspx accessed on 09 Mar 23

The offset rules and policies reassuring investments

Government of India introduced an innovative offset policy (MoD guidelines on Defence Offset, 2012) to encourage various investments in the defence sector. The prime function of the offset policy was included in the defence acquisition procedure. The main objective was to attract the investment for defence manufacturing from overseas as well as domestic considering micro small and medium enterprises. The guidelines of the offset reformation are made quite flexible for sales, the Indian offset partners have allowed some alterations in the offset components as well as in the signed agreement. Apart from these significant deliveries, the foreign original equipment manufacturers were allowed to deliver the details of the various Indian offset partners and services and amenities after signing the agreements.

Aiming toward bringing more efficiency and transparency into the discharge process and the offset information the offset portal was created in May 2019. Incentivization includes multiplying the purchased content of the products related to the defence sector. The main focus is on the micro small, and medium enterprises which need to be multiplied up to 1.5 times the original. Furthermore, the various investment has been provided with incentives through more multiplication under the discharge of the offset information which includes the defence manufacturing multiplied by 1.5 times and the defence industrial corridor which is multiplied to 2 times the original and before the reformation.

There was no settlement strategy for the disputes that have been found in the contract of the offset policies. The portal related to the offset policies has benefitted with lots of improvements which include online auditing service of the different clients related to offset discharge, the faster dispensation of the entitlements, better accountability, efficiency as well as transparency in the whole positive, the introduction of the settlement mechanism of the disputes through the independent monitoring system.

The overseas dealers who have to fulfil offset responsibility will consume an extensive source of the probable Offset Partners of India (IOPs) out of the micro, small, and medium enterprise subdivisions to select from. This ought to benefit the MSMEs since the overseas contractors favour indicating them as Indian Offset Partners for the reason of the different advantages obtainable to them if they indicate micro, small, and medium enterprises as their Indian Offset Partners. The extensive base of the MSME also progresses the projections of progressively more Make in India initiatives as well as projects being commenced and accepted through these initiatives as developments with

growth price up to rupees three crores in addition to rupees ten 10 crores held in reserve considering the Make-I and Make-II subcategories correspondingly.

Foreign Direct Investment Policies for Defence MSMEs

According to MoD PRID – 1844610 dated 25 Jul 2022, "the Government of India has enhanced Foreign Direct Investment (FDI) in Defence sector up to 74 percent through the automatic route for companies seeking new Defence industrial license and 15 up to 100% by Government route wherever it is likely to result in access to modern technology".

The various companies and organizations that are trying to acquire the industrial license have the ability to bring the foreign direct investment in the Defence sector which is up to 74 percent considering the automatic route. The prevailing approval holders of the foreign direct investments need to provide a statement within the thirty days of alteration in the stockholding pattern and equity. The flow of foreign direct investments has increased profoundly over years. According to Ministry of Defence PRID – 1654091 dated 14 Sep 20, "As per the data furnished by 80 companies in Defence and Aerospace sector, FDI inflows of over Rs 3454 crore have been reported so far (i.e. till June, 2020) in Defence and Aerospace sectors. Further, out of this, FDI inflows of over Rs 2133 crore have been reported in Defence and Aerospace sector from financial year 2014-15 onwards. ".

Defence Industrial Corridors with respect to the MSMEs

Aiming towards the initiation of the Indian Government considering the Make in India initiative and Atmanirbhar Bharat Abhiyan, the Government of India launched two

defence industrial corridors in Tamil Nadu and Uttar Pradesh to serve as the foundation of financial progression and development in the defence sector considering the country as the base. The twelve different nodes of the defence corridors have been recognized and selected to direct and connect the ultimate potential of manufacturing in the defence sector considering the micro, small and medium enterprises situated all over the country. A large number of private-sector industries are planning and many have already made investments in the defence industrial corridors towards the fulfilment of the Make in India initiative and Atmanirbhar Bharat Abhiyan.

Apart from that, the policy provides infrastructural development while strengthening the ecosystem of some micro small, and medium enterprises. Aiming towards the situation, before the formation of the laws and policies, there was no initiative on interference towards the progress of an all-inclusive defence manufacturing ecosystem. All the states of India have adopted various policies of aerospace and defence to attract assets and investment of capital including certification of the industry, allotment of land, progression of skills as well as capital investment. The improvement also provided the SGST, stamp duty, electricity duty, and taxes considering duty concessions and exemptions.

TNDIC. The Tamil Nadu Defence Industrial Corridor (TN DIC) is a strategic initiative launched by the Government of India to promote indigenous defence production and create a strong defence industrial base in Tamil Nadu. The corridor was launched in January 2019 by Prime Minister Narendra Modi. The TN DIC covers five cities in Tamil Nadu - Chennai, Hosur, Salem, Coimbatore, and Tiruchirappalli. These cities have been selected based on their existing industrial base, technical expertise, and skilled

workforce. The objective of the TN DIC is to attract investments in defence manufacturing and create an ecosystem for research and development, innovation, and skill development in the defence sector (www.tndefencecorridor.in, accessed on 09 Mar 23). The corridor is expected to provide a boost to the Make in India initiative and contribute to the country's self-reliance in defence production. The prevailing companies of the Tamil Nadu defence industrial corridor have furthermore made an investment of 1140 crore rupees. According to Financial Express dated 07 Feb 2023, "The Tamil Nadu Defence Industrial Corridor (TNDIC) has received significant investment from the industry, with 53 organizations and companies investing a total of Rs 11,794 crore (approximately $1.6 billion)". The five cities have created job opportunities both directly and indirectly through this investment. The TN DIC is expected to have a significant impact on the growth of Micro, Small, and Medium Enterprises (MSMEs) in the state. The corridor is expected to provide MSMEs with a host of opportunities to expand their businesses and increase their competitiveness in the defence manufacturing sector.

UPEIDA. The Uttar Pradesh Expressway Industrial Development Authority (UPEIDA) is a government organization responsible for the development of industrial corridors and expressways in the state of Uttar Pradesh, India. The organization aims to promote industrialization and economic growth in the region by providing world-class infrastructure and business-friendly policies (https://upeida.up.gov.in, accessed on 09 Mar 23). The impact of UPEIDA on MSMEs (Micro, Small, and Medium Enterprises) in the region can be significant. UPEIDA's focus on developing world-class infrastructure can benefit MSMEs by providing them with better connectivity, access to markets, and transportation facilities. This can help them reduce their logistics costs, which can lead to improved profitability.

Green Channel Status Policy

The Ministry of Defence launched the Green Channel Policy as a part of Make In India Initiative (DDP letter No-43(5)/2015/D(QA) dated 24 Mar 17). This policy allows manufactures to obtain “Green Channel Certificate” which will self-certify their products supplied to the Defence Services. Green Channel Certificate will provide deemed registration status, waiver of pre-dispatch inspection and acceptance of stores under supplier's guarantee/warranty against the contracts concluded by various Procurement Agencies under Ministry of Defence. By 2027, the Defence Ministry wants to see 70% of weaponry produced domestically, which offers enormous opportunities to business operators. Green Channel Status (GCS) policy has been established to stimulate and promote private sector participation in the defence industry. Given the government's focus on lowering barriers to foreign investment in order to realise India's vision of a "Atmanirbhar Bharat," the growth trajectory of the Indian defence industry continues to be positive.

Negative Import List

“An import embargo on 101 defence items was announced on 9 August 2020. Over a period of five years, the items will be prohibited from being imported” (Indian Express, 11 Aug 2020). “On 31 May 2021 Government of India announced the ban on 108 items that were excluded from early list. This also includes roadmap of five years for the promotion of indigenous. The list was described as "2nd Positive List for indigenisation" by the government. These include weapon systems like artillery guns, assault rifles,

corvettes, transport aircraft, light combat helicopters and even wheeled armoured fighting vehicles" (Business Standard, 22 Feb 2021). Before the reformation of the policies and laws, there were no such recognized and constructive items present. Nevertheless, after the reformation, it benefitted in several aspects which include:

a. Providing a motivation and stimulus towards job opportunities all over the country.

b. This initiative meets the needs and matches with the demand of our Prime Minister Shri Narendra Modi's call 'Vocal for Local'.

c. Provide a good opportunity for the industries related to Indian Defence, together with the private sector, to assemble and procure these objects by means of their innovation, design, and advancement competencies to encounter the necessities of the defence sector in the upcoming times.

IDEX

According to government website, "the Indian government is focussing on innovative solutions to empower the country's defence and security via 'Innovations for Defence Excellence (iDEX)', which has provided a platform for start-ups to connect to the defence establishments and develop new technologies/products in the next five years (2021-2026). Working through partner incubators, iDEX has been able to attract the start-up community to participate in the Defence India Start-up Challenge (DISC) programme".

Make Projects

According to financial express dated 31 Mar 2022, "The government had also introduced 'MAKE Projects' in Defence Acquisition Procedure (DAP) 2020 to facilitate indigenous

design and development of defence equipment both with government funding and industry funding. According to the Make in India portal, “the MAKE Projects have been instrumental in enhancing the role of MSMEs in the defence sector with over 40 per cent of the project sanction orders issued to MSMEs and projects amounting to over Rs 1,000 crores reserved for MSMEs. The government had also set up a Technology Development Fund (TDF) to encourage the participation of MSMEs through a provision of grants in developing technology capability for defence systems”.

Arms Export

India's track record as an arms exporter has been modest due to export restrictions on the manufacturing organisations like OFB. OFB exports Arms and Ammunition, Weapon Spares, Chemicals & Explosives, Parachutes, Leather and Clothing items to more than 30 countries worldwide. “Few of the countries being exported are Thailand, Malaysia, Indonesia, Srilanka, Bangladesh, Germany, Belgium, Turkey, Egyp t, Oman, Israel, Kenya, Nigeria, Botswana, Chile, Suriname and USA” (ddpdpp.gov.in, 06 Jun 2022).

However, due to liberal policies adopted by the government since 2014, there has been a substantial increase in India's defence exports. “According to the latest official data given in the upper house of Indian Parliament - the Rajya Sabha, India's defence export has jumped by 700% in just two years. The export authorisation went up from $213 million in FY 2016–17 to $1.5 billion in FY 2018-19 (April to March period)” (Wikipedia). “The Stockholm International Peace Research Institute has noted that three Indian companies that rank among the top-100 defence companies, viz., Hindustan Aeronautics Limited, Ordinance Factory Board and Bharat Electronics Limited, account

for 1.2% of the defence exports of the top-100 total" (Peri, Dinakar The Hindu 16 Dec 2021). "In March 2011 government of India agreed to sell its first indigenously designed and built multi-role offshore patrol vessel (OPV) named Barracuda, to Mauritius. In March 2017, India finalised a deal with Myanmar for sale of indigenously developed lightweight torpedoes worth US$37.9 million. Similar naval platforms were sold to Sri Lanka and Vietnam as well" (Times of India, 05 May 2015). "In Sep 2017, Advanced Weapons and Equipment India Ltd (AWE) secured its biggest export order from UAE for the supply of 40,000 numbers of 155 mm artillery shells for ₹3.22 billion (US$40 million)" (Mint, 30 Nov 17). " In Aug 2019, AWE received a second order from UAE to supply another 50,000 artillery shells" (The Economic Times, 03 Aug 2019).

The Defence Minister had stated in 2021 that India was ready to export different types of missile systems, Light Combat Aircraft, helicopters, multi-purpose light transport aircraft, warships and patrol vessels, artillery gun systems, tanks, radars, military vehicles, electronic warfare systems and other weapons systems to Indian Ocean region nations. MSMEs in the defence sector are in a good position to take advantage of this export market and profit from it.

Private Defence Industry

In response to Govt initiatives, most of the prominent business houses in the country viz, entered the defence arena and established separate companies for defence production. These companies have also invested in R&D and have entered into JVs with few foreign OEMs. Among the major domestic orders bagged by the private sector, IAF's Modernization of Air Field Infrastructure (MAFI) project valued at Rs 1094 crore bagged

by M/s TPSED, the Indian Army's Self-Propelled Tracked Howitzers contract bagged by M/s Larsen & Toubro in partnership with South Korea's Samsung Tech worth a billion dollars and the Integrated Electronic Warfare Systems for Mountainous Terrain (IEWS-MT) bagged by M/s TPSED at 903 Cr stand out. The policy initiatives for greater role for the private sector resulted in greater share of the private sector in the defence industry.

Outlook for MSMEs in Indian Defence

India's Aerospace & Defence (A&D) sector is a strategically critical sector. Around USD 250 billion in capital spending is anticipated over the next ten years, with a strong focus on "Made in India.". According to MoD PRID-1882700 dated 12 Dec 22, "The Government has taken several policy initiatives in the past few years and brought in reforms to encourage indigenous design, development and manufacture of defence equipment, there by promoting self-reliance in defence manufacturing & technology in the country. These initiatives, inter-alia, include according priority to procurement of capital items from domestic sources under Defence Acquisition Procedure (DAP) 2020". One of the most important industrial segment under "Made in India" to achieve the USD 5 trillion GDP by 2024 has been designated as the A&D manufacturing industry. To increase defence exports, the Ministry of Defence (MoD) has implemented a number of reforms and streamlined processes.. "Defence exports in the country have grown nearly seven folds in last 02 years from INR 1,521 crores in FY17 to 10,745 crores in FY19. India has set for itself an ambitious target of INR 35,000 crores in defence exports to be achieved by FY24" (The Economic Times, 18 Jun 2019).

By encouraging domestic design, development, and manufacturing of defence tools, platforms, systems, and subsystems, new policies are focusing on institutionalising,

streamlining, and simplifying defence procurement processes to support the "Make in India" effort. The draft DPP 2020, defence corridors, and tax incentives are only a few examples of the policy changes that are planned to increase private engagement. To increase private involvement in the defence manufacturing industry, the MoD has also set aside certain contracts for commercial defence suppliers. It has already granted more than 70 defence manufacturing licenses to private enterprises that have showcased an interest in defence manufacturing and as per the new Strategic Partnership (SP) policy[3], the MoD will sign contracts with the Indian firms for some of the critical systems/ platforms. The establishment and application of the "Make I/ II/ III" category & subcategories for defence acquisition has clearly demonstrated the GoI's intention to indigenize production/ manufacture and, more significantly, Indianize Intellectual Property (IP).

Opportunities for MSMEs in Defence Sector

a. **New regulations, "Make-III" and the DPP 2020.** With 8643 MSMEs currently working in the defence sector MoD is pushing for greater participation of MSMEs (MoD PRID – 195106, dated 12 Oct 22). The MoD is actively working towards a higher level of indigenization and has set a goal to engage with over 16,000 MSMEs in

[3] SP Policy – "Government has finalized the policy on Strategic Partnerships in the Defence Sector. The same has been promulgated on 31.05.2017 as Chapter VII of Defence Procurement Procedure (DPP) 2016 as "Revitalising Defence Industrial Ecosystem through Strategic Partnerships". The Chapter has been uploaded on Ministry of Defence website: https://www.mod.nic.in. The Policy is intended to encourage broader participation of the private sector, in addition to DPSUs / OFB, in the manufacture of defence platforms and equipment. The following four segments have been identified for acquisition under Strategic Partnership route Fighter Aircraft, Helicopters, Submarines, Armoured Fighting Vehicles (AFVs) / Main Battle Tanks (MBTs). The Policy will serve to enhance competition, increase efficiencies, facilitate faster and more significant absorption of technology, create a tiered industrial ecosystem, ensure development of a wider skill base and trigger innovation, leading to reduction in dependence on imports and greater self-reliance in meeting national security objectives" (MoD PRID – 1514268).

the next three years. In order to build an ecosystem for technological advancement and innovation in the defence sector, Innovation for Defence Excellence (iDeX), a platform for funding MSMEs, start-ups, and individual innovators, was introduced in 2018. A proposal for the inclusion of iDeX in the defence procurement process was recently approved by the MoD, which will help MSMEs, individual innovators, and nascent start-ups.

Through iDEX, Defence India Startup Challenge (DISC) was also launched in 2018 and through these initiatives the government is aiming to fund 250 startups and "achieve 50 tangible innovations in the next 05 years" (MoD PRID – 1591289, dated 11 Nov 19). The MoD has incorporated changes to the draft DPP 2020 that will support the growth of MSMEs and import substitution. MSMEs would be free to create Joint Ventures (JVs) with international Original Equipment Manufacturers (OEMs) under Make-III for parts, machines, or platforms that are not made in India but are designed abroad. The requirement is that at least 60% of the raw materials used in production must be from within the country.

b. **Component and subsystem manufacturing for DPSUs/ OFBs.** In 2012, the public procurement policy for Micro and Small Enterprises (MSEs) order specified that 20% of the total annual procurement for all central PSUs must be from MSMEs, which was increased to 25%, effective November 2018.

c. **Linkage to the global supply chain of OEMs and offset discharge partnership.** Today's MSMEs in India are able to work with multinational OEMs to join their global supply chain. MSMEs are also looking at options to partner with foreign businesses as

Indian Offset Partners (IOPs) in order to fulfil their offset requirements. According to Society of Indian Defence Manufacturers (SIDM) report (2020) the capabilities broadly being offered by MSMEs as part of the defence manufacturing sector are as follows: -

1." Composites. The growth in composites and allied technology in India has been acknowledged wherein composites have a widescale application in defence along with other commercial applications. Today, India has the capabilities in prepreg moulding, Vacuum Assisted Resin Transfer Moulding (VARTM/ resin infusion, multi-axes filament winding and hand layup. Using these capabilities, the raw materials are being processed into composites like woven carbon and glass-based reinforcements, glass filament manufacturing, epoxy resin manufacturing, higher grade imide and phenol production, high temperature foam manufacturing and so on. India has dedicated plants for manufacturing of resins, reinforcements, fillers, adhesives and consumables for composites.

2. Precision manufacturing. India is home to a plethora of companies in the precision manufacturing space. The manufacturing capabilities currently in India include precision machined parts, mechanical parts assembly, Computer Numerical Controlled (CNC) machining, precision lathe work, complex milling operations in hard metals, cylindrical and surface grinding, electrical discharge machining and, surface treatments and finishing. The manufacturers in India are utilising turning and turn mill centres, vertical, horizontal and 5 axis CNCs to produce thin walls, tight tolerances and intersecting intricate features.

3. Forging and sheet metal work. Capability of Indian companies in the field of forging and sheet metal work has been recognised globally for its high quality. India has the capability to forge variety of raw materials like Carbon steel, alloy steel, stainless steel, super alloy, Titanium and Aluminium. Indian manufacturers have forging capabilities in hot closed dies, open dies, cold closed dies, ring rolling, CNC & VMC machining, gear finishing (hobbing, shaping shaving, broaching), robotic welding, heat treatment, ED painting, tool designing and development.

4. Shipbuilding. Shipbuilding in India, particularly Defence Shipbuilding, has come a long way since its fledgling years, when it began in 1950s. In many warships in services, MSMEs have a played a key role in indigenising and retro fitting many marine grade military components during repair, refit and Mid Life Upgrades (MLU). Some of the thrust areas wherein MSMEs in the manufacturing sector have played and will continue to play a major role include manufacture of shipboard, pipe fittings, valves, electrical switches, panels and fittings, components of motors & pumps, insulating material and rubber components. In the service sector, MSMEs in the subcontracting vendor base of yards have played a key role in pane level hull fabrication / repair, hull outfitting work, painting work, piping & cabling layouts, accommodation space outfitting, installation / repair / overhaul of engineering and electrical equipment etc".

d. **R&D support for DRDO labs**. According to SIDM report, "The DRDO is a key stakeholder in the promotion of MSMEs and boosting indigenous innovation and has taken initiatives for the involvement of the private defence industry. The DRDO has listed

various technologies on its website that are being offered for Transfer of Technology (ToT) to Indian firms for manufacturing. The DRDO has defined these technologies under two categories; Category A as those technologies with military use and Category B as technologies with dual use (military and commercial)". The end- users for Category A technologies can only be Indian Armed Forces/ MHA/ other Government agencies (both central & state). "In January 2018, the DRDO conducted a 2-day defence industry interface where it transferred 18 technologies to MSMEs for production under the 'Make in India' initiative" (DRDO website, News letter March 2018). The event saw participation from more than 1,000 MSMEs. The DRDO has subsequently published a list of equipment on its website that the industry may choose to opt for manufacturing under ToT. According to DRDO website, "apart from the ToT, the DRDO has also set up the Technology Development Fund (TDF) under the "Make in India" initiative. Promoting self-reliance and aimed at creating an ecosystem for supporting MSMEs, the fund will provide financial assistance for the development of cutting-edge technology capability for defence application(s). The TDF will cover the cost of development of the following

1. Significant improvements or developments in the existing products or application.

2. Technology readiness level upgradation from Technology Readiness Level 3 (TRL3) onwards to the realisation of products as per tri-services requirements.

3. Development of futuristic technologies and/ or innovative products which can be useful for defence applications.

4. Import substitution of components whose technologies do not exist with the Indian industry.

Currently, 57 projects have been closed under the TDF scheme, while feasibility for 14 projects is still ongoing. Key projects under TDF that are ongoing or upcoming are listed below": -

Table 3.4 – Key Ongoing Projects under TDF

l No	Service	Project	Present Status
1	IAF	Digital Instantaneous Frequency Measurement (DIFM) unit for Tarang Radar Warning Receiver (RWR) system	On-going
2	IAF	Development of indigenous DIFM unit for R118 RWR system	On-going
3	Navy	VLF loop aerial for underwater platforms	On-going
4	Navy	HF-VLF antenna matrix for underwater platforms	On-going
5	Army	Development of robotic solution for disposal of misfire ammunition	Upcoming
6	IAF	Development of amplidyne	Upcoming

Source: https://tdf.drdo.in accessed on 23 Feb 23

e. **Self-certification scheme for defence public sectors and private vendors.**

The programme, which was launched in May 2019 by Government Notification No. 93244 (2019), was aimed to incorporate quality throughout the manufacturing process and guarantee the high quality of the final product. The plan has been adopted in DDP to allow the producer himself to certify that the quality of their products satisfies industry standards. For the scheme, the DPSUs and private vendors must:

(a) Must consistently have a supplier rating of at least 90%.

(b) Processes should be stable and have a Process Capabilities Index (Cpk) of at least 1.33.

(c) Must have a Quality Management System (QMS) in place that is accredited in accordance with ISO 9001:2015 and any subsequent updates.

(d) Must have a test lab quality system that complies with ISP/IEC 17025 criteria and, ideally, be NABL accredited.

A specific product is given the self-certification status. Companies seeking status must submit an application to the Authority Holding Sealed Particulars (AHSP) along with a list of the products they have delivered during the previous three years. Performance matrices and a thorough QMS assessment report should be on the list. The Directorate General of Quality Assurance issues the self-certificate after the evaluation team reviews the report (DGQA). From the date the certificate was issued, the status is valid for three years. If a quality audit or customer feedback on product quality is unsatisfactory at any moment, it may be cancelled by DGQA after notification.

Outlook Summary

After the clarion call given by our Hon Prime Minister for Atmanirbhar Bharat in May 20, Ministry of Defence has issued several guidelines restricting import of defence equipment and has initiated enabling measures for Make in India with emphasis on defence sector MSMEs. With the opening up of defence production to private sector the outlook for defence sector MSMEs to don the role of tier 2, 3 and 4 suppliers / manufacturers appears promising. With the growing defence exports and increased domestic requirement of defence items due to non-availability of import option defence sector MSMEs need to match up to the challenge of achieving atmanirbharta in defence production through innovation, capacity build-up, technology upgrade, ToT and acquisition of skillset.

CHAPTER 4

INDIGENIZATION CHALLENGES

The security of a nation ultimately rests with the government. Its capacity to outfit its armed forces using its own industrial and technological resources is crucial, especially if a conflict results in the disruption of supply routes, prospective arms supplier sanctions, and urgent armament demands. A strong defence industry also gives a nation strategic clout with other nations, including as a prospective supplier to neighbours who may otherwise buy from rivals. Defense exports can also lower the cost of defence procurement and contribute to a nation's budget for defence; in Israel's instance, exports significantly fund the nation's defence research and development (R&D). For all of these reasons, the indigenization of the defence sector is a crucial and important national security goal, especially for a big nation like India with a developing economy, a range of security threats, and mounting international obligations.

India is one of the biggest consumers of defence equipment, with foreign Manufacturers providing about 70% of our needs. There is a large reliance on foreign OEMs for their sub systems and components, even for the defence products and systems made domestically. This is primarily due to the lack of necessary technologies in the nation and private industry's historical absence from defence production.

Indigenisation and self-reliance have remained a Key Result Area (KRA) of Indian armed forces for the last few decades. As stated in Indigenisation Road map IAF (2016)

“Indigenisation is typically attempted at three distinct levels of complexity viz. System level, subsystem level and MRO spares. These are elaborated below: -

(a) **System Level**. This level typically includes aircraft, engines and systems as a whole. These requirements flow from our Long-Term Perspective Plans (LTPP) and are primarily based on the Air Staff Qualitative Requirements (ASQR). Tejas aircraft, Dhruv helicopter and Kaveri engine projects are a few examples at this level.

(b) **Sub-System Level**. At the second level we have sub systems which can be designed, developed and manufactured in house. At this level, IAF has been able to successfully develop and integrate a large number of sub systems on our aircraft fleets with the active participation of DPSUs, DRDO labs, CEMILAC and a few Indian industries. Some shining examples in this category are the Radar Warning Receivers, Counter Measure Dispensing System and Mission Computers which have been successfully integrated onto a few of our weapon platforms and are performing satisfactorily.

(c) **MRO Spares**. The third and very important aspect of ‘Make in India’ for armed forces is sustenance of aircraft fleets and systems by means of Maintenance, Repair and Overhaul, i.e., MRO. Maintenance of wide range of combat systems of Indian defence forces is a huge challenge primarily due to technological obsolescence coupled with rapidly diminishing product support from the OEM. New inductions have also posed challenges for maintenance staff for timely supply of various spares, tools, testers and ground handling equipment.

Ever increasing costs of spares, dependence on foreign vendors and declining support from various OEMs have led to a more rigorous pursuit of indigenisation of maintenance infrastructure and spares”

The term "indigenization" has evolved over time, and currently it refers to a variety of activities such as reclamation, refurbishment, upgrading, life extension, etc., however the primary goal is still to address maintenance-related problems.

Fig 4.1

Source: IAF Indigenization Manual (2016)

The government also launched a Srijan webpage in August 2020 to provide information on things that can be taken up for indigenization by the business sector, towards easing and accelerating the process of indigenization.. The present status of Indigenisation list updation in Srijan portal is as given below: -

Table 4.1 – Positive Indigenisation List Updation Status in Srijan Portal

Sl No	Details	Number of items Uploaded
1	DPSU's First List	351
2	Second List	107
3	Third List	780

Source – Srijan Portal as on 23 Feb 23 (https://srijandefence.gov.in/About)

The status of the indigenization of each list is as given below: -

Table 4.2 – Status of Indigenisation List

EOI	RFP for DA	Project Sanction Order	Proto-type D&D	Comm RFP	Trial	SO Placement	Other actions	Indi-genised
0	0	21	32	4	29	0	7	258
0	22	8	54	0	11	0	4	8
47	285	71	245	7	45	0	60	20

Source – Srijan Portal as on 23 Feb 23 (https://srijandefence.gov.in/About)

The vendor only needs to scan the QR code for the goods in order to access all the necessary information. Almost 60,000 lines of spare parts have already been locally produced for the Air Force, of which more than 40,000 lines are frequently used. All of these were mostly obtained from MSMEs.

MRO for Sustenance of Defence Equipment

MRO is not a brand-new idea to the IAF or any other defence organisation. IAF BRDs, Army Base Workshops, and Navy Dockyards all carry out the full spectrum of MRO tasks. The following objectives drove the development of these captive MROs:

(a) In the past, defence technology was a luxury, and the private sector lacked the necessary competence.

(b) Low volumes prevented Indian firms from making investments in MRO infrastructure.

(c) Services were constrained by OEM contracts, and ToT to the Indian industry was restricted.

The situation has completely altered recently, and establishing a defence MRO in the private sector is not only possible but also well-facilitated by liberal government policies. For the support and maintenance of weapon systems, the MRO concept is a crucial sector for the Indian armed forces.

The prospects for MRO in defence can be gauged from gauging the drivers and challenges. According to IAF Indigenization Manual (2016), the drivers are:

(a) "Defence budget has been steadily increasing over the years. Increased defence budget augers well for the defence industry and is a driver for Indian industry to invest in this sector.

(b) MRO can effectively utilise and gainfully exploit the offset clause.

(c) Increased FDI permitted by the government can be utilised to enter into JV with foreign companies for a win-win partnership.

(d) Sustained economic growth and political stability

(e) Availability of young and skilled work force and labour cost in India is amongst lowest in the world."

As against these drivers, there are difficult challenges that need to be overcome.

(a) **Technology Absorption**. Defence sector, especially the field of aviation, is technology intensive. In addition to acquiring weapon platforms, we need to have a plan for acquiring technologies in order to be self-sufficient. If technological evolution/acquisition, development, and deployment are not planned in advance, we cannot be successful in defence manufacturing and indigenization. The product life cycle has shrunk in modern times as a result of the accelerated pace of technological advancement and greater sophistication; therefore, it is necessary to speed up product creation as well as boost organisational flexibility. A developing nation has two options for technological development: it can either develop its own technology or import it through foreign direct investment (FDI). According to MoD PRID 18084817 dated 19 Dec 22, few of the successful indigenous technology development are "155 mm Artillery Gun system

'Dhanush', Light Combat Aircraft 'Tejas', Surface to Air Missile system 'Akash', Main Battle Tank 'Arjun', T-90 Tank, T-72 Tank, Armoured Personnel Carrier 'BMP-II/IIK', Su-30 MK1, Cheetah Helicopter, Advanced Light Helicopter". Both these options need to be selected and pursued judiciously. One of the main problems for MRO firms would be absorption of high-end specialist technology with which the aviation sector is connected. The sector would need to build these competencies in terms of the necessary infrastructure and trained and skilled labour.

(b) **R&D Infrastructure**. India is gradually becoming a prominent player in the field of global R&D. While domestic R&D output and investment have increased steadily over the past few years, public investment still makes up more than three-fourths of all R&D expenditures, and increasing Indian industry involvement in R&D remains difficult. Another obstacle for any businesses wishing to participate in Made in India in the defence sector is a strong R&D programme. "Unlike other advanced countries where more than 70% contribution of GERD (Gross Expenditure on Research and Development) comes from the private sector, in India the private sector contribution to GERD is less than 40%" (Business Standard, 10 Aug 2021). Any technology that has potential for use in defence would require a significant commitment of time, money, and human resources to develop. In addition, several countries' governments have export restrictions on defence technology. So, it is essential to identify the long-term capability requirements and to start developing the right technologies in accordance with perspective planning. To become self-sufficient in the defence sector, we must

build the necessary R&D infrastructure and strengthen our nation's R&D capacity.

(c) **Material and Manufacturing Technology**. Lack of the essential materials and manufacturing technology within our country, particularly for aviation items is a problem for MRO in the defence sector. For the fabrication of airborne spares, a significant amount of metallic and rubber raw materials are still imported. But, the bigger challenge is on the subject of materials. The A&D sector has historically presented a challenge that India's expertise in material sciences has not been able to meet. Our inability to comprehend, evaluate, and provide platforms is further hindered by a lack of knowledge in the material sciences. The availability of materials is a constraint in today's world, and it also affects our ability to scale up manufacturing. Beyond that, there has to be a consistent emphasis on R&D in the field of materials sciences. Without a consistent focus on material sciences in research and development, no nation in the world has been able to establish a strong environment for A&D manufacturing. India won't be an exception either to this rule. A clear illustration of this is the failure of the Kaveri engine project for Light Combat Aircraft. The difficult task of building sufficient local proficiency in material sciences holds the key to finding the solution. To do this, industry and university must be much more closely linked to defence research establishments. The nation still lacks certain niche manufacturing technology needed to produce sophisticated defence equipment, particularly in aviation sector. For instance, despite ongoing efforts by DPSUs and the Indian industry, we have been unable to develop aviation grade bearings for our fleet of

aircraft. We would continue to be reliant on foreign suppliers if we didn't develop these technologies ourselves.

(d) **Industry Capability**. There are currently enterprises within our country that have the necessary skills and knowledge to meet the demands of the defence services. With the active assistance of the DRDO, academia, and other scientific organisations in the nation, the industry has to develop some competencies that are specialised to defence, particularly in the aviation sector.

(e) **Economic Order Quantities**. Economy of scale would be one of the main obstacles for defence MROs. The majority of spare parts and components utilised by the three services are made specifically for military use and have no application in the private sector. Although there are many uses for military materials, a single order quantity for any given grade of material is usually quite small. These order amounts are typically lower than the Minimum Order Quantity (MOQ) necessary to maintain a profitable firm. The order quantities remain below sustainable levels since some of these specific grades of material have little to no potential for dual usage. Companies are therefore unable to recoup their investment in building indigenous skills for these critical items (required in small quantities) as compared to commercial application. A private player might not find it economically feasible to invest in such goods since the order quantities are so tiny. For the production of low MOQ items, a whole new model must be developed. To get around this obstacle, MSMEs can band together to build a matrix-style organisation.

(f) **Airworthiness & Quality Assurance.** Due to its very nature of usage, defence equipment in general and equipment for IAF in particular, has to meet highly exacting standards and correspondingly very stringent airworthiness requirements have been laid down. Due to the strict constraints of weight-to-strength considerations and the demand for highly reliable systems, quality assurance and dependability are crucial in aerospace and defence technologies. The industry strives for zero defects. Although the quality control in Indian manufacturing has substantially improved, the country is still developing a mature supplier base, and the inability of SME suppliers to keep up with the escalating quality issues could cause problems for Indian aerospace and defence. There can be virtually no failures and the requirement for strong quality control methods and adequate certification of indigenous products needs no emphasis. The process is pretty well established, and CEMILAC is the organisation that certifies all domestic military aircraft goods. High standards of quality assurance are required at various phases of MRO of aviation products/platforms due to strict airworthiness regulations. DGAQA has been given charge of the Quality Assurance duties at production companies for the IAF. Defence MRO would also need to build the necessary QA infrastructure to meet the extremely strict criteria.

(g) **'Black Box' Design.** It is not always possible to produce domestic alternatives due to a lack of specific technical information, particularly when it comes to Russian systems and components. In these situations, it is necessary to use the "Black Box" development process, in which the item is produced using the component's or system's known input and output. The component to be indigenised is developed from scratch to meet the input and output specifications

because the designer views the system to be indigenized as a "black box" for which the inputs and outputs must be preserved in the new design. In these cases, it is essential for the designer resorting to black box design technique to ensure Form, Fit and Functionality compatibility of the newly designed component with the original component. Development of such items remains a challenge.

According to Dhruva J (2019), “although several high-level committees have been established to address the problem of defence industrial indigenisation, very few of the necessary steps have been taken. In part, this is because India faces a number of dilemmas in trying to reform its defence industry: the normal rules of market economics do not apply; ideal objectives of quality, cost, and timeframes cannot be achieved simultaneously; defence budgets remain susceptible to cuts; the nature of defence supply chains is changing; and little heed has been paid to policies to maximise technological absorption. Moreover, major stakeholders confront their own challenges: India’s powerful defence public sector faces conflicts of interest and is resistant to change; the armed services provide unrealistic qualitative requirements; the Ministry of Defence lacks specialisation; the Finance Ministry discourages long-term spending; and the political leadership lacks expertise and is reluctant to make decisions due to political perceptions”. To address these diverse challenges, efforts should be made to ensure predictable long-term requirements and create a more level playing field between the public and private sectors. Further, a mechanism must be found to ensure predictable capital expenditure, in order to incentivise investment. These steps are essential to address the indigenisation challenges in defence sector.

CHAPTER 5

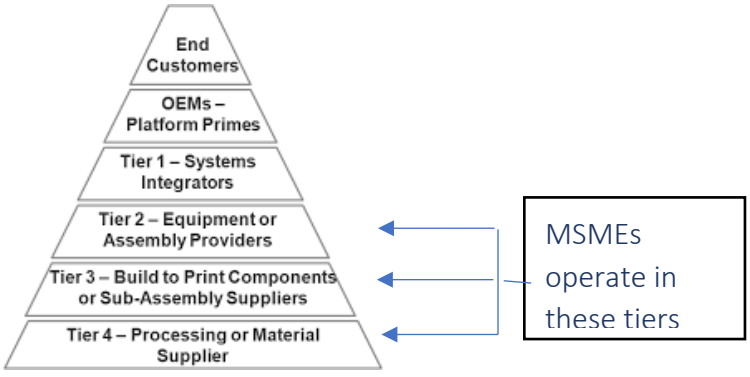
FACTORS AFFECTING DEFENCE MSME PRODUCTIVITY

MSMEs in the defence sector are suppliers of components and subassemblies to the state-owned organizations and the big private sector players. MSMEs make almost 80% components, aggregates and assemblies of complex weapon systems and aircraft. Most of the companies design or integrate the components and only 20% of them make critical components. DPSUs and OFBs generally outsource 20% of their component requirements to private sector companies.

MSME Position in the Defence Supply Chain

MSMEs lie at the bottom of the pyramid of Indian Aerospace and defence supply chain. MSMEs usually act as Tier-2, 3 and 4 suppliers. Tier-1 suppliers provide subsystems to OEMs, tier-2 suppliers provide subassemblies and high value components to tier-1 supplier, tier-3 supplier provides basic components and parts to tier-2 supplier. Tier-4 supplier provide raw material and consumables.

Fig 5.1: MSME Position in Defence Production & Supply Chain



MSME in defence sector in India are usually restricted to fabrication of low-risk high standardisation components and parts.

The analysis of the literature uncovered issues pertaining to marketing, technology, human resources, operations, export potential, insufficient strategic management, financial literacy, and talent retention. Poor-quality products, a lack of foreign quality certifications, inefficient logistics, weak bargaining power, informational and infrastructure gaps, complex laws, policy uncertainty, etc. are some of these issues. Others include complicated documentation, lack of consultancy support, need-based research programmes, lack of the newest technological skills, low ICT literacy, lack of motivation, high employee attrition, and lack of the latest technological skills. In the succeeding paragraphs these factors are discussed in more detail, and some of the more important ones had their veracity tested using primary research.

Factors affecting Productivity of MSMEs in Defence Sector

Financial issues. Access to financing has always been a problem for smaller businesses and firms in the Indian economy. Banks are reluctant when it comes to MSME funding as their financial requirements could be of a low-ticket size, and they are unsure about MSMEs' repayment capabilities. Because of this confidence issue, banks typically apply tight eligibility and approval requirements to grant loans to SMEs. Because MSMEs may not have a credit history, they are considered to be high-risk; They consider such loans a high cost to their business (Dipstick Study on loans to MSMEs by Financial Institutions in India, Ministry of MSME report).

In addition, small businesses often fail to maintain their credit ratings, thus affecting their ability to access MSME loans. Also, the long process of approving MSME loans adds to the dissatisfaction of small business owners. Some businesses fail to keep track of their credit ratings which undermines their ability to get a loan. In addition, standard lending options make it difficult for business owners to meet strict eligibility requirements without the long-term MSME loan approval process which is extremely stressful. Despite the Government's efforts to make corporate debt freely available to small businesses, many businesses face difficulties in securing funding or access to MSME loans. Due to the strict collateral policy of lending institutions in providing MSME loans, small businesses may find it difficult to secure MSME loans. Small businesses may lack the necessary resources to secure access to **MSME loans**. For example, many MSME industries include regional businesses such as handicrafts, art, marble, stonework, etc. Although these industries are booming in the international market, banking institutions are failing to provide much-needed support for MSME lending. Aside from displaying amazing business acumen, many MSME business owners do not have the financial knowledge to make sound business decisions. In many cases, this can lead to higher operating costs and lower debt scores. In addition, failure to choose the right lender leads to higher interest rates on **small Business Loans**. They are not up to date with the latest financial technology used by many NBFCs and online lenders. According to report "Enhancing role of SMEs in Indian defence industry", (2016) MSMEs also lack financial advisory services and the low operating profits reduces sustainability of the business. Moreover, MSME businesses in India often have lower creditworthiness than their bigger competitors. Lenders are unable to assess or determine if MSMEs can repay their loans because they lack assets to use as security. The fund constraint is aggravated

in defence sector due to long gestation period of project and lower probability of return of investment due to various factors.

Regulatory issues. Despite government MSME programmes to make conducting business easier, most regulatory gaps still persist in this industry. The MSMEs are unable to obtain financial help on time because of the antiquated regulatory practices. These laws make it difficult for MSMEs to complete the processes for getting insurance, business licenses, and conducting tax assessments. Many MSMEs, particularly those in rural regions, lack the information necessary to execute regulated transactions online. They exacerbate the regulatory issues, slowing small enterprises' rate of expansion. Many small businesses struggle to obtain raw materials on time, to access new technology and equipment, or even to find trained staff since it takes so long to secure funding. Over time, a number of regulatory concerns have been discovered, such as issues with tax compliance and modifications to labour rules that have ended up costing the MSME sector significantly. Attempts at modest labour changes were made a few years ago in an effort to increase this sector's competitiveness relative to others. While making MSMEs more competitive than larger companies, they did little to improve their situation. Defense-specific regulations are more strict, and adhering to their standards needs industry-specific expertise, practical experience, and strong financial support. (CII and E&Y report, 2016).

Infrastructure. Even if it is simple to understand, the infrastructure challenge is far more difficult. It affects every part of the MSME business, from sourcing and procurement to collecting payments, because it is present across the entire value chain. Infrastructure can be viewed from both a macro and micro perspective. Macro refers to

issues affecting the entire nation, such as the accessibility of energy, water, and roads and highways, among other things. Here, reforms must be pushed by central, state, or local government initiatives. Micro refers to the decisions made by specific MSME units. It mostly concerns how these units want to operate their operations. Here, decisions are made on digital enablement, technology adoption, and investment in assets that support scalability. In general, MSMEs face problems in accessing the basic infrastructure such as raw material, electricity, water, logistics and distribution services (Chopade K, Lad J, 2016). Though captive power plants have been set up for access of electricity, MSMEs still face problems for continuous power supply. Water supply is a crucial problem for MSMEs in certain regions in India. Water is used by industries for various activities such as wash, fabrication, dilution purposes etc. Interrupted water supply and lack of water recycling capabilities increases the problems for the MSMEs. A strong infrastructure is necessary for a firm to expand, and manufacturing SMEs suffer from lower productivity and profitability due to a lack of infrastructure facilities including electricity, water supply, and access roads. The viability of MSMEs will be guaranteed by the availability of infrastructure and competent labour. MSMEs are either found in industrial parks, operate in cities, or have sprung up haphazardly in rural sections of the nation. These places have below par and unreliable infrastructure facilities. MSMEs in defence sector invariably require machineries that are expensive and sophisticated, test equipment for compliance check and customized infrastructure for product development and testing which are capital intensive.

Low productivity. MSMEs may be very productive only when it comes to being cost-efficient and are capable of creating high volume at very low costs. But given that their production for the defence sector is on a small scale with low margins, low productivity

can put them at a disadvantage, especially when compared with larger firms (CII and E&Y report, 2016).

Lack of innovation. The majority of the defense-related MSMEs in India generate low-end technologies, and they lack much in the way of innovation. The poor level of indigenization and SRI value, despite three decades of intensive endeavour, are indicators of this. This industry suffers from a serious dearth of entrepreneurs, which has stopped it from embracing new technology and techniques that have significantly altered other industries. As a result, MSMEs, especially when compared to larger companies, have had to contend with out-of-date technology and low levels of production. However, with the startups in UAVs entering the fray the MSMEs operating in the niche technology sectors like drones, automation, artificial intelligence are better placed to leverage their innovation to achieve higher productivity and profit margins.

Skills. Despite the fact that the defence sector uses a lot of labour, highly skilled workers are still needed. ITIs need to produce millions of qualified individuals with high-quality training because the Indian educational system has not been compatible with the industry requirement. The fact that Indian MSMEs rely so largely on low-paid, unorganised workers who lack the necessary technical abilities to help increase production has caused them to lag considerably behind their international counterparts in terms of skill levels. One of the largest difficulties MSMEs in India confront is the lack of competent labour. The use of unskilled labour prevents MSMEs from operating as efficiently as possible. This is also due to the fact that the industry's needs have not been adequately met by the upskilling efforts. Smaller businesses are consequently obliged to take on tasks that call for little knowledge and experience, which hinders their long-term

possibilities for growth. There is an urgent need to set the things right (CII and E&Y report, 2016).

Access to Markets. Market accessibility is essential for every business to grow. The majority of MSMEs in India are known to only use a brick-and-mortar business model, which is believed to restrict their reach and productivity to their immediate area. MSMEs are not exposed enough to the market conditions. Their information is not up to date with respect to market. They lack exposure to domestic and international market. There is an information asymmetry and many MSMEs could not forecast the market demand appropriately or are not aware of the future outlook of the industry. Although while MSMEs are capable of producing items of a particular calibre, their inability to participate in the global value chain limits their ability to boost sales and initiate a positive feedback loop of growth. Though witnessing a reducing trend, a significant percentage of MSMEs still use secondary information and are dependent on traditional methods for promoting their brands such as print media or telephone directories (Chopade K, Lad J, 2016).

Non Recovery of receivable from Large Firms. Payments to MSMEs operating primarily in the business-to-business (B2B) realm in the construction, metal, mining, and engineering sectors are frequently delayed. As a result, they experience a liquidity crisis and are unable to fund their ongoing business activities. Almost 44% of MSME units experience payment delays, which is a problem that is common in the manufacturing sector. For the services sector, this figure was slightly lower at 27%. (CII and E&Y report, 2016). Although the Micro, Small and Medium Businesses Development (MSMED) Act, 2006 was passed and penalises late payments to the MSME sector, the weak bargaining

power of these units remains a significant issue. They are unable to discuss the terms of payments, let alone take legal action if payment is late. MSMEs are dependent on large scale organization for the sale of their products. Many MSMEs face challenges in recovering the dues from large organisations as their bargaining power over large firms is low. Non recovery of past dues increases the financial burden of MSMEs and makes it difficult for them to manage the working capital.

Access to Current Technology. The report by CII and E&Y (2016) highlights below challenges with respect to access of technology for MSMEs:

(a) MSMEs do not have access to international technologies and best practices in the industry.

(b) MSME score low in development and adoption of the recent technologies.

(c) There is a lack of information and communication system with MSME and it hinders the information flow between players in the industry.

(d) Lack of awareness among MSMEs about the new technologies make them dependent on outdated technologies. As technology access is important in delivery of cost effective and high-quality products, inability of MSMEs to access the technology makes it difficult to offer competitive solutions to the customer.

Access to Information and Business Development Services. MSMEs are focused towards the internal operation of the organisations and do not have provision to access

relevant information, current business practices and management processes to improve their business. Their inability to gauge an external problem ahead of competition makes them vulnerable and increases their risk of operating the business. They also lack access to recent technology trends and adoption of the technology takes more time for MSMEs than large scale organisations. These problems affect their reach and time to market their products making them difficult to sustain the business (Chopade K, Lad J, 2016).

Increased Competition from International and Private Sector Companies. Small scale operation of MSMEs pose serious threat to their business. Large scale organisations which are operating for a long time adopt recent technology and offer cost effective solutions to the buyers. The cost competition arising due to fixed cost associated with manufacturing business again poses threat to the operation of MSMEs (CII and E&Y report, 2016).

Human Resource Challenges. As per the report by CII and E&Y (2016), MSMEs face challenge to attract the top talent in the industry and once recruited they have challenges to retain them. The small-scale operations of MSMEs and slow growth provides less incentives for the employees and the new market opportunities pull them out. Also, the skill gaps are present in major MSMEs and there is a lack of skill development program offered by MSMEs. Unavailability of skilled work force makes it difficult to compete in the industry (Chopade K, Lad J, 2016).

CHAPTER 6

RESEARCH FINDINGS

Based on the literature survey, research questions were formulated and based on these a questionnaire was prepared in Google form. A survey was undertaken with MSMEs through the Directorate of Indigenization Air HQ and directly with the firms to ascertain their views on issues hindering their productivity, problems being faced and the suggested solutions. The survey responses were collected from 21 Oct 22 to 20 Feb 23 and 50 firms in India involved in the defence industry. The questionnaire for the survey and the details of firms that responded are placed at Appendix A and B respectively. The response from the firms and the analysis is placed at Appendix C. The key summary of the responses is as enumerated below.

- Majority of firms (63%) in the sample have been in existence for more than 15 years. 25% of firms have been operating between 5 and 15 years. Remaining 12% entered operation during the last 5 years. Entry of startups particularly in the UAV segment is a healthy sign.

- Though the location of MSMEs in defence sector were distributed throughout the country, the sample responses indicated 32.6% MSMEs around Bangalore, 20.4% around Hyderabad, 16% from Maharashtra and 12% from UP. The representative data is indicative of the fact that MSMEs are collocated near aerospace industries particularly HAL and DRDO labs. Also, the major base repair depots of armed forces are based at these locations.

- Majority of firms (63%) had a turnover between Rs 1 and 50 Crores which is indicative of the robustness established in the sector and 20% had a turnover of more than Rs 50 Crore in the financial year. Closer scrutiny of the responses indicates that turnover of less than 1 crore pertained to companies that came into existence in the recent past.

- 43% of the firms (employed between 11 and 50 personnel) which is indicative of the employment opportunities being provided by this sector. The fact that 17% of the firms employed more than 100 people further endorse the fact that the sector is key employer in both urban and rural sector.

- Productivity is a key driver of income growth. When MSMEs views were sought on factors that affected productivity

- 20% attributed availability of fund as the most critical factor
- 10% attributed delayed payment from big companies, DPSUs and Govt.
- 12% considered access to technology as a most critical factor
- 12% each considered skilled workforce and availability of confirmed order

- An industry's output is the total amount of goods and services generated within that industry over a specific time period and sold to customers or other firms. While assessing impact on output for MSMEs in defence sector

- 35% of respondents attributed fund availability as the primary criteria
- 20.5% of respondents stated technology assimilation as the primary concern.
- Defence related industry is bound by very stringent specifications to be tested and certified for compliance prior acceptance requiring requisite specific infra-structure. 20.5% of respondents attributed QA clearance as a primary concern.

- While commenting on the factors hindering Indigenisation

  - 53% of respondents were of the view that the primary cause is order quantity being inadequate.
  - 22.5% of respondents were of view that non-availability of design details is a major hinderance.
  - 16.3% respondents attributed non availability of raw material as a primary hinderance.
  - Less than 6% considered complex technology as a major hinderance which indicate the confidence of MSMEs to take on the indigenisation task subject to above factors being addressed.

- Only 30% defence MSMEs have opted for transfer of technology with other companies. Closer scrutiny of data reveal that most of them deal with Avionics.

Statistical Method. Data for research questions have been collected in Likert scale. A one-sample z test is used to check if there is a difference between the sample mean and the population mean when the population standard deviation is known. The formula for the z test statistic is given as follows:

$z = (xbar - \mu)/(\sigma\sqrt{n})$, where xbar is the sample mean, μ is the population mean, σ is the population standard deviation and n is the sample size.

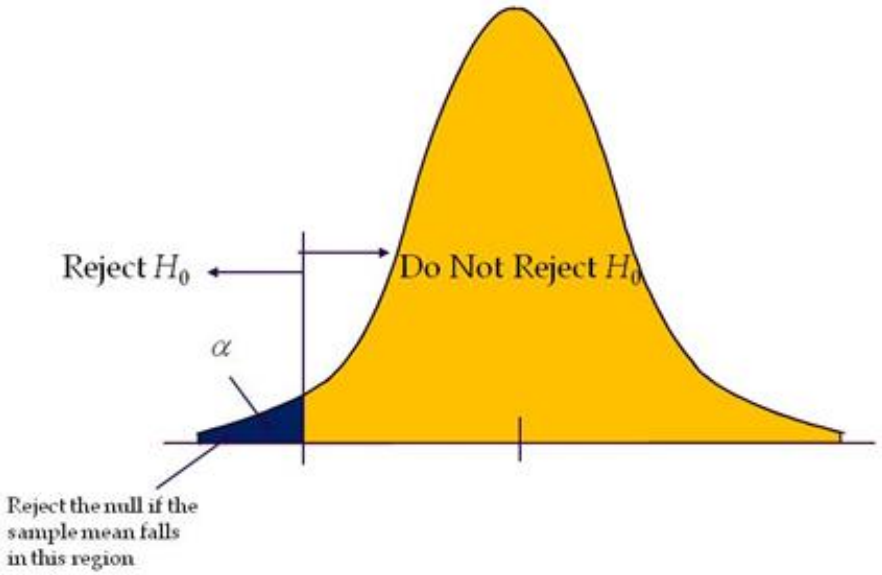
Left Tailed Test: A *left-tailed* test is used when the alternative hypothesis states that the true value of the parameter specified in the null hypothesis is less than the null hypothesis claims.

Null Hypothesis: $H0 : \mu=\mu0$

Alternate Hypothesis: $H1 : \mu<\mu0$

Decision Criteria: If the z statistic < z critical value then reject the null hypothesis.

Fig 6.1 – Region of Rejection for Null Hypothesis



Z-Test with Level of Significance (α) = 5% has been chosen. This corresponds to 95% level of confidence.

If $z \geq -1.645$ (as per table of area under normal curve for the given confidence level of 95%, α = 5%, level of significance); accept null hypothesis.

For, $z \leq -1.645$; reject null and accept alternate hypothesis.

Calculation:

X_{bar} computed

$\sum (Xi-X_{bar})^2$ computed

бs computed

During statistical treatment, permissible assumptions have been made that бp=бs.

μH0 = 3 Population mean, by Likert design

Z-Test, Acceptance and rejection regions based on a large amount of survey samples (50: i.e. >30 for Z-test) from related stake holders, a test statistic for testing the alternate hypothesis has been developed and tested.

Research Question -1: Effect on Productivity – Assimilation of Technology.

The null hypothesis that ability to assimilate technology is not a concern and does not hinder productivity has been found true. The z test result is given below:

Table 6.1

H1 z-Test: One Sample for Mean

	Response
Mean	2.836735
Known Variance	1.067
Observations	49
Hypothesized Mean	3
z	-1.10614
P(Z<=z) one-tail	0.134333

z Critical one-tail	-1.644854
P(Z<=z) two-tail	0.268666
z Critical two-tail	1.959964

20.5% of the respondents were of view that non-availability of fund hinders technology assimilation.

Research Question -2: Effect on Productivity – Infrastructure Availability.

80% of the respondents have opted for technology upgrade for their infrastructure. This aspect reflected in their response to above mentioned research question. The null hypothesis that adequate infrastructure available for production requirement has been found true. The z test result is given below:

Table 6.2

H2 z-Test: One Sample for Mean

	Response
Mean	3.897959
Known Variance	1.025
Observations	49
Hypothesized Mean	3
z	6.207103
P(Z<=z) one-tail	2.7E-10
z Critical one-tail	-1.644854
P(Z<=z) two-tail	5.4E-10
z Critical two-tail	1.959964

Research Question -3: Effect on Productivity – Quality of Skill Development Program and Availability of Skilled Manpower.

Quality of Skill Development Program.

80% of the respondents have stated that available skill development program is adequate to meet the production requirement.

Availability of Skilled Manpower

The null hypothesis that skilled manpower available for production requirement has been found true. The z test result is given below:

Table 6.3

H3 z-Test: One Sample for Mean

	Response
Mean	2.979592
Known Variance	1.1634
Observations	49
Hypothesized Mean	3
z	-0.13242
P(Z<=z) one-tail	0.447327
z Critical one-tail	-1.644854
P(Z<=z) two-tail	0.894654
z Critical two-tail	1.959964

Only 10% of respondents have availed skill development program offered by government.

63% of MSMEs provide financial remuneration and status recognition at work place to retain skilled manpower. 19% offer status recognition at work place and 12% MSMEs offer only financial remuneration to retain skilled manpower.

Research Question - 4: Effect on Productivity – Testing Facilities

70% of the respondents have confirmed adequacy of the testing facilities in their premises to meet the production requirement. Also, around 10% of respondents only have considered testing facilities availability as a primary or secondary concern on impact of output.

Research Question - 5: Effect on Productivity – Quality Certification (Quality Assurance and Airworthiness Certification).

Quality Assurance. This activity is undertaken by representative of DGQA/DGAQA at vendor or user premises. The null hypothesis that Quality assurance activity does not hinder productivity is rejected and is found to have an impact on productivity. The z test result is given below:

Table 6.4

H4 z-Test: One Sample for Mean - QA

	Response
Mean	2.489796
Known Variance	1.0025

Observations	49
Hypothesized Mean	3
z	-3.5661
P(Z<=z) one-tail	0.000181
z Critical one-tail	-1.644854
P(Z<=z) two-tail	0.000362
z Critical two-tail	1.959964

Around 59% of respondents have stated that QA clearance of finished product takes more than a month. The detailed breakdown is placed at Q24 in Appendix C.

Airworthiness Certification. The null hypothesis that Airworthiness certification activity does not hinder productivity is rejected and is found to have an impact on productivity. The z test result is given below:

Table 6.5

H5 z-Test: One Sample for Mean AW

	Response
Mean	2.244898
Known Variance	0.9901
Observations	49
Hypothesized Mean	3
z	-5.31076
P(Z<=z) one-tail	5.46E-08
z Critical one-tail	-1.644854
P(Z<=z) two-tail	1.09E-07

z Critical two-tail	1.959964

Around 53% of respondents have stated that Airworthiness clearance takes more than 3 months. The detailed breakdown is placed at Q27 in Appendix C.

Research Question -6: Performance of different schemes of Government of India

Credit and Finance Assistance Scheme. Only 16% of the respondents have availed credit and finance assistance scheme.

Skill Development and Training. Only 10.22% of respondents have availed skill development and training from government.

Market Development and Assistance.Only 2% of respondents have availed government scheme for market development and assistance.

Effectiveness of MSME Champion Scheme. Respondents were requested to rate this scheme in Likert scale. The null hypothesis that the scheme is effective was rejected and z test result is given below:

Table 6.6

H6 - MSME Champion Scheme z-Test:

One Sample for Mean

	Response
Mean	2.653061

Known Variance	1.09
Observations	49
Hypothesized Mean	3
z	-2.32563
P(Z<=z) one-tail	0.010019
z Critical one-tail	-1.644854
P(Z<=z) two-tail	0.020038
z Critical two-tail	1.959964

Research Question 7: Impact of government schemes on factors affecting productivity.

Assimilation of Technology. Only 16.3% of respondents agreed that government schemes were effective in assimilation of technology.

Infrastructure Improvement. Only 22.4% of respondents agreed that government schemes were effective in infrastructure improvement.

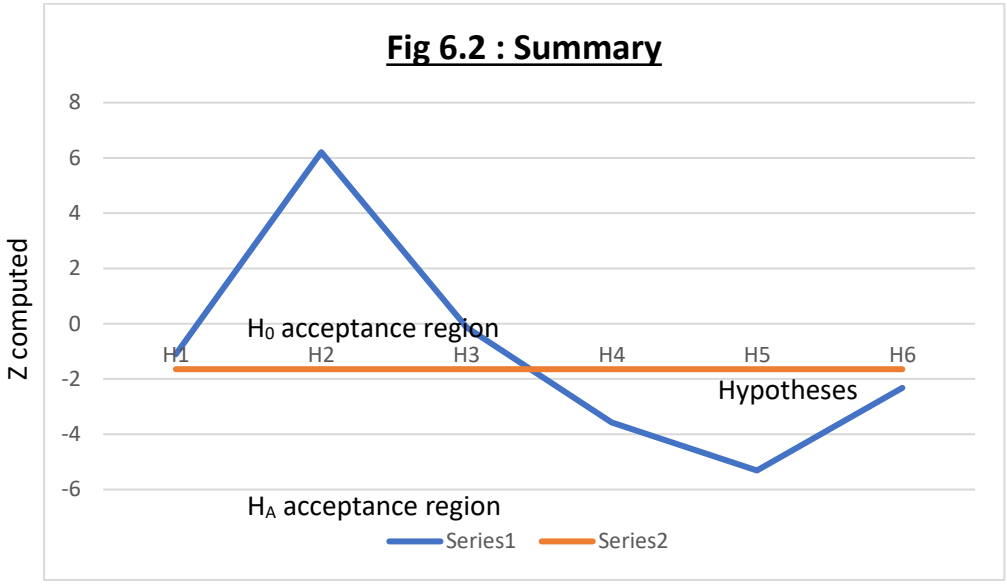
Skill Development and Training. 22.4% of respondents were of view that government schemes helped acquiring skill development and training.

Testing Facilities. 12.2% of respondents stated that government schemes helped in improvement of testing facilities.

Table 6.7: Hypotheses Statements and Results of z test Summary

H	Null Hypothesis H_0	Alternate Hypothesis H_A	Z computed	Z threshold	Decision Criteria	Decision
H1	Ability to assimilate technology is not a concern.	Ability to assimilate technology is a concern.	-1.106	-1.645	Reject Null if z<-1.645	H_0 accepted
H2	Adequate infrastructure available for production requirement	Adequate infrastructure not available for production requirement	6.207	-1.645	Reject Null if z<-1.645	H_0 accepted
H3	Skilled manpower available for production requirement	Skilled manpower not available for production requirement	-0.13242	-1.645	Reject Null if z<-1.645	H_0 accepted
H4	Quality assurance activity does not hinder productivity	Quality assurance activity hinders productivity	-3.5661	-1.645	Reject Null if z<-1.645	H_A accepted
H5	Airworthiness clearance activity does not hinder productivity	Airworthiness clearance activity hinders productivity	-5.3107	-1.645	Reject Null if z<-1.645	H_A accepted
H6	MSME Champion scheme helpful in enhancing productivity	MSME Champion scheme not helpful in enhancing productivity	- 2.3256	-1.645	Reject Null if z<-1.645	H_A accepted

Summary of Research Framework



Factors affecting Productivity. Analysis of qualitative response indicate the following: -

(a) MSMEs undertaking indigenisation task are predominantly tier-3 suppliers who fabricate non-critical components for aircraft and aero-engines. Other than availability of funds they are constrained for raw materials and in case of avionics, non-availability of design details is considered a major hinderance. Post indigenisation and accord of Local Certificate (LC) the companies find it difficult to hold the price level for three years due to price fluctuations in raw material and limited order quantity.

(b) One of the respondents has stated that there is no provision to offer patented product developed through own company R&D. GeM is not accepting inclusion of product in new category. According to that company this discourages innovation and new R&D.

(c) Biggest challenge is that the company has to invest, develop, deliver as per the project needs and thereafter the funds are released. This takes up to few years in govt projects. Most of the MSMEs can't afford to invest so much money and also be L1. Also, consistently a large percentage of MSMEs have reported that the banks don't entertain without collaterals and they don't honor CGTMSE schemes.

(d) In spite of specific directions to that effect that MSME payment dues to be cleared within 45 days, more than 20% MSMEs have reported that delay in materialization of payment adversely affecting their cash flow and thereby the productivity. Even banks hesitate to provide loans against sovereign contracts doubting the ability of MoD to pay in time against delivery of products

(e) Testing facilities is critical for developing airborne components. The test facilities should be able to simulate high/low temperature, humidity, altitude, vibration and electro-magnetic interference conditions. One of the respondents has recommended that there is a need to provide test facility especially for the military and space products to qualify. Testing facility should be provided in all capital cities so that every production company could direct effort in development area.

(f) Infrastructure in terms of Testing Facilities and Loaning Equipment would help a lot to fasten the cycles and reduce load on MSME's. Presently at few places like Bangalore and Hyderabad testing facilities of DRDO labs can

be used by private players. But regular testing of sub systems and systems which happens at the MSME"s facilities need Standard Test Instruments, and they are very expensive. One of the MSME has suggested that if some standard instruments available with DRDO lab can be issued on loan to small MSMEs for testing in their premises it would be beneficial. Testing only at the Lab restricts the development speed.

(g) One of the respondents has suggested skilled work force to be scaled up fast. This is a function of multiple factors. Most of the high-end skilled work force, are preferring MNC's. There is a need to focus from Colleges and Academia level itself on Core technologies instead of Software. Training establishments need to increase, if a single consortium at a national level with all defence companies are working on skill development, it will create many skilled high-end jobs.

(h) MSME's are constrained by the cashflow and the payment terms of defence. As these systems need huge funding ahead, banking systems with easy access to funds for confirmed orders, also changing the payment terms from govt with advances and Milestones without BG's would be helpful. Bank Guarantee (BG) can be discontinued. Instead, Security Bonds in line with what has been done for Infrastructure projects can be considered for MSME in Defence sector. This will free up lot of working capital that gets stuck in BG. Many Companies have a good track record of utilizing funds well and not misusing it. This would help a lot to reduce the cashflow pressure.

(i) One of the respondents has commented that DPP does not have same rules for private vendors and government owned companies. E.g. MoD gives maximum 15% advance when it awards a contract to any private company for which a BG has to be submitted by the vendor. However, when a 2.5-ton LPTA is procured from Vehicle Factory Jabalpur for a MoD project, vendor need to pay 100% advance to VFJ without any provision for BG and LD. Hence, there is a dichotomy in the rules the way MoD treats a vendor and its own companies.

(j) Few MSMEs have sought reverse LD on government agencies for delayed release of payment.

(k) A common response that transcended MSMEs involved in supplying components for DRDO and armed forces for indigenisation was the delay encountered during accord of air worthiness clearance of initial design and qualification checks of the finished product. The air worthiness clearance of the system design is accorded by CEMILAC and due to stringent aerospace safety requirements this process tends to take time and is iterative. Quality check of components produced by vendor is checked by representatives of DGQA (for surface-based systems) and DGAQA (for aviation). Analysis of data also indicates that MSMEs perceive these clearances as a hinderance to productivity. Few respondents have acknowledged that poor staffing at these offices tend to aggravate the delay. As both these agencies perform safety critical functions, a viable solution need to be evolved to address MSME concerns.

Interaction with Bank Managers. Interaction was carried out with few branch managers of banks to ascertain their views on problems encountered by MSMEs. The salient outcome of the discussion is given below:

(a) According to bank managers about half of the MSME owners are already aware about the loans when they approach the banks for loans. Banks mostly give general business loan, small business or retail loan and cash credit facility.

(b) Loans help business units mostly in buying machineries. The bankers report that the MSMEs benefit from their loans as it takes less time, the amount is flexible, and the rate of interest is less. Loans which are easier to get from the banks are general business loan, cash credit and overdraft facility, and loan against property or equipment.

(c) Banks find it difficult to give loan to MSMEs due to lack of proper documents, unit owners are not eligible to get the amount that they want, they are unable to provide collateral, and their business is not established.

(d) Bankers reported that MSMEs do not trust the bank for providing collateral and they are unprofessional (mostly micro units) and fail to repay EMIs. Yet bankers are happy that many MSMEs come back to banks for repeat loans and can expand their business with their loans. They also consider the Offices of bank as their personal financial advisors and with time they learn to repay EMI on time.

(e) Few negative points mentioned include lack of participation of statutory bodies after loan approval, work pressure on Officers of bank and financial institutions, lack of trust on MSMEs who come in through digital portal of statutory bodies, and lack of ownership of loan by the MSMEs.

Effectiveness of Government Schemes. Analysis of response indicate that most of the MSMEs have not availed the government schemes. Salient observations are given below:

(a) To avoid getting into NPA, in spite of government instructions, banks are insisting on collaterals. This undermines government's effort to provide financial support to MSMEs.

(b) Approximately 10% of the MSMEs in the sample population have availed one of the schemes. This is consistent with the annual report of Ministry of MSME 2021-22 which states that only 74,415 applicants have availed PMEGP scheme in FY 20-21 across all MSMEs (including defence sector).

(c) Schemes for Technology Development and Competitiveness that are applicable for MSMEs operating in defence sector have been accessed by only 10% of the sample population. According to annual report of Ministry of MSME less than 10% of earmarked funds have been consumed. The schemes under this category are expected to be of benefit to MSMEs in defence sector. Two respondents came to know of these schemes during the survey and are likely to access them.

(d) CGTMSE and skill development programmes were relatively accessed by more number of MSMEs.

CHAPTER 7

RECOMMENDATIONS AND CONCLUSION

Through the analysis of the dissertation gaps have been identified between current MSME participation and the expected level of participation. Recommendations based on the study undertaken during this dissertation are enumerated in succeeding paragraphs.

Public Private Partnership and MSME Clusters. The strength of MSMEs lies in low cost, flexibility and diversified product manufacturing. Defence MSMEs face difficulties in sustaining business due to resource constraints. Government may consider encouraging MSMEs operating within same geographical area to form a Public Private Partnership with government organization / companies or can form clusters to pool out constrained resources. These MSME clusters can enhance productivity, technology innovation, service and market opportunities.

Funds for Technology Development. More than one third of the respondents of survey had identified lack of fund as the primary criteria impacting the output. Defence technology is complex requiring high investment and returns are invariably delayed by several years and in some cases no assurance of return. Most of the defence MSMEs find it difficult to sustain this financial burden. Government needs to consider increasing the allocation of existing Technology Development Fund for earmarking projects to MSMEs possessing expertise in technology niche areas. A similar approach may be adopted by DPSUs who can partner with MSMEs possessing expertise in the R&D area.

Extension of Loan Facility for IR 4.0. MSMEs investing in 4IR technologies such as artificial intelligence and autonomous systems need to be prioritised while extending loan facility. These MSMEs working in the niche areas can also be considered for allocation of technology development fund that is being earmarked by DRDO for select Research and Development activities.

Boosting Defence Exports. Towards development of military technologies for export market, Ministry of Defence may form a dedicated cell that is equipped to provide budgetary and regulatory support to assist participating companies build overseas export competitiveness. Also, with government focusing on increasing defence export to $ 5 billion by 2025 defence MSMEs that are presently supplying components and sub-assemblies to Original Equipment Manufacturers can move up the value chain

Ease of Access to Defence Market. The Ministry of Defence may take into consideration setting up a help desk facility to offer assistance to potential suppliers in order to promote participation of innovators, SMEs, and non-defence suppliers for expansion of robust defence supply chain. Moreover, MoD can encourage increased supplier reach through webinars, actual presence at trade shows, and a dedicated outreach team.

Measures to Improve Finance Availability. The existing government procurement procedures may be modified without incurring consumer risk as follows:

- Bank Guarantee (BG) may be discontinued and instead Security Bonds in line with what is being considered for Infrastructure projects may be introduced for

MSME in Defence sector. This will free up lot of working capital that gets stuck in BG.

- Presently there is no penalty on government agency for delay in payment against a delivery which has been accepted by the government agency. There should be a 18% levy of interest on delayed payment by government agency to its vendors. This will aid timely disbursement of payments to MSMEs.
- Interest free loans should be made available for IDDM / Make projects to be undertaken by MSME.

Research and Development. The DRDO's monopoly on defence R&D and the establishment of a nodal point as a centre of excellence have not produced the expected outcomes. Other cutting-edge defence manufacturing nations influence R&D from a variety of institutions, including industry, universities, and schools. We ought to adopt the R&D management strategy used by DARPA in the US and the Office of the Chief Scientist (OCS) in Israel, which does not conduct its own research but instead recognises and funds innovative ideas from business, academia, governmental agencies, and private citizens. The government may decide to assume all or part of the risk for all R&D projects.

Transfer of Technology to MSMEs. MoD guidelines for offset obligation specifies multiplication factor of 1.5 where MSMEs are Indian Offset partners. MSMEs which are entering into ToT with foreign OEM need to assimilate technology and move up the value chain. The process of global technology transfer (ToT) to India is intricate and requires the help and participation of specialised organisations focused on technology, as well as complete participation from the government and the enabling

environment. MSMEs engaging in ToT must ensure detailed contract articulation, together with detailed work breakdown structures, review mechanisms, and mid-course correction measures, in order to maximise the gain.

Skill Development for MSME Employees. Though 80% of the respondents found existing skill development adequate, to move up the value chain there will be a need to acquire new skill sets. The skill development schemes offered by the government has been accessed by 10% of the sample population. A concerted effort is required by government and SIDM to increase the reach of the scheme. Also, to scale up the skill force government need to increase the training institutions. The syllabus for these training institutions should be formulated in consultation with industry partners to meet the 4IR requirement.

Testing Facilities. Defence equipment are expected to perform consistently under stringent environment and operational condition. Therefore, the component needs to be checked rigorously at every stage of manufacturing process. Availability of requisite testing facilities at manufacturing premises is a critical requirement. Though 70% of the respondents have confirmed adequacy of the existing testing facilities to meet the present requirement, to cater for the remaining population and also to cater for future requirements the testing facilities need to be augmented / upgraded. Setting up of Defence Testing Infrastructure is capital intensive. Government may consider setting up these test facilities for MSMEs to avail on payment basis. These test facilities can be located at proposed defence corridors and existing defence and aerospace hubs.

Qualification delays.

- CEMILAC accords the design clearance for any component that is under development for installation on aircraft. Once the component clears rigorous functional and qualification checks the airworthiness certification is accorded by CEMILAC. This initial clearance process is time consuming and mandatory for any aviation component developed indigenously for installation on aircraft. More than 40% of the respondents have conveyed that this takes more than 6 months. As safety is paramount this delay is considered unavoidable. However, those systems that are not safety critical can be cleared in a fast-track manner. As most of the MSMEs deal with non-safety critical (including mission critical) they can be cleared in a timebound manner. CEMILAC may specify the time period by which non-safety critical and mission critical systems can be cleared. This would benefit a large segment of MSMEs.
- DGAQA / DGQA carryout inspection of the manufactured product and their compliance to specifications. According to 60% of the respondents the delay is more than one month. As majority of components fabricated by MSMEs are not safety critical it should be possible for MSMEs to self-certify if they are compliant to QMS standard. MSMEs should be encouraged to adhere to AS9100 and QMS standard that may enable them to self-certify their products that are not safety critical. This aspect needs to be reinforced by SIDM to defence sector MSMEs in its newsletter.

Development of Private Sector. For the private sector, DPSUs, and OFB to compete fairly, level playing fields must be established. Few measures in this regard are suggested below: -

(a) Share Information - Senior military leaders, technical officers (active duty and retired), and managers from the corporate sector involved in defence should develop a roadmap for weapon system development. An advisory cell under the MoD may be set up to serve as a single military point of contact with business in order to establish clear, healthy, and fruitful two-way communication between the purchaser and the producer.

(b) Share Infrastructure - Assistance for the private sector is required in the areas of access to infrastructure, access to test sites, help from qualified specialists, and ToT of previously indigenously developed technologies. For the long-term production of defence products, all facilities, both public and private, should be shared by everyone and should be considered a national resource.

(c) Share Present Situation - The private sector should be brought in right away to handle significant deficiencies with the military forces in order to stabilise the current situation. The already-produced equipment from the commercial sector should be approved for testing, and if it satisfies the standards for quality, it should be purchased.

(d) Share Responsibility - It is necessary to replace the fear of failure among the private sector with the prospect of success. In the private sector, confirmed orders

require a guarantee. If security is offered for the acceptance of results, it would engage in research and development. To increase their confidence and morale, large contracts must be given to the private sector. Establishing an effective arbitration cell is necessary, one whose decisions are definitive and rarely subject to appeal. Nearly all disputes should be addressed there. When the government is able to allay worries about FDI, IPR, investor protection, land acquisition, licencing challenges, and taxation regime, India would become an easier place to do business.

Effectiveness of Government Schemes. The schemes that are relevant for defence MSMEs have been availed by 10% of the sample population. Many respondents were not aware of the schemes that can benefit them. A concerted efforts needs to be initiated by government through webinars, SIDM newsletters, help desk, workshops, vendor development meets and exhibitions to increase the awareness of the schemes. An app may be developed for MSMEs that would enable them to access the details of the schemes that are applicable to their profile and apply online.

Mentor-Mentee Program (MMP). For the purpose of helping MSMEs in the defence sector, a mentor-mentee programme that is comparable to the mentor-protégé programme launched by the United States during the first Gulf War can be established. The MoD can take the lead in running the programme and can offer assistance in fostering mentor-mentee relationships. When smaller enterprises combine with larger corporations, this will enable them to enter the defence industry and increase their market share. Small businesses will benefit from this program's assistance in comprehending and navigating the Ministry of Defence (MoD) procurement ecosystem. By way of the

initiative, the Mentor corporations help the small businesses grow their technical capacity while also getting a handle on the MoD's regulatory needs. The Ministry of Defence may think about paying a portion of the Mentor company's program-related expenses, as the US government did. Benefits of such a programme can include:

(a) Advantages to the MoD

i. Lowering the risk of quality in MSME contracts.

ii. A rise in MSME involvement in the defence industry.

iii. More opportunities for acquisition in the Make and Buy-IDDM categories.

(b) Advantages for MSMEs

i. Assistance in understanding the defence acquisition process.

ii. Recognize the manufacturing specifications for goods that need industrial licences.

(c) Advantages for mentoring businesses

i. Tax benefits on all program-related expenses, subject to a MoD-set cap.

ii. If the MoD approves a greater offset multiplier for Indian companies that are also mentor businesses in the programme, there will be an increase in the likelihood of becoming a JV partner with international OEMs.

Innovation challenge for MSMEs. The MoD may co-host innovation challenges for MSMEs with the armed forces for future procurements that have passed the RFI stage. The MSMEs will be asked to offer a solution, and the one whose creative approach the MoD selects will receive a future contract.

(e) Advantages to MoD

i. A healthy level of involvement will guarantee the finest concepts and technology for acquisition.

ii. The options that are rejected might spur creativity in other programmes.

(b) Advantages to MSME

i. A future contract is guaranteed for MSMEs who succeed in the innovation challenge.

ii. Possibility of working as a supplier for many Tier-1 OEMs and building capacities.

Conclusion

It is high time for policies to be put in place that support the development of an environment that allows MSMEs to fully realise their potential in relation to the defence industry. Through various events, such as conclaves, workshops, vendor development meets, seminars, exhibitions, and conducted on-site visits to the notable defence sector establishments in the public and private sectors, the MSMEs need to be educated about the needs and expectations of the defence sector, as well as the enabling provisions and avenues introduced by the government to encourage them.

The factors that affect the productivity of defence MSMEs have been researched, and corrective actions have been recommended. The effectiveness of government programmes was examined. In order to support MSME growth in the defence manufacturing industry, this report suggests further actions that the GoI might take. Non-defence MSMEs most definitely need assistance in order to securely manage the

operational and regulatory compliances that characterise the industry. Asking for assistance from larger businesses that provide to the MoD is one efficient approach to achieve this. Also, MSMEs need to be more actively involved in innovation and technology, which will help the MoD purchase equipment.

MSMEs in defence sector can enhance their productivity if the recommendations are implemented in earnest. These measures will help in increasing the contribution of MSME in defence sector and will help India become self-reliant in defence.

LIST OF TABLES / CHARTS

LIST OF FIGURES

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Appendix A

QUESTIONNAIRE FOR MSMEs

1. Name of the company *

2. Registration ID *

3. Address *

4. Year of Inception *

5. Annual Turnover *

6. Number of regular and contract employees *

7. What are the factors in your view affecting productivity of defence MSMEs? *

8. Please sequence the following in decreasing order of importance (impact on output)

(a) Assimilation of technology
(b) Fund availability
(c) Skill development programme
(d) Infrastructure
(e) Testing facility
(f) QA clearance
(g) Military / Air worthiness certification

*

9. According to you what is hindering the indigenization. Sequence the following in descending order of importance

(a) Non availability of design details
(b) Non availability of raw material
(c) Quantity inadequate for return on investment
(d) Inability to reverse engineer
(e) Technology too complex

*

10. Have you entered into Transfer of Technology with any company? *

- ○ Yes
- ○ No

11. If yes, how easy was it to assimilate the technology? *

	1	2	3	4	5	
Extremely Difficult	○	○	○	○	○	Extremely Easy

12. Have you opted for technology upgrade of your infrastructure *

- ○ Yes
- ○ No

13. What do you think is hindering technology assimilation? Please answer if hinderance is perceived *

14. Are you satisfied with the infrastructure available at your premises to meet production? *

	1	2	3	4	5	
Grossly Inadequate	○	○	○	○	○	More than Adequate

15. What is the annual turnover of manpower? *

16. From where do you recruit skilled manpower? *

- ○ Campus recruitment

- Employment exchange
- Referal
- Other:

17. What are the incentives for skilled manpower? *

- Additional Financial compensation
- Status / Recognition at work place
- All the above
- Other
- Other:

18. Is the available skill development programme adequate to meet the company requirement? *

- Yes
- No

19. If no, what need to be done by company? *

20. Have you accessed / used any government scheme / programme for skill development? If yes, please specify name of the scheme / programme. *

21. Availability of skilled manpower in market *

	1	2	3	4	5	
Scarcely available						Easily available

22. Do you have adequate testing infrastructure in your premises to meet the production commitment *

- Yes
- No

23. If no, is adequate testing infrastructure locally available to meet the production commitment *

- ☐ Yes
- ☐ No

24. How many days does it take to get Quality Assurance (QA) clearance from DGAQA/ DGQA? (You may give approximate number of days) *

25. How many days did it take to obtain recent QA clearance involving DQAQA / DGQA)? *

26. How difficult is it to get Quality Assurance (QA) clearance? *

	1	2	3	4	5	
Extremely Difficult	○	○	○	○	○	Extremely Easy

27. How long does it take to get initial worthiness certification? (You may give the average time taken) *

28. How difficult is it to obtain air worthiness / military worthiness certification? *

	1	2	3	4	5	
Extremely Difficult	○	○	○	○	○	Extremely Easy

29. Did you avail any of the government's Credit and Financial assistance scheme for MSMEs? If yes, please specify the name of the scheme. *

30. Did you avail any of the government scheme for skill development and training? If yes, please specify the name of the scheme. *

31. Did you avail any of the government scheme for market development and assistance? If yes, please specify the name of the scheme. *

32. Is government scheme for technology upgradation and competitiveness (MSME Champion scheme) helpful in enhancing productivity? *

	1	2	3	4	5	
Grossly Ineffective	○	○	○	○	○	Highly Effective

33. Have you availed any of the following government schemes? *

	Yes	No
Credit Guarantee Trust Fund	☐	☐
Credit Linked Capital Subsidy for Technology Upgradation	☐	☐
MSME - Cluster Development Programme	☐	☐
MSME - Market Development Assistance	☐	☐
MSME Champions scheme	☐	☐
National Manufacturing Competitiveness Program	☐	☐

Entrepreneurial and Managerial Development of SMEs through Incubators	☐	☐
Lean Manufacturing Competitiveness for MSMEs	☐	☐
Technology & Quality Upgradation Support	☐	☐
Capital Goods Scheme	☐	☐
TIDE - Tech Incub Dev of Entrepreneur	☐	☐

34. Has any of the government policy aided technology assimilation *

- ○ Yes
- ○ No

35. Has any of the government scheme aided / improved infrastructure within company? *

- ○ Yes
- ○ No

36. Has any of the government scheme(s) aided / improved skill development of employees? *

- ○ Yes
- ○ No

37. Has any of the government scheme(s) aided / improved testing infrastructure within company? *

- ○ Yes
- ○ No

38. In your opinion what else can government do to give impetus to MSME? *

Appendix B

LIST OF FIRMS PARTICIPATED IN SURVEY

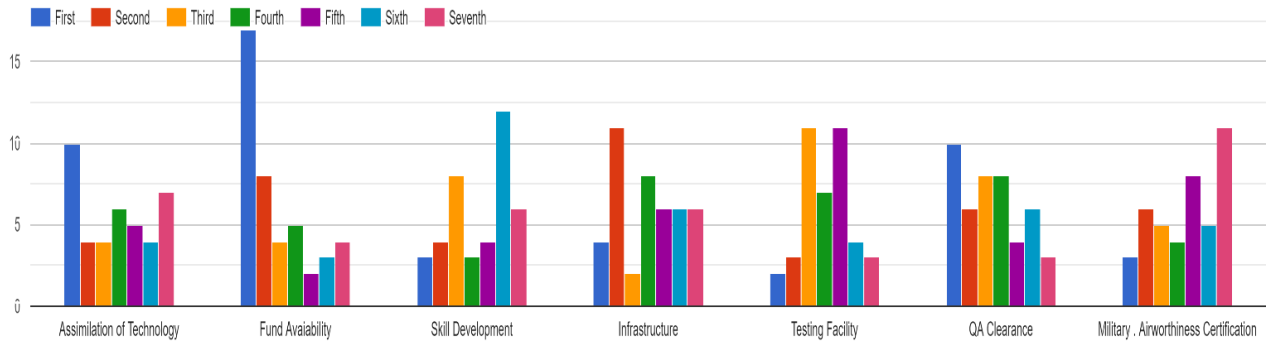
1. R S Innovus Engineers Pvt Ltd
2. Electro Circuit Systems
3. MIRACLE ELECTRONIC DEVICES PVT LTD
4. Unistring Tech Solutions Pvt Ltd
5. QUALITY EVALUATION AND SYSTEMS TEAM PVT. LTD
6. Atindriya Systems Pvt Ltd
7. SM Creative Electronics Limited
8. Aayur Technology Solutions P Ltd
9. CHAMPAKLAL AND SONS
10. Dhruva technologies Pvt ltd
11. Rayrivah Materials Pvt Ltd
12. Gandhi Automations (P) Ltd.
13. SASMOS HET TECHNOLOGIES LIMITED
14. Innogenx
15. Helix Systems
16. S S ENGINEERING WORKS
17. Arrow Engineering Industries Pvt Ltd
18. Sehmbey allied industries
19. SREE CNC TECHNICS
20. MADHUBABU Pvt Ltd
21. Tiranga Aerospace
22. PRESS TOOLS ENGINEERING WORKS
23. Constelli Signals Pvt Ltd
24. Cyient Limited
25. Eternal Alloy Cast P Ltd
26. Max Aerospace and Aviation Pvt. ltd.
27. SPM Associate Industries
28. ARUN ENTERPRISES
29. I CAD CAM SOFTWARES
30. Zing Technologies
31. Vista Consoles Electronics Pvt Ltd
32. Nandan Ground Support Equipment Pvt Ltd
33. Absolute Engineering Solutions
34. PRECITEX EQUIPMENTS (P) LTD
35. Harshe Consultants & Manufacturing
36. ADONIS AVERO
37. Aerochamp Aviation Intl Pvt Ltd
38. RPM ENGINEERING SERVICES
39. Pinnacle Engg
40. Triveni Turbine Limited

41. Defsys Solutions Pvt Ltd
42. ACCORD SOFTWARE AND SYSTEMS, Bangalore
43. IMPEX HITECH RUBBER
44. Aidin Technologies Pvt Ltd
45. Spectrum Cable Tech Pvt Ltd
46. Siri Technologies, Ltd
47. Mayvi Aerospace
48. Yashwanth Globe Tech
49. Data Patterns (India) Pvt Limited
50. Manastu Space Technologies Private Ltd

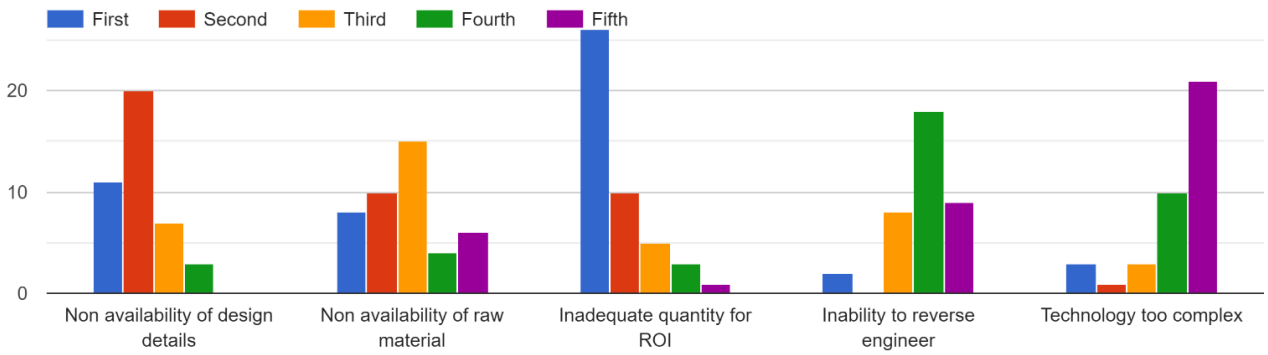
Appendix C

RESPONSE TO SURVEY: DEFENCE MSMEs IN INDIA

8. Impact on output

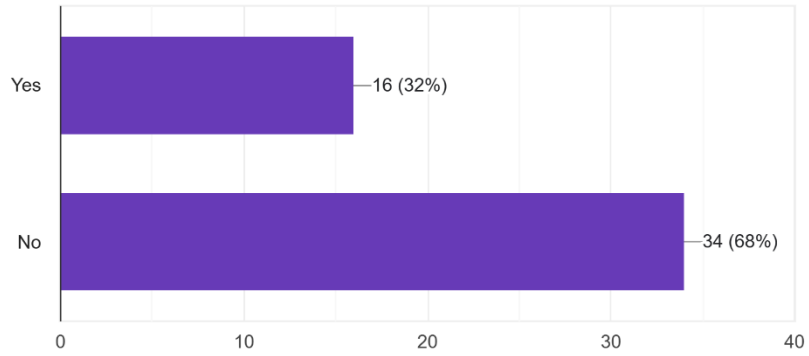


9. Indigenization hindered by



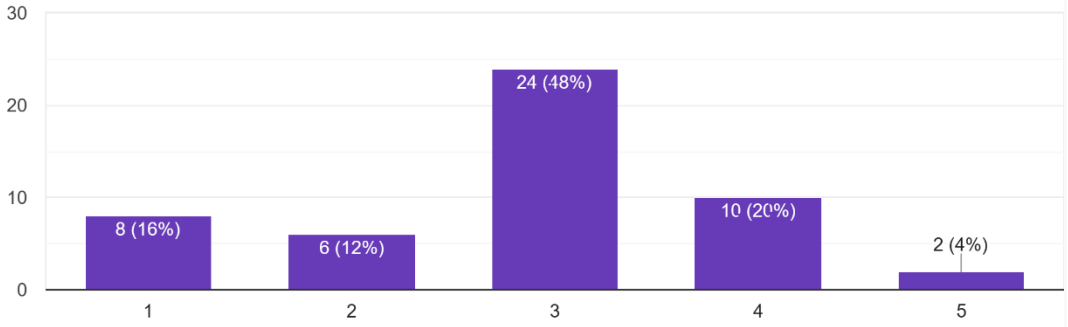
10. Have you entered into Transfer of Technology with any company?

50 responses



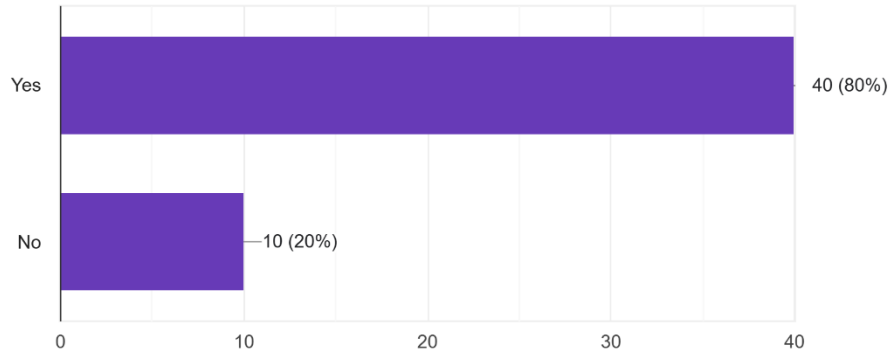
11. If yes, how easy was it to assimilate the technology?

50 responses



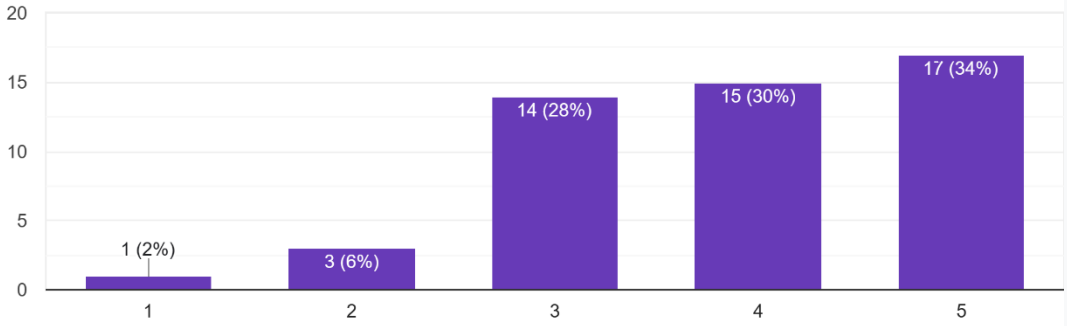
12. Have you opted for technology upgrade of your infrastructure

50 responses



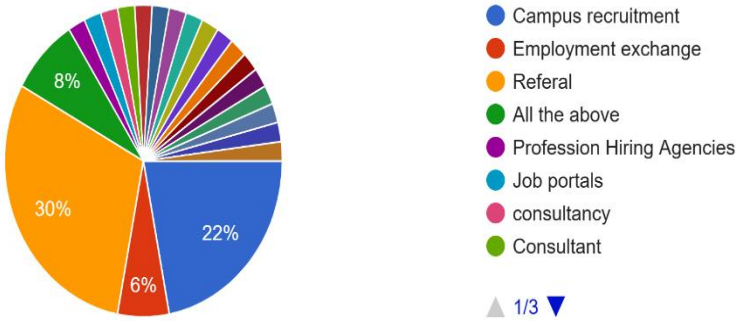
14. Are you satisfied with the infrastructure available at your premises to meet production?

50 responses



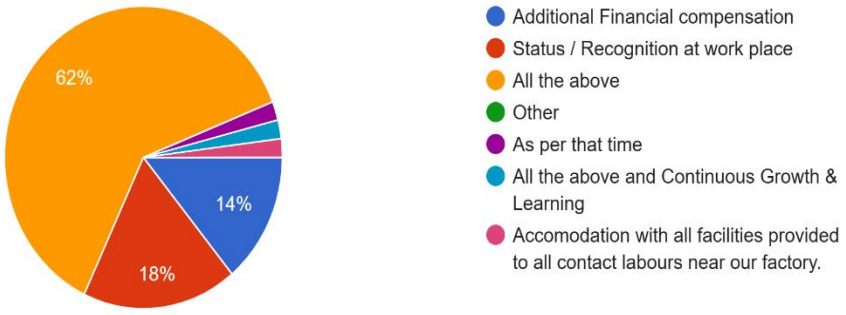
16. From where do you recruit skilled manpower?

50 responses



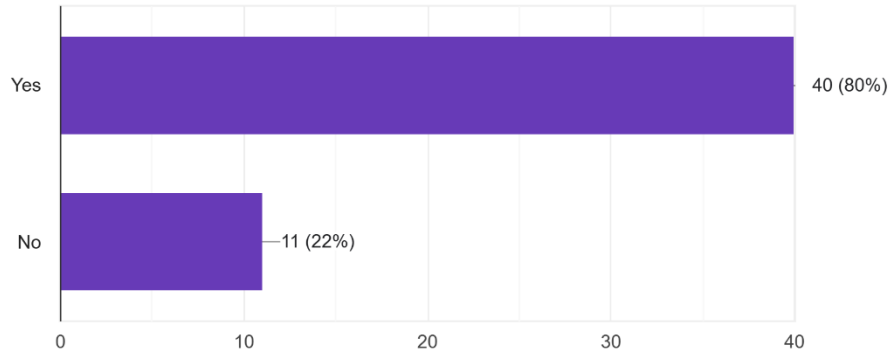
17. What are the incentives for skilled manpower?

50 responses



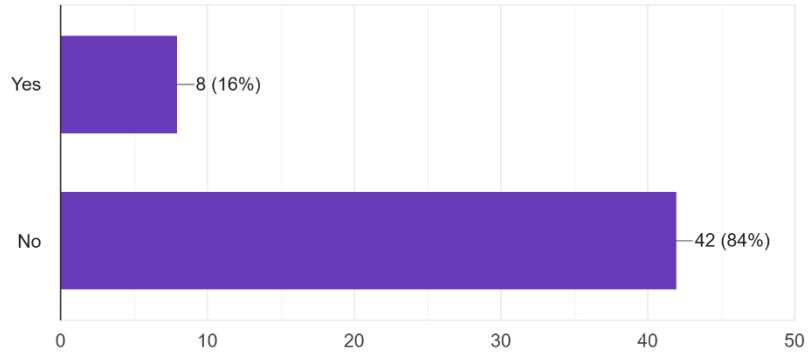
18. Is the available skill development programme adequate to meet the company requirement?

50 responses



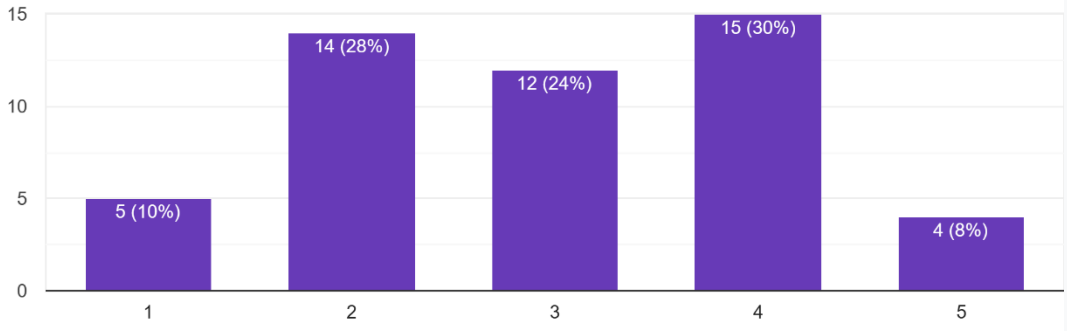
20. Have you accessed / used any government scheme / programme for skill development? Yes or No

50 responses



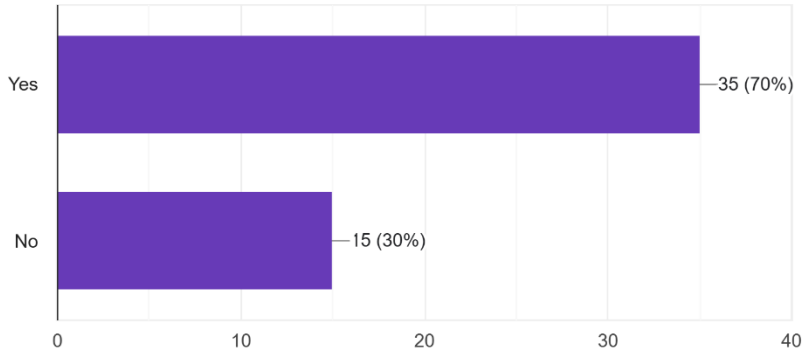
21. Availability of skilled manpower in market

50 responses



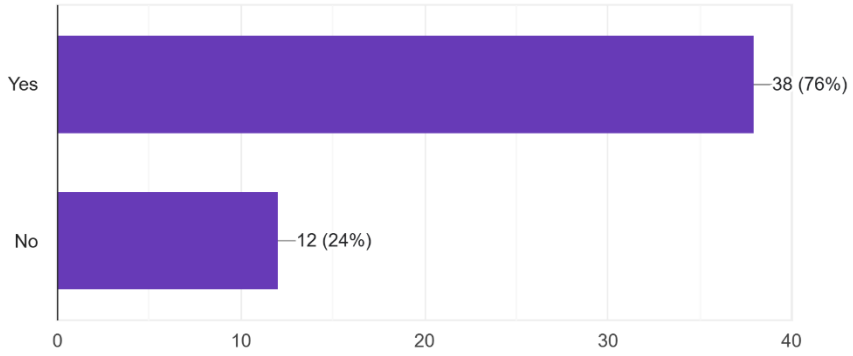
22. Do you have adequate testing infrastructure in your premises to meet the production commitment

50 responses



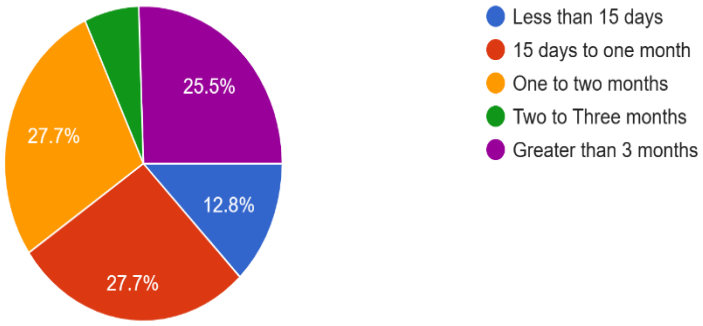
23. If no, is adequate testing infrastructure locally available to meet the production commitment

50 responses



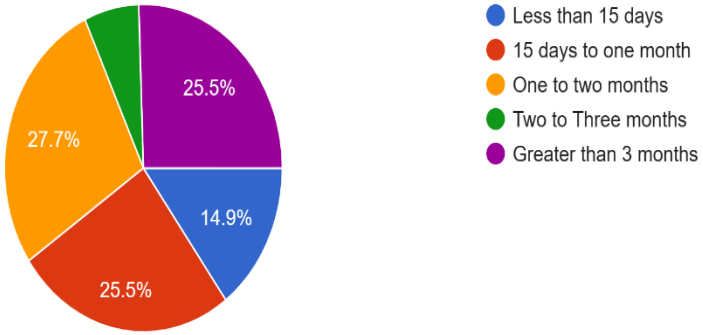
24. How many days does it take to get Quality Assurance (QA) clearance from DGAQA/ DGQA?

47 responses



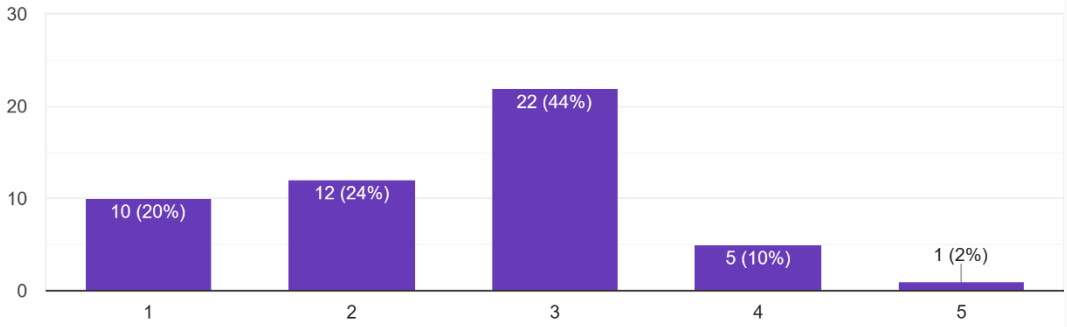
25. How many days did it take to obtain recent QA clearance involving DQAQA / DGQA)?

47 responses



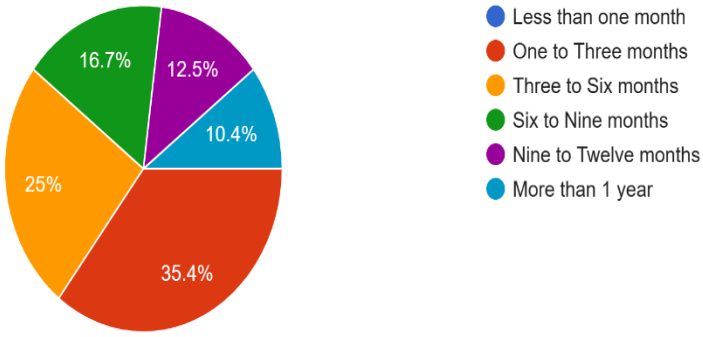
26. How difficult is it to get Quality Assurance (QA) clearance?

50 responses



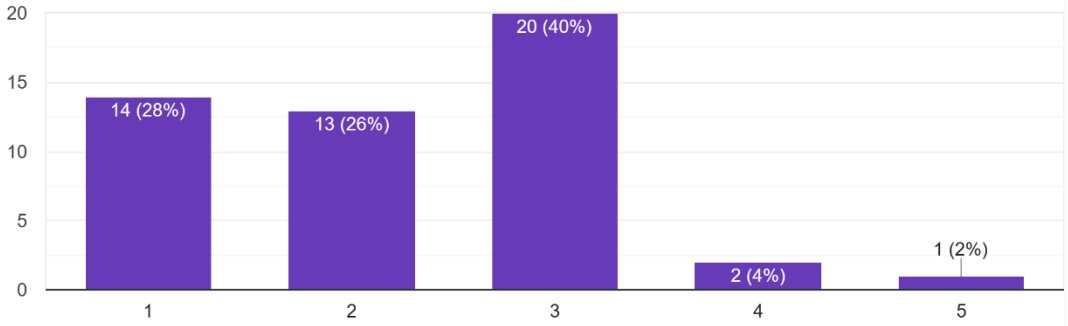
27. How long does it take to get initial worthiness certification? (You may give the average time taken)

48 responses



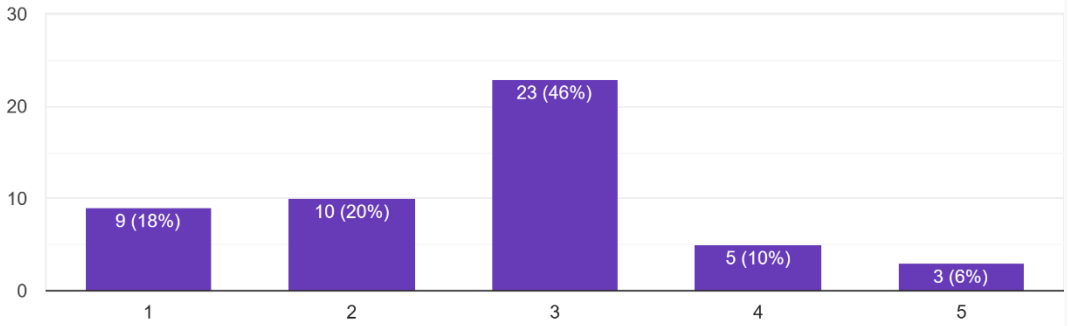
28. How difficult is it to obtain air worthiness / military worthiness certification?

50 responses

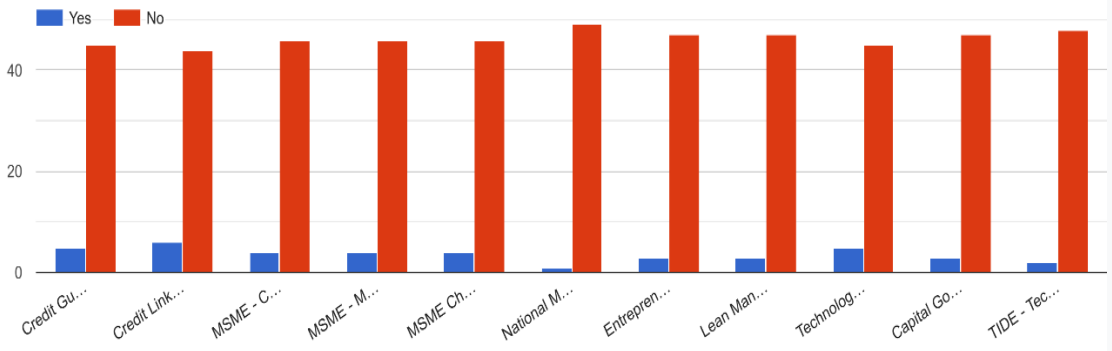


32. Is government scheme for technology upgradation and competitiveness (MSME Champion scheme) helpful in enhancing productivity?

50 responses

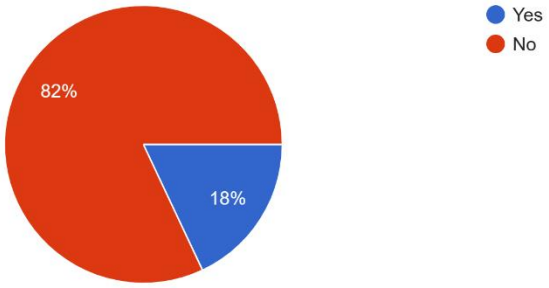


33. Have you availed any of the following government schemes?



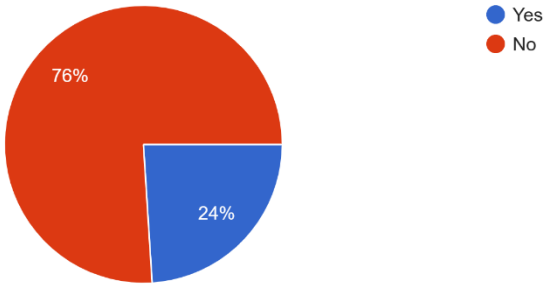
34. Has any of the government policy aided technology assimilation

50 responses



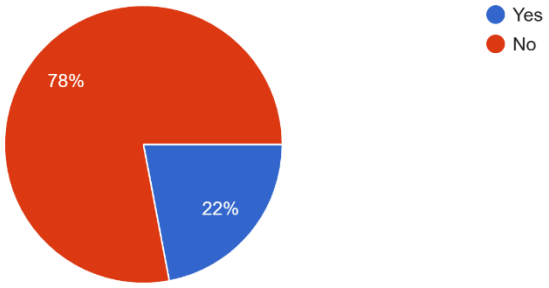
35. Has any of the government scheme aided / improved infrastructure within company?

50 responses



36. Has any of the government scheme(s) aided / improved skill development of employees?

50 responses



37. Has any of the government scheme(s) aided / improved testing infrastructure within company?

50 responses