Draft Detailed Project Report

ESDM Focused Technology Centre at Puducherry

Technology Centre Systems Program

Report No: 2015-Delhi-0465

Submitted To

The Office of Development Commissioner - MSME

Ministry of MSME, Govt. of India

Maulana Azad Road, New Delhi -110108

EY

Building a better
working world

13 July 2016

Director (Tool Room)

Office of Development Commissioner (MSME), Ministry of MSME

Nirman Bhawan, Maulana Azad Road,

New Delhi -110108

Dear Sir,

As part of our engagement to provide Consulting services for establishment of Program Management Unit (PMU) for designing the project, undertaking the pre-project activities and providing implementation support during the course of the Technology Centre Systems Program (TCSP), we hereby submit the Draft Detailed Project Report for setting up of Technology Centre at Puducherry for your kind perusal. The deliverable has been prepared in accordance with our engagement agreement dated 07 November 2013, and our procedures were limited to those described in that agreement.

This Detailed Project Report is based on inquiries of and discussions with:

- ► O/o DC MSME
- ► PSC
- ► Industry experts
- ► World Bank Mission
- ► ESDM units
- ► Government Institutes and Industry association
- ► Secondary Research

We have not sought to confirm the accuracy of the data or the information and explanations provided by the O/o DC MSME. Our work has been limited in scope and time and we stress that more detailed procedures may reveal other issues not captured here. The procedures summarized in our Draft Detailed Project Report do not constitute an audit, a review or other form of assurance in accordance with any generally accepted auditing, review or other assurance standards, and accordingly we do not express any form of assurance. This Draft Detailed Project Report is intended solely for the information and use of the Office of DC-MSME and is not intended to be and should not be used by anyone other than this specified party.

We appreciate the cooperation and assistance provided to us during the preparation of this report. If you have any questions, please contact the undersigned.

Very truly yours,

Amar Shankar, Partner – Advisory Services

Abbreviations

AICTE	All India Council For Technical Education
ARISE	Advanced Repair and Industrial Skills Enhancement
BT	Biotechnology
BHELSIA	BHEL Small and Medium Industries Association
CAD	Computer Aided Design
CAE	Computer Aided Engineering
CAGR	Compound Annual Growth Rate
CAM	Computer Aided Manufacturing
CDGI	Centre for Development of Glass Industries
CFTI	Central Footwear Training Institute
CGTMSE	Credit Guarantee Trust for Micro Small and Medium Enterprises
CIHT	Central Institute of Hand Tools
CII	Confederation of Indian Industry
CITD	Central Institute of Tool Design
CLCSS	Credit Linked Capital Subsidy Scheme
CMC	Construction Management Consultant
CNM	Cluster Network Manager
CST	Central Sales Tax
CTR	Central Tool Room
CTTC	Central Tool Room & Training Centre
DGM	Deputy General Manager
DIC	Department of Industries and Commerce
DTE	Department of Technical Education
EDA	Electronic Design Automation
EHS	Environment, Health, and Safety
ELCIA	Electronics City Industries' Association
ELCINA	Electronic Industries Association of India
EMC	Electronic Manufacturing Cluster
EMS	Electronic Manufacturing Services
ESDM	Electronic System Design and Manufacturing
ESTC	Electronics Service and Training Centre
ETDC	Electronics Test and Development Centre
FAB	Fabrication Facilities
FFDC	Fragrance and Flavour Development Centre
FMCG	Fast Moving Consumer Goods
FSSP	Full Social Screening Process

GC	Governing Council
GDDP	Gross District Domestic Product
GDP	Gross Domestic Product
GESIP	Gender, Equity and Social Inclusion Plan
GM	General Manager
GT&TC	Government Tool Room and Training Centre
HAL	Hindustan Aeronautics Limited
HDI	Human Development Index
HR	Human Resource
HSRL	High Speed Rail Link
IDEMI	Institute for Design of Electrical Measuring Instruments
IDTR	Indo Danish Tool Room
IESA	India Electronics and Semiconductor Association
IPSSP	Indigenous People's Social Screening Process
ISRO	Indian Space Research Organization
IT	Information Technology
ITES	Information Technology Enabled Services
ITI	Industrial Training Institute
LA	Location Attractiveness
MAIT	Manufacturers' Association for Information Technology
MSME	Micro, Small and Medium Enterprises
NAL	National Aerospace Laboratories
NCVT	National Council for Vocational Training
NPSP	National Portal Service Provider
NSSP	No Social Screening Process
O/o DC (MSME)	Office of Development Commissioner - Micro, Small, and Medium Enterprises
OEM	Original Equipment Manufacturer
PCB	Printed Circuit Board
PIPDIC	Pondicherry Industrial Promotion Development and Ivestment Corporation Limited
PMU	Program Management Unit
POC	Proof of Concept
PPDC	Process and Product Development Centre
R&D	Research and Development
RFP	Resettlement Policy Framework
SCVT	Skill Council for Vocational Training
SEZ	Special Economic Zone

SIPCOT	State Industries Promotion Corporation of Tamil Nadu Ltd.
SMT	Surface Mount Technology
STPI	Software technology Parks of India
TANSTIA	Tamil Nadu Small and Tiny Industries Association
TC	Technology Centre
TCSP	Technology Centre Systems Program
TP	Technology Partner
TR	Tool Room
UPS	Uninterrupted Power Supply
VAT	Value Added Tax
VLSI	Very Large Scale Integration

Revision History

Version	Issue date	Amendment description	Prepared by	Reviewed by
V1	07th April, 2016	First Draft	Devesh Gautam	Dr. Milind Mujumdar Utsav Mishra
V2	26th April, 2016		Devesh Gautam	Dinesh Pradhan Mr. S.V Singh (Advisor MoMSME)
V3	5th May, 2016	Environmental and Social Screening section updated as per the comments received.	Devesh Gautam	Shubhra Aprajita Naveen K Pawar
V4	11th July, 2016	Updated civil cost incorporated in the DPR as per the revised area estimate. Civil cost provided by by CMC as per BOQ. Comments from, CITD, Hyderabad incorporated in the DPR.	Devesh Gautam	Dr. Milind Mujumdar

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Executive summary

The objective of the DPR is to evaluate feasibility of the proposed TC. The key components of the DPR include:

Opportunity and need assessment

Technology & Skillset requirement

Social and Environmental assessment

Investment & Return

Opportunity and need assessment

Key clusters in Puducherry Catchment Area
- Proposed electronics manufacturing cluster in Puducherry, Vellore
- Automotive cluster in Chennai & Kancheepuram
- Textile cluster in Trichy
- Chemical cluster in Chennai and Cuddalore

Industrial goods Production In Puducherry Catchment Area

42%
of leather goods

60%
of country's Automotive export

Largest Electronic hardware manufacturing and exporting hub of India

10%
Of sugar production

Stakeholder discussions

Key Stakeholders
- O/o DC-MSME,
- Government of Puducheryy,
- MSME-DI (Chennai)
- PIPDIC, CII-Puducherry
- OEMs, Tier I & II suppliers,
- Industrial Association
- Government Institutes
- MSMEs

Key Training Requirement
- Skilled manpower in hardware repair
- Quality workforce
- Stable Workforce

Key Technology Requirement
- PCB design and manufacturing
- Product assessment, testing and calibration

Location overview

- Located on National Highway NH 45A
- Railways connectivity
- Connectivity with major cities like Bengaluru, Chennai, Coimbatore and other districts in Tamil Nadu
- Electrified double track between Chennai-Puducherry
- Chennai International Airport

Focus Area of the TC

1 Training

Over **35%** of total revenue

Number of trained students

637 — Year 1
2548 — Year 2
4459 — Year 3
5733 — Year 4
6370 — Year 5

Key Training Areas
- Electronic design and manufacturing
- Hardware repair and maintenance
- IT system and software
- Industrial automation
- Microprocessor and microcontroller
- CNC Machines and Tools
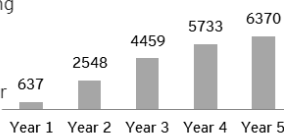
2 Production
- Production of PCB
- Testing and calibration
- 3D manufacturing technology

3 Consulting
- Design Support
- Productivity improvement
- Support to training colleges

4 Other areas
- Manufacturing incubation and technology incubation centre
- Entrepreneur development cell
- TP and CNM support

Financials

Total Capital expenditure: INR 121.57 Cr

Production Machine: INR 42.16 Cr.

Training Machine: INR 19.24 Cr.

Civil Cost incl. Building etc.: INR 54.11 Cr.

Other Infra incl. Pre-operative etc.: INR 6.06 Cr.

Revenue (INR in Cr)

6.7 — Yr 1
10.6 — Yr 2
14.4 — Yr 3
17.5 — Yr 4
21.7 — Yr 5
25.5 — Yr 6
28.3 — Yr 7
30.1 — Yr 8
32.0 — Yr 9
34.1 — Yr 10
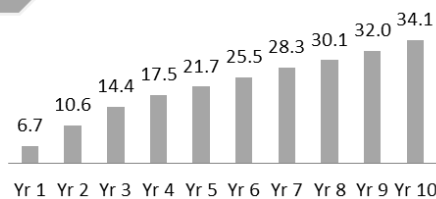
IRR: 7.7%
Positive income after depreciation is projected to be registered in 8th year

Introduction

1. Introduction

1.1 Background and project rationale

India is one of the largest and dynamic emerging markets with vast economic potential. India's GDP in 2012 was USD 1.8 trillion ranking 10th amongst all countries[1]. The objective of the Government of India's, 12th Five-Year Plan (FY2013–17) is to return to GDP growth rates in excess of 8 percent, with strong emphasis on the manufacturing sector. Manufacturing has long been recognized as an essential driver of economic development for most countries, as it has an important economic and employment multiplier effect. The manufacturing sector will have to play an important role to take Indian economy to a high growth rate trajectory and achieve the planned objectives. Micro Small and Medium Enterprises play an essential role in the overall industrial economy of the country and account for over 45% of India's manufacturing output[2].

Despite strong potential, India's manufacturing performance has not been encouraging. The share of manufacturing in India's GDP has stagnated at around 16 percent[3], compared to more than 30 percent (and growing) in some of the other Asian countries. India's manufacturing sector has been facing challenges, such as low value addition, low productivity, and less-than-desirable up scaling. However, world-class production units that compete in the international market are also present in India.

The major constraints in the growth and competitiveness of India's manufacturing sector are:
- ► access to finance (especially for MSMEs)
- ► access to technology and skilled manpower
- ► access to markets (domestic & export)
- ► infrastructure deficiencies

These constraints impact the competitiveness of MSMEs operating in both upstream and downstream manufacturing industries.

Upstream industries, such as the tooling industry, which consists of developing and manufacturing of dies, moulds, casts, as well as testing and prototyping, serves as an interface between product design and product manufacturing. The right tools help increase throughputs, reduce material waste, improve product quality, time to market and thus improve competitiveness. The importance of the tooling industry increases with accelerating technological developments, product sophistication/ innovation/ customization and reducing time to market. Tooling is a specialized but local industry

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[1] http://unstats.un.org/unsd/snaama/dnltransfer.asp?fID=2
[2] http://www.dnb.co.in/Nashik2013/PDF/MSMEsInIndia.pdf
[3]The Manufacturing plan - Strategies for accelerating growth of manufacturing in India in the 12th Five Year Plan and beyond, Planning Commission

(more than 60 percent of tools in the world are locally produced and consumed – including in India) dominated by MSMEs (more than 80% of firms in India, Europe, US and Japan). Like other countries, the private tooling industry in India has grown hand in hand with the manufacturing industry. The turnover of the Indian tooling industry is approximately INR 13,000 crores, with more than a thousand firms employing over 120,000 workers (TAGMA 2011). The constraints to the growth and competitiveness of the Indian tooling industry mirror the ones affecting manufacturing as a whole, as articulated above. The scarcity of skilled workers and problems related to their retention, as well as the lack of access to a high-quality design and prototyping facility has hurt growth.

In downstream industries such as automotive, electronics, fragrance and flavours, glass, leather, toys etc., there is shortage of skilled labour and limited access to advanced technologies. These industries include large numbers of MSMEs, often working as part of supplier networks of larger enterprises and subject to increased international competition.

1.1.1 Demographic overview and challenges

While India stands to benefit from an immense demographic dividend, with the largest youth population in the world (around 66 percent of the total population is under the age of 35), it has an overall employment rate of 4.7 percent (under usual principal status approach) and an overall labour force participation rate of 50.9 percent[4]. For the country to gain from this demographic dividend, skilling and up-skilling its youth are key priorities for the Government of India (GoI).

India has a labour force of about 470 million, of which less than 10 percent have received skills training, either through formal or informal means[5]. About 13 million young people enter the labour force annually. Despite the huge expansion of skills training provision during the 11th Five-year plan, the country's skills development system requires massive up scaling. In its 11th and 12th Five-year plans, India recognized that skill development is critical to achieve faster, sustainable and inclusive growth on one hand, and to providing decent employment opportunities to the growing young population, on the other. According to the National Skill Development Policy published in March 2009, India has set a target of skilling 500 million people by 2022[6]. This program will play a bigger role in the country's plan by setting a target of skilling 150 lakh people within the next 6 years.

Global experience shows that a workforce with higher schooling and skill levels leads to higher productivity and personal income. A 2011 study showed that students who attended three-year vocational training courses at ITIs earned 25 percent more than two-year course students, who earned 14 percent more than did one-year course students[7]. These results were also observed in a

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[4] Report on the Third-Annual employment & unemployment survey (2012 – 2013) of the Ministry of Labor, Government of India.
[5] 11th and 12th Five Year Plan
[6] http://labour.nic.in/upload/uploadfiles/files/Policies/NationalSkillDevelopmentPolicyMar09.pdf
[7] Vocational Training in the Private Sector (Goyal 2011)

2007 study showing that the returns on vocational training in India have been found to be 8 percent, almost equivalent to the 8.4 percent related to an additional year of education. The same study showed that, increased educational attainment by one year is associated with 5.8 percent higher firm-level productivity in India[8].

1.1.2 Country's manufacturing objectives

Development of Indian manufacturing sector calls for deepening and recalibrating of economic reforms that would strengthen the sector and make it grow faster and become an engine of inclusive growth. To realize the potential of the manufacturing sector, Government of India has announced National Manufacturing Policy in 2011 with the objective of enhancing the share of manufacturing in GDP to 25% within a decade and creating 100 million jobs. It also seeks to empower rural youth by imparting necessary skill sets to make them employable. Sustainable development is integral to the spirit of the policy and technological value addition in manufacturing has received special focus.

The National Manufacturing Policy has six objectives:
► Increase manufacturing sector growth to 12-14% over the medium term to make it the engine of growth for the economy. The 2 to 4 % differential over the medium term growth rate of the overall economy will enable manufacturing to contribute at least 25% of the National GDP by 2022.
► Increase the rate of job creation in manufacturing to create 100 million additional jobs by 2022.
► Creation of appropriate skill sets among the rural migrant and urban poor to make growth inclusive.
► Increase domestic value addition and technological depth in manufacturing.
► Enhance global competitiveness of Indian manufacturing through appropriate policy support.
► Ensure sustainability of growth, particularly with regard to the environment including energy efficiency, optimal utilization of natural resources and restoration of damaged/ degraded eco-systems.

1.1.3 Recommendations of XII plan Working group & Parliamentary Standing Committee

At present, the Office of Development Commissioner [O/o DC (MSME)], Ministry of Micro, Small and Medium Enterprises, operates 10 TRs and 8 TDCs (both hereinafter called as TCs) spread across the country. The TCs have been providing technical and vocational training programmes to more than 1,50,000 trainees annually including AICTE and NCVT approved certification. They also provide design and manufacturing support to entrepreneurs alongside technical consultancies. The TCs primary focus is to improve access to advanced technologies & provide technical advisory support to

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[8] The Knowledge Economy and Education and Training in South Asia (World Bank 2007)

entrepreneurs and workers, as well as opportunities for technical skill development to the youth at varying levels.

Considering the performance of existing TCs, the Department related Parliamentary Standing Committee on Industry, in its 235th report submitted to Rajya Sabha on 4 May 2012 have recommended as follows:

i) "The committee is impressed with the performance of the TRs established by the MSME Ministry. These enable the youth to improve their skills and get employment opportunities. The success of such TRs inspires confidence that establishment of more such institutions will equip the young people with necessary ability useful in the expanding market and manufacturing sector".

ii) "The Committee strongly recommends that more money must be allocated for establishment of TRs across the country. It is understood that MSME Ministry is also approaching the concerned organizations within Government to get loan from International Financial Institutions. If Planning Commission and Finance Ministry cannot allocate more funds for this purpose, the necessary permission to MSME Ministry to get access to borrowings from international banks may be given without delay. However, it is strongly recommended that we must use our own resources for this cause, which is good for the youth of our country and MSME sector".

The evaluation of existing ten TCs was undertaken under GIZ–MSME Umbrella Programme during 2011. The experts have appreciated the performance of the existing TCs and have recommended expansion of skill development activities and introduction of newer technologies in the TCs.

During the budget speech of 2013-14, following announcement was made;

Para 75: "TRs and TDCs set up by the Ministry of MSME have done well in extending technology and design support to small businesses. I propose to provide with World Bank assistance, a sum of Rs 2,200 crore during the 12th Five Year Plan period to set up 15 additional Centres".

In pursuance of (i) the announcement made in the Budget (2013-14), (ii) the recommendations of the Department Related Parliamentary Standing Committee on Industry in its 235th Report submitted to Parliament (Rajya Sabha) on 4 May 2012, and (iii) the recommendations of the experts after evaluating the performance of existing TCs, it was proposed to implement "Technology Centre Systems Programme (TCSP)" at an estimated project cost of INR2,200 crore including World Bank assistance of USD 200 million by setting up 15 new TCs and to modernize / upgrade existing TCs by introducing latest machinery / technologies.

1.1.4 Technology Centres System Program

The Technology Centres Systems Program, a national program, seeks to enhance the technological and skill base of MSMEs in selected manufacturing industries, via upgraded and new TCs (currently called TRs and TDCs). The TCs will have as their mission to improve the competitiveness of MSMEs across India – with a strong emphasis on low income states.

This will be achieved by providing an integrated suite of services to MSMEs on a fee basis, ranging from providing them access to technology, access to skills and access to business advisory services. TCSP will reinforce the technical capability of the TCs as well as their performance, by further increasing the participation of the private sector in key decisions at both the national and local levels.

The TCs will support industry clusters across manufacturing value chains, both upstream (tooling industry) and downstream (key industries exposed to global competition close to the technology frontier, such as the automotive and electronics sectors, as well as industries evolving through indigenous innovations, such as fragrance and flavour, glass, leather, toys etc.).

TCSP's Program Development Objective has been defined to enhance the competitiveness of MSMEs by improving their access to technology and business advisory services as well as skilled workers through systems of financially sustainable TCs. The program seeks to establish 15 new TCs and upgrade capabilities of select existing TCs and develop linkages between MSMEs, Indian and international research institutes and leading manufacturers. This would include upgradation in technology, land and building infrastructure and other associated infrastructure of the TC. The program will connect leading practices contributing to advance technology, knowledge, skilling and innovation which can be transferred to MSMEs served by each TC.

The competitiveness of MSMEs is impacted by various factors such as entrepreneurial drive of the leader, market and customer dynamics, their access to technology, finance & business advisory and availability of skill manpower. The TCs will shape the outcomes of the program by providing MSMEs access to technology, business advisory and skilled manpower. So it would be possible to measure the success of this program by measuring the offtake of these paid services of the TCs by MSMEs. Therefore, the key indicators that will be measured are;

- ► Number of enterprises paid for services rendered including placement services
- ► Number of long term trainees employed by industry, including MSMEs, within six months after being trained at TCs
- ► TCs' gross profit before depreciation (not including land)
- ► Access to Technology
  - ▪ Revenue of TCs from access to technology activities (production support and consultancy)
  - ▪ Capacity utilization of TCs machines

- Number of technology strategies/roadmaps developed by TPs and endorsed by Industry Associations and IC

► Access to Skilled Workers

- Number of trainees trained (direct program beneficiary)
  - external trainers trained
  - with newly developed contents
  - female
  - from low income states
  - from disadvantaged section of society (SC/ST)
- Number of skills development contents (e.g. curricula, standards, certification schemes) developed and adopted by industry associations, and/or certifying agencies

► Access to Business Advisory

- Number of needs assessment and related business plans developed by CNMs and endorsed by Industry Associations
- Value of TCs' businesses generated with support of Cluster Network Managers

In addition, intermediate result indicators are designed to monitor critical progress towards achievement of the PDO with primary emphasis on market-tested outputs of the TCs supported by Technology Partner and Cluster Network Manager. Examples of such indicators include capacity utilization of machines, number of trainees trained, access to services by MSMEs, number of technology strategies / roadmaps developed by TPs and endorsed by industry associations and value of TCs' businesses generated with support of CNMs.

Figure 1: TCSP eco-system

This program will create an ecosystem to help MSMEs become more competitive by acquiring improved technology and employing better skilled workers. This will be done directly through the services provided to them by the TCs, as well as indirectly through the linkages with larger firms (e.g. as part of the supplier network of an OEM), which will provide access to the services of the TCs under the condition that it benefits their suppliers. The TCs will contribute by providing inputs to MSMEs on manufacturing technology & business advisory and by improving the skills of workers/ skill seekers for better employment opportunities. The program will therefore benefit the Indian MSMEs, students and workers and help establish systems of TCs in the country wherein each centre will gain from the specialisation and experience of the others and improve the competetiveness of MSMEs.

1.1.5 <mark>Key TCSP stakeholders</mark>

TCSP has multiple stakeholders who will need to work together to achieve the objective of enhancing the competitiveness of MSMEs by improving their access to technology and business advisory services as well as skilled workers through systems of financially sustainable TCs. The key players who will participate in the program include:

► **MSME Units - Beneficiaries**

MSME units will be the prime beneficiaries of the program and the overall objective of the program centres around providing them with access to modern technology, access to business advisory services and access to skilled workforce.

► **Skill seekers**

Workers, job and skill seekers will also gain from this program with access to short term and long term training/skill development courses that will help job seekers to improve their career prospects and finding livelihood.

► **Office of Development Commissioner, Ministry of MSME (DC-MoMSME)**

The program would be designed and implemented under the aegis of the O/o Development Commissioner MSME, Government of India. O/O DCMSME has the mandate to support MSMEs and TCSP will serve this towards this purpose.

► **Technology Centres**

The TCs will serve MSMEs with integrated suite of services on a fee basis, ranging from providing them access to technology, access to skills and access to business advisory services. The program will focus to upgrade selected existing TCs and development of 15 new TCs that support or will support industry clusters across manufacturing value chains, both upstream (tooling industry) and downstream (key industries exposed to global competition close to technology frontier, such as automotive electronics, as well as industries evolving through indigenous innovations, such as fragrances and flavours, footwear, glassware, toys etc.).

► Collaborations with Industry associations, academia, applied research institutes and others
Strategic collaborations between TCs and various other organizations will be critical to foster research and development, business incubation and strengthen the TCs with regard to manufacturing services, business advisory and training capabilities. These include:

- Regional / sectorial industry associations representing MSMEs
- Regional / national level engineering/ academic / vocational training institutions
- Applied research institutes
- Local regional colleges
- Autonomous institutes such as IISc, CSIR

- Academia

Leading practices from around the world for similar program suggest and underscore the importance of establishing such linkages. In the Indian context, there are many research oriented projects and concepts that can provide competitive advantage to Indian industry once the early state research emanating from applied research institutes and academia can be validated and implemented at the TC through such collaborations. The TCs will provide a unique environment of bringing the country's leading academics, engineering and industry professionals together to develop and demonstrate new technologies on an industrial scale. This will allow the clients of TCs to develop new manufacturing processes in a safe, neutral setting, reducing the associated financial risks.

► **Program Management Unit (PMU)**

Role of PMU is to assist the O/o DC MSME in designing and implementing this program. This includes developing framework for identifying sites/sectors for the new TCs, developing detailed project report, support in procurement of services and EPC contracts; developing and implementing environment and social safeguards, monitoring and evaluation, manage the roll out of the national portal, deployment of subject matter expertise and overall program management for TCSP over 6 years. EY LLP has been selected as the PMU for the TCSP by the O/o DC MSME via competitive bidding as per World Bank guidelines.

► **Technology Partner (TP)**

Role of TP is to help enhance the supply side of the TC by augmenting the technologies at the TCs, assist in their capacity building with respect to the identified technologies and clusters and provide greater support to the services being offered to the MSMEs by the TCs. These services include being exposed to the potential impact of new and relevant technologies, learning how to use new technologies/equipment, providing access to cutting-edge equipment, developing and testing new products, consultancy, training and deploying efficient techniques and practices that improve the competitiveness of the MSMEs being served. M/s Steinbeis GmbH & Co. KG für Technologietransfer has been selected as the TP for ESDM Sector under the TCSP by the O/o DC MSME via competitive bidding as per World Bank guidelines.

► **Cluster Network Manager (CNM)**

CNMs for each System (or sub System) of TCs will specialize on specific geographic cluster(s)/ industry(s). The CNM will build capacity of the TC to enhance economic development cooperation amongst key stakeholders to improve the competitiveness of the cluster. This will include strengthening market linkages of the TCs with the MSMEs in the cluster it serves, trade and industry associations, academia, educational institutions, applied research institutions, service providers, other government support institutions, workers and skill seekers.

The CNM would seek to increase competitiveness of supply chains of large firms by enhancing quality, reliability and productivity of MSME suppliers by offering services of the TC, thus also helping in

meeting revenue targets of the TC. The CNM will enhance the competitiveness of the cluster business environment by establishing a network of service providers which will address the needs of the MSMEs not served by the TC e.g. access to a network of financial services. The CNM will also facilitate closer cooperation between the TC and MSMEs with key innovation stakeholders such as applied research institutes, autonomous institutions such as IISc, CSIR, academia, skill seekers, and students etc. to enhance product and process innovation. TC's capacity will be further enhanced through closer cooperation amongst skills development and labour market stakeholders to increase the number of workers/ trainees from TCs finding long term employment to improve their livelihood.

► **National Portal Service Provider (NPSP)**

Role of NPSP is to design, develop, set-up, operate and maintain the IT platform for MSMEs. The IT platform will act as a common platform for services that will be required by an MSME from the start of their business, to successful operations and closure e.g. access to regulatory services for entrepreneurs, assistance for financing, access to list of suppliers etc. The platform intends to extend the reach of the program to its remote beneficiaries well beyond the TCs' physical location through access to e-learning solutions, B2B service and product market place, e-recruitment, assistance for financial services and e-governance services (forum to address grievances, automation of customer facing operations of the O/o DC MSME) on paid basis.

► **Construction Management Consultant**

The Construction Management Consultant (CMC) shall be responsible for design, supervision of work and final closure of construction works for the TC. CMC will prepare concept plans and subproject appraisal reports, carry out contract planning and detailed engineering designs, prepare schedules of quantities and specifications. It will support the PMU in preparation of procurement packages, bid documents, invitation, receipt and evaluation of bids etc. CMC will supervise the construction, manage the contract, monitor construction activities and will certify contractor's progress claims, carry out quality control, testing, and prepare progress and monitoring reports, and certify bills. Tata Consulting Engineers Ltd. has been selected as the CMC for the TCSP by the O/o DC MSME via competitive bidding as per World Bank guidelines.

1.1.6 RFD of TCSP

TCSP's objective is to enhance the competitiveness of MSMEs by improving their access to technology, business advisory services as well as skilled workers through systems of financially sustainable TCs. For monitoring the program outcomes, RFD has been defined; which contains the results indicators at the PDO level and intermediate outcome level together with the baselines and targets over the life of the program. Intermediate results indicators are designed to monitor critical progress toward achievement of the PDO with primary emphasis on market-tested outputs of the TCs and other stakeholders of the TCSP (viz. TPs, CNMs and ITP service provider).

Active participation of General Manager of TCs will be essential for steering the operationalization of TCSP in line with the envisioned mandate. The key success parameters of the General Manager include:

- ► Revenue earned by respective TC from,
  - Production
  - Training
  - Consultancy and others
  - Business given to private tool rooms
  - Production/training/consultancy with the help of CNM (territory/sectors to be identified Jointly by CNM and TCs in advance)
- ► Recovery ratio--Revenue/ recurring expenditure (cash) in percentage
- ► Profit before depreciation
- ► Profit after depreciation
- ► No. of trainees trained in Long term & Short term training programme
- ► No. of courses identified which are suitable for women employment & courses designed and started (CNM to assist the identification of courses and TP to design)
- ► No. of units assisted , out of which how many are MSMEs
- ► Present technical papers showing successes delivered and how it has aided industry
- ► Technical incubation centre to start and the long term trainees to be encouraged to register for starting enterprises

The table below depicts the snapshot of result indicators which form a part of the RFD.

Table 1: Result indicators of the RFD

Program development objective indicators		Number of enterprises paid for services rendered including placement services
		Number of long term trainees employed by industry, including MSMEs, six months after graduating from the TCs
		TCs' gross profit before depreciation (not including land)

Intermediary Results

Component 1- Technical assistance to the existing and new TCs	Access to Technology	TCs revenue from access to technology activities (production support and consultancy)
		Capacity utilization of machines in TCs
		No. of technology strategies/roadmaps developed by TPs and endorsed by industry associations and IC
	Access to Skilled workforce	Number of trainees trained (direct program beneficiary
		Number of skills development contents (e.g. curricula, standards, certifications) developed and adopted by industry associations, and/or certifying agencies
	Access to Business Advisory	Number of needs assessment and business plans developed by CNMs and endorsed by Industry Assocs.
		Value of TCs' businesses generated with support of Cluster Network Managers
		Number of users of IT Platform
Component 2-Investments to upgrade existing and develop new TCs		Number of new TCs built
Component 3-Technical assistance to MoMSME		Establishment of PMU for program implementation and capacity building of MoMSME

The program aims to have direct and indirect industrial and economic outcomes to the country, such as enhanced manufacturing competitiveness, improvement in the overall employment rate and increased GDP growth.

1.2   Overview of existing MSME TCs

Out of the currently operational 18 Technology Centres (TCs) & Tool Rooms (TRs), 10 are for the tooling industry and 8 are for other industries such as ESDM (electronics system design and manufacturing), glass, footwear, and fragrance and flavour and sports. Half of these eighteen TCs are located in low income states (Uttar Pradesh, Madhya Pradesh, Odisha, Jharkhand and Assam). The TCs are self-sufficient institutions that provide design support, training, manufacturing, testing & calibration and consulting services to MSMEs and other enterprises. They have created a niche in the market in various fields such as hand tools, plastics, automotive, testing & calibration etc. The list of the existing TCs & TRs along with their specializations is given below:

Table 2: Existing TCs & TRs with focus sectors

SN	Name	Focus Sector
1	Central Tool Room & Training Centre (CTTC), Bhubaneswar (Odisha)	General engineering (Precision components)
2	Indo Danish Tool Room (IDTR), Jamshedpur (Jharkhand)	General engineering (Auto components)
3	Central Tool Room & Training Centre (CTTC), Kolkata (West Bengal)	General engineering
4	Tool Room & Training Centre (TRTC), Guwahati (Assam)	General engineering (Training in tool making)
5	Indo German Tool Room (IGTR), Aurangabad (Maharashtra)	General engineering (Auto components)
6	Indo German Tool Room (IGTR), Indore (Madhya Pradesh)	General engineering (Auto & Pharma)
7	Indo German Tool Room (IGTR), Ahmedabad (Gujarat)	General engineering (Auto & Plastic tools)
8	Central Tool Room (CTR), Ludhiana (Punjab)	General engineering
9	Central Institute of Hand Tools (CIHT), Jalandhar (Punjab)	General engineering (Hand tools)
10	Central Institute of Tool Design (CITD), Hyderabad, (Andhra Pradesh)	General engineering & ESDM
11	Institute for Design of Electrical Measuring Instruments (IDEMI), Mumbai, (Maharashtra)	ESDM and tool making
12	Electronics Service & Training Centre (ESTC), Ramnagar (Uttarakhand)	ESDM
13	Process and Product Development Centre (PPDC), Agra (Uttar Pradesh)	Foundry and forging

SN	Name	Focus Sector
14	Process cum Product Development Centre (PPDC), Meerut (Uttar Pradesh)	Sports goods
15	Central Footwear Training Institute (CFTI), Agra (Uttar Pradesh)	Leather & footwear
16	Central Footwear Training Institute (CFTI), Chennai (Tamil Nadu)	Leather & footwear
17	Fragrance and Flavour Development Centre (FFDC), Kannauj (Uttar Pradesh)	Fragrance & flavours
18	Centre for Development of Glass Industries (CDGI), Firozabad (Uttar Pradesh)	Glassware

Figure 2: Location of existing TCs and New TCs
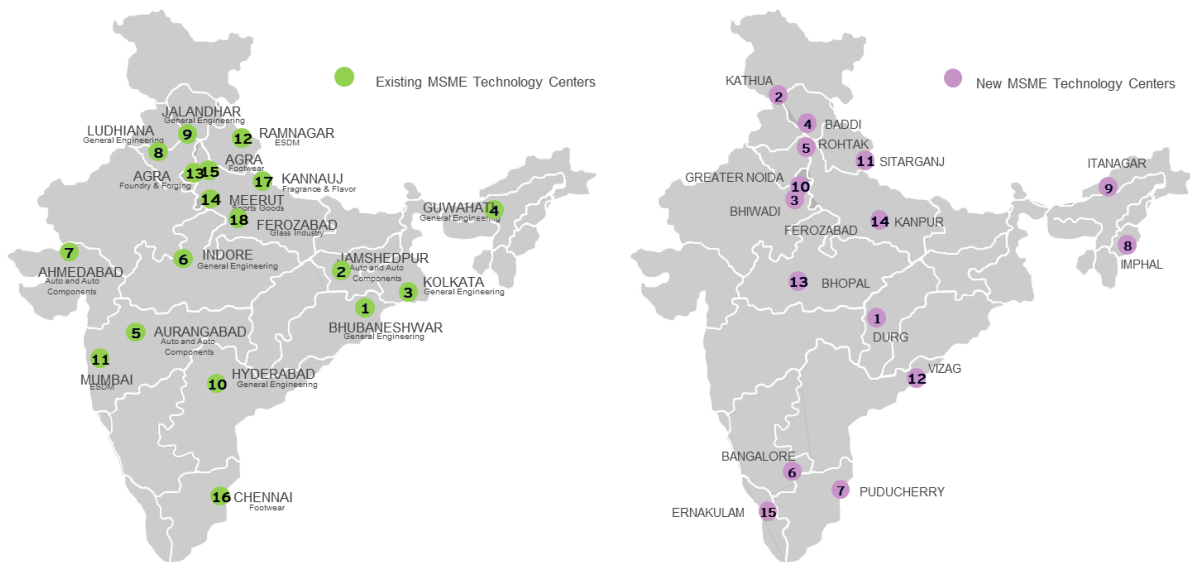
Several of these were set up through support from German and Danish Government under bilateral agreements as well as with the UNIDO. These TCs are largely self-sustaining entities that provide technical and vocational training programs to more than 1,50,000 trainees annually. Some of these include training programs certified by the AICTE and NCVT. They also provide design and manufacturing support to entrepreneurs alongside technical consultancies.

The existing TC's, were set up between 1967 and 1999, with primary focus on improving access to technologies and providing technical advisory support for entrepreneurs in the given industry cluster they serve. These TCs also serve workers and youth by offering opportunities for hands-on technical training and skill development in varied specialisations with a view to improve employability and livelihood opportunities.

The key services offered by the TCs include:

► Design & manufacturing
  • Product Development
  • Design & Manufacturing of tools, dies, moulds, precision tools
  • Process Development & Improvement

► Skill development
  • Conduct long & short term training programs in the areas of CAD, CAM, CNC, automation, RPT, mechatronics, glass design, shoe design, aromatherapy etc.
  • Offers customised programs for industries

  The education level of the participating students ranges from school drop outs to 10th/12th/ITI/diploma/degree holders

► Consultancy
  • Process and Product Improvement
  • Automation solutions
  • Quality Systems support
  • Turnkey assignments
  • Course curriculum developments

Over the last few years, financial performance of the TCs has markedly improved. Most of them have experienced strong revenue growth (mostly due to training activities) and have achieved financial sustainability (before depreciation and land costs and few TCs even after depreciation). Based on the recent reports and financial analysis, following are some of the key observations:

► High profitability in recent years: There has been an improvement in recovery ratio of these TCs, thus allowing them to progress towards their self-sustainability mandate. Majority of them have become profitable in the last three years.

► Skew towards training: Training and skill developed services have been a key revenue sources for the TCs. The scope of manufacturing needs to be up-scaled to achieve a balance in operations and revenues from each TC. Ideally, revenues should be balanced between the two main sources of income for the TCs. Only IGTR Aurangabad is found to be closely balanced. CITD Hyderabad and CTTC Kolkata, although profitable, need to perhaps enhance their production activities.

▶ Focus of production activities is more towards job work or component production: It was found that the utilisation of machines in the production area was focused on component production and facilities for designing, die casting or tooling were not being fully utilized. CTTC Bhubaneswar and IDTR Jamshedpur focus on component production while CTR Ludhiana on job work and IGTR Indore and CTTC Kolkata on jigs and fixtures. Only IGTR Aurangabad and CITD Hyderabad were found to focus on specialization in production, including designing, such as die casting and sheet metal or press tooling.

▶ Training capacity is well utilized: As reflected in the sources of revenue generation, the scale of training activities has been growing. All TCs initially reviewed, demonstrated an increase in training numbers from 2011-12 to 2012-13. The highest increase was observed at IGTR Ahmedabad. Although this is a positive trend, the staffs at these TCs needs to focus on production and maintain a balance between these two activities, while also up scaling other activities like consultancy and product testing. The centres should also seek avenues for taking advantage of government sponsored schemes and subsequently train more technicians in welding, machining and in automation.

There is a need to replicate the TCs at more places along with technological up gradation, improved training facilities and innovation in the business models etc. This will increase their capacities to train and strengthen the workforce supply. By improving the competitiveness of these facilities, the MSME TCs can be better utilized and expected to produce a bigger footprint in the Indian manufacturing sector.

1.3   Evaluation study of TCs and recommendations of the experts

A study of selected MoMSME TRs in India on *'Strategic Assessment and Recommendations'* was submitted under the *'Micro, Small and Medium Enterprises Umbrella Programme'*. The purpose of the study was to make comparison of the TRs with international TRs programmes. It is to be noted that these TRs have now been renamed as TCs. An integrated set of ten recommendations have been made to increase the impact of the TR programme - reducing constraints to manufacturing MSME growth which are as follows:

▶ **Scale up training to meet market demand** - TCs should train more people. The gap in the supply of advanced manufacturing skills will systematically reduce.

▶ **Support private tooling sector to mature to excellence** - Besides 10 government TRs, hundreds of private TRs contribute to increased manufacturing MSME competitiveness by providing more complex tools at lower prices.

▶ **Engage in strategic partnerships** - Partnerships with large manufacturers can help realise large scale opportunities for manufacturing MSME. TCs can benefit from large scale and long lasting demand for services and increased revenue.

► **Re-organise "business model" of government TRs**- the TCs should function as autonomous business units with increased powers and accountability, increase job enrichment and control over own wellbeing. These teams are likely to become more motivated, innovative, leaner and more responsive to customers.

► **Map out the TRs role in the local innovation system** - TCs can benefit from integration with the local innovation system. Increased opportunity will result from increased stakeholder awareness and support.

► **Move away from hierarchy to network governance** - TCs will benefit from more autonomy which enables them to respond better to opportunities.

► **Establish a strategic framework** - TCs should utilise a coherent strategic framework which clearly articulates programme goals, sound economic development principles and good practices. Revised KPIs should promote sound strategy that result in greater, sustained development impact.

► **Establish a strategic facilitation capacity** - TCs should learn faster to achieve greater development impact. TCs should be at an international level of competitiveness.

Apart from above, several studies have been undertaken by O/o DC MSME in recent years to analyse the technology capabilities and governance framework established at the existing TCs. The key findings from these studies are summarized as follows:

► **Technology**
  - There is a possibility of improving the overall machine performance by suitable investments in large size milling machines and grinding machines to remove the bottleneck
  - Rationalization and standardization of all manufacturing processes
  - Reduction of in-machine set-up times using zero-point clamping systems and pallets

► **Organization**
  - Definition of requirements for improving planning and control of the order fulfilment process by developing an electronic planning and control system.

► **Training**
  - Development of a link between manufacturing competencies and course offerings through the introduction of course offerings that address organizational capabilities and component manufacturing,
  - Establishment of modular course structure for advanced training of industry professionals.

All of the above recommendations are valuable not only for the improvement of the existing TCs but also it serves as an important input for conceptualizing and planning for the new TCs.

DPR Objective and Approach

2. DPR objective and approach

2.1 Objective

An ESDM focused Technology Centre in Puducherry has been proposed with the underlying fact and review of the catchment area (Puducherry, Chennai, Trichy, Salem, Kancheepuram, Cuddalore etc.) which has some of the leading ESDM units. Further a number of transformational industrial projects are proposed and the TC can facilitate and support the MSME units coming up across this region. The TC at Puducherry will play an important role in enhancing the competitiveness of the MSME Units in the area. TC will provide support service to entrepreneurs and MSMEs from the initial stages of product concept to prototyping, low volume production and incubation for a period of 2 years. The TC will focus on improving access to technology, providing skill up-gradation and offering advocacy support to the MSMEs with high growth potential. The long term vision is to ensure competitiveness of the MSMEs in the eco-system by strengthening their linkages to the mainstream ESDM manufacturing sector in the region.

The objective of this DPR is to evaluate feasibility of proposed MoMSME TC at Puducherry. This includes assessment of the market need in the region, technology and skillset requirement, amount of investment required, construction needed, its layout and subsequent requirements for implementation of the green field TC at Puducherry. This DPR has been prepared in consultation with relevant stakeholders including O/o DC-MSME, Government of Puducherry, MSME-DI – Chennai, Department of Industries - Puducherry, key players, industry associations in Puducherry such as CII, PIPDIC, PIA, CLIK, ELCINA, IESA, Government Institutes and ancillary units in the region. This DPR would facilitate the implementation plan of proposed TC at Puducherry. Also, a workshop at Chennai and Puducherry was organised on 8th and 11th Sep 2015 respectively, in which representatives from various industry associations, industries, MSMEs participated. Their suggestions and views were also taken into consideration during the preparation of this DPR.

2.2 Approach

To start with, a comprehensive secondary research was carried out to understand the technological requirements of the sector and in particular of the Puducherry catchment area. To validate the facts, the team performed a detailed primary research, which included meetings with various key stakeholders including O/o DC-MSME, ESDM units in the catchment and others as explained below.

Discussions with various stakeholders were carried out to develop better understanding of the requirements and expectations from the proposed TC. Leading players like Flextronics, Ford India, Lenovo, Eaton etc. were met in this region to discuss and understand the various insights with respect to the tooling & other technological requirements during the preparation of the DPR. Telephonic discussions with some of the key ESDM component manufacturers and suppliers in the Puducherry region were carried out. The objective of this primary research was to understand their business

requirements, issues, challenges, and future requirements to develop a deeper understanding of the requirements that can be served by the TCSP in future.

Based on the outcomes and the results of the discussions, market opportunity assessment was undertaken to understand the technology demand in ESDM sector, across segments, across the various stages of manufacturing.

Way forward: Post completion of the DPR for the proposed TC at Puducherry under TCSP, the on-boarding of 3 main partners would be very much required to achieve the envisaged outcome in the defined time frame.

► **Construction Management Consultant** - For the development of the new facility. Tata Consulting Engineers Ltd. has been selected as the CMC for the TCSP.

► **Manufacturing Technology Partner** – Procurement of machines and adoption of new technologies. Steinbeis Centre for Technology has been selected as MTP for ESDM sector under the TCSP programme.

► **Cluster Network Manager** – Marketing the centre and development of cluster with the right mix of products and services

Location Selection for New TCs

3. Framework for selection of industry/ clusters/ systems/ location for new TCs

3.1 Location selection framework

With the objective of establishing 15 new TC's to support industry clusters, there was a need to prioritize and identify high potential growth industries based upon certain selected parameters. Hence, one of the most challenging and critical aspect of the TCSP was selection of the Industry/Clusters/Systems/Locations. This required careful consideration of parameters and consultation with the stakeholders. Preliminary meetings with the O/o DC-MSME were held to discuss the concept and approach. Subsequently three distinct approaches were finalised to identify the locations:

a) **Manufacturing Competitiveness approach:** Key idea for this approach was to identify location for TC at a place where it can create the most impact on improving the manufacturing competitiveness. The steps involved were:

► Listing major manufacturing industries creating value across country

► Identifying the clusters which can be catalyst to the manufacturing competitiveness for respective industry

One key limitation of this approach is that it will select the clusters which are already established and are among the most competitive across the country, will get shortlisted. A TC at such location will further improve the competitiveness of this location.

b) **Inclusive Growth approach:** Approach is based on the assumption that state which has higher Net State Domestic Product has better growth and hence the states with lower per capita state domestic product should be supported. A TC in such states would become catalyst to improve the manufacturing growth in the state. Following steps were followed:

► Identification of bottom 15 Low Income states on the basis of per capita Net State Domestic Product[9]

► Identification of major manufacturing Industries in the State

► Identification of the major clusters for the identified major industries in the state

One of the key drawbacks of this approach is that clusters identified will not be the most competitive for the industry in the country. It is possible that by investing in a TC at such a location might improve the competitiveness of that cluster but may not make this TC viable in short term.

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[9] 2011-12 Current prices

c) Alignment of Major Economic Projects: As a TC will create value for many years[10] and there are some mega projects in progress which will get completed in 10-15 years. This approach aims to incorporate the possible future growth areas on the basis of these mega projects. Considering that such economic growth is based on future development these areas may not get covered in above two approaches. The steps included are:

► Identification of major Economic projects & timelines (which have been ratified by the Government)
► Listing the States & Industries getting impacted
► Identifying the emerging clusters for the top industries

Above three approaches resulted in the first list of many locations. It was important to create a common framework to choose the most appropriate location. In this context "systems approach" was applied. Systems approach takes in to account the presence of entire ecosystem for a TC in the catchment area[11] and Location Attractiveness Index was created.

> **A Technology Centre will perform better in achieving its objectives if it is established at a location with better LA Index.**

Construct of LA Index:

LA Index Score= Catchment Score * Presence of TC Score

Catchment Score = fx (MSME Unit Score * ITI/PT Score * Presence of Major Firms Score* Presence of Leading Technical Institute Score)

Presence of TC Score= Presence of state/private technology center in the catchment area

Following data prints were captured and analysed:

► Number of MSMEs, Number of ITIs /Polytechnics, Number of Major Firms, Leading Technology Institutes for R&D
► Existence of TCs in the Catchment area (inclusive of DC-MSME, State Government , and Private Tool Rooms)

MSME Units: This reflects the concentration of MSME and it is envisaged that larger the number of units more opportunity for TC to impact the competitiveness.

Number of ITIs/Polytechnics: This reflects the availability of population seeking skill development courses. It has also been observed that students from ITI and polytechnic form a large group of students seeking vocational training at TCs due to lack of such facilities at their respective institutes.

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[10] Existing Technology Centers are more than 25 year old.
[11] Catchment Area = District of the location and all neighbouring districts (transcending state boundaries) it is assumed that maximum value creation will be in the immediate surroundings of the Technology Center.

Number of Major Firms: It has been observed that often larger firms take the initiatives to go for technology upgrades and performance improvements. This leads to cascading effect and firm's suppliers, competitors follow up these initiatives in order to stay competitive. If a TC has larger number of such major firms in the vicinity it will have more opportunity to do technology collaborations and thus impact the entire ecosystem.

Leading Technology Institutes: Each TC can play a vital role to establish an Industry- Academia partnership. It has been found that while there are researched ideas available at the academia but they have difficulty in commercializing same. On the other hand the industries are looking for the fresh ideas to improve upon their competitiveness in the market. Unfortunately this linkage does not happen as industry has need of ideas where the proof of concept is ready and unfortunately academia does not goes beyond research. TC can play a role of bridging this gap and create the platform to link industry and academia.

State/Private TC: TC can play a vital role in mentoring and improving the performance of the state government or private sector TCs (tool rooms). If there are such opportunities in the vicinity of the MoMSME TC it can further increase the reach of TC to improve the competitiveness of MSMEs.

The weightages assigned to each parameter were as below:

State	Industry	Location	Net Score	Catchment Area Parameters 30				Major Firms 20		Tech Inst. 10		Presence of state/pvt TR 20	
				Units	Unit Score	ITI/PT	ITI/PT Score	Number	Score	Number	Score	TC of State Govt/ Pvt Tool Room	TC-State Govt/ Pvt Score

In order to further refine the list of locations arrived using the above approach, following additional criteria for shortlisting the industries were incorporated:

► **Prior experience:** These are the sectors where O/o DC-MSME has experience of operating TCs, such as General Engineering, Automotive, Electronics/ESDM, Leather & Footwear, Glassware, Sports Goods, and Fragrance & Flavours

► **Concentration of MSME's:** These are sectors where O/o DC-MSME has limited prior experience of operating TCs, however there exist a large number of MSMEs in these

industries. Such as Food processing, Textiles (including Handlooms & Handicrafts), Pharmaceuticals, Wood/Paper/Pulp, and Rubber & Plastics.

► **Emerging Sectors:** These are upcoming sectors that may be at the forming stage, but will become major sectors in the near future, such as Bio-technology, Nano -technology, etc.

The sector in which DC-MSME has prior experience have been taken on priority. These sectors are: auto components, ESDM, general engineering, fragrance & flavour, leather & footwear, glass. Later the scope can be expanded to include other sectors pertaining to ministries other than MoMSME, if needed. Such sectors include food processing, pharmaceutical, packaging etc. where presence of MSMEs is considerable.

The list of locations arrived through the above was further refined and finalised with respect to the following additional considerations;

► State Classification: The states were classified into two categories as unserved states and served states. All states of the country were distributed between Un-served states where O/o DC-MSME did not have an operating TC and served states where an operating MoMSME TC existed.

► At first unserved states were considered for the new TC in order to spread the coverage of MoMSME TC which would help in supporting more MSMEs across the country. With the approval of locations for the unserved states, served states would also be considered for the technologies for which existing TC cannot support.

► On the basis of MSMEs concentration in prior experience sectors, leading clusters were identified in each unserved state. This resulted in identifying the industry wise potential locations in each of these states.

► Some of the unserved states took proactive approach and have allocated or identified land for the purpose of TC. These locations were mapped to the locations identified in the step above. Accordingly technology focus was selected for these locations.

3.2   Selection of Puducherry location for setting up of new TC

As per the location selection framework and subsequent approval in the 4th PSC meeting held on 15th May 2014, Puducherry was selected as the location for setting up of new ESDM TC. Puducherry region has been found suitable from multiple perspectives:

► Catchment area Puducherry, Chennai, Trichy, Salem, Vellore, Kancheepuram etc. has some of the leading ESDM players. Puducherry and its catchment area have several major ESDM OEMs and over 1200 MSMEs in the ESDM sector. A TC at Puducherry will help improve the manufacturing competitiveness.

  ▪ Major OEMs include – Flextronics, Ford India, Lenovo, Eaton, Samsung, Hyundai etc.

► Mega industrial projects in vicinity

  ▪ The Puducherry government has set up an Electronic Park at Thirubuvanai which is 23Kms from Puducherry town. An SEZ has also been proposed in Sedarapet- Karasur villages by PIPDIC which will be focused on automobile & auto parts, IT including services, electronics, hardware and bioinformatics, machinery and equipments. Incentives are being provided to industry players, which are expected to increase the number of units in the catchment area.

  ▪ Several industrial zones are being allocated for the industry in the catchment area. This includes existing and proposed greenfield and brownfield clusters like Information Technology park, Puducherry, Sriperumbdur industrial park, Oragadam industrial park, Siruseri information technology park, Pillaipakkam industrial park, Cheyyar industrial complex.

  ▪ The industrial policy of Government of Puducherry released in 2013 has identified thrust areas which include electronic industries, IT hardware and software and IT enabled services, alternative and renewable energy products, textiles and garments industries.

  ▪ Mahindra World City is a 1550 acre green township being developed by Mahindra group. It is being developed as a joint venture with the Government of the state of Tamil Nadu. It is located just 35 Kms from Chennai International airport and on Golden Quadrilateral (NH 45). The zone is being positioned as a high-end development for new technology and high value segments from Electronics, Automotive, Information Technology, Solar Manufacturing and Light Engineering.

► Good connectivity and access from other locations

  ▪ Puducherry is extremely well connected and is located on NH 45A.

  ▪ It is about 148 Kms from Chennai International airport and 172 Kms from Chennai seaport.

Location Brief

4.   Location brief

4.1   Regional overview

The Union Territory of Puducherry is located in southern India and is constituted out of the four erstwhile French establishments of Puducherry, Karaikal, Mahe and Yanam, which form small unconnected districts. Puducherry, Karaikal and Yanam lie on the Bay of Bengal and Mahé lies on the Arabian Sea. Puducherry district is located at 11.56°N 79.53°E, about 170 km south of Chennai.

The nearest airport from Puducherry is in Chennai (though Puducherry has its own airport, but only one flight operates from there). Similarly, the nearest airports from Yanam, Karaikal and Mahe are in Vishakapatnam, Tiruchirapalli and Kozhikode, which are about 200 km, 75 km and 70 km away respectively from the districts.

The total area of all the regions is around 492 sq. km, out of which Puducherry district contains 294 sq. km. The Government of Puducherry provides good infrastructural facilities in terms of roads, electricity and water supply.

Figure 1: Location of Puducherry
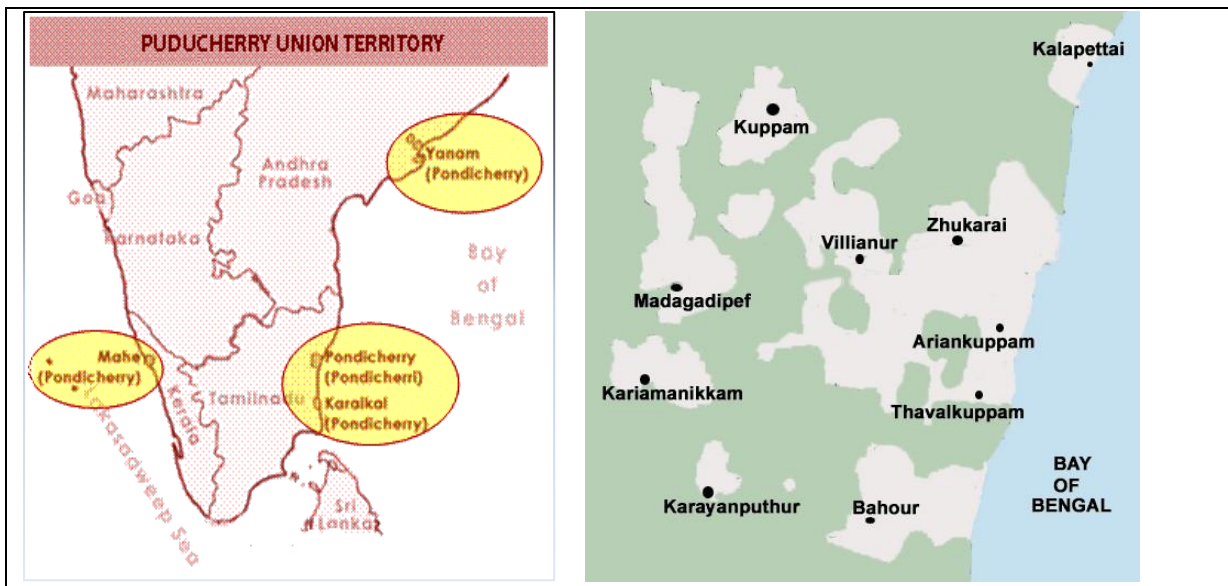
Table 1: Puducherry District Snapshot[12]

Section	Quantity/Value
Area	
Total geographical area	294 sq. km
Administration	
Tehsil	10
Villages	90
Land use pattern	
Total area	29,378 hectares
Total irrigated area	15,192 hectares
Population (census 2011)	
Total population	946,600
Men	466,143
Women	480,457
Literacy (except 0-6)	
Total literate	86.13 %
Men	92.07 %
Women	80.40 %
Infant mortality rate	7.4 per 1,000 live births less than one year
Energy	
Electrified villages	100%

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[12]http://www.censusindia.gov.in/2011-prov-results/paper2-vol2/data_files/Puducherry/Chapter/Chapter-1.pdf
http://electricity.puducherry.gov.in/

Table 2: Status of power, water, wind and rainfall in the region

Aspect	Status	Significance for TC
Water availability	► Pondicherry Industrial Promotion Development and Investment Corporation Limited (PIPDIC) is to promote less water intensive industries ► Being a coastal area, borewells are not allowed within six kms. from high tide line ► Hence, desalination and recycling techniques of waste water would be encouraged	► Puducherry region relies totally on ground water resource ► The town water supply system may have to be rehabilitated as pipelines were laid 30 years ago and overhead tanks to be constructed
Electricity availability	► Puducherry Power Corporation Limited, a wholly owned undertaking of government of Puducherry generates electricity in Puducherry. ► With all the Towns and villages electrified in as early as 1972, the district is 100% fully electrified ► The Puducherry power Corporation Limited presently operates a 33 MW gas power plant in Karaikal region	► Currently, district faces frequent power cuts during summers with the availability of power not matching up to the demand. Thus, while the district is 100% electrified, power back up to be designed keeping emergency and essential services/ equipment in mind
Wind flow	► During south west monsoon between March and September, the wind blows predominantly from the south ► During June, July and August, strong wind is experienced from south west direction in mornings from south during afternoons and from south east during nights ► The north east monsoon starts in October. Wind first blows from the coast then changes to northernly direction in December and gradually decreases in force during January and February. The	► Would be helpful to maximise natural ventilation during designing the layout of TC

Aspect	Status	Significance for TC
	direction also changes from northeast to east. Northeast monsoon winds are usually stronger than the southeast monsoon winds ► All through the year, wind speed is between 1 and 19 Km/hour	
Rainfall	► North-East monsoon is the major source of rainfall in the district ► Wet season persists mainly during the north east monsoon period between October and December ► The average annual rainfall is about 1300 mm	► For estimation of capacity of rain water harvesting system in the TC campus
Temperature	► 35.7ºC in the month of June and 20.9ºC in the month of January ► The average maximum temperature is 31.5ºC and the average minimum temperature is 23.9ºC	► For estimation of capacity of AC to be installed for adequate cooling, designing of building as well as estimate the potential for use of solar based equipment

4.2   Demographic Profile of the district

▶ **Population growth:** As per 2011 India census, Puducherry had a population of 946,600. The growth of population during the last decade (2001-11) was 28.73%. In Puducherry, 10.08% of the population is under 6 years of age. The density has increased from 2510 people per square kilometres in the year 2001 to 3232 in the year 2011. The graph depicts the growth of population over the decades in the district.

Figure 2: Growth of population in Puducherry district
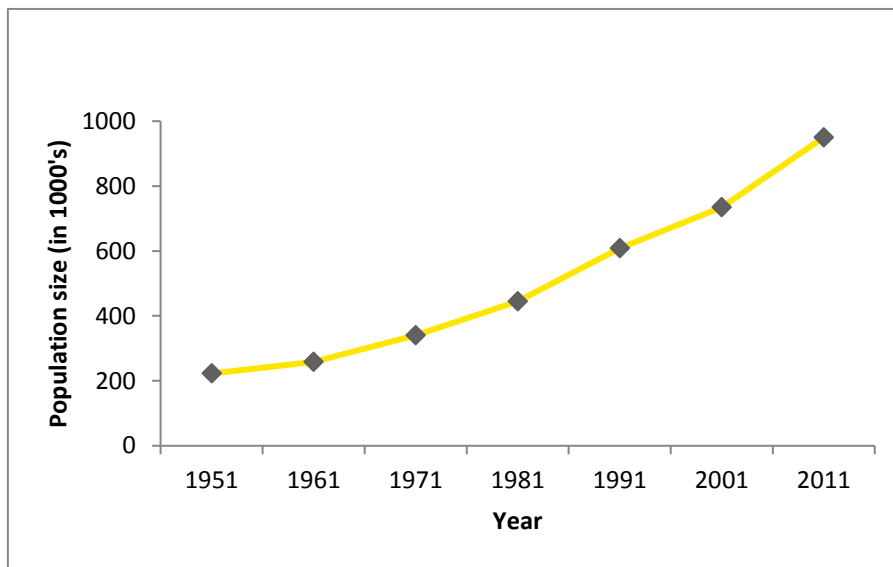
Source: Census of India 2011

▶ **Rural-urban population composition:** Puducherry district has an urban population of around 69.13% (654,392) and a rural population of around 30.87% (292,208) as per census 2011. In urban area, males constitute around 49.18% (321,834) of the population and women constitute for around 50.82% (332,558) of the population. In rural area, males constitute around 49.39% (144,309) of the population and women constitute 50.61% (147,899) of the population.

▶ **Sex ratio:** Males constitute 49.24% of the population (466,143) and females 50.76% (480,457). The sex ratio has shifted to 1031 females per 1000 males in 2011 from 990 females per 1000 males in 2001. The child sex ratio (0-6 age) is 969 females per 1000 males in 2011 as compared to 967 females per 1000 males in 2001.

▶ **Literacy rate:** Puducherry had an average literacy rate of 86.13% in 2011, higher than the national average of 59.5% and up from the district's literacy rate of 80.66% in 2001. The male

literacy is 92.07%, while the female literacy is 80.40%. In 2001, the male and female literacy were 88.44% and 72.84% respectively.

► **Languages spoken:** The majority of Puducherry residents speak Tamil, Telugu, or Malayalam. There is also a sizable community of Indians from other states of India, notably West Bengal, Gujarat and Odisha. Tamil, Malayalam, Telugu and French are the official languages of Puducherry.

4.3   Regional stakeholders

Regional Industry associations, leading manufacturers, training institutes, applied research institutes, academia, thought leaders and above all MSMEs would play an important role in providing the guidance on key aspects including (but not limited to) designing capabilities, technological requirements, skillset requirement and cluster development.

Key stakeholders for Puducherry TC would include; Government bodies, industry body associations, manufacturers and suppliers (e.g., OEMs, tier 1 and MSMEs etc.), financial institutions, technical and vocational training institutes, applied research institutes etc. in the catchment area. Puducherry and its catchment area include: Chennai, Trichy, Salem, Vellore, Kancheepuram etc.

Figure 3: Stakeholders of Puducherry TC
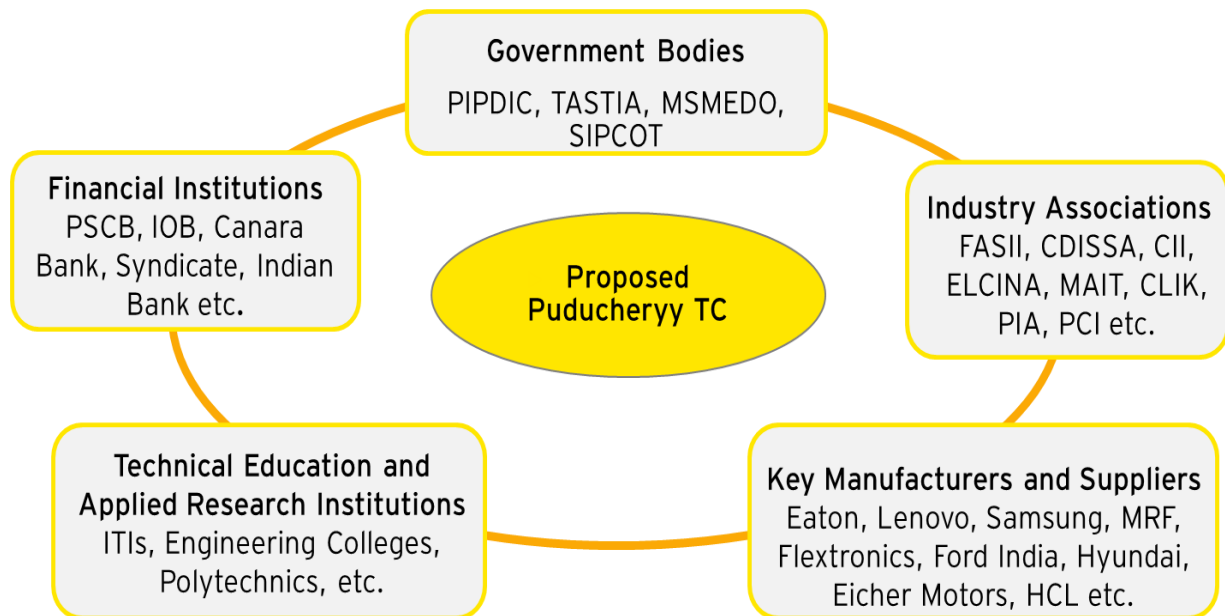
4.3.1 Government bodies

▶   **Pondicherry Industrial Promotion Development and Investment Corporation Limited (PIPDIC)**

The PIPDIC was set up by the Government of Puducherry in 1974 with the twin objective of promoting the Industrial Development of Puducherry and providing financial assistance to entrepreneurs.

The Industrial Policy of the Government is well structured and comprehensive aimed at ensuring overall growth of the Union Territory. Vibrant economy, reliable power supply, excellent infrastructure, skilled manpower and attractive concessions with incentives have made Puducherry a favourite destination for investors. The Key role of PIPDIC is:

- To promote sustainable industrialisation in the Union Territory of Puducherry

- To gainfully utilise the human resource of the territory and maximise employment
- To conserve the environment of Puducherry for sustained and rapid industrial growth
- To ensure balanced industrial development in all the regions of the Union Territory

► **SIPCOT (State Industries Promotion Corporation of Tamil Nadu Ltd.)**

The SPICOT was established in the year 1971 by Government of Tami Nadu to develop industrial growth in Tamil Nadu. In the last 44 years SIPCOT had established 11 Industrial Complexes, 3 Growth Centres, 5 Industrial Parks and 7 SEZs.

The Functions of State Industries Promotion Corporation of Tamil Nadu Limited (SIPCOT) are:
- Development of industrial complexes/parks/industrial estate and growth centres with basic infrastructure facilities
- Establishing sector-specific Special Economic Zones (SEZs);
- Implementation of Special infrastructure Projects
- On site office for complete assistance in interfacing with various government and non-government institutions
- Attractive fiscal incentives package depending on size of investments
- Common application form and single window facilitation to get all approvals
- Provision of external infrastructure including roads, power and water supply, public transportation, education, healthcare, housing and training facilities

► **TANSTIA (Tamil Nadu Small and Tiny Industries Association) - The Apex Body of MSMES**

TANSTIA is an apex body in the services of small & tiny industries as follows:
- Entrepreneur counselling service
- Sub-contracting Exchange
- Entrepreneur Development Programme
- Organizing Seminars, Workshops, Exhibitions and Trade visit foreign countries
- Liaison with Government
- Publication of Small Industry

Role of TANSTIA: TANSTIA's role is more promotional than demanding:
- It actively participates in the committees set up by state and Central Governments and promotes the interest of Small and Tiny industries.
- It sponsors Experts meet and Trade delegations to other countries.
- It offers valuable guidance to entrepreneurs.
- It publishes monthly magazine and newsletters for small industries.
- It organises Technical and Managerial training programmes to small industries.

TANSTIA - FNF Service Centre is a collaborative venture between Tamilnadu Small and Tiny Industries Association, Chennai and Friedrich Naumann Foundation, Germany. It is intended for the following purposes:

- Creates an atmosphere for stimulating the growth of the state economy through the vibrant sector of small-scale industries
- Renders supporting services to small and tiny industries

► **Small Industry Development Organization (MSME Development Organization)**

The Small Industries Development Organization (MSME Development Organization), headed by the Additional Secretary & Development commissioner (MSME), is one of the apex bodies of the Government of India, Ministry of MSME, to assist the Government in formulation of policies and programmes, projects schemes, etc., for the promotion and development of MSME in the country and also coordinating and monitoring the implementation of these policies and programmes, etc.

Promotion and development of MSME is primarily the responsibility of the States and Union Territories (UTs) and the role of the Central Government (including the MSME Development Organization) in this field is to aid and assist the States/UTs in this endeavor. The MSME Development Organization functions through a network of MSME Development Institutes, Branch MSME Development Institutes, Regional Testing Centres, Field Testing Stations and autonomous bodies. It renders services such as:

- Advising the Government in policy formulation for the promotion and development of MSME and small scale service and business entities (collectively referred to as small enterprises) and for their graduation to medium enterprises.
- Providing techno-economic and managerial consultancy, common facilities and extension services to small enterprises.
- Providing facilities for technology up gradation, modernization, quality improvement and infrastructure of/for small enterprises
- Developing human resources through training and skill up gradation of small entrepreneurs as well as its own man power
- Providing economic information services to the Government and small enterprises.
- Maintaining liaison with other Central Ministries, Planning commission, State Governments and other organizations concerned with development of small enterprises.

Over the years, the MSME Development Organization has served a useful purpose as a catalyst of growth of small enterprises through its countrywide and varied network of specialized field organizations.

► **BHELSIA (BHEL Small and Medium Industries Association)**

Bharat Heavy Electricals Limited (BHEL) is a public sector undertaking of the Government of India, and its Trichy Unit has been a significant manufacturer of critical components for the energy sector in India. BHELSIA was formed in 1975 and comprises of 272 fabricating units, which supply key components to BHEL's power projects.

BHELSIA along with BHEL, Trichy has set up four committees to ensure smooth operations for its member. Following are the four committees:

1. Information Technology Task Force: B2B was introduced, resulting in knowledge updation and networking of all members.
2. Quality Task Force: Transparency in vendor evaluation, selection of best sub-contractor; and the formation of reward and punishment committee with BHELSIA
3. Material Task Force: Easing the process of material collection and improvement in off-cut management.
4. Technology Task Force: Introduction of CO_2 welding and product development.

4.3.2 Industry Associations

► **Information Technology Traders Association**

ITTA is an association of IT dealers of Puducherry formed in the year 2003. Presently 49 dealers representing Hardware, Software, Training, Design / R&D, UPS, Telecommunication and the associated service sectors of the Indian IT & Communication Industry are the part of this forum. Its main objective is to promote better understanding among the dealers to supply quality products and services to the customers in and around Puducherry.

ITTA has emerged as an effective and dynamic organisation. Representing Hardware, Training, R&D & Hardware Design and other associated service segments of the Indian IT Industry, ITTA's charter is to develop a global competitive Indian IT Industry, promote the usage of IT in India, strengthen the role of IT in national economic development, promote business through international alliances, promote quality consciousness in the IT Industry and transform the Indian IT Industry into a World Scale Industry leading to a World Class Usage and thus a World Size Market.

ITTA is represented on all concerned Government of India and works in close association with the Industry Chambers and all IT/Electronics Associations in India and overseas for the advancement of the IT Industry in India. It also recognizes the importance of Information Technology Industry growing with sound business relations with the rest of the world.

ITTA, Puducherry has members from Computer Resellers, UPS manufacturers and resellers & Office Automation products.

► **India Electronics and Semiconductor Association (IESA)**

IESA is a trade body representing the Indian ESDM industry. IESA is committed towards building global awareness for the Indian ESDM industry and supporting its growth through focused initiatives in developing the ecosystem. This is through publishing credible data, networking events and alliances with other international associations. IESA works closely with the Government as a knowledge partner on the sector, both at the centre and at the state level.

The primary objective of IESA is to act as a catalyst for the growth of the ESDM industry in India. Objectives include:

- Create global awareness for the Indian semiconductor and electronic systems industry outside of the generic 'IT' umbrella
- Create a win-win interaction among semiconductor and electronics product and services companies, government, academia, venture capitalists and industry bodies
- Create an enabling ecosystem that catalyses industry growth and leadership
- Enhance operational efficiency
- Foster active collaboration between industry and universities to further expand the available world class semiconductor talent pool
- Identify investment opportunities
- Drive technology vision for the semiconductor and electronic systems industry
- Promote trade and industry

► **Confederation of Indian Industry (CII)**

CII works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII's primary goal is to develop Indian industry and to ensure that government and society as a whole, understanding both the needs of industry and its contribution to the nation's well-being. Their role includes:

- To identify and strengthen industry's role in the economic development of the country
- To act as a catalyst in bringing about the growth and development of Indian Industry
- To reinforce industry's commitment to society
- To provide up-to-date information and data to industry and government
- To create awareness and support industry's efforts on quality, environment, energy management, and consumer protection
- To identify and address the special needs of the small sector to make it more competitive
- To promote cooperation with counterpart organisations
- To work towards the globalisation of Indian industry and integration into the world economy

► **Manufacturers Association for Information Technology (MAIT)**

MAIT represents Hardware, Training, R&D & Hardware Design and other associated service segments of the Indian IT Industry. MAIT's vision is to develop a globally competitive, standards compliant, green ICT ecosystem in the country and transform the Indian ICT industry into a world scale industry leading to a world class usage and thus, a world class market.

MAIT contributed in formation of the ICT policies of both the States and the Central Government, including the 12th Five Year Plan for IT. MAIT was also a part of the Task Force set up by the Ministry of Communications & IT, Government of India in the past to suggest measures to stimulate the growth of IT, ITeS and Electronics Hardware Manufacturing Industry in the country. MAIT has played a role in formulating the e-Waste Rules 2011 as well the e-Waste Implementation Guidelines.

Key thrust areas:

- Enabling a policy framework of IT manufacturing ecosystem
- Attracting investments in IT/electronics manufacturing
- Simplification of procedures for domestic and external transactions
- Increasing IT penetration/usage in India.
- Rationalization of local levies and taxes on IT products to make them affordable.
- Promoting Green IT management
- Promoting sustainability & environmentally sound management of e-Waste
- Promoting IP among all the stakeholders
- Promoting international relations
- Demand Creation
- Promoting SME sector
- Promoting design, innovation and new product development.
- Promoting development of local language IT applications/products/solutions.
- Promoting usage of genuine IT products, components and consumables.

4.3.3 Leading manufacturers

► **OEMs and Tier 1 players**

Key OEMs and Tier 1 players in the region include: General Air conditioners, Samsung India, Caparo Engineering, Flextronics Technologies, Usha Martin, Cooper Bussmann, NCR, NEC, Chemin, Nexus Electro Steel, Shriram Group, Sun Label, Accurate Springs, Cherri systems, GKM, Hindustan Lever, Pondicherry Co-op Spining Mills, Chemfab Alkalis, TVS Whirlpool, MRF, WIPRO, Dr. Reddy's, Jyothy laboratories, Godrej, Suzlon energy, Shasun chemicals, etc. The proposed Puducherry TC would

develop capabilities in manufacturing of industrial electronics and consumer electronics required to support these enterprises. It would also play an important role in the supply of skilled manpower.

► **MSME Units**

Puducherry and its catchment area include Chennai, Salem, Kanchipuram, Trichy etc. The catchment area has nearly 58700 small scale industries apart from approx. 1000 large scale and 2800 medium scale industries. Some of the significant industries in Puducherry and its catchment are in electronics, IT systems and hardware, chemicals, textiles, light engineering, metals, and food processing.

4.3.4 Financial institutions

Major financial institutions across the region are as follows:

Table 5: Prominent financial institutions in the region

District name	Financial institutions
Puducherry	Puducherry State Co-operative Bank Ltd., Nationalised Banks
Chennai	Commercial, Nationalised Banks and State Financial Corporation
Salem	Indian Bank (Lead Bank), Nationalised Banks
Kanchipuram	Indian Overseas Bank, Indian Bank, Canara Bank, Bank of India
Trichy	Nationalised Banks

4.3.5 Technical education institutions and vocational training

The details of technical and vocational training institutes supplying skilled man-power in the area have been given as follows:

► Technical education

The Directorate of Higher & Technical Education was set up for dealing with the matters pertaining to the Higher Education. The Government of Puducherry, to impart quality higher education has established various colleges in the Government sector and also under various Societies. Apart from this, private initiative in the field of higher education also being encouraged by the Government by providing No Objection Certificate for Private Managements to start Arts & Science Colleges and Professional Colleges. Some of the key institutes are: Pondicherry Engineering College, Puducherry, Motilal Nehru Govt. Polytechnic College, Lawspet, Puducherry, Women's Polytechnic College, Lawspet, Puducherry, Perunthalaivar Kamarajar Institute Of Engineering And Technology, Nedungadu, Karaikal.

Table 6: Intake capacity at technical institutions in the catchment area[13]

	Number of ITI / ITCs	Intake Capacity (approx.)
Puducherry	12	1656
Chennai	22	3514
Kanchipuram	110	11355
Trichy	62	8820
Vellore	42	5680
Salem	41	5387
Cuddalore	21	2365

There is a Central University by the name of "Puducherry University" located at Kalapet. Most of the Government Arts & Science Colleges, Professional Colleges, Engineering & Medical colleges are affiliated to Puducherry University.

Its mission is to provide higher education in research and Arts, Science and Technology, which would cater to the immediate and future need of the Nation, towards building up useful Human resources and to enhance opportunities to develop synergy across higher education community through exchange of best idea and practice among institutions and industries.

► **Vocational Training**

District Industries Centre

The District Industries Centre (DIC), Puducherry was established on 1st July 1978. The DIC is an institution set up at the District Level providing wide range of services and support to the entrepreneurs/educated unemployed youth for setting up of small, tiny and cottage industries.

DIC with its head office at Puducherry plays a vital role in the area of developing entrepreneurs, providing employment opportunities to the educated unemployed youth by imparting various training, providing financial assistance under centrally and State Sponsored schemes for setting up of self-employment ventures and marketing assistance for sale of produces by the industrial units of Puducherry.

DIC extends services in establishing new industries to obtain various clearances/permission through a system called Industrial Guidance Bureau (IGB). The objective of the programme is to create more employment opportunities broadly for the unemployed youth particularly to the women to pursue wide career opening besides self-ventures by giving training in trades like Tailoring & Embroidery, Beauty Parlour, Arts & Design.

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[13] http://www.aicte-india.org/downloads/APH_NVEQF_241212_final.pdf
http://dget.nic.in/upload/uploadfiles/files/itits%20state/PondicherryITI.pdf
Director of technical education, Chennai

Opportunity and Need Assessment

5.   Opportunity and need assessment

5.1   India scenario

ESDM is one of the fastest growing manufacturing industries in the India. Despite accounting for only about 3.5% of the global electronics market, the Indian ESDM industry is being globally recognized for its consumption potential. A CAGR of 9.9% is estimated for ESDM in India, from USD 59 billion in 2010 to an estimated USD 94 billion in 2015. However, most of the demand is at present being fulfilled by imports. By the end of 2015 only 6.7% of this is expected to be made by local domestic companies.[14]

The below charts depict Indian's ESDM sector growth in the recent past:

Figure 3: Indian ESDM Revenues (US $ Billion)
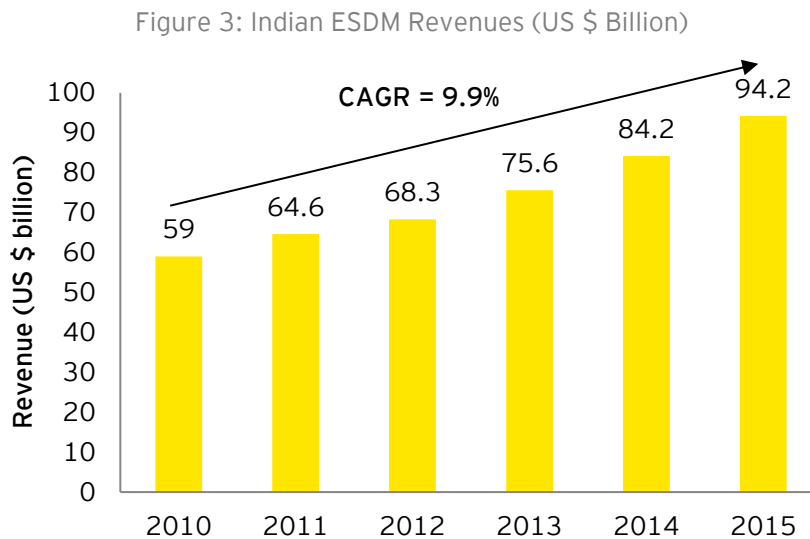
The Indian ESDM industry can be categorised into five key segments:

1. **Electronic Products** - These constitute the total market for electronic products (produced locally or imported) for domestic consumption as well as export of electronic products manufactured in a country

2. **Electronic Components** – This includes all local manufacturing of electronic components

3. **Semiconductor Design Services** – These include revenue from semiconductor design-related activities of local players and captives of semiconductor MNCs operating in a country. It includes revenues from embedded software, very large scale integration (VLSI) and hardware/board design

4. **Electronics Manufacturing Services (EMS)** – Includes revenue from all EMS services rendered in the country

5. **Semiconductor fabrication** – This will include revenue generated by foundries through fabrication of semiconductors.

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[14] Indian ESDM Market 2011 – 2015, ISA – Frost Sullivan Report

The diagram below depicts the breakdown of these key ESDM Segments:

Figure 4: ESDM Sector Overview
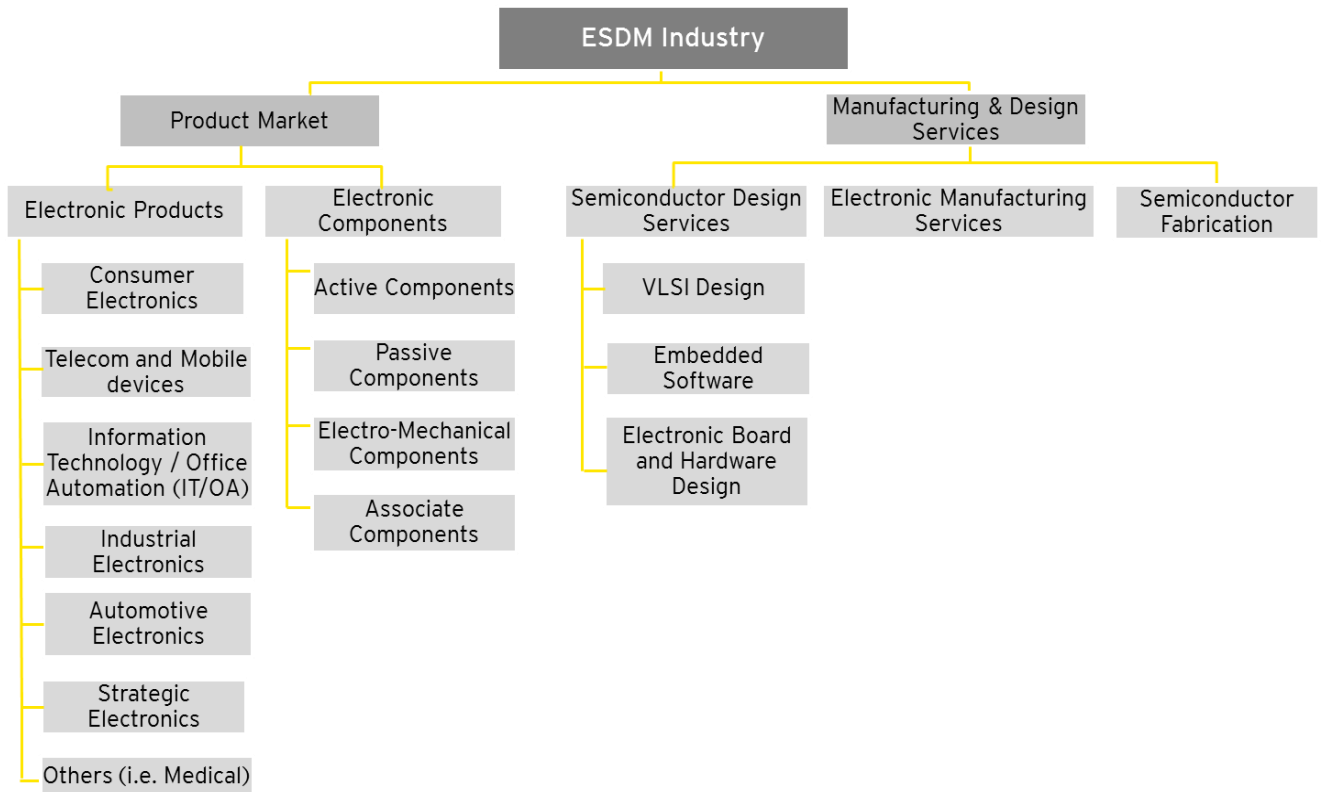
Additionally, the following chart shows the breakup of the the Indian ESDM market in value terms in the year 2012.

Figure 5: Indian ESDM market value 2012 (by categories)[15]
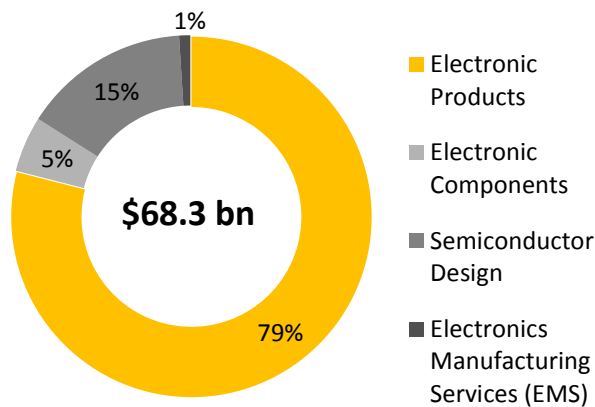
Note: Semiconductor fabrication is a relatively new area in India and no revenue from the same was reported in 2012.

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[15] IESA-FS Indian ESDM Market 2014: http://www.iesaonline.org/downloads/IESA-F&S-Indian-ESDM-Market-2014-Executive-Summary.pdf

Analysing the application segment, it was observed that the top 20 products accounts for 80 percent of the overall electronics total market in terms of value in 2012. The following chart depicts the top 10 products by Total Market Revenue share in the Indian Electronics Manufacturing Sector:

Figure 6: Indian Electronics Market share (in %): Top 10 Products by Total Market Value (2012)[16]
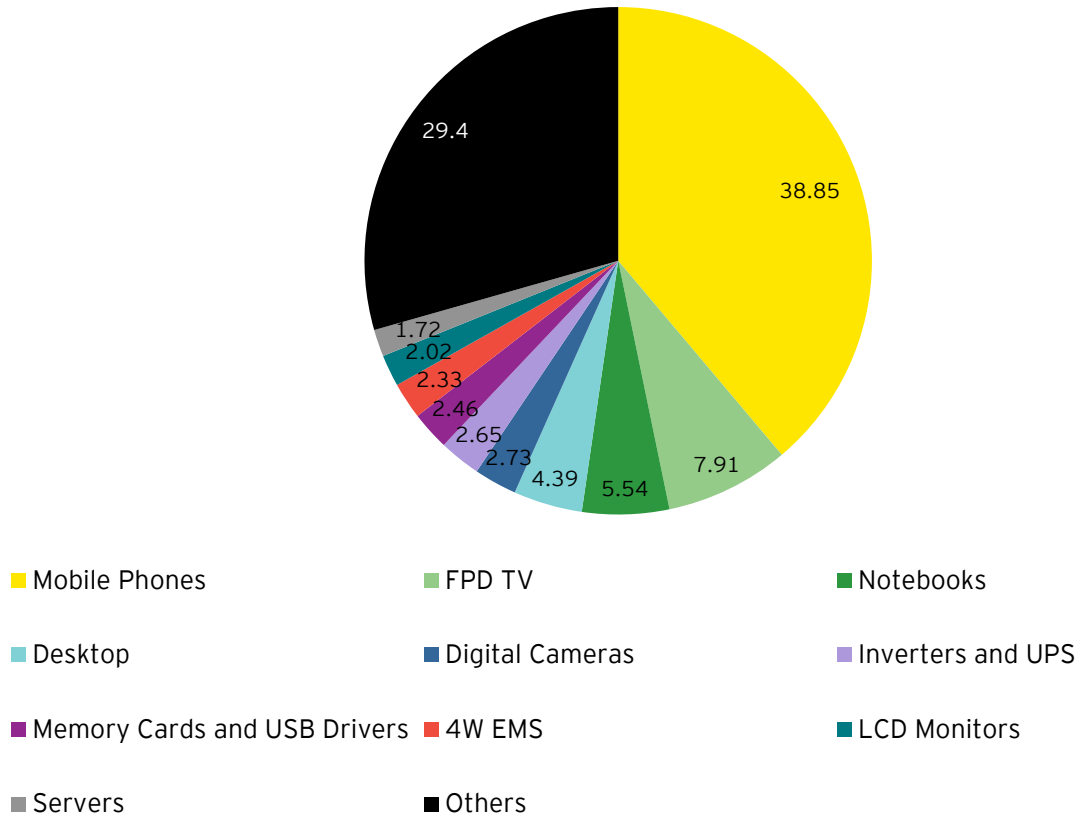
Changing global landscapes in electronics design and manufacturing capabilities as well as cost structures are forcing global companies to look for other options. Companies from around the world such as Samsung, Philips, General Electric (GE), etc. are looking to build local capabilities in India as well as other low cost destinations, not just to serve the domestic market but also to cater to overseas markets. The different value chain segments within the ESDM industry are at varying stages of development. Similarly, various electronics applications markets such as telecom electronics, automotive electronics, consumer electronics and industrial electronics, are at different stages of ecosystem development.

The Government of India has taken measures to boost investments in the electronics hardware manufacturing sector, as well as to promote MSMEs in the ESDM sector. Various schemes have been announced to facilitate this:

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[16] IESA-FS Indian ESDM Market 2014: http://www.iesaonline.org/downloads/IESA-F&S-Indian-ESDM-Market-2014-Executive-Summary.pdf

► DeitY has announced a scheme to promote MSMEs in the ESDM sector, which aims to provide financial support to MSMEs to promote manufacturing, to bring quality into Indian manufacturing, and also to promote exports. The support under the scheme will be in the form of reimbursements to the manufacturers, domestic industry, and exporters in the electronics sector. The scheme will provide grant in aid for the following activities[17]:

- Reimbursement of expenses relating to compliance of electronic goods with "Indian Standards".
- Reimbursement of expenses for testing and certification required for export.
- Development of electronics manufacturing clusters.

► The Government of India has announced the Modified Special Incentive Package Scheme (M-SIPS) that:

- provides up to 25% of the capital investment in SEZ areas

► India is attempting to join the select countries which have capabilities to manufacture state-of-the-art semiconductor chips in the world. Recently, Government of India has approved two semiconductor wafer fabrication facilities (FABs) to be set up. Two consortia of investors and technology providers have responded to the Government of India's expression of interest to set up FABs in India. These two consortia are:

- M/s Jaypee Associates along with M/s IBM,USA and M/s Towerjazz, Israel. The proposed location is Greater Noida about 50 Kms from New Delhi.
- M/s HSMC along with M/s ST Microelectronics, Geneva and M/s Silterra, Malaysia. The proposed location is Prantij, near Gandhinagar, Gujarat.

5.1.1 Primary research

As a part of preparing the DPR, discussions with some electronics manufacturers, industry associations, and other stakeholders in the Puducherry region (including Chennai, Kanchipuram, were carried out. The objective of the primary research was to understand the business requirements, issues, challenges, and future requirements[18] of the ESDM industry to develop a deeper appreciation of the requirements that the Technology Centre Systems Program of the O/o DC MSME can serve. The research also included the support requirements of players with respect to designing, training, manufacturing and consultancy.

Stakeholders workshop were held at Puducherry and Chennai with members FASII, CDISSA, CII-Puducherry, PIA, PCI, PPA, Department of Commerce and Industries and other industry, MSME experts. Meetings were held with large OEMs in the vicinity like Flextronics in Sriperumbdur, Ford

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[17] http://deity.gov.in/sites/upload_files/dit/files/Notification2.pdf
[18] Key questions asked during telephonic discussions in Annexure

Motor Private Limited in Chengalapattu, Eaton and Lenovo in Puducherry. Also detailed telephone discussions and meetings were held with CLIK, ELCINA, IESA, JWG for ESDM, MoMSME and other industry experts.

Key inferences drawn from the primary research focused on four main areas, as follows:

Design and Development:

► It was recommended that facilities for designing and prototyping for the electronics sector should be included. It was suggested that the TC should procure prototyping equipment to support MSMEs and start-ups.

► PCB Layout Designing and embedded system development assistance is required

► 3D printing of PCB and manufacturing facilities of PCB should be provided

► IP Creation and Innovation within the ESDM sector should be supported

► Platform should have Venture Capital scrutiny and rigour apart from the regular product development support

► Technology & manufacturing process support to Entrepreneurs for manufacturing ESDM components.

Consultancy:

► It was recommended that the TC should provide consulting services for product design at the time of inception, fault finding and designing of body / enclosures for products / components.

► Government rating programs/certifications which will help MSMEs in clearing quality/technical etc. standards of OEMs.

Production:

► A requirement for testing and calibration facilities was expressed for industrial electronics, auto-electronics, telecommunications, avionics, sensor technology and packaging of electronics are the key areas which were recommended for the TC to focus on.

► Testing requirements (performance, environmental, etc.) are common across all subsectors of the ESDM industry, and the TC should cater to all sub-sectors within the ESDM sector.

► Testing requirement for PCB, electronic components and software/hardware

► A clean room should be established for product manufacturing.

► It was suggested that the TC should provide diagnostic services in addition to testing

► Idea of a Manufacturing Incubation Centre should be explored

Training:

► Training programs in assembly, soldering, PCB surface mount technology, PCB manual training etc. should be focused on.

► A skilling centre is required for supporting MSMEs and large scale enterprises

5.2   Market opportunity

Puducherry has become an IT systems, hardware and electronics hub. Puducherry is known as the hardware capital of India. Though, lots of companies in IT systems and hardware are moving out of Puducherry due to withdrawal of incentives from state government and most of them have setup there bases in and around Chennai. Due to this the ESDM ecosystem has been affected in Puducherry and even the existing companies are struggling to make use of their production capacity, like during the visit to Lenovo and Eaton manufacturing facility, PMU team discovered that both of them are running at around 60% of their production capacity. However, there are lots of companies in ESDM sector in the Puducherry catchment area and same has been discussed in section 5.2.2 of this chapter.

Further to above, Puducherry has been notified as cluster for Electronics Manufacturing for the purpose of Modified Special Incentive Package Scheme (MSIPS) notified by Department of Electronics & Information Technology (DeitY), Govt. of India. Under this scheme, DeitY is promoting large scale manufacturing, to offset disability and to attract domestic and global investments into the ESDM sector in India. Also, Puducherry has several reputed companies such as Lenovo, Eaton, HCL and General Air Conditioner etc. which have their manufacturing facilities and design & development centres in the state. Also, there are four more clusters notified by DeitY which are in the catchment area of proposed TC at Puducherry. Several reputed companies like Flextronics, Hyundai, Ford Motor, Caparo etc. have their manufacturing facilities and design & development centres.

► Puducherry catchment area is spread over 1576 square kilometres, and comprises 13 industrial estates[19].

► Electronic Park at Thirubuvanai which is 23Kms from Puducherry town. An SEZ has also been proposed in Sedarapet- Karasur villages by PIPDIC which will be focused on automobile & auto parts, IT including services, electronics, hardware and bioinformatics, machinery and equipment.

Puducherry is extremely well connected and is located on NH 45A. It is about 148 Kms from Chennai International airport and 172 Kms from Chennai seaport.

Along with its connectivity, Puducherry's competitive advantage lies in:

- Infrastructure in Puducherry is more developed in comparison to nearby area.
- Availability of labour and proximity to Chennai region (an ESDM, IT and auto hub), where several electronics and automobiles companies are located.

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[19] DC msme
[20] http://deity.gov.in/sites/upload_files/dit/files/Brownfield_Notification_2_13%20may.pdf

- The industrial policy of Government of Puducherry released in 2013 has identified thrust areas which include electronic industries, IT hardware and software and IT enabled services, alternative and renewable energy products, textiles and garments industries.

- Availability of basic amenities such as piped water supply, schools, transportation, hospitals, telecom networks, banks etc.

- Puducherry is known as the hardware capital of India and almost all the majors in the hardware industry such as Lenovo, Acer, Wipro, HCL etc.

- As per the Budget 2014 – 2015, the Union government has given its in-principle approval for setting up of ESDM cluster development in Puducherry.[20]
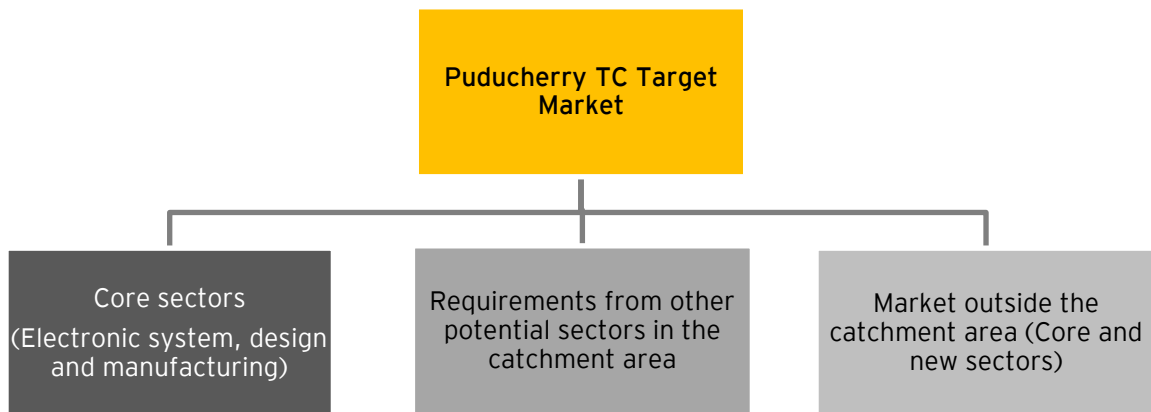
5.2.1 Market in core sectors in the catchment

Puducherry and its catchment area include Chennai, Trichy, Salem, Vellore and Kanchipuram. Together, the catchment area comprises approximately 86,925[20] MSME units. Of these, about 16,167 are in the EDSM sector.

Puducherry and its Catchment Area

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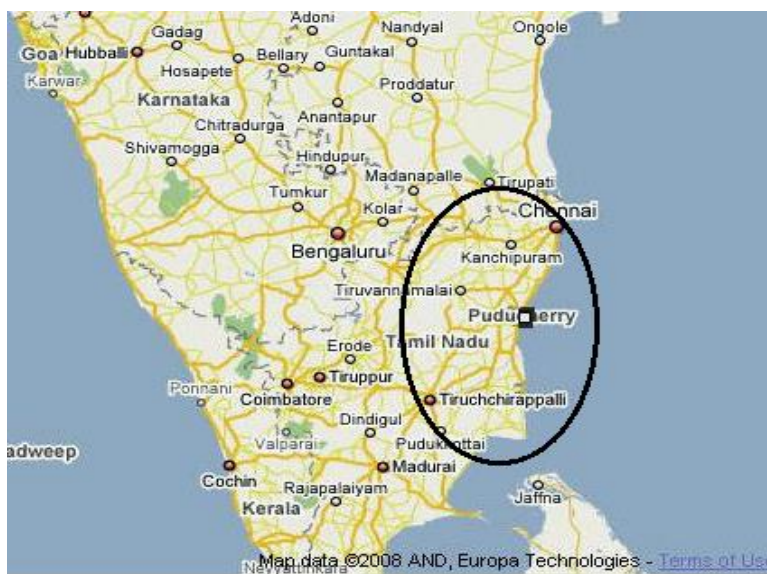
[20] DC msme

The MSME sector is a vibrant and vital sector of Puducherry's economy in terms of employment generation and share of production. There were nearly 1.21 lakh registered MSMEs in Puducherry and its catchment area as on 31st March, 2012, providing employment to over 9 lakh persons.[21] The Puducherry and Tamil Nadu State government has developed schemes which provide incentives to MSMEs as well as to the ESDM sector. This combination of incentives is expected to provide a thrust to ESDM MSMEs in the State, and make Puducherry an attractive destination for entrepreneurs in this sector to establish enterprises.

Puducherry's Industrial Policy has identified thrust areas like electronic industries, IT hardware and software and ITES, automobile components, medical equipment, food processing etc. Industrial policy sets targets for the State. In order to achieve these targets, numerous incentives are being provided to the industries in thrust areas. The following are the key highlights of Puducherry Industrial Policy[22]:

- Emerge as the leading contributor to India's hardware industry and take necessary measures to retain Puducherry as the "Hardware Capital of India"
- An information technology special economic to be set up in Mettupalayam, Puducherry.
- Develop core competencies in specific ESDM verticals such as telecom, defence electronics, avionics and energy
- Capital investment subsidy for thrust area industries on the investments made on plant and machinery @ 20% for large and medium enterprises subject to a maximum of 20 lakhs and @35% for small and micro enterprises subject to a maximum of 35 lakhs
- Interest subsidy for industrial units set up in thrust area/IT sector.
- Generator subsidy for micro, small and medium industrial units upto 50% with a cap of Rs 5 lakhs per industrial unit.
- As part of the National Skill Development Mission, a State Skill Development Mission has been formed with Labour Department as the Nodal Agency. The agency has targeted that 20,000 persons will be trained in 14 identified trades in a period of 5 years.

Table 3: MSME Units in Focus Sector in the Catchment Area

District	Total MSME Units	MSME units in Focus Sector
Puducherry	4349	455
Chennai	29054	7084
Trichy	9687	2604
Salem	5657	1149
Vellore	12396	1250
Kanchipuram	20397	2845
Cuddalore	5385	480
Total	86,925	16,167

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[21] MSME DI, district profile report
[22] http://industry.puducherry.gov.in/pdf-go/Puducherry%20Industrial%20Policy%202013.pdf

Key highlights of the catchment area have been presented in the table below:

District & No. of MSMEs[23]	District Profile	Units in General ESDM	Key highlights
Puducherry (4349)	► Hardware capital of India ► Several large MNCs in the ESDM sector have established branches here ► Proposal for setting up ESDM manufacturing cluster by Government of India ► Electronic Park at Thirubuvanai and an SEZ proposed PIPDIC which will be focused on automobile & auto parts, IT including services, electronics, hardware and bioinformatics, machinery and equipments	► 455 units in the ESDM sector	► Multi-storied complexes at Electronic City industril estate and Bommasandra ► Multi-storied complexes in Peenya Industrial Estate
Chennai (29,054)	► 11 Industrial areas the District ► Government has acquired 1500 acres of land for the establishment of Mahindra world City which is a joint venture between Mahindra Group and SIPCOT ► More than 170 engineering colleges in the district ► Ranks 4th in the highest number of employees in India's IT & ITES sector.	► 7084 MSMEs in the ESDM sector	► Electronic Hi Tech SEZ in an area of 348 acres in Oragadam ► Siruseri Industrial park spread over an area of 781 acres. ► USD 4760 million of investment in envisage in ESDM sector in the Chennai region ► High speed rail link to Coimbatore, Madurai and Kanyakumari ► Chennai – Bengaluru Freight corridor with an investment of USD 900 million.
Trichy (9,687)	► 4 industrial areas in the district ► Direct connectivity to Tuticorn port, making it an emerging export destination ► Engineering cluster with over 300 units providing employment to over 60,000 people.	► 2606 MSMEs in the ESDM sector	► Presence of a Large companies like BHEL, BPLC, IOCL etc. provides an idea opportunity for the development of MSME cluster. ► Presence of tier 1 institutes like IIM Trichy, NIT Trichy

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[23] DCMSME District Industrial profiles

Salem (5,657)	► 7 clusters with over 9300 units providing employment to more than 4,00,000	► 1149 MSMEs in the ESDM sector	► Proposed smart city in Salem (Tamil Nadu is set to receive Rs. 70 crore in the initial disbursement period to develop Salem as a smart city ► Development of logistics park ► Coimbatore-Salem Industrial corridor for manufacturing to be developed over an area of 5000 hectare with an investment of USD 1200 million
Vellore (12,396)	► 5 industrial estates	► 1250 MSMEs in the ESDM sector	► Proposed smart city in Vellore (Tamil Nadu will receive Rs 500 crore spread over a period of five years) ► Proposed ESDM manufacturing cluster in Vellore
Kanchipuram (20,397)	► 13 industrial estates including SEZs like Sriperumbdur SEZ etc.	► 2845 MSMEs in the ESDM sector	► Proposed ESDM manufacturing cluster in Kanchipuram district ► Proximity to Chennai Airport and Seaport makes Kanchipuram a very good centre for export oriented products ► Presence of established companies like Flextronics, Royal Enfield, Nissan, Ford India etc.
Cuddalore (5,385)	► 4 industrial estates	► 480 MSMEs in the ESDM sector	► Upcoming Chennai-Tuticorin freight corridor with an investment of USD 1667 million ► Development of port in Cuddalore region with an investment of USD 333 million

While the Technology Centre will provide services for MSMEs across the ESDM sector, it will focus on certain key subsectors as detailed below:

a. **Industrial Electronics:** The Indian industrial electronic sector is now a matured industry sector in the country as far as various application segments are concerned. There has been an increased demand for automation and process control in process-based industries. The demand for automation and process control equipment is mainly from process-based industries including the power generation, chemical, medical, pharmaceutical, fertilizer, and petrochemical sectors. Going forward, the demand for industrial electronics is expected to be driven by its applications in areas such as artificial intelligence, robotics, decision analytics, smart image processing and nanotechnology. State of the art and reliable supervisory control and data acquisition (SCADA), programmable logic controller (PLC)/Data Acquisition systems are being applied across various sections of the process industry. Latest AC drive systems from smaller to very high power levels also find application in large engineering industries like steel plants and metal industries. World class digital UPS systems are being manufactured in the country to cater to the need of the emerging digital economy. However, it appears there is insufficient manufacturing base in the country for the whole range of the latest test and measuring instruments which are invariably produced from outside. A good number of Indian companies in the control and instrumentation sector are able to acquire orders for export through international competitive bidding. Key players in industrial electronics in the catchment area include Eaton, Manatec Electronics, Numeric UPS and Samsung India.

b. **IT Systems and Hardware:** It systems and hardware industry is one of the largest and fastest growing industry in India. Some of the important factors that are critical to competitiveness of the Indian IT systems and hardware industry are the availability of raw materials, quality human resources, physical infrastructure, technology and credit availability. Unlike software industry, hardware industry is not able to take the advantage of available manpower as this industry is highly dependent on skilled human resource (viz. entrepreneurs, managers, technologists, skilled workers) who would facilitate/carry out research and development resulting to innovation and product diversification through technology up gradation, cost effectiveness and quality control. The government's initiatives towards boosting IT systems and hardware in the state are visible in the form of tax and duty exemptions to boost the growth of IT systems and hardware in the state. With the presence of Lenovo, HCL, Acer, etc. and with a good ecosystem the State and it catchment area is emerging as the favoured destination in this sector.

c. **Automotive Electronics:** India's automotive industry, which has emerged as the seventh largest in the world, has been growing rapidly in recent years. Between FY07 and FY12, domestic sales in the industry increased at a CAGR of 11.4% to reach 17.4 million unitsi. This growth can be largely attributed to increased sales of passenger vehicles (PVs), followed by commercial vehicles (CVs) and in the two-wheeler segment. Economic growth, favourable government policies and increased affordability have been the main growth drivers of the industry. Puducherry and its catchment has become a manufacturing hub for auto majors like Hyundai, Ford, TVS, Eicher Motors, BMW, Renault, Nissan and Mitsubishi-HM as well as auto component companies like Mando India, Wabco, Sundaram Clayton, Bharat Forge, Motherson Sumi and Rane etc.. The presence of the automotive industry provides an opportunity for the technology centre, as the cost of electronic content in cars is currently 20-25%. It is expected that the cost of electronic content in cars will go up to 35 % by 2017, and further up to 50 % in 2030. Several automobile manufacturing zones exist in the catchment area, providing an opportunity for the TC due to an increased demand for automotive electronics. The catchment area is the base of 30% of India's Automobile Industry and 35% of its automobile component industry in 4 wheeler vehicles.

5.2.2 Market in other potential sectors in catchment

The region has potential to tap the demand from other growth sectors in and across the neighbouring districts states within upcoming sectors in manufacturing and service particularly in the areas of Automotive, Aerospace and Defence, Renewable Energy and Textiles.

► **Aerospace & Defence** – The global Aerospace and Defence market is valued at USD 1.7 trillion in 2013. Growth is primarily attributed to strong performance of commercial aerospace driven by surge in passenger travel demand, increasing per capita income and positive global GDP outlook. The defence sector is being driven by factors such as increased budgetary outlay for armed forces, replacement of old defence equipment, emergence of networks centric warfare that depends on electronics, and growth of aerospace market. Further, under the Indian Defence Offset Policy, offset obligations require Defence contractors to source the equivalent of 30 per cent of the foreign exchange value of the contract from Indian suppliers. Currently, the offset obligation is rarely met through any investment in the electronics sector. However, DeitY had formulated a proposal wherein it has been broadly envisaged that in case of procurement of electronic items, 10-15 per cent of the procurement price (i.e. a total of US$ 1 – 2.25 billion) should be earmarked for electronics products/components that go into manufacture of that item. It is also proposed that in case domestic electronic products for the purpose are not available, the supplier must undertake to invest in manufacturing in India to meet the offset obligations. Challenges for this sector include high investment and long gestation period for start-ups, as well as very strict standards with need to be complied with. With the presence of HAL, NAL, AIRBUS,

BOEING, ISRO, HCL, Honeywell, UTC Aerospace, Goodrich Corporation etc. and with a good ecosystem the State is emerging as the favoured global destination in Aerospace and Defence Sector.

▶ **Renewable Energy** – Tamil Nadu is the no. 1 state in renewable energy capacity among all the states in India and generated 36.9% of its total power capacity from renewable energy sources. The state has an outlay of USD 9.16 billion for the development of solar sector in the state and programmes like solar rooftop has been made compulsory for all new government buildings in the state. Apart from this the state has also allocated USD 377 million and USD 198 million in two phases for provision of transmission capacity for wind and solar sources, thus giving them preferential treatment in evacuation of renewable power over power from conventional sources.

5.2.3 Market outside catchment area

Going forward, in addition to the MSMEs in existing sector (ESDM), Puducherry TC can also focus on MSMEs in the ESDM sector outside the catchment area. Typical opportunities for TCs outside the catchment are sourced from existing and proposed industrial zones in this area.

There is growing impetus to the ESDM Industry in India. Several State Governments have come out with their own policies to facilitate, promote and develop Electronics design and manufacturing sector. The states that have come out with Industrial Promotion/ Electronics Hardware/ ESDM Policy are Andhra Pradesh, Gujarat, Madhya Pradesh, West Bengal, Maharashtra, Karnataka and Uttar Pradesh.

This impetus from the government clubbed with the steady growth rate of the sector in India has led to a large number of electronic clusters/hubs emerging in India. The map below indicates the location of some of these key clusters.

Figure 7: Electronic clusters in India

Some of the key clusters which the Puducherry TC can cater to include:

State	Location
Andhra Pradesh	Hyderabad, Sri City
Tamil Nadu	Hosur, Trivandrum
Karnataka	Nellore, Bengaluru
Kerala	Ernakulam

A new TC is to be established in Bengaluru, which will also cater to the same market. These TCs can work in synergy with each other in order to cater to the market in the area.

5.3 Opportunities associated with other mega projects planned in Puducherry and it's catchment area

► Samsung has signed up with the Department of Technical Education (DTE) and the Ministry of Micro, Small and Medium Enterprises (MSME) to set up Samsung Technical Schools across Industrial Training Institutes (ITI) and Tool Rooms in India. Complementing the regular

syllabus ongoing at these institutes, Samsung's Technical Schools run the Advanced Repair and Industrial Skills Enhancement (ARISE) training program, designed to impart hands-on, trade specified training to these students. Additionally, soft skills courses for smoother consumer interaction through theory as well as hands-on practical knowledge are also provided. Students also benefit from on the job training at Samsung manufacturing facilities and authorized service centers. Apart from Samsung other large OEM's like Eaton etc. showed interest in setting up technical schools similar to Samsung Technical Schools at Puducherry TC. This option can be explored by TP and CNM.

► Daimler India Commercial Vehicle Pvt Ltd signed an agreement with the state government – to invest Rs 4,000 crores in its plant in Oragadam near Chennai. Also, Yamaha Motor Co Ltd to manufacture a green field facility to manufacture two wheelers with an investment of about Rs 1500 crores.

► Ascendas to set up a Rs 3,517 crore township. A manufacturing zone inside the township is expected to attract investments of around Rs 15,000 crore and create 40,000 jobs.

► Nagarjuna Oil Refinery Limited's additional investment of around Rs 12,000 crore over and above the already committed Rs 10,000 crore (including the setting up of a Rs 7,160 crore refinery and captive port along with storage infrastructure).

► State-run Tamil Nadu Industrial Development Corporation (TIDCO) signed a MoU with GAIL to float a new company, which in turn will invest around Rs 10,000 crore to set up pipeline infrastructure and power projects based on LNG.

► GMR Krishnagiri Special Investment Region (GKSIR) is a 2800 acre Greenfield City being developed by the GMR Group, an Indian Infrastructure major. It is being developed as a joint venture with the Government of the state of Tamil Nadu. GKSIR is located on the Bengaluru-Chennai Industrial Corridor. The zone is being developed in phases, and is being positioned as a high-end development for new technology and high value segments from Electronics, Automotive, Defence, and Aerospace Manufacturing to Nano Technology, Solar Manufacturing, and Light Engineering.

► Brownfield electronics manufacturing cluster initiative has been approved in Vellore and Kancheepuram.

These mega projects will provide significant opportunities in key sectors for the proposed TC in the long run.

Focus Area for Puducherry TC

6.   Focus area for Proposed TC

As discussed in the previous section, Puducherry and its catchment area has become a major electronics and IT hub in India. Within the ESDM sector, the Joint Working Group (ESDM) had identified 14 key sub-sectors that can be supported by the TCs focused on the ESDM sector. The key services such as electronic design, electronic assembly, testing, calibration etc. required to manufacture electronic product remain the same across the various sub-sectors. Therefore the greenfield TC in Puducherry is proposed to provide services across the value chain for ESDM sector for all sub-sectors with a focus on PCB manufacturing and design, with a key areas for specialization such as Industrial Electronics, Automotive Electronics, IT systems & hardware etc.

Figure 8: Service Areas across the ESDM Value Chain

Product Conceptualization	Design & Prototyping	Scaling up Manufacturing	Product Assessment, Testing & Calibration	Reaching Market
▶ Product ideation ▶ Concept Generation ▶ Software creation using Technology Incubation Centre ▶ Innovation Roadmap ▶ Proof of Concept Development ▶ Business Planning	▶ PCB and Electronic Product Design ▶ Embedded Software Design ▶ Low volume production using EMS facility ▶ Prototype development	▶ Higher volume production using Manufacturing Incubation Centre ▶ Improve manufacturing efficiency through digitization	▶ Product assessment for compliance and fault finding ▶ Testing 　○ Performance 　○ Environmental 　○ EMI/EMC 　○ Ingress ▶ Calibration of Equipment	▶ Product marketing through CNM ▶ Workshops involving key OEMs ▶ Constant Industry-Academia interaction programmes

Therefore, based on discussions with O/o DC-MSME and industry associations in Puducherry and its catchment area, an ESDM TC with a focus on areas such as industrial electronics, automotive electronics, IT systems and hardware etc. is proposed at Union Territory Puducherry. It is important to note that O/o DC-MSME has proposed to set up two other TCs focussed on the ESDM sector across India. Therefore, Puducherry TC is planned in such a way that it complements the existing investment and overall improves the capability of ESDM focussed MSMEs in India.

The Puducherry TC is planned to provide support to entrepreneurs from the point of concept creation to development of prototype and low volume production. The diagram below provides a snapshot of the services that will be provided by the TC:

Figure 9: Proposed Services to be provided by Puducherry TC

Innovation and Design Centre	Prototyping, Assessment, Testing and Calibration Centre	Manufacturing Incubation Centre	Technology Incubation Centre	Training & Placement Centre
Concept Creation support	Prototyping	Shell Infrastructure	Shell Infrastructure	Electronic Product Eng./ Embedded System
Product Design Centre	Electronic Assembly & Testing	Business Facilities Centre	Business Facilities Centre	PCB Assembly and Testing
Patent Registration and Harnessing	Product Assessment	Machinery and Equipment on rent	Machinery and Equipment on rent	Hardware Repair and Maintenance
Entrepreneurship Club	PCB Manufacturing	Software & Hardware on Rent	Software & Hardware on Rent	Placement Cell

Consultancy Services like legal advisory, financial advisory etc.

The key services of the TC are divided into four independent profit centres:

a) **Innovation and Design Centre** – This will provide support for concept creation, product design, patent registration and harvesting along with related consultancy services for entrepreneurs, MSMEs and other large players in the ESDM sector

b) **Prototyping, Assessment, Testing and Calibration Centre** – This will provide facilities for additive manufacturing, electronic assembly, testing and calibration for electronic products

c) **Manufacturing Incubation Centre** – This facility will provide shell infrastructure, business facility centre and machinery and equipment for entrepreneurs/MSMEs to rent for a period of 2 years

d) **Training Centre & Placement Cell**- The TC will provide a number of long, medium and short term courses on embedded system design, PCB Design and Assembly, hardware maintenance and repair and computer hardware and software. The TC will have course in traditional tool design and maintenance like CAD/CAM design, tool design, CNC maintenance etc. Along with training, TC will facilitate the students in getting the placements in reputed firms through a dedicated placement cell.

Details of each of these centres in provided in the following sub-sections:

6.1   Innovation and Design centre

The innovation and design centre will provide consultation support to entrepreneurs, MSME in the ESDM sector on various areas such as concept creation, product design, patent registration and harvesting, process design and development, lean manufacturing, cost engineering etc. The key services to be provided by the centre have been further divided into the following:

6.1.1   Concept creation support

Generating a successful product requires product ideation, testing of an idea in the market, confirming if the idea would work in practice, checking the patent landscape, defining a roadmap, developing a proof of concept etc. The TC would provide the following services to support this:

- ► **Product ideation** – Generate & shape ideas in a structured way, identify opportunities, develop and test concepts, develop processes that foster creativity & improves the quality

- ► **Innovation roadmap** - Set-up, design and implement robust, future-proof innovation roadmaps covering everything from business strategy to project initiation that can be translated into sound product architectures and platforms that form the basis of current and future range with support of Manufacturing Technology Partner

- ► **Proof of concepts** – Developing schematics, CAD designs, hands-on lab support, feasibility judgments, and early feedback on manufacturability

- ► **Business Plan** – planning product and services, support for market research, marketing plan, financial assessment etc.

- ► **Legal advisory** – Support from legal and financial experts for assistance/ advisory regarding firm incorporation, tax compliance etc.

- ► **Assistance for secure financial assistance** – Support for seeking financial assistance through banks, government schemes (of central and state government) to support entrepreneurs/MSMEs and facilitating angel/venture capitalist funding

- ► **Market Linkages** – Assist entrepreneurs in creation of market linkages with OEMs, suppliers, research institutes and labs through support of the Cluster Network Manager

The TC will have a dedicated team of coaches and mentors who will provide the above mentioned consultancy services to entrepreneurs and MSMEs who sign up for this service. It is suggested that a team of at least 4 dedicated professionals with prior experience of providing similar services be hired to provide these services. The 4 professionals include an innovation coach, a finance guide and two

consultants for support and institutional memory. In addition, the TC would hire the expertise of the required resources e.g. sectorial experts, legal guide etc. to increase their in-house capability in specific domains as per the market demand.

6.1.2 Product design centre

The TC will provide product design related services for electronics products including

▶ Product architecture and specifications

▶ Electronic Design – Electronic System Design including circuit, PCB, FPGA, analog and digital components, Power/Transformer etc.

▶ Mechanical Design – Mechanical components, packaging & housing

This will require the need to procure the following software and equipment:

Table 4: Product Design Centre: Software and Equipment

S.No.	Design Type	Equipment/Software
1.	Electronic Design	1. PCB Thermal Design & Packaging Software like 2. PCB and Electronic Design Software such as OrCAD, TinyCAD, DesignSpark PCB, PADS, Eagle etc. 3. PCB Therma/Mechanical Reliability and Assessment Software like 4. DSP/ ARM/ Microcontroller/ FPGA/ CPLD Development Board + Software
2.	Mechanical Design	1. CAD Software like CATIA, UG etc.

The design centre would require a dedicated manager support by two senior design engineers for electronics and one senior design engineer for mechanical design.

6.1.3 Patent registration and harnessing

The TC will provide support for a broad range of Intellectual Property matters including patent search, drafting, filing and prosecution. These services require inputs from a large number of experts such as patent attorneys, registered patent agents and technologist. The TC will utilize the services of the Cluster Network Manager to create an ecosystem of such expertise whose services can be utilized by MSMEs as per their requirements at subsidized costs.

In addition the TC will have a dedicated IPR guide who will assist MSMEs for filing patents as well as harnessing existing patent information to accelerate innovation. Patents contain large amounts of

technical, business, and policy-related information that can help entrepreneurs to generate ideas and drive innovation. In addition, it can be useful for MSMEs and entrepreneurs to identify expired or abandoned patents in relevant areas to check if they can be utilized by them for their products. The specific objectives of this facility will be as follows:

i. Provide facility for searching/mapping of patents, electronic designs etc.
ii. Provide basic information to file application for grant of patent, GI, electronic design etc.
iii. Facilitate successful transfer and commercialization of technologies
iv. Facilitate collaboration with potential clients for exploring possibilities for technology tie-ups and upscaling needs
v. Provide information on best IPR practices
vi. To provide guidance in filing applications with national/international agencies and execution of other documents concerning to licensing technology transfer agreements, etc.
vii. To advise beneficiaries on legal remedies available on issues such as infringement, duplication of patent/ industrial designs, etc.

The facility should work in close association with the National Patent Offices/ Regional Patent Offices and other National/ International Agencies administering implementation of IPR related matters.

6.1.4 Entrepreneur club

This facility at the TC would be tasked to attract potential entrepreneurs in the ESDM sector. Entrepreneurs would be encouraged to submit technology centric business ideas to the TC which would be assessed by an Appraisal Committee with help of the industry and selected entrepreneurs would be asked to join the Entrepreneur Club. Joining the club would provide entrepreneurs with the following:

a) All services of the TC including concept creation support, product design, intellectual property services, consultancy services, prototyping, assembly testing, calibration, access to Manufacturing Incubation Centre would be provided at a subsidized rate.

b) The TC would facilitate access of entrepreneur club members to service providers who can help in creation of start-up e.g. Charted accountants , Banks, Intellectual property office, etc.

c) The TC would organize workshops and group discussions for entrepreneurs with key experts to help and guide members with their ideas

6.1.5 Consultancy services

MSMEs in every sector are plagued with bottlenecks and inefficiencies that compromise their competitiveness and presence in the market. Handholding is required to enable MSMEs to develop

competencies in the areas of product & process development, operation improvement, streamlining and standardisation of processes through adoption of international norms, new technologies and capacity enhancement. Quality and technical relevance of products need to be maintained by supporting innovation for product development, component manufacturing, precision engineering, process automation and adherence to quality norms.

Therefore, the Puducherry TC would have a dedicated professional wing to assist MSMEs by providing consultancy services in the field of electronic product design, manufacturing processes and innovations for improved quality and productivity. The support of Technology Partner will be taken wherever required. Consultancy will be provided in the following areas:

Table 5: Proposed Consultancy Services

S.No.	Area
1	Product Road mapping and Architecture
2	Concept Creation Support
3	Electronic Product Design and Engineering
4	IT Systems Hardware & Design Support
5	Process Design and Engineering
6	Value Engineering/ Cost Competitiveness
7	Development Productivity and Lean Manufacturing
8	Financial Services (Project Financial , Business Plans for funds, Book Keeping, etc)
9	End User Driven innovation and Open innovation
10	Certifications and accreditations for medical electronics (Electronic Testing and Calibration)
11	Environment Health and Safety Standards for ESDM Units
12	IP Harnessing and Support in IP filling / Legal Advisory
13	Market Development Support to find the vendors, customers and other enablers
14	Other Consultancy Services

To start with, the staff of the innovation and design centre will provide consultancy services as well. In addition, the TC would hire the required resources to increase the in-house capability. Illustrative phasing of the areas/domains where the TC can provide consulting services has been suggested below. This has been designed keeping in mind the resource planning and future revenue projections as well. The table below represents the projected revenue estimates for 10 years, keeping in mind

the impetus on the consulting services for the proposed TC. Refer to table in section 14.1.1 for the projected revenue from consulting.

6.2 Printed circuit board manufacturing

The Puducherry TC will provide latest technologies, machinery and equipment to help MSMEs in manufacturing PCB. A printed circuit board (PCB) mechanically supports and electrically connects electronic components using copnductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. PCBs can be single sided (one copper layer), double sided (two copper layers) or multi-layer. Conductors on different layers are connected with plated-through holes called vias. Advanced PCBs may contain components - capacitors, resistors or active devices - embedded in the substrate.

Multilayer printed circuit boards (PCBs) represented the next major evolution in fabrication technology. From the base platform of double sided plated thru came a very sophisticated and complex methodology that would again allow circuit board designers a dynamic range of interconnects and applications.

The multilayer PCB is made up by two or more PCBs which are stacked together with reliable predefined mutual connection between them. There are at least three conductive layers in one multilayer PCB with two layers outside and the one layer synthetized in the insulation board. Due to the complex manufacturing process and lower production, the cost of multilayer PCB is relatively higher.

Multilayer circuit boards were essential in the advancement of modern computing. The multilayer PCB basic construction and fabrication are similar to micro chip fabrication on a macro size. The range of material combinations is extensive from basic epoxy glass to exotic ceramic fills. Multilayer can be built on ceramic, copper, and aluminium. Blind and buried vias are commonly produced, along with pad on via technology. Multilayer PCB has applications in broad areas including (but not limited to) Computers, File servers, Data storage, Lightings, Signal transmission, Cell phone transmission, Cell phone repeaters, GPS technology, Industrial controls, Satellite systems, Hand held devices, Test equipment, X-ray equipment, Heart monitors, Cat scan technology, Atomic accelerators, Central fire alarm systems, Fiber optic receptors, Nuclear detection systems, Space probe equipment, Weather and others. At present, Bureau of Indian Standards (BIS) has not developed any IS Standard/Specification on Multilayer PCS.

6.2.1 Domestic demand, supply and gap analysis of PCB

The multilayer PCB is used across the ESDM value chain. It is used in consumer electronics, industrial electronics, automotive electronics, strategic electronics, IT hardware etc. It is also used in professional electronic equipment, such as computers and military equipment, especially in the case
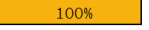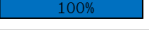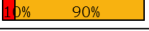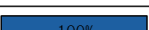
of the overload of weight and volume. They are also very useful in high-speed circuits, and can provide more space for the conductor pattern and power.

The following table provides the demand, supply, and gap analysis for Multiplayer PCBs in India, in million square meters:

Demand, Supply, and Gap of Multiplayer PCBs in India (in million sq meters)

Year	Demand	Supply	Gap
2010-11	06.48	05.10	01.38
2011-12	07.89	05.61	02.28
2012-13	09.60	06.17	03.43
2013-14	11.58	06.78	04.80
2014-15	13.62	07.46	06.16

A brief overview of PCB usage across the sub –segments:

Segment	Type of PCB Used	Procurement	Key Customer	Segment Growth
UPS-APC	85% 15%	0%	APC	18%
Mobile Phones	100%	0%	Nokia, Motorola	28%
Energy Meters	5% 85% 10%	81%	HPL, Havell	20%
Set Top Boxes	68% 32%	0%	Thomson, Humax	18%
LCD Monitors	14% 86%	3%	Samsung, LG, HCL	30%
Mother Boards	100%	0%	Intel Asus, Koblan	12%
Inverters	100%	97%	Luminous, Su-kam	20%
ECU	100%	0%	Denso, Bosch	20%
Microwave	42% 58%	0%	LG, Samsung	20%
LCD TVs	10% 90%	0%	LG, Samsung	50%
Speedometers	10% 90%	100%	Pricol, Siemens	25%
Combination Switches	25% 75%	100%	Delphi, Magna	25%
Security System	100%	100%	Autocop, Minda	30%
Power Window	100%	100%	Anand, Virdi	20%

Multiple Layer
Double Side
Single Side

Local
Imports
% local procurement

Source:- Indian Brand Equity Foundation – Indian PCB Scenario 2012 Report

It can be seen that the demand is growing faster than the supply, leading to an increase in the demand-supply gap. Also in most of the sectors PCB is still being imported and there is a huge gap

which can be filled by local manufacturing and it presents an ideal opportunity for MSMEs to venture into PCB manufacturing.

6.2.2 Growth potential

<mark>As electronic devices are becoming smaller and lighter, single-sided and double-sided printed PCBs cannot match increasing assembly density due to the limit of available space.</mark> Further, there are many problems in the PCB layouts, such as noise, stray capacitance, crosstalk, etc. Therefore, the design of PCBs must be committed to minimizing the length of the signal line and avoiding the parallel routes. Dingle-sided and double-sided PCBs cannot meet the requirement because of the limited intersections that can be achieved. Under the demand of larger number of interconnections and crosses, the PCBs cannot achieve a satisfactory performance unless they are expanded to more than two layers. Thus multilayer PCBs are growing in importance.

At present, multilayer PCBs are widely used in a variety of electronic devices, and they have become an important part among the electronic components owing to their numerous advantages. These include high assembly density, small size, good quality, reliability, flexibility, the constitution of a circuit with impedance, the formation of high-speed transmission circuit, the setup of shielding layer for electronic circuit and magnetic circuit, simple installation and so on.

The projected domestic demand, supply, and gap analysis of multi-layered PCBs is as follows:

Projected Demand, Supply, and Gap of Multiplayer PCBs in India (in million sq meters)

Year	Demand	Supply	Gap
2015-16	15.66	08.21	07.45
2016-17	18.01	09.03	08.98
2017-18	20.71	09.93	10.78
2018-19	23.8	10.93	12.87
2019-20	27.39	12.02	15.37
2020-21	31.50	13.22	18.28
2021-22	36.22	14.55	21.67
2022-23	41.66	16.00	25.66
2023-24	47.91	17.60	30.31
2024-25	55.10	19.36	35.74

Source:- Indian Printed Circuit Board Association

<mark>Demand is expected to grow rapidly, and at current rates, supply is not expected to keep pace. Thus, the demand-supply gap is expected to grow by approximately 5 times from 2015-2016 to 2024-2025.</mark> Hence it presents a very good opportunity for Puducherry TC to increase the manufacturing competitiveness of MSMEs in this sector so that future demand can be cater to. The details about machines and equipment have been discussed in section 6.3.1.

6.3   Prototyping, testing and manufacturing centre

This facility will provide MSMEs and entrepreneurs with support to develop prototypes for their electronic items, test and manufacture them and also produce pilot orders using this facility before embarking upon the regular manufacturing. To provide these services this centre would have the following facilities:

a) **Prototyping facility** – with 3-D additive machines to produce mechanical components to be used in developing an electronic product

b) **Electronic Assembly and Product assessment facility** - basic electronic assembly facility with PCB assembly workstations and technicians for assembling prototypes and low volume production for pilot orders required by entrepreneurs. Facility for assessment of products made by MSMEs.

c) **Electronic testing, calibration and certification facility** – Electronic testing, calibration and certification facility to provide environmental, safety, EMI/EMC, ingress and performance testing, calibration and certification of electronics and physical sensors for electronic items

The sections below provide details of the machinery and equipment planned in each of these facilities.

6.3.1   Electronic prototyping, assembly and assessment facility

This facility will be used for developing prototypes for all plastic body, casing and smaller components for electronic products. This facility will not be used for mass production. The TC will provide prototyping and additive manufacturing machines for polymers and plastics and will be staffed with a dedicated senior technician supported by the design team.

Also, a 20 workstation electronic assembly unit has been planned at the TC, to provide basic manual electronic assembly services for assembling prototypes, PCB manufacturing and low volume production for pilot orders required by entrepreneurs. This facility will not support high volume production. It will be housed in a 216 square meter 10,000 grade clean room. Details of the same are provided in the infrastructure section. This facility will be staffed with one dedicated manager, one senior engineer and two senior technicians. In addition to the above, trainees being trained in electronic product assembly will also support the above manpower.

The following machines have been identified for the electronic prototyping facility with latest PCB manufacturing facilities at the proposed TC. The list will be further validated by technology partner for finalisation and to initiate procurement. The budgetary cost of these machines is approximately estimated at around INR 1450 lakhs.

Table 6: Electronic Prototyping, Assembly and Assessment Facility: Machinery

S.No	Machine	No.	Unit Cost (INR Lakhs)	Total Cost (INR Lakhs)
1.	3D Polymer Additive Manufacturing Machine + 3D Scanner	1	100	100
2.	Bare board manufacturing PCBs machine with Carbon Track Technology	1	50	50
3.	PCB Labelling Machine	1	15	15
4.	Pin Stitching machine for PCBs	1	100	100
5.	Screen Printing with Surface Mount Technology	1	35	35
6.	Pick and place machines with Surface Mount Technology	1	50	50
7.	Reflow Soldering Oven with Surface Mount Technology	1	50	50
8.	Pick and place machines with Through Hole Technology	1	50	50
9.	Automated Optical Inspection Equipment for PCB and Other Electronic Items	1	40	40
10.	20 person Electronic Assembly Unit with Class 10,000 Clean Room	1	500	500
11.	Electronic and PCB Design Softwares	5	60	300
12.	PCB Manufacturing and Testing Equipment (Detailed list is shown below)	1	400	400
	Total			1450

S.No	BoQ for **PCB Manufacturing and Testing Equipment**
1.	Photo Plotter
2.	Photo film processing
3.	Sharing machine, Punching machine
4.	Pre Forming Machine
5.	CNC PCB Drilling Machine
6.	CNC PCB Routing Machine, V-Cut Machine
7.	Single Spindle Drilling Machine with X-Ray
	Contd..

S.No	BoQ for **PCB Manufacturing and Testing Equipment**
8.	Scrubbing Machine
9.	Dry film laminator
10.	Dry film exposure, screen exposure
11.	Dry film developer
12.	PCB Assembly Jig
13.	PCB Storage Rack
14.	PCB Screen Printing Machine
15.	Hot Air Levelling Machines for PCBs
16.	Automatic and Manual Etching Machines for PCBs
17.	Component Storage Bins
18.	Tool kit consisting of (Soldering iron, De soldering pump, Wire cutter, Wire cutter/stripper, Automatic wire stripper, Different types of Screw drivers , Pliers, Tweezers, IC Slip extractor etc.)
19.	Soldering Station
20.	Temperature Controlled Soldering Station
21.	De soldering Station.
22.	SMD Rework/Repair Station
23.	Wave Soldering Machine
24.	Solder Mask Exposure & Developer Machine
25.	Oven
26.	Multi-Layer press machine
27.	Plating Line (PTH Line, Pattern Plating Line, Gold Plating Line)
28.	Bare Board Testing Machine (BBT)
29.	Coated PCB Test apparatus
30.	Enclosure Impact
31.	X-Ray Fluorescence Test kit
32.	PCB fault locator test set
33.	In Circuit test kit
34.	Functional Test kit
35.	Microscope
36.	LCR Meter
37.	Digital Multimeter

Initially major machines have been planned for manufacturing PCB at Puducherry TC. More machines may also be required at the facility but the feasibility for the same will be assessed by the Technology

Partner at a later stage. A 3D Polymer additive machine has also been planned to help in producing the prototypes of all kind of electrical equipment's.

In addition, the facility would also need to provision for items for antistatic assembly such as antistatic mat, antistatic bags , antistatic component storage bin, wrist strap , static charge meter, antistatic PCB storage rack, antistatic tools etc.

6.3.2 Electronic testing, calibration and certification facility

The testing and calibration facility at Puducherry TC will be limited in scope and provide environmental, safety, EMI/EMC, ingress and performance testing and calibration for electronic products. Also most of the equipment included in this facility can be utilized for testing of all electronic items (e.g. Industrial, Mobile, IT Industry, Consumer Electronics, etc.). Also a new TC has been proposed in Bengaluru which will be focussed on testing and calibration facilities and MSMEs can avail the facilities of this TC in case of some specialized job is required in testing and calibration. The TC will provide a secondary level electronic calibration facility for calibration of all basic electronic products and physical/electronic sensors used in electronic items

The following machines have been identified for the electronic testing and calibration facility at the proposed TC. The list will be further validated by technology partner for finalisation and to initiate procurement. The budgetary cost of these machines is approximately estimated at around INR 2344 lakhs.

S.No	Machine	No.	Budgeted Cost (INR Lakhs)	Total Cost (INR Lakhs)
	Basic Requirement/ Infrastructure			
1.	Voltage Stabilizer/ CVT	5	1.5	7.5
2.	Three phase regulated variable power source	1	20	20
3.	Single Phase regulated variable power source	1	10	10
4.	Split AC	20	0.5	10
5.	Dehumidifier	5	0.5	2.5
6.	Purchase of New IEC/IS/UL/ISO/EN and other standards, etc.	1	10	10
	Sub Total			60
	Safety Testing			
7.	Temperature Recorder	1	15	15
8.	Digital storage Oscilloscope	1	8	8
9.	High voltage probe	1	5	5
10.	Electronic load	1	25	25
11.	Digital multimeter	5	0.6	3
12.	Electrical Safety Tester	1	30	30
				Contd..

S.No	Machine	No.	Budgeted Cost (INR Lakhs)	Total Cost (INR Lakhs)
13.	Gas detector	1	2	2
	Sub Total			**88**
	Environmental Testing			
14.	Environmental chamber	1	60	60
15.	Thermal Shock Chamber	1	50	50
16.	Vibration Test system	1	50	50
17.	Bump/Shock Test System	1	85	85
18.	Altitude Test Chamber	1	50	50
	Sub Total			**295**
	Fire Safety Test Equipment			
19.	Horizontal and Vertical Flame Chamber	1	50	50
20.	Heat deflection temperature test set	1	50	50
	Sub Total			**100**
	Ingress Protection Test			
21.	Test Probe IEC 61032 – 1 set	1	8	8
22.	Digital force Gauge	1	1	1
23.	Dust Chamber	1	10	10
24.	Ingress of water test system- 1 set	1	200	200
	Sub Total			**219**
	EMI/EMC Test Equipment			
25.	Electrostatic Discharge Simulator	1	15	15
26.	Anechoic Chamber,	1	850	850
27.	Radiated susceptibility and Radiated Emission test system	1		
28.	RF Shielded chamber	1	50	50
29.	Electrical fast transient/burst simulator	1	50	50
30.	Conducted RF immunity simulator	1	40	40
31.	Noise Simulator	1	40	40
32.	Surge Simulator	1	60	60
33.	Power frequency magnetic field test system	1	30	30
34.	Pulse magnetic field test system	1		
35.	Harmonics/Flicker Measurement test System	1	60	60
36.	Line Impedance stabilizing network	1	15	15
37.	Automatic Impedance Measuring Machine	1	20	20
	Sub Total			**1230**
	Electro-Technical Calibration			
38.	Multifunction Calibrator	1	45	45
39.	Decade Mega Ohm Box	1	20	20
				Contd..

S.No	Machine	No.	Budgeted Cost (INR Lakhs)	Total Cost (INR Lakhs)
40.	Decade Resistance Box	1	25	25
41.	Standard Resistors	1	10	10
42.	Sound Level Calibrator	1	10	10
43.	Sound Level Meter	1	5	5
44.	Tachometer Calibrator	1	10	10
45.	AC/DC Current source	1	15	15
46.	CT Analyzer	1	12	12
47.	CT/PT Calibration System	1	200	200
	Sub Total			**352**
	Total			**2344**

The Technology Partner will be asked to assess the requirement of other facilities at the TC at a later stage.

Also under TCSP, IEDMI Mumbai and Bengaluru TC is planned to become a primary testing and calibration centre, therefore any MSMEs requiring testing and calibration services of precision greater than the one planned at the Puducherry TC will be referred IDEMI Mumbai or Bengaluru TC.

6.4   Mechanical facility

The Puducherry TC will also provide professional training in courses with focus on general engineering. The TC will be able to produce skilled technical workforce, with greater career prospects in the General engineering industry. The duration of courses will be both short and long term, ranging from 1 month to 12 months in various specializations like; Tool Room & CNC Manufacturing, CAD/ CAM, Industrial and process Automation, etc. The batch size; number of batches per annum and respective fee have been decided on the basis of capacity of existing TCs and NCVT norms. A soft skill lab for training in English language and communication facilities will also be established in the TC. Soft skill module will be an integral part of all the medium to short term courses. The TC will start training activity from the first year of its operation across all specializations. The detail of courses in various specializations is given under section training centre.

S.No	Machine	No.	Budgeted Cost (INR Lakhs)	Total Cost (INR Lakhs)
1.	Injection Moulding Machine (80T)	1	25	25
2.	CNC Lathe Machine	2	25	50
3.	CNC Milling Machine (3 Axis)	2	50	100
4.	CNC Wirecut	1	45	45
5.	CNC EDM	1	35	35
				Contd..

S.No	Machine	No.	Budgeted Cost (INR Lakhs)	Total Cost (INR Lakhs)
6.	CNC Simulator	10	3	25
7.	Conventional Lathe	5	5	25
8.	Conventional Milling	5	10	50
9.	Surface Grinder	2	5	10
10.	Cylindrical Grinder	2	10	20
11.	Surface Table Big (Granite and CI)	2	1	1
12.	Sheet Bending Machine	2	1	2
13.	Power Press 50 Mt	1	12	12
14.	Metrology and Mechanical Testing Lab (include Universal Testing Machine, Hardness Testing Machine, Impact Testing, Surface Polishing Kit, Equipment for Non-Destructive Testing, Quality Control Equipment including CMM)	1	175	175
15.	Radial drill machine (25mm)	1	10	10
16.	Tooling and Other Accessories	1	15	15
Total				**600**

6.5   Incubation centre

Promoting emerging technological and knowledge-based innovative ventures that seek to nurture ideas from professionals is important for development MSMEs. Such entrepreneurial ideas need to be fostered and developed in a supportive environment before they become financially sustainable or attractive enough for venture capital. Hence need arises for incubation centres to promote budding individual innovators and to assist them to become technology based entrepreneurs. Typical areas of Incubation support include

- Idea conceptualisation & business planning - Technology commercialization,
- Access to infrastructure – networking, office space
- Access to finance - bank loans, loan funds, guarantee programs, investors
- Access to technology – access to machines, designing support
- Access to market – Introduction to strategic partners
- Facilitation of approvals - regulatory compliances, clearances

The incubation centre may also provide support to promote networking and forging of linkages with other constituents of the innovation chain for commercialization of their developments.

Figure 10: Key areas of incubation support
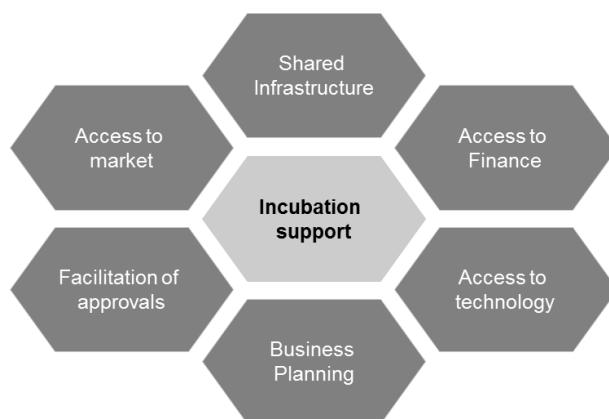
Typically the incubation support initiatives provide support to new businesses for an initial period of 2-4 years.

Business incubators differ from traditional research and technology parks in terms of scale and assistance. Research and technology parks are typically large-scale projects that house corporates, government companies or university labs to very small companies. Typically research and technology parks do not provide business assistance services, which are the hallmark of business incubators. However, research and technology parks may house incubation programs.

Several initiatives in this direction of incubation have been taken by various departments of Central Government. Some of them include

► **Incubators scheme for MSMEs- A component of National Manufacturing Competitiveness programme to improve competitiveness of MSMEs (MoMSME)**
The term 'innovation' covers a very wide domain. According to MoMSME, innovation signifies any activity and new/ ingenious procedure or product that is likely to be of use to society and marketable in the long run. The scheme seeks to provide small dose of assistance, to students/ ex-students of science and technology and entrepreneurs to try out their innovative ideas (new processes/ products) at the laboratory or workshop stage and beyond (to the extent possible) with an objective to carry the idea from concept stage to 'know-how' stage and then to 'do how' stage.

► **Technology Business Incubator (TBI), Department of Science & technology, (MoST)**
TBI is a flagship programme of National Science and Technology Entrepreneurship Development Board (NSTEDB) and focuses on incubation of potential ideas and innovations through a well-defined venture/ enterprise creation process and by effectively utilizing the requisite expertise, facilities and other infrastructure available within the host institution and the adjoining region. The incubation period is expected to be 2-3 years. Key areas of assistance in the TBI scheme include:

- Market survey/ marketing,
- Business planning and training,
- Organising management/ technical assistance,
- Obtaining statutory approvals,
- Information dissemination on product ideas/technologies,
- Syndicating finances,
- Arranging legal and IPR services,
- Provision of work space, shared service facilities

The proposed MSME technology centre at Puducherry will house manufacturing incubation facilities to promote new entrepreneurs and MSMEs in the catchment area.

6.5.1 Manufacturing incubation centre

Puducherry TC will provide space for new age entrepreneurs and young minds to transform their innovative ideas into viable business propositions. The major role of TC will be to facilitate a platform for a budding entrepreneur to start a business venture with minimum risks. Puducherry TC will ensure that incubates have access to technological assistance which will be generated through mentors with multidisciplinary expertise. Young enthusiasts with creative pursuits with an inherent zeal to be entrepreneurs will be encouraged to take advantage of this novel initiative. Puducherry TC will facilitate interdisciplinary research with special emphasis on development and innovation of high-growth- knowledge-based-business and nurtures the indigenous products with innovative hardware/embedded designs in the ESDM sector. Technical support, business mentoring, space availability and soft loan facility subject to availability will be the key services of the TC.

The Manufacturing Incubation Centre proposed at the Puducherry TC will have basic shell infrastructure with area of approx. 800 square meter and latest facilities. The entrepreneurs at MIC can use the latest machines of Technology Centre on a modest rental basis to develop their products, ideas etc. This MIC is expected to fuel the growth of enterprise which has successfully crossed the stage of pilot order and ready to execute larger orders. The MIC would support entrepreneurs to develop end products for commercialization. The MIC would comprise of the following facilities:

a) Shell infrastructure for setting up an EMS facility with space between 100-150 square metre

b) Support Business facilities like office space, conference rooms, reception area etc.

c) Business Support: Provides assistance in company formation, provides assistance for Regulatory Clearances, Vetting Business Plans, etc.

d) Technical Support: The incubatee companies are provided with support of machineries, testing and calibration equipment, product assessment facilities and mentors for technical support.

e) Financial Support: The MIC will provide financial support to the Incubatee Companies in the form of Soft Loan with minimum simple interest, from the funding agencies.

f) Legal Support: The Incubatee Companies would also be assisted in filling patent, patent harnessing as and when required on chargeable basis.

g) Networking: The MIC will provide Networking with Domains Experts, Consultants, Venture Capitalist and other funding agencies.

h) IT Support services like internet, video conferencing, Wifi etc.

i) Electricity and power connection with sub-meters

j) Registrations and Clearances for setting of a manufacturing unit such as environmental clearances, fire safety, license for running a factory, registration for commercial establishment etc.

No common plant and machinery has been planned for the first phase of the TC. The Technology Partner will assess the required common equipment than can be purchased by the TC and offered to MSMEs on rent. This will also be driven by the need of the entrepreneurs and will become a part of the incubation centre. In the meantime, the entrepreneurs can utilize the common facilities already available at the TC.

The Manufacturing Incubation Centre would not only provide space, latest technologies but also help in connecting with suppliers and skilled workers. One of the key points this MIC aims to achieve is to ensure focus on quality control from the get-go. Members of the MIC would be encouraged to start work in a setup concentrated on following environment, protocols and ethics from day one. It is therefore expected that when these enterprises come out of the MIC they could be examples of world class manufacturing practices.

6.5.2 Proposals & Selection

The success of an Incubation Centre depends on the ideas it gets for ripening. To get an 'out of the box' ideas an interest generation campaign shall be in operation throughout the year. The campaign can have conferences, seminars, road shows etc. The other processes which can be a part of robust selection process are listed below;

Interest Generation Campaign → Application → Shortlisting → Presentation → Credentials → Selection
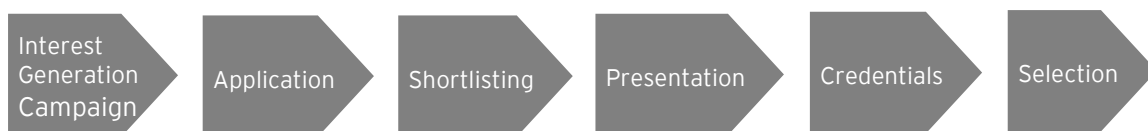
The incubation centre will have robust processes for entry and a systematic strategy for the exit of incubates. The entry process will involve stages like proposal submission, interview etc. A model which will be followed for the development of processes is given below;

Entry	Guidance	Exit
• Proposal Submission • Evaluation of proposal • Interview • Selection	• Induction • Mentorship • Proposal Refinement • Proof of concept / Filing IPR	• Product Development • Evaluation of Product • Market Development • Funding and Exit
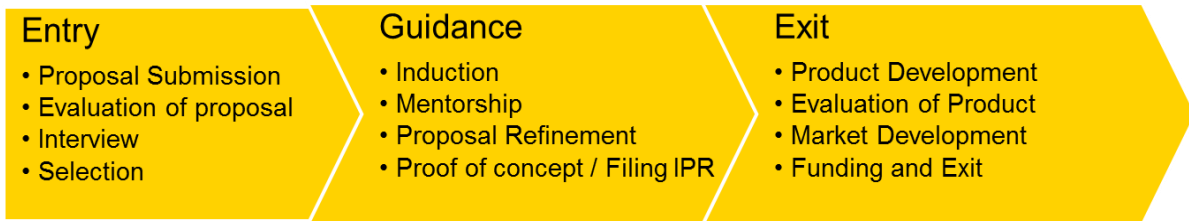
The key parameter for the exit of incubates can be:

➢ Completion of incubation period

➢ Raising substantial investment from VC/angel investor/ Govt. etc.

➢ When the number of employees of the company exceeds 10/15 or so

➢ When annual revenue of the company exceeds substantial amount.

6.5.3 Investments/ Sustainability of incubation centre

There are various government schemes which can be availed to set up an Incubation Centre. Few of the Govt. Schemes and other ideas which can be used for investments generation and sustainability of Incubation Centre are listed below:

a) Modified Special Incentive Package Scheme (M-SIPS) - The scheme is promoted by Department of Electronics & Information Technology (DeitY), Govt. of India. Under this scheme subsidy is provided for investments in capital expenditure, 20% for investments in SEZs and 25% in non SEZs. There are other incentives as well which can be availed by state govt. for setting up Incubation Centre.

b) Electronics Development Fund (EDF) – The Govt. of India is planning to set up a US $2 billion EDF to aid the domestic electronics manufacturing in the country. EDF can be used by state govt. for setting up Incubation centre.

c) Atal Incubation Centre (AIC) – The Govt. of India under AIM, intends to establish 'new' incubation centres across India by providing them financial support. Under the scheme, the incubation centre will provide necessary and adequate infrastructure along with high quality assistance services to start-ups in their early stages of growth. The AIC can be used by TC to set up Manufacturing Incubation Centre.

d) Incubation Centre should have facilities which can provide pay per use support to existing and upcoming manufacturing facilities that are keen to be competitive in the ESDM sector.

e) The Incubation Centre would provide World Class Manufacturing plant and machinery on rental basis for 2-3 years with area ranging from 800-900 Square-meter.

f) Few of the facilities within the Incubation Centre can be set up on PPP model in collaboration with existing reputed companies present in state such as Aricent, Siemens etc.

g) An international investment promotion cell can be set up to encourage foreign investments and form alliances with trade bodies from Japan, Taiwan, US and other countries to facilitate technology transfer.

6.6   Training centre

The TC at Puducherry will provide professional training in various courses with focus on the ESDM sector. The TC will be able to produce highly skilled technical workforce, with greater career prospects in the ESDM sector. The duration of courses will be both short and long term, ranging from 1 month to 12 months in various areas:

a) Electronic Design and Manufacturing – Embedded Systems, PCB Design and Manufacturing, Electronic Assembly

b) Electronic Repair and Maintenance

c) Computer Hardware and software

d) Other Trades

The batch size, number of batches per annum and respective fees has been decided on the basis of capacity of existing TCs and NCVT norms. The TC will start training activity from the first year of its operation across all specialisations. The detail of courses in various specialisations is given below:

No.	Trade	Course name	Duration (months)	Part Time/Full Time	Batch size	No. of Batch/ year	Capacity Intake
1	Electronic Design and Manufacturing	Advanced course in Embedded Technology	6	FT	30	2	60
		Basic course in Embedded Technology	3	FT	40	4	160
		Electronic/PCB Design and Manufacturing	6	FT	40	2	80
		PLC Based Automation Techniques	3	FT	30	4	120
		Microcontroller Programming Skills	3	FT	20	4	80
		Microprocessor Programming	3	FT	30	4	120
		PLC Programming	1	FT	20	6	120
		Advance PLC Programming and SCADA	1	FT	20	6	120
		Computer Aided PCB Design and Manufacturing	12	PT	40	2	80
		PCB Assembly	6	PT	40	4	160
		Multilayer PCB Design & Manufacturing on ALTIUM Software	2	PT	40	6	240
		Embedded System Design	3	PT	30	4	120
		Masters Course in Electronics Design and Manufacturing	6	PT	25	3	75
		Advance Diploma Industrial Automation	6	PT	25	3	75
2	Hardware Repair and Maintenance	Computer Hardware Repair, Maintenance, Installation, Networking and Multimedia	2	FT	30	6	180
		Mobile/HDD Repair and Maintenance	2	FT	40	6	240
		Refrigerator Repair and Maintenance	6	PT	30	4	120
							Contd..

No.	Trade	Course name	Duration (months)	Part Time/Full Time	Batch size	No. of Batch/ year	Capacity Intake
		Electronic Mechanic	12	PT	30	2	60
		Electrician Trade Practices	12	PT	30	2	60
		Auto Electrician	6	PT	30	2	60
		Electronic and Instrumentation Technician	12	PT	30	2	60
		SMD Work and rework and electronic repair	1	FT	30	6	180
		Small Transformer and Stabalizer Manufacturing and Repair	1	FT	20	6	120
		Repair and Maintenance of Telecom Equipment	1	FT	30	6	180
		Air Conditioner Repair and Maintenance	6	PT	30	4	120
		Certificate Course in Solar Panel Installation	1	PT	20	6	120
		UPS/Inverter Repair and Maintenance	6	PT	30	4	120
3	Computer Hardware and Software	Advance course in Computer Software	6	FT	30	3	90
		Advanced course in Computer Hardware	6	FT	30	3	90
		Advanced Computer Networking	2	FT	30	4	120
		Diploma in Information Security Management	4	FT	30	3	90
		Diploma in Software Programming	3	FT	30	4	120
		Diploma in Oracle PL, SQL and DBA	4	FT	30	3	90
		Diploma in Software Testing	3	FT	30	4	120
		Core Java and Java Programming	2	PT	30	6	180
							Contd..

No.	Trade	Course name	Duration (months)	Part Time/Full Time	Batch size	No. of Batch/ year	Capacity Intake
		Certificate Course in VLSI Design	2	PT	30	4	120
		Visual Basics	2	PT	30	4	120
		C	2	PT	30	6	180
		Computer Hardware Repair, Maintenance & Networking	3	FT	30	4	120
		C++	2	PT	30	6	180
		Computer Fundamentals	2	PT	30	6	180
4	Other Trades	Basic Milling	3	PT	30	4	120
		Basic Turning	3	PT	30	4	120
		Certificate Course in Machine Maintenance	12	FT	20	2	40
		Tool Design	12	FT	30	2	60
		Certificate Course CNC Machining (Milling & Turn)	12	FT	30	2	60
		Certificate Course in Metrology & QC	12	FT	30	2	60
		CNC Lathe Programming and Operation	4	PT	40	4	160
		CNC Milling Programming and Operation	4	PT	40	4	160
		Certificate Course in Machine Tool Operations (Conventional L, M, G)	12	FT	40	2	80
		Basic Grinding	2	FT	30	4	120
		CAD using CATIA, CRE-O	1	FT	40	6	240
		CNC Programming and Machining	3	FT	30	4	120
						Total	6370

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The TC will have adequate installed capacity of infrastructure like equipment, software, tool kits, computers etc. required to provide training to the proposed student capacity under various specialisations. The estimated cost of these machines is approximately INR 1302 lakhs. The following table provides the details of the same;

Table 7: Training Lab Infrastructure

S.No.	Training Labs	Nos	Value (lakhs)	Total
1	PCB Manufacturing Set Up (25 person)	25	8	200
2	PCB Assembly Setup (30 person)	30	2	60
3	Clean Room Facility	1	100	100
4	FPGA Kits + Software	25	4	100
5	8052 Kits + Software	25	4	100
6	PIC Kits + Software	25	4	100
7	Automation Kits+Software	10	12	120
8	Control Kits + Software	10	12	120
9	Electronic Repair and Maintenance Kits	40	0.5	20
10	PCB Design Software - 40 users Education license	40	1	40
11	Solar Energy Lab	1	25	25
12	Computers	300	0.5	150
13	Furniture for labs	20	3	60
14	Classroom Furniture @ 60 seats	15	3	45
				1240
18	Misc, Unforeseen & Contingency			62
				1302

6.7 Industry collaborations and associations

The objective of this section to understand the potential areas of collaboration and association the new TC at Puducherry can form and further support MSMEs. The key stakeholders have been identified in section 4.3.

Figure 11: Potential areas for collaboration or association with key stakeholders
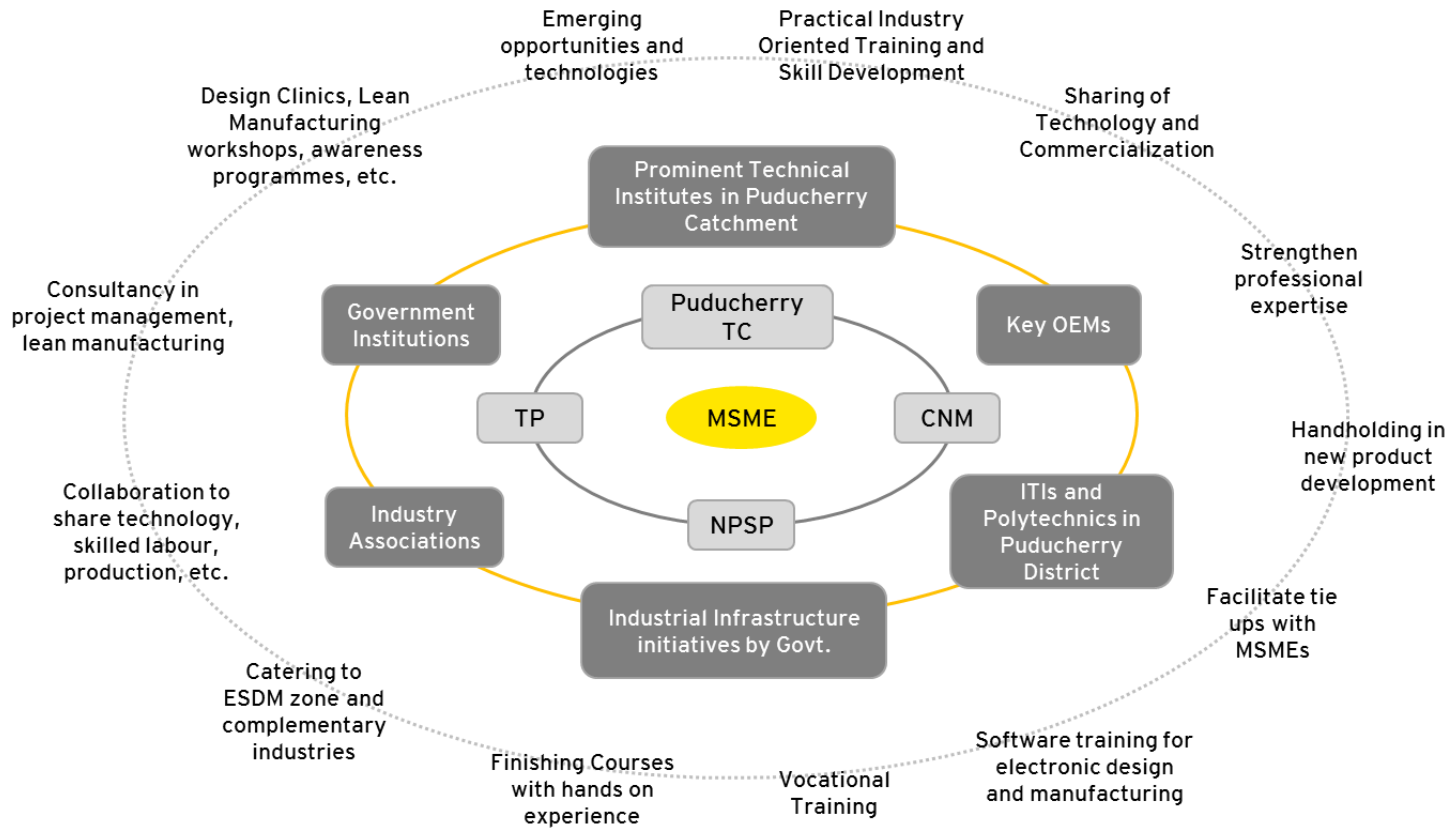
Table 8: Potential Areas for Industry Collaborations and Associations

SN	Stakeholder type	Potential areas of Collaborations and association for Puducherry TC[24]
1	Prominent technical institutes in Puducherry catchment	► The Puducherry TC can collaborate with technical institutes and centres of excellence, with the objective to strengthen its professional expertise and skilled manpower in the field ESDM. ► Further, emerging opportunities and technologies can be jointly met with respect to the global technology trends. ► TC can tie up with these prominent institutes for student exchange programmes to provide better practical industry oriented training and skill development. ► TC can become partner for commercialisation of the research by these institutes in ESDM and help in technology sharing among MSMEs through CNM. ► To form technology collaboration with these institutes for technology innovation through TP.
2	Key OEM's	TC can, ► Provide handholding in new product development. ► Facilitate tie ups with MSMEs for production outsourcing etc. ► Support suppliers to meet OEM requirements. ► Provide tailor made training programmes to the OEMs. ► Key OEM's in the catchment area includes Lenovo, Eaton, Hyundai, Ford India, Flextronics, Eicher Motors etc.
3	ITI and Polytechnics in Puducherry catchment area	► The Puducherry TC can tie up with the ITI /Polytechnics/ engineering colleges in the catchment area to provide training to the students for the development of various skill sets like; ► Software training to its students for electronic design and production. ► During summer vacation, the TC can conduct vocational training programmes for students. ► TC can further conduct finishing courses for students post completion of their diploma/ITIs. Finishing courses provide for sufficient hands on experience, which helps students develop expertise and increase the employability of the students. ► TC can help in development of similar finishing courses to train students in the premises of these institutes.

[24] The TC will take support from Technology Partner and Cluster Network Manager in mentioned areas wherever required

4	Industrial infrastructure Initiatives by Government	► Existing infrastructure of the ESDM zone and industrial zone can be leveraged by new TCs by catering to the industry. ► TC can further collaborate with these zones/ clusters above to share technology, produce, skilled labor etc. ► TP can guide them in different high-end technologies for manufacturing and other process. ► These clusters will have easy access to market. CNM can collaborate with them in future for different initiatives.
5	Industry associations	► TC can conduct various initiatives with industry associations and MSME members ► During these workshops, TC can educate about the details of different promotional policies and schemes of DC, MSME, Govt. of India for benefit and sustainable growth of MSMEs. ► TC can also provide consultancy services in the areas of project management, lean manufacturing etc. to these associations and MSME members.

6.8   Placement cell

The proposed TC will have a dedicated team of two people including one manager and one officer level staff. The placement cell will ensure the placement of all the graduating students from TC. The placement team will be supported by CNM and marketing team in developing relations with the industry organizations.

6.9   Technology collaboration

The proposed TC at Puducherry should venture into multiple new areas and to facilitate technology transfer and improve market linkages, role of TP and a CNM has been planned under TCSP.

► The TP will help identify and define globally competitive technological capabilities required in the cluster and assist proposed TC in building this capability through planning and handholding over a period of five years. The Technology Partner (TP) is required to enhance the capability and service offerings of TCs such that they transform to become models of manufacturing excellence for MSME. They need to become a trusted partner for MSMEs to learn how to attain manufacturing excellence and attain associated excellence in skills development. The services of the TCs include being exposed to the potential impact of new and relevant technologies, trainings on use of technologies/equipment, providing access to cutting-edge equipment, developing and testing new products and patenting. The key objectives of the TP include:

- In conjunction with all stakeholders of the TCSP identify and define the globally competitive technological capability required by TCs, assist in their execution and provide handholding during their roll out.

- Supporting the up gradation of the existing TCs and establishment of new TCs for the manufacturing sector

- Augment services being offered by the TCs with respect to identified technologies and clusters with respect to training, production assistance (including optimization of equipment utilization) and technical advisory, resulting in increase in revenues of TCs focused at the manufacturing sector

- Support TCs to increase productivity and competitiveness of general engineering (specially automotive and precision engineering)focused MSMEs by

  - Exposing them to existing and expected future technologies

  - Develop skills of the workers and students in the identified technologies and clusters

  - Offering advice/recommendations to MSMEs (clients) who directly or indirectly supply to large auto OEMs or automotive and automotive component manufacturers.

All investment decisions (technological & other) and work prioritization in TCs must be intrinsically connected with the market place and efficiently translate market needs to products and services that (satisfy these needs), & will be enabled by technology and enriched by global knowledge & expertise of the various stakeholders including the TP, empowered by global networks and people.

► The CNM will be appointed for a period of five years to facilitate cluster and market development to realise improved competitiveness. The CNM will work closely with the MSME clusters to understand their needs and requirements and get OEMs/ buyers involved in the program. The CNM will strengthen market linkages of TC with the MSMEs in the cluster it serves, trade and industry associations, academia, educational institutions, applied research institutions, service providers, other government support institutions, workers and skill seekers. Existing research institutions which could be potential collaborators for specific technologies are – CMRI, SAMEER, NML, IISc etc. The CNM would work towards the following key objectives:

  - Increase of business opportunity for MSMEs through new market linkages.

  - Increase competitiveness of supply chains of large firms by enhancing the quality, reliability and productivity of MSME suppliers.

- Increase the number of MSMEs utilizing the services of TCs resulting in increase in revenues of TCs

- Enhance competitiveness of the cluster business environment:

  - Increase access by MSMEs to a network of business development services (BDS) which address needs not in the domain of TC expertise

  - Increase access by MSMEs to network of financial service providers

  - Increase awareness of opportunities in the public sector to contribute to a more competitive business environment.

- Establish closer cooperation of key innovation stakeholders to enhance product and process innovation. This would include linking the research agendas of applied research and education institutes/organizations to industry and market requirements and promoting joint research and development projects.

- Facilitate closer cooperation amongst skills development and labor market stakeholders to increase the number of workers/ trainees from TCs finding long term employment to improve their livelihood.

- Establish a business model which ensures financial self-sustainability of the CNM as before the end of the TCSP funding window.

All investment decisions (technological and other) and work prioritization in TCs must be intrinsically connected with the market place and efficiently translate market needs to products and services that (satisfy these needs), and will be enabled by technology and enriched by global knowledge and expertise of the various stakeholders including the CNM, empowered by global networks and people.

Social and Environmental Safeguards

7. Social and environmental safeguards

7.1 Socio-economic profile

► **Composition of workforce:** Majority of the population in Puducherry district is engaged in the secondary and tertiary sectors. The tertiary sector employs the largest proportion of people, being the largest contributor to the district's economy. The primary sector employs a minor proportion of people.

► **Sector Composition:** The state's GDDP (gross district domestic product) in 2014-15 with base year 2004-05 is Rs. 25819.35 crores at current prices, and per capita income for the year 2014-15 is Rs 175006[26].

Primary sector: This sector accounts for 4.80% of the GDDP, contributing Rs. 1240.06 crores in 2014-2015, with major contribution from agriculture, tourism and fishing.

- Total geographical area of the district is 29,378 Hectares, and the net area sown is 11,354 Hectares[27].
- Paddy and Ragi are the major crops grown in the district along with other subsidiary crops such as Coconut, Casuarina and Blackgram.

Secondary sector: This sector accounts for 36.25% of GDDP, contributing Rs. 9560.54 crores in 2014-2015, with major contribution from manufacturing activities.

- As of 2014, Puducherry 239 Large and Medium industries, and 6964 small scale industries.
- All industries have capital investment of approximately Rs. 221.4 crores, and providing employment to over 40,000 persons.
- The types of industries registered include electrical machinery, engineering units, cotton textile, ready-made garments and embroidery, chemical / chemical based industry, rubber, plastic and metal based (steel fab).

Tertiary sector: This sector accounts for 58.3% of GDDP, contributing Rs. 15018.75 crores in 2014-2015. The important areas in the service industry are; IT / ITES, trade, hotels, restaurants, transportation, and retail.

- Puducherry is also known as hardware capital of India.
- The district has a large concentration of firms specializing in IT systems and hardware.

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[26] Directorate of Economics and Statistics, Puducherry
[27] Source: Brief industrial profile of Puducherry district, Ministry of MSME

► **Education:** Puducherry's literacy rate is 86.13%, significantly higher than that of the rest of the country. At the Intermediate college level, courses are available in the area of science, arts and commerce. The famous colleges in the region include Pondicherry Institute of Medical Sciences, Christ College of Engineering and Technology, Pondicherry Engineering College etc. The following table gives information regarding the number of educational institutions present in Puducherry district during 2010-11;

Educational Institutions in the District (2010 – 2011)[28]

Education	Number
Primary schools	190
Middle Schools	76
Secondary / senior secondary schools	216
Colleges	123
Technical Institutes	93

► **Health:** The status of health delivery system in the Puducherry has been widely appreciated. The health delivery structures that were functioning during the French Puducherry had made a good precedence for the current health infrastructure. The following table gives an overview of health infrastructure in the district during 2010-11:

Health Infrastructure in Puducherry District[29]

SN	Type	Numbers
1.	Allopathic hospitals	8
2.	Beds in allopathic hospitals	3034
3.	Ayurvedic hospitals	0
4.	Beds in ayurvedic hospitals	0
5.	Community health centres	2
6.	Primary health Centres	27
7.	Sub health centres	55
8.	Private hospitals	2

► **Tribal Population:** As per the census 2011, there is no tribal population in the whole of UT.

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[28] Source: Brief industrial profile of Puducherry district, Ministry of MSME.
[29] Source: Brief industrial profile of Puducherry district, Ministry of MSME.

7.2 Social and environmental screening

Environmental and social screening enables the envisaged risks to be addressed at the very beginning of designing and conceptualizing the implementation of the expansion or the green-field development. The two main objectives of environmental and social screening are to:

► Enhance the environmental and social sustainability of a proposed project. This aspect of screening focuses on the environmental and social benefits of a project.

► Identify and manage environmental and social risks that could be associated with a proposed project. This aspect of screening focuses on the possible environmental and social costs of an intervention and may point to the need for environmental and social review and management.

7.2.1 Social screening

As per World Bank guidelines TCSP has a two-tier approach[30] to Social Screening Process (SSP) as defined by World Bank which is as follows;

► No Social Screening Process (NSSP) is applicable if,

• Expansion/modernization of an existing TC takes place within its existing complex/campus and/or within an established and operational sites such industrial estates, industrial parks, export promotion zones etc.

• New TC is to be established within established and operational sites such as industrial estates, industrial parks, export promotion zones etc.

► Full Social Screening Process (FSSP) is applicable if a new TC is to be established on land acquired from private title holders and/or on Government land under different tenure systems provided by the Government to establish a new Centre

► Indigenous People's Social Screening Process (IPSSP) will be undertaken

• If a new TC is to be established in an area with high indigenous population comprising tribal populace and

• If the area is covered by Govt. Policies and Plans such as Tribal Sub Plans and Panchayati Raj Extension to Scheduled Areas

Further, Resettlement Policy Framework (RPF) applies to all components of Technology Centre Systems Program that requires acquisition of private land and transfer of Government/public land and that are likely to have adverse social impact including involuntary resettlement.

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[30] As per TCSP Environmental management framework - Draft (9 December 2013), MoMSME

Puducherry TC;

► The identified site for the proposed TC at Puducherry;

- Land has been transferred by Government of Puducherry to O/o DC-MSME for the development of the TC by O/o DC-MSME.

- Clearances received from the department for being free from any kind of encumbrances and squatter settlements. Further during site visit by PMU consultants the same has been verified.

► The allocated site for the proposed new TC at Puducherry is in the extension of Puducherry Engineering College. So, FSSP would not be applicable as 'the land for the establishment of the TC is not acquired from any private title holders and/or on Government land under different tenure systems'.

► Hence, in this case NSSP will be applicable since the new TC is to be established within an established and operational site of the Aerospace Industrial Park,

Also, the proposed location of the TC is not established in an area with high indigenous population comprising tribal populace and the area is not even covered by any Govt. Policies and Plans such as Tribal Sub Plans and Panchayati Raj Extension to Scheduled Areas. Hence, this rules out the undertaking of IPSSP.

The responsibilities related to social management will ultimately reside with the respective TC. The PMU will facilitate, support the implementation of the Social Management Plans and prepare a six-monthly report on all aspects of Resettlement Policy Framework and Process.

7.2.2 Environmental screening

TCs are like mini industries; hence planning, development and management of the TCs involve several critical environmental, health and safety obligations. Good environment practices and processes are required to be an integral part of any expansion or development of any green-field TC. The foremost and most essential stage of environment management is to conduct an environmental screening that highlights appropriate level and type of Environmental aspects and their likely associated environmental impact. The screening process aims to quickly identify those projects in which no potential environmental and social issues exist, so that only those with potential environmental and social implications will undergo a more detailed screening process. As a consequence, the outcome of the screening process will be a categorization of the project into one or more of the following categories:

► **Category 1:** No further action is needed, either because no significant environmental impact and risks were identified, or because sufficient environmental review has already been conducted and environmental management recommendations have been incorporated into the project;

► **Category 2:** Environmental sustainability elements need to be integrated into project design because there are possible environmental and social benefits, impact, and/or risks associated with the project (or a project component) but these are limited in nature, predominantly indirect or very long-term and so extremely difficult or impossible to directly identify and assess.

► **Category 3:** Further environmental and social review and management is needed because potential environmental and social impact or risks are associated with the project (or a project component) and it is possible to identify these with a reasonable degree of certainty. In some cases, determining the significance of these impact or risks will require environmental and social assessment which, in turn, will lead to the identification of specific environmental and social management measures that need to be incorporated into the project.

The methodology for screening includes desk study, site visit and study of available literature.

► *Desk study* involves collection and review of the secondary data available in the public domain. This may involve the seismic activity of the area where new TC is proposed, soil type, land use pattern, etc. This will enable one to decide the methodology and level of Environment assessment and distributing the responsibility amongst the team members.

► **Site visit/s** is/are conducted to collect first hand data/information about the new site. This enables a cross check of the secondary data available during the desk review and assessing the likely environmental aspects and health and safety hazards. Also, this involves interaction with different stakeholder in the region to gauge any possibility of conflict related to TC.

During the study phase the team conducted a site visit. Based on this, the checklist used to conduct environment screening at the selected site is given below:

Table 9: Checklist for environmental screening

SN	Issues	Yes/No	Remarks
1	Will the expansion or new tool room affect the land use pattern?	No	The allotted land is a designated commercial area. The same has now been earmarked for MSME. Therefore, setting up of the tool room will not lead to any effect on the land use pattern.
2	Will the development include significant land disturbance or site clearance?	Yes	The land allocated for TC has some wild grass, shrubs apart from some trees. The development of TC shall require clearing of this grass and vegetation. The trees may not be required to be

SN	Issues	Yes/No	Remarks
			cut and the same shall be taken care while developing the layout of the TC.
3	Will the project involve acquisition of land from private players?	No	The land has been allocated to MSME by the Puducherry University. Therefore, does not involve acquisition of land from private players.
4	The selected site is defined as industrial / commercial / residential?	Yes	Commercial zone
5	Is there any protected area or biodiversity sensitive area in the vicinity which is likely to be affected by the operations of the tool room?	No	There is no biodiversity sensitive or protected area in the vicinity which is likely to be affected by the operations of the tool room.
6	Is there any archaeological or cultural/heritage structure in the vicinity of the site?	No	There is no archaeological or cultural/heritage structure in the vicinity of the site.
7	Is there any group of indigenous people in and around the selected site?	No	There are no indigenous people in and around the selected site
8	Will the construction activity affect the surrounding around the tool room?	Yes	The allocated land has state highway on one of its side, Puducherry university on the two sides and some private property on the fourth side. As such construction and operation of the Tool room is not envisaged to have any impact of the surrounding area. However, care may be exercised to minimize dust emissions from the construction activity in the EMP.
9	What is the source of water available at the site (Ground water, surface water, municipal supply, etc.)? Is the water requirement envisaged to put additional pressure on the water sources?	No	As of today, Puducherry university has a municipal supply line for water. During discussions with the officials it was observed that the Puducherry university may be requested to extend the supply line for the TC or permission may be sought from Central Ground Water Authority (CGWA) to dig a bore-well on the site. Moreover, since the operations of the Tool Room are not expected to

SN	Issues	Yes/No	Remarks
			be water intensive and therefore, they shall not put additional concern on water source.
10	Was there any air emissions noted within the Site and the region?	No	No air emission was noted within the Site and the vicinity of the Site.
11	What were the sources of noise identified on the Site?	No	No noise nuisance was noted within the Site or in the vicinity of the Site.
12	Were any chemicals used on or in the vicinity of the Site?	No	No chemical or solvent usage was observed within the Site.
13	Does the Site involve in handling, storage and disposal of hazardous waste? If yes, what are the different types of waste envisaged from the TC?	No	No waste is currently generated on the site.
14	Is the project located in the area of seismic faults? In case yes, in which seismic does the location lie?	No	The TC location falls in the Seismic zone - II (Least active). Therefore, there is no concern is expected from the seismic activity.
15	Is there any record of natural calamity in the area in the past? If yes, what is the probability of the same effecting the operations of TC in the future?	Yes	Yes, Puducherry has had a history of Cyclones and Floods. It was declared as natural calamity affected area in 2012 due to devastation caused by Thane cyclone. The probability of such incidences in future and the same effecting operations of TC is not predictable but appropriate measures shall be undertaken to ensure minimal / no damage in case of such natural calamity.

Apart from this, in case of an expansion of the further data/information may be collected so as to identify the existing issues and plan appropriate measures to address the same in the brown-field development.

Also, publicly available literature review on the issues in the envisaged industrial sectors should be kept in mind. This may further help in a robust screening of the possible EHS impact of upcoming TC and may provide opportunity to MSME to have measures in place to mitigate the same.

After the initial screening, Detailed Site Assessment for the proposed TC may be conducted using the environmental assessment checklist so as understand the existing issues and the environment feasibility with respect to the proposed development.

7.3   Gender equity and social inclusion strategy

Gender, Equity and Social Inclusion Plan (GESIP) is an important aspect of the social management framework. TCSP also aims to create more choices for young people entering labour force (including women and those who belong to vulnerable sections of society) in terms of providing opportunities for hands-on-technical skills development at varying levels and types through TCs. This is in accordance with Government of India's focus on inclusive growth focusing on poverty reduction and group equality and also with World Bank's Country Partnership Strategy with emphasis on engagement, transformation and inclusion.

GESIP will be formulated for the proposed Puducherry TC, during its operational phase which would not only be an outcome of the participatory process but also be rooted in the national and state policies for gender and social inclusion. Areas to be considered while preparing GESIP will also be in line with the RFD of the programme and would comprise the following (but not limited to):

► Criteria for admission into vocational education and training for skills development
► Increased opportunities for employment to women trainees
► Timings of training
► Ease of Location of TC
► User friendly campus infrastructure esp. for differently abled sections
► No. of women rest rooms
► Training Aids and infrastructure
► Any other component

The PMU will prepare and monitor the strategy to help with the preparation and implementation of a GESIP with particular emphasis on inclusion of young women as well as those who belong to weaker and underprivileged sections of society. For example, those who belong to SC/STs, backward castes, minorities and those who are differently abled. Good practices coming out of the GESIP will be documented and replicated/scaled up further in new TCs.

GESIP Strategy roadmap (Suggestive)

► Develop a module/ guidance notes for preparing TC specific GESIPs covering the following aspects:

- Gender gaps
- Importance of gender
- Identification of gender specific issues and constraints that hinder the implementation of GESIP (human capital, access to information, access to finance, institutional factors, socio-cultural norms, structural factors, political/ legal)
- Use of gender-disaggregated data to analyse the business environment
- Identify communication channels to reach intended program beneficiaries
- Useful links and tools
- Case studies/ best practices
- Core questions and indicators

► Capacity building of TC focal points identified to work on GESIP. Analysis of existing pool of potential trainees and their eligibility in terms of gender and social inclusion and in terms of eligibility criteria as set out in national and State policies

► Hand holding support for planning and implementing GESIP

► Setting up institutional arrangements at TC level for transparent and accountable implementation and monitoring of GESIP based, among others, on specific and measurable indicators. Develop reporting and monitoring formats to assess progress every 6 months

► Organize and facilitate monthly meetings (for 6 months) for GESIP coordinators to identify issues and best practices and synthesize learning's' within and across sectors

7.4 Sample monitoring and reporting template

The monitoring of environmental parameters would be undertaken on quarterly basis. The responsibility of the same would lie with the concerned TC and a copy of the consolidated performance will be sent to the O/o DC MSME for their records and recommendations. The suggestive template for monitoring and reporting for the same to be adopted by the TC's is given below. Further, during operation and maintenance of the TC, a number of potential EHS impact may be expected based on the kind of activities undertaken. These possible aspects are delineated in the EHS section of this DPR.

Table 10: Sample monitoring and reporting template

SN	Parameter	Frequency of monitoring and reporting
1	Water consumption	Quarterly
2	Water Cess Report	Quarterly
3	Energy consumption	Quarterly
4	Waste generation and disposal - Municipal Solid Waste - Hazardous waste - Non-hazardous waste - Other categories	Quarterly
5	Safety records Near Misses First Aid cases	Quarterly
6	Training No of students and other trained	Quarterly
7	Air pollution and Noise pollution	6-monthly
8	Internal audit report	Quarterly
9	Update of legal register	6-monthly

Clearances Required and Respective Authorities

8.   Clearances required and respective authorities

The proposed TC at Puducherry is one of the Greenfield projects proposed under TCSP. This would include development of physical infrastructure including facilities like production, training, administration, hostel, canteen, utilities etc. keeping in view the long-term sustainability. The same would require clearances at different levels during construction such as approval of layout plan, environmental clearance, electricity and water supply connection, health and safety clearance and other associated clearances. Obtaining these clearances would be crucial for timely completion of the project and therefore needs to be planned well in advance. The following table gives indicative details of the various clearances along with the respective approving authorities and the tentative time required. However, considering that land has already been allotted, some of these regulations may not be applicable.

Table 11: Clearances required and respective authorities – Illustrative

SN	Required clearance/ approvals[31]	Department /agency
1.	Registration under VAT Act	Commercial Taxes Department
2.	Registration under CST Act	Commercial Taxes Department
3.	Tax Clearance Certificate	Commercial Taxes Department
4.	Land conversion - Conversion of land use	Town and Country Planning Department
5.	Land Allotment	PIPDIC
6.	Allotment of plots in Industrial Areas	PIPDIC
7.	Issue of NOC to the authority concerned regarding conversion of land use	Town and Country Planning Department
8.	Environmental Clearance and consent to establish from State Pollution Control Board (SPCB)	Puducherry State Pollution Control Board
9.	Consent to operate under the Air Act and Water Act from SPCB. Also, under the hazardous Act, if hazardous materials are being handled and disposed from the facility	Puducherry State Pollution Control Board
10.	Electricity Connection	Electricity Department, Govt. of Puducherry
11.	Water connection	Water Resources Department
		Contd..

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[31] Ebiz Puducherry

SN	Required clearance/ approvals[31]	Department /agency
12.	NOC from Fire Department	Puducherry Fire and Emergency Services
13.	Approval of place and for permission to construct building under the Factories Act	Labour and Employment Department - Department of Factories, Boilers, Industrial Safety and Health
14.	Approval of factory layout plan under factories Act, 1948	Labour and Employment Department - Department of Factories, Boilers, Industrial Safety and Health
15.	License for running the factory	Labour and Employment Department
16.	Registration of shops and commercial establishments	Labour and Employment Department - Labour Department
17.	Stability Certificate	Town and Country Planning Department
18.	Permission to establishments having more than 50 labours under Industrial Employment	Labour and Employment Department - Labour Department
19.	Safety certificate for Lift	Puducherry State Electrical Inspectorate
20.	Permission to extract ground water, if applicable	Central Ground Water Authority
21.	Society registration	Indian societies registration act 1960

Manpower and Human Resource Development

9. Manpower and human resource development

The success of an institute or an organization majorly depends upon the skill set and experienced human resource available with them. Hence, it's planning, recruitment and development is one of the most important aspects while designing a new Technology Centre. As a part of the study we have analysed organizational structures of some of the existing Technology Centres to understand the major functional areas, number and level of employees, contractual staff and other related aspects. In continuation, we have also discussed the same with O/o DC-MSME and some of the heads/GMs of the existing TRs.

As per the existing structure, there are following functional areas/streams in a TR:

- ► Production
- ► Design
- ► Training
- ► Consultancy and Marketing
- ► Administration and Accounting

The level of employee heading a particular Functional area/stream/department varies in some of the TCs. In an Indo German TR Administration and Accounting is head by a Manager while in Indo Danish TCs this is being headed by a Senior Manager. Sanctioned employee strength in these existing TCs typically varies from 110-120.

9.1 Proposed organisation structure

While analysing the existing organizational structures and designing the new one, we have taken some considerations into account which have been discussed and validated with the O/o DC-MSME. Some of the key considerations are as below:

- ► As per the decision taken in the Empowered Finance Committee, the total sanctioned strength for any new TC would be 60, in contrary to the existing ones which have total sanctioned strength of 110-120.
- ► In the proposed organizational structure for Puducherry TC, the main revenue streams are Production (which includes Manufacturing, Assembly and Testing), Innovation, Design and Consultancy, and Training. These departments will be headed by Senior Managers who would directly report to GM/DGM.
- ► Contrary to the existing structures and target of sanctioned employee strength of not more than 60, we have proposed only 7 levels as compared to the existing structures which have 9 levels in the hierarchy. Below these levels, the resources will be hired as contractual employees on need basis.
- ► In the proposed structure for Puducherry TC, a separate vertical for the Manufacturing Incubation Centre (MIC) has been proposed.

► In the existing structure consultancy and marketing department were clubbed into one, but in the proposed structure for Puducherry TC it has been proposed to have marketing as a separate department and consultancy be clubbed with the design and innovation department.

► The other three departments namely, Marketing, Administration and Accounting, and MIC are proposed to be headed by Manager level position and they will directly report to GM/DGM. This has been done as the administration and accounts department is lean and a manager level employee would be able to manage the same. Also, as stated above, the total sanctioned strength cannot exceed 60.

► In contrary to the sanctioned strength (4-5 employees) in marketing department of many existing TCs, the sanctioned employee strength in the proposed structure has been reduced to 2 only (1 Manager and 1 officer sales). This has been proposed keeping in mind that the GM or Deputy General Manager will devote his/her significant time in marketing and sales. Also, the respective departmental heads (Senior Managers) will be responsible for the sales and marketing efforts of their departments. Moreover, above all TCSP aims to hire Cluster Network Manager to facilitate all the market linkages for the proposed TC. The role of CNM for marketing would be very crucial and it will act as an additional arm of the marketing wing of the proposed TC. Considering all the above factors into account, a lean marketing department has been proposed for the proposed Puducherry TC.

► It is proposed that training in the Puducherry TC will be focused on Electronics, IT Systems and Hardware

► Based on our discussions with the O/o DC-MSME and heads of the existing MSME TCs, there was a need for dedicated manager for the short term trainings. In the structure for Puducherry TC, we have proposed separate managers for long term and short term trainings. Keeping in mind the scale and the number of trainees in the short term courses, the manager short term would mainly be responsible for administration, planning, quality control, issue of certificate to trainees, fee collection and others. The managers would be additionally responsible for placement of students which will include industry interaction, managing training and placement, delivering presentations etc.

As highlighted above, the proposed Technology Centre at Puducherry will be divided into six functional areas/departments. These are:

► Production (Manufacturing, Assembly, Testing, and Calibration)
► Training (Electronics, IT Systems & Hardware, Instrumentation)
► Design, Consultancy and Innovation
► Manufacturing Incubation Centre (MIC)
► Marketing
► Admin and Accounting

It is recommended that the GM and the DGM divide these six areas/departments between them, depending on competency, work-load and previous experience. Overall GM would be responsible for the management and financial health of the TC.

The chart consists of 5 levels in addition to the General Manager (GM) and the Deputy General Manager (DGM).

► The third level consists of Senior Managers as the departmental heads of innovation, design and consulting, production and training. They will report directly to either the GM or the DGM, depending upon the division of departments within them.

► The fourth level will consist of Managers who will be supporting Senior Managers in their respective domains. But for marketing, admin and accounting, and MIC department, as explained above manager will head this department and directly reporting to GM or DGM.

► The fifth level consists of senior engineers (Sr. Engg.) and Sr. Officers. Level six consists of engineers (Engg.) and offices.

► The final level consists of senior technicians with requisite operational level expertise.

The responsibilities of each position and qualifications required to fulfil roles are covered in the following section. Hence, the recommended final organisational structure for the proposed TC is based on experience from established MSME technology centres, discussions with O/o DC-MSME and heads of some of the existing TCs, expert opinion and knowledge and experience with organisational planning.

Based on the considerations stated above, the organisational chart provided below demonstrates the target organizational structure to be achieved in 5 years (by 2020-21) from inception. Though, we have provided the figures till 2025-26 since we are estimating the revenue and expenditures for next 10 years.

Table 12: Sanctioned strength of key resources

S. No.	Designation	Proposed Sanctioned Strength
1.	General Manager	1
2.	Deputy General Manager	1
		Department
3.	Sales & Marketing	2
4.	Administration and accounting	7
5.	Innovation, Design and consultancy	8
6.	Production	20
7.	MIC	2
8.	Mechanical Facility	3
9.	Training	14
10.	Placement Cell	2
	Total	60[32]

In addition to the above sanctioned strength, we have recommended additional employees as contractual employees.

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[32] The details and basis of number of employees is provided in the next section

Figure 12: Proposed organisation structure
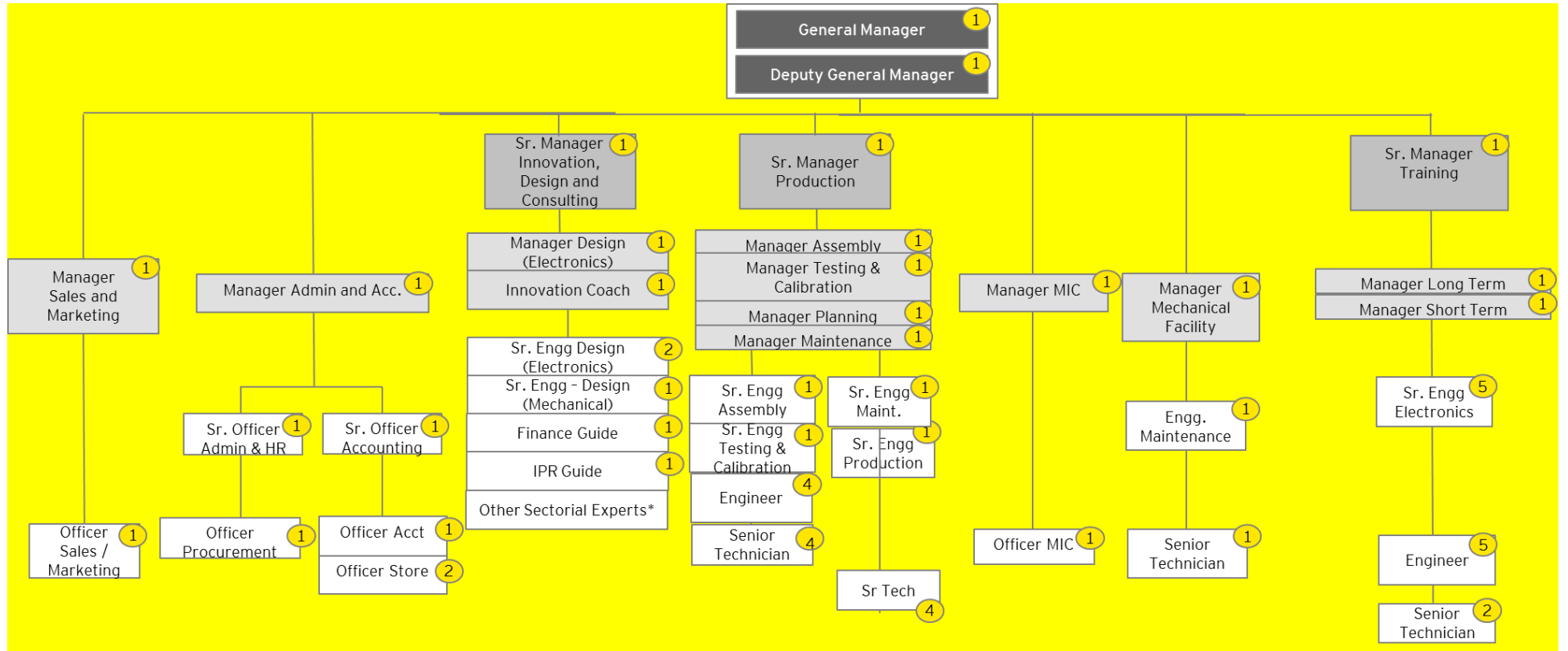
In addition to the above sanctioned strength, we have recommended additional employees as contractual employees. Based on the requirement, we have estimated around 60 contractual employees (45 in training, 12 in production, and 3 in consulting) by end of FY 2026. The figure for number of contractual employees have been arrived at by taking various factors into account namely – existing employees in training and production, the number of courses vis-à-vis the number of trainees, trainee to teacher ratio, projected revenue numbers over the years, number of shifts in production vis-à-vis the utilization and others.

While considering the ratio for trainee to teacher, we have used the following assumptions after discussion with existing GMs and O/o DC-MSME.

- Trainee to teacher ratio for theory classes – 60:1; with theory classes conducted for 20% of time
- Trainee to teacher ratio for practical classes – 20:1; with practical classes conducted for 80% of time

After calculating the weighted average of the above ratios we got the overall trainee to teacher ratio of 28:1. Post discussions, we have considered trainee to teacher ratio of 25:1 for calculating the number of employees in the training department (regular and contractual faculty) keeping in mind the employees who will be on leave at any given point of time.

9.2   Phase wise induction of human resources

As discussed in the above sections, the proposed TC will be have 60 employees as sanctioned strength and the target structure will be achieved within 5 years from 2016-17. Therefore due care have been taken during the study to phase the recruitment of employees. On the same lines, initially some positions have been proposed to be vacant when establishing the organisational structure of the TC. This has been proposed keeping in mind the time it will take to be fully operational. Vacant positions will also create incentives for high performers to obtain higher positions when the time comes for fulfilling these.

The phase wise estimated staffing over next few years as part of human resource planning has been done through the identification and analysis of the various types of activities and skill sets required for smooth and efficient functioning of the proposed TC. Multiple rounds of discussions with industry experts, World Bank, O/o DC-MSME and heads of some of the existing MSME TCs have been undertaken to arrive at the requirement of human resources needed to meet the business objectives in the short and long term of the proposed TC.

The following provides the details of recruitment in various phases over next few years. This phasing is suggestive and can be modified based on the need and revenue generating capabilities of the TC during operations. Some of the considerations which have been taken into account while recommending the phasing of employees are as below:

► **Year 2016-17: 3 staff members**

- GM will be involved in project implementation and work out the strategy for marketing, training, production and consultancy with the help of CNM and TP. GM will also monitor the progress of construction and procurement of machines etc. GM will also be responsible for planning of recruitment of required manpower.

- Manager – Administration & Accounts will be responsible to get statutory registrations like sales tax and PF, opening of TC's bank account, getting power and water connection etc. Manger will also support GM in recruitment of people in the coming years.

- Manager – Sales and Marketing will be responsible for building relationships with industries, association. Manager will support the GM in preparing strategy for marketing and sales.

► **Year 2017-18: 23 staff-members**

- Three senior managers (Innovation, Design and Consulting; Production; and Training) will be recruited to further recruit staff in respective departments. These would also be responsible for orientation and training of respective staff members.

- The first long term training programme will commence this year and one senior engineer, one engineer and one senior technician will be recruited for installation of machines and conducting theory and practical training

- By second half of this year, production and design staff will be recruited. The respective senior managers would be responsible for orientation and training of these staff members. These staff will undergo training for a period of 3-6 months to make them fully trained before start of the operations of the proposed TC

- An innovation coach and senior design engineer will also be recruited, in order to commence consultancy operations

- Manager - maintenance and senior technicians will be recruited to install and commission machines for production and training. They will also be responsible for installing the power supply system

- Manager MIC will be recruited in order to set up manufacturing infrastructure and provide for plug-and-play facilities

- Stores and accounts officers will be recruited to maintain statutory records and support the operations

► **Year 2018-19: 43 staff- member**

- Production will commence during this phase and hence more engineers and senior engineers will be recruited. The number of staff has been decided based on estimated number of machines commissioned during this phase and number of shifts in production

- This year some short term training courses will commence along with the starting of the second year of the long term course.

- ▪ Officer sales will be recruited to support manager marketing for preparation of detailed marketing plan of the TC. The staff would be engaged in various marketing activities for wider reach of the proposed TC across the region. This would be crucial for promotion of the TC and would help departments increase their revenue
- ▪ Officer MIC will be recruited in order to facilitate rental of space, and providing linkages with suppliers and skilled workers.
- ▪ The Innovation, Design and Consultancy department has been planned to commence its commercial services during this year and hence managers, consultants, and senior engineers will be recruited to meet the requirement.

► **Year 2019-20: 50 staff members**

The proposed TC would be fully operational by this period with activities in production, training, innovation, design and consultancy, MIC, etc. Additional staff will be recruited for smooth undertaking of the gradual increase in the activities across all the departments.

It is recommended to leave the position of the DGM vacant initially. The position of the DGM can be filled by a high performing senior manager within design and consulting, production or training depending upon the requirement, skill set and experience.

Rest of the positions will be filled gradually as TC activity escalates and the manpower requirements increase. The tables below summarise the phasing of the organisational completion within each area; Administration and Accounting, Innovation, Design and Consulting, Production, MIC, Training and Sales and Marketing, in addition to the positions of the GM and DGM. The numbers represent the numbers of employees within the specific position at a given point in time. The timeline spans from 2016 to 2027.

Table 13: Summary of phase wise induction of resources

Year	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27
Full time employees											
Total	3	23	43	50	56	60	60	60	60	60	60
Sub-Contractors											
Total	0	3	13	21	23	33	35	45	50	55	60

The tables below depict the hiring of number resources in every department every year starting from 2016-17 to 2026-27. In the year 2020-21, the TC is recommended to hire the complete sanctioned strength of 60 employees.

Table 14: Department wise induction of fulltime resources – Illustrative

Year	16-17	17-18	18-19	19-20	20-21	25-26	26-27
General Manager							
General Manager	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Deputy General Manager							
Deputy GM	0	0	0	0	0	1	1
Total	0	0	0	0	1	1	1
Sales and Marketing							
Manager Sales and Marketing	1	1	1	1	1	1	1
Officer Sales and Marketing	0	0	1	1	1	1	1
Total	0	1	2	2	2	2	2
Administration and Accounting							
Manager Admin. and Accounting	1	1	1	1	1	1	1
Sr. Officer Admin and HR	0	0	0	0	0	1	1
Sr. Officer Accounting	0	0	0	0	0	1	1
Officer Procurement	0	0	1	1	1	1	1
Officer Accounting	0	1	1	1	1	1	1
Officer Store	0	1	1	2	2	2	2
Total	1	3	4	5	5	7	7
Innovation, Design and Consulting							
Senior manager	0	1	1	1	1	1	1
Manager Design (Electronics)	0	0	1	1	1	1	1
Innovation Coach	0	1	1	1	1	1	1

Contd..

Year	16-17	17-18	18-19	19-20	20-21	25-26	26-27
Sr. Engg. Design (Electronics)	0	1	1	1	2	2	2
Sr. Engg. Design (Mechanical)	0	0	1	1	1	1	1
Finance Guide	0	0	1	1	1	1	1
IPR Guide	0	0	1	1	1	1	1
Total	**0**	**3**	**8**	**8**	**8**	**8**	**8**
Production							
Senior Manager Production	0	1	1	1	1	1	1
Manager Assembly	0	0	1	1	1	1	1
Manager Testing & Calibration	0	0	1	1	1	1	1
Manager Planning	0	1	1	1	1	1	1
Manager Maintenance	0	1	1	1	1	1	1
Sr Engg. Assembly	0	0	0	1	1	1	1
Sr Engg. Testing & Calibration	0	0	0	1	1	1	1
Sr. Engg Production	0	0	1	1	1	1	1
Sr. Engg. Maintenance	0	1	1	1	1	1	1
Engineer	0	2	3	4	5	5	5
Senior Technician	0	1	2	4	5	5	5
Senior Technician Maintenance	0	1	1	1	1	1	1
Total	**0**	**8**	**12**	**16**	**17**	**18**	**18**
Manufacturing Incubation Centre & Technology							
Manager MIC & TIC	0	1	1	1	1	1	1
Officer MIC & TIC	0	0	1	1	1	1	1
Total	**0**	**1**	**2**	**2**	**2**	**2**	**2**

Contd..

Year	16-17	17-18	18-19	19-20	20-21	25-26	26-27
Mechanical Facility							
Manager Production	0	1	1	1	1	1	1
Engg. Maintenance	0	0	1	1	1	1	1
Senior Technician Maintenance			1	1	1	1	1
Total	0	1	3	3	3	3	3
Placement Cell							
Manager Placement Cell	0	1	1	1	1	1	1
Officer Placement Cell	0	0	1	1	1	1	1
Total	0	3	3	4	4	4	4
Training							
Senior Manager	0	1	1	1	1	1	1
Manager Long Term	0	0	1	1	1	1	1
Manager Short Term	0	0	1	1	1	1	1
Sr. Engg.	0	1	3	5	5	5	5
Engg.	0	1	3	5	5	5	5
Senior Technician	0	1	2	2	2	2	2
Total	0	4	11	15	15	15	15

9.3   Roles and responsibilities

Below is summary of the suggestive roles and responsibilities (including the minimum qualification levels) of the individual employees which can be referred to while recruiting.

Table 15: Roles and responsibilities of proposed positions

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
General Manager	B.Tech (CS / Electrical / Electronics) with MBA or M.Tech	15 Years with 8 years in similar role	► Electronics Manufacturing / Design / Testing and Calibration / Training. ► Experience in Project Implementation will be preferred ► Networking skills with industrial associations, key players, etc.	► Over all responsible for the administration and financial health of the TC ► Key responsibility areas include (but not limited to); Marketing, Administration, HR, Accounts, Production, Design & consultancy etc. ► Responsibility for achieving the target KPIs set by the Governing Council
Deputy General Manager	B.Tech (CS / Electrical / Electronics) with MBA or M.Tech	12 Years with 5 years in similar role	► Electronics Manufacturing / Design / Testing and Calibration /Training. ► Experience in Project Implementation will be preferred	► Head of Production, Innovation and Design, Consultancy and Training
Manager- Sales & Marketing	M. Tech. in CS / Electrical / Electronic	10 years with 5 years in similar role	► Marketing of TC product range ► Supporting Sr. Managers of respective departments to acquire orders	► Plan and evaluate marketing activities towards all stakeholders ► Stakeholder analysis ► Sales according to targets

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			► Follow up with prospective and existing customers	
Sales Officer	MBA or Equivalent	3 years	► Experience of invoicing and sales accounting ► Payment collection from customers ► Should be familiar with Computerised accounting procedures	► Execute marketing and sales activities ► Sales invoicing, taxes etc.
Manager - Admin. and Accounting	CA/ICWA or MBA with bachelor's degree in Commerce/ Accounting / Finance	8 Years with 3 years in similar role	► Experience in the area of Administration, HR and Accounting ► The Manager must also have basic knowledge of government laws, regulations and state specific compliances ► Familiarity with ERP/accounting softwares	Head of Accounts, Administration and HR: ► General housekeeping of TC ► Bookkeeping, accounting and finance including financial analysis ► TC security ► Payroll ► Procurement management and store keeping
Sr. Officer - Admin. & HR	MBA or Equivalent	5 Years	► Experience in the area of HR and Administration ► Familiarity with Industrial laws and compliances	► Housekeeping of TC ► Security systems operation ► Transport System and management ► Payroll
Sr. Officer - Accounting	Bachelor's degree in commerce/Accounting / Finance	5 Years	► Experience in accounting and Tax ► Should be familiar with latest accounting software	► Bookkeeping and accounting ► Financial analysis

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	with M.Com. or MBA			
Officer - Accounting	M. Com. or MBA or Equivalent in Accounting	3 Years	► Experience in accounting and Tax. ► Should be familiar with latest accounting software	► Bookkeeping and accounting ► Handling of Cash, Banking etc.
Officer Store	Diploma in CS / Electrical / Electronic or Equivalent	3 Years	► Experience in Store keeping, including inventory management ► Experience in Computer systems / software for store keeping operation	► Managing store ► Issue of consumable and non-consumable stores and keeping records
Officer Procurement	M. Com. or MBA or Equivalent	3 Years	► Experience in Procurement processes ► Knowledge of Govt. Procurement rules and processes will be desirable	► Procurement ► Vendor Development
Senior manager – Innovation, Design & Consultancy	M.Tech in CS / Electrical /Electronic engineering	10 Years with 5 years in similar role	► Proficiency in Electronics design ► Practical Experience in use of software for electronics design like OrCAD, PADS, CAD Soft Eagle, etc. ► Knowledge of Quality systems ► Experience in technical consultancy will be preferred ► Experience with ESDM Start ups ► Providing Consultancy Services	Responsible for supporting MSMEs and entrepreneurs w.r.t: ► Concept creation support, including product ideation, innovation roadmap, development of proof of concepts, business planning, and market linkages ► Product architecture and design ► Consulting Services in areas such as process design, value engineering, lean manufacturing, EHS, etc.

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
				In charge of entrepreneur club and patent registration and harnessing centre
Manager- Design (Electronics)	B. Tech in Electronic engineering.	8 years with 3 years in a similar role	► Experience in product modelling, design ► Proficiency in Electronics design ► Practical Experience in use of software for PCB and electronics design ► Experience of manufacturing and assembly of electronics ► Knowledge of Quality systems ► Experience in technical consultancy will be preferred	► Designing electronics and components ► Product development ► Prototyping
Manager – Design (Mechanical)	B. Tech in Mechanical engineering	8 years with 3 years in a similar role	► Experience in product modelling, design, tool design ► Proficiency in one of the areas in Tool Design, either Sheet metal press tool or Plastic mould ► Practical Experience in use of CAD/CAM/CAE in product and tool design ► Knowledge of Tool trial ► Knowledge of Quality systems ► Experience in technical consultancy will be preferred	► Designing tools, moulds and die casting ► Product development ► Quality systems ► Value engineering ► Tool try outs and proving ► Consultancy to MSMEs: Deliver functional consulting on assigned areas to ensure MSMEs are able to successfully use the solutions

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Innovation Coach	B. Tech in CS / Electrical /Electronic engineering	8 years with 3 years in a similar role	► Proficiency in Electronics design ► Practical Experience in use of software for electronics design like OrCAD, PADS, CAD Soft Eagle, etc. ► Experience in product ideation and innovation ► Knowledge of Quality systems ► Experience in business planning ► Experience with ESDM Start ups ► Providing Consultancy Services	Providing consultancy services in the following fields: ► Product ideation, development and testing of concepts ► Setting up innovation roadmap including business strategy, product architecture ► Proof of concepts including developing schematics, lab support, feasibility judgements ► Business planning ► Market Linkages
Sr. Engineer-Design (Electronics)	B. Tech in CS / Electrical / Electronic engineering	5 Years	► Experience with designing electronic components / electronics ► Knowledge of high software in electronic design such as OrCAD, PADS, CAD Soft Eagle, etc. ► Experience of consultancy in the areas of product and component development, quality systems and value engineering	► Designing electronics and electronic components ► Product and prototype development ► Quality systems ► Value engineering ► Consultancy to MSME
Finance Guide	B. Sc. / Diploma in Finance or equivalent	5 Years	► Experience in financial assessment ► Experience in financial consultancy and business plan creation	► Consultancy services for financial assessment and feasibility, business planning

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
IPR Guide	LLB / PGDM in IPR or equivalent	5 Years	► Experience in patent creation and harnessing	► Consultancy services for patent creation and harnessing
Consultant	B. Tech in CS / Electrical / Electronic engineering	5 Years	► Proficiency in Electronics design ► Practical Experience in use of software for electronics design like OrCAD, PADS, CAD Soft Eagle, etc. ► Experience in product ideation and innovation ► Prototyping experience ► Knowledge of Quality systems ► Experience in business planning ► Experience with ESDM Start ups ► Providing Consultancy Services	► Assistance and consultancy in concept creation, product and process development, quality and reliability, sustainability, prototyping
Sr. Manager Production	M. Tech. in CS / Electrical / Electronic Engineering	10 Years with 5 years in similar role	► Experience with manufacturing and assembly, testing and calibration, and at least 3 years of leadership experience ► The Sr. Manager should also have hands on experience with programming software for electronics production	► Responsible for assembly, testing, and calibration centres ► Quality assurance of services ► Overall responsible for machine maintenance and upkeep ► Ensuring on-time deliveries ► Deliver budgeted quantities as per required quality standards

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			► Experience to debug, analyse problems, root causes & take corrective improvement actions	► Manpower deployment and controlling manpower costs as per target
Manager-Assembly	B. Tech CS / Electrical / Electronic Engineering	8 Years with 3 years in a similar role	► Experience with electronic product and PCB assembly (SMT and through hole / manual and automated) ► Hands on experience with PCB design software ► Experience of de-bugging, analysing problems, root cause and taking corrective improvement actions when PCB is not functional as per specifications ► Should have good knowledge of quality inspection	► Product and PCB assembly centre ► Responsible for timely delivery of products ► Overall responsible for machine maintenance and upkeep ► Ensuring on-time deliveries
Manager-Testing & Calibration	B. Tech in CS / Electrical / Electronic Engineering	8 Years with 3 years in a similar role	► Experience with using testing equipment and software ► Safety testing and fire safety testing ► Environmental testing and Ingress testing ► EMI / EMC ► RoHS Testing	► Supervise testing and calibration department staff. Planning, organizing, and monitoring testing assignments and ensuring work expectations for scope, schedule, cost and responsiveness. ► Interface with engineering for technical resolutions for tolerance failure's ► Increase through-put of testing department

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
				► Overall responsible for machine maintenance and upkeep
Manager- Planning	B. Tech in CS / Electrical / Electronic Engineering	8 Years with 3 years in a similar role	► Experience in electronics assembly, testing, and calibration ► Experience in programming, knowledge of programming software	► Preparation of stage wise / machine wise scheduling in co-ordination with head of production team ► Production Planning and Control, and further despatching of jobs ► Estimate & manage to get component requirements ► Responsible from issue of raw components to despatch of final product to customers including routing
Manager- Maintenance	B. Tech in Mechanical/ Electrical/ Electronics Engineering	8 Years with 3 years in a similar role	► Knowledge of Installation and commissioning of machines and equipment ► Practical experience in preventive and repair maintenance of machines and equipment ► Practical experience of maintaining utility equipment like sub-station, UPS, water treatment plant, DG set etc.	► Head of Machinery maintenance including preventive maintenance, repair etc. of machines and equipment ► Responsible for Power supply, energy conservation water system in the campus

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Senior Engineer- Assembly	B. Tech in Electronics Engineering	5 Years	► Prior experience with electronic assembly	► Electronic product and PCB assembly (SMT and through hole / manual and automated) ► Running PCB design software ► De-bugging, analysing problems, root cause and taking corrective improvement actions when PCB is not functional as per specifications ► Quality inspection
Senior Engineer – Testing & Calibration	B. Tech in Electronics Engineering	5 years	► Prior experience with electronic testing & calibration	► Safety testing and fire safety testing ► Environmental testing and Ingress testing ► EMI / EMC ► Electro-Technical Calibration ► Thermal Calibration ► RoHS Testing
Senior Engineer - Maintenance	B. Tech in Electronics Engineering	5 years	► Experience in Maintenance of machines and equipment (electronics or mechanical) ► Experience in machine programming and operation (electronics)	► Machine maintenance including preventive maintenance, repair, etc. of machines and equipment ► Responsible for power supply, energy conservation water system in the campus
Senior Engineer - Production	B.Tech in Electrical/Mech	5 Years	► Knowledge and experience in electrical prototype manufacturing ► Experience of precision components	► Quality assurance ► Team work ► Prototype manufacturing

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
	anical Engineering			
Engineer	Diploma in Electronics	3 years	► Knowledge and experience in electronics assembly / testing / calibration / prototyping ► Machine programming and operation (electronics)	► Machine programming and operation for testing / calibration / prototyping ► Assembly of electronics
Senior Technician (Assembly / Testing / Calibration / Prototyping)	Diploma / ITI in respective areas	3 years as Sr. Technician	► Knowledge and experience electronics and component manufacturing ► Electronics assembly ► Testing and calibration ► Prototyping ► Knowledge of machine programming and operation for testing / calibration / prototyping	► Machine programming and operation for testing / calibration / prototyping ► Assembly of electronics
Senior Technician - Maintenance	Diploma/ ITI in respective areas	1 year after Diploma or 5 Years after ITI in respective areas	► Experience in Maintenance of machines and equipment (electronics) / ► Experience in machine programming and operation ► Experience in electronics assembly, testing and calibration	► Maintenance of machines and equipment ► Machine programming and operation (electronics)

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Manager – MIC	M. Com. Or MBA or Equivalent	8 Years	► Experience in management, administration, and marketing in the ESDM sector ► Familiarity with regulations and compliances	► Helping members of Incubation centre in getting orders and execution of the same
Officer – MIC	M. Com. or MBA or Equivalent	3 Years	► Experience in the area of Administration and Marketing ► Familiarity with Industrial laws and compliances ► Prior experience of marketing and promoting in the ESDM sector	► Administration and Promotion
Manager – Production (Mechanical Facility)	B. Tech in Mechanical Engineering	8 Years with 3 years in a similar role	► Experience in tooling or manufacturing ► Experience in metal or plastic mould and/or die casting. ► Experience in CAD and CAM software, and programming of CNC machines ► Knowledge of ERP software	► Preparation of stage wise / machine wise scheduling in co-ordination with head of production team ► Production Planning and Control, and further despatching of jobs ► Estimate & manage to get raw materials and component requirements ► Responsible from issue of raw materials to despatch of final product to customers including routing

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Engineer Maintenance (Mechanical Facility)	B. Tech in Mechanical Engineering	5 Years	► Knowledge and experience in tool manufacturing, metal cutting through CNC programming and operation ► Experience of precision components ► Tool assembly ► Tool trial	► CNC machine programming and supervision of machining and assembly of tools ► Machinery maintenance ► Quality assurance ► Team work
Senior Technician Maintenance (Mechanical Facility)	Diploma/ ITI in respective areas	1 year after Diploma or 5 Years after ITI in respective areas	► Experience in Maintenance of machines and equipment (electronics or mechanical)/ ► Experience in CNC machine programming and operation/ ► Experience in Tool assembly and trial	► CNC machine programming and operation ► Assembly and trial of Tools ► Also work as Maintenance Technician in Mechanical/ Electronics
Senior Manager- Training	M. Tech. in Electronics engineering	10 Years with 5 years in a similar role	► Experience with electronics manufacturing and training in the field of ESDM ► Experience with designing curriculum and preparing lecture plans and course material for long term and short term training	► Overall responsible for planning and executing training activities ► Overall responsible for designing curriculum and preparing lecture plans and course material ► Responsible for Quality and Certification in training

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
Manager Training- Long Term	B. Tech. in Electronics Engineering	8 years with 3 years in a similar role	► Experience with electronics manufacturing and training in ESDM ► Experience with designing of curriculum and preparing lecture plans and development of course material for long term and short term training	► Planning and implementing of training activities in designing, manufacturing, assembly, testing ► Focus on long term training courses ► Evaluation of training activities and identify improvements ► Curriculum design ► Lecture plans and course material
Manager Training – Short Term	B. Tech. in Electronics Engineering	8 years with 3 years in a similar role	► Experience with electronics manufacturing and training in ESDM ► Experience with designing of curriculum and preparing lecture plans and development of course material for short term training	► Planning and implementing of training activities in designing, manufacturing, assembly, testing ► Focus on short term training courses ► Evaluation of training activities and identify improvements ► Curriculum design ► Lecture plans and course material
Senior Engineer- Electronics (Training)	B. Tech. Electronics Engineering	5 Year	► Experience with electronics and component manufacturing and training in ESDM ► Experience with designing curriculum and preparing lecture plans and development	► Undertake training courses in electronics and component manufacturing

Profile/ Designation	Minimum Qualification	Minimum Experience	Other Skill set/ requirements	Key Responsibilities
			of course material for long term and short term training ► Knowledge of software for electronic design and manufacturing	
Engineer- Training	Diploma in Electronics	3 Years	► Experience in electronics manufacturing and training in ESDM	► Undertake training courses ► Demonstrate practical skills to trainees ► Deliver theory lectures
Senior Technician - Training	Diploma / ITI in respective areas	1 year after Diploma or 5 years after ITI in respective areas	► Experience in Maintenance of machines and equipment (electronics) ► Experience in machine programming and operation (electronics) ► Experience in electronics assembly, testing and calibration	► Machine programming and operation for equipment used in trainings
Manager Placement Cell	M. Com. Or MBA or Equivalent	8 Years	► Experience in HR management, administration ► Contacts with OEM's in ESDM sector	► Helping students of TC to get placement in reputed companies ► Good relationship with industry players across the ESDM value chain
Officer Placement Cell	M. Com. or MBA or Equivalent	3 Years	► Experience HR management and Marketing ► Familiarity with ESDM players	► Promoting the TC to industries and association for recruitment of students

9.4   Governance structure

9.4.1 Selection of the Governance Model for the new TCs

All the existing 18 TCs have been set up under the Societies Registration Act, 1860. The management of affairs mainly rest with the Governing Council constituted by MoMSME, Government of India with the Additional Secretary and Development Commissioner of Ministry of Micro, Small and Medium scale Enterprises (DC-MSME) acting as the President of the Society and Chairman of the Governing Council (GC).

This arrangement has proved effective as most TCs have supported local MSMEs well and have performed financially. Each TC has a separate society and has very decentralised authority and governance structure. DC, MSME being chairman and other two members Director –Tool Room and representative of IF-wing of MoMSME are common members in all 18 GCs.

During the study and preparation phase of this DPR, we analysed different governance models for the new TCs. Under Indian law, there are three legal forms that exist for non-profit organisations. Mainly two forms are relevant for the purpose of the TCSP Program.

► Society as per society Registration Act, 1860
► Section 25 companies as per Companies Act, 1956

The two forms mentioned above have distinguishing features as per their respective acts.

Table 16: Comparison of Society Registration Act and Companies Act

Features	Registered Society	No-for-profit Company u/s 25
Setting up and running cost	Nominal	Comparatively more than the society & trust
Formation	Simple	Takes 2-3 months, required to comply with provisions of Companies Act
Jurisdiction	Registrar of society	Registrar of companies
Meetings	Annual Meeting As per Law. Governing Body meeting as per the rules of Society.	Quite Extensive as per the provision of Company Law
Governance	Vests with governing body as per the rules framed by them. Law specifies no rules & regulation	Vests with Board of directors & management committee. Specific provisions for quorum, adoption, ratification and compliance

Features	Registered Society	No-for-profit Company u/s 25
Membership transfer	Impossible	Free or control as per desire
Statutory Regulations	Limited	Exhaustive
Transparency	Transparent (As society act is not so exhaustive requiring statutory compliance for each and every step of business operation)	Fully Transparent (The Companies Law is quite exhaustive requires specific compliance in each activity of business operation)
Perception commercial lenders	Less comfortable	More comfortable
Interest of commercial lenders	Less secured, as Act doesn't provide any rules regarding how the interest of lenders can be settled in the case of bankruptcy	More secured, as exhaustive provisions in companies act about how the interest of lenders can be secured by distributing the assets of the company in case of liquidation
Accountability	More (Can be established, if the rules, regulation and by-laws of the Society are framed in manner to fix accountabilities)	More, (As per the statutory regulations)
Financial Management & Disclosures	Best practices can be adopted through framing regulations. However, Act doesn't provide anything specific on this	Exhaustive provisions in Companies Act providing for financial management and disclosure policies
Modification of Objects	Easy Legal Procedure	Complicated legal procedure
Penalties	Lesser	Higher
External audits	Subject to lesser audit requirement. As Act doesn't provide for various kind of audits of the Society. However, generally the society provide for audit regulations and compliance to audit observations as part of their bye-laws and rules and regulations	Greater degree of control through Auditing framework as per companies Act. E.g. Statutory Audit, tax audit, cost audit etc.
Basic Document	Memorandum of Association Articles of Association with rules & regulations	Memorandum of Association Articles of Association

The Table above outlines difference in the two prominent governance structures. Generally, Companies are construed as more reliable legal entity in the commercial world or to attract private participants because the transparency inherits from the statute itself under which it is incorporated.

However, a society may also bring forward discipline by framing rules and regulations of the society through the governing body. This fact together with the minimal cost of setting up and running and simplicity in its formation makes the society a popular model in the case where purpose is not to finance the cost of the project but optimise the cost and delays.

The existing 18 TCs formed as per society model have made it proven model because of the following facts:

► Very clear cut authority flow and ownership by other GC members and GMs (as permanent member secretary). It instils competition among individual TCs to excel.

► The Incentive schemes work better in small groups (individual TCs). It also allowed better performing and surplus generating TCs to retain surplus fund and deploy them best suited to them.

► Rules and regulation framed by the societies fix the accountability of various authorities in organisation.

► Delegation of financial power has been developed which fix the authority of each of the officer in management body.

► Well established system for procurement is being followed as per GoI guidelines and GFR, 2005

► Matters have been identified on which decision van be taken only by the Governing Body.

► Annual accounts are audited by the statutory auditors well in time and audit report is placed and adopted by the Governing Body in its annual meeting

► Compliance to audit observations are strictly complied with and observed by the O/o DC-MSME

Overall the present system is working well and at this stage raising fund is not the sole purpose, it is recommended to continue with the societies for proposed Puducherry TC with following few minor modifications

► Governing council can make provision for more membership from OEMs

► Provision of membership from state technical University who controls most private Engineering colleges

► One more sector expert in the GC

► GC usually meets once in six months only and it is suggested to have one executive committee or advisory committee consisting of local MSME/Cluster association members,

sector experts and other stakeholders who can meet quarterly and can advise TCs and can also be delegated with powers higher then GMs

9.4.2 Composition of the Governing Council

As mentioned above, the proposed TC will be set up under the Societies Registration Act, 1860. The management of affairs primarily rest with the Governing Council constituted by MoMSME, Government of India with the Additional Secretary and Development Commissioner, Ministry of Micro, Small and Medium Enterprises (DC-MSME) acting as the President of the Society and Chairman of the Governing Council of each TC.

The Governing Council of TC will comprise four types of members as explained below:

Table 17: Governing Council of Puducherry TC

Representation in the Governing Council	Suggestive recommendations
(i) Ex-officio members	
Representative from Government of India ► Development Commissioner, Ministry of MSME as Chairman, ► Industrial Advisor or Director of TR or Program Coordinator, ► Director DI-MSME of the respective States, ► Representative from Integrated Finance Wing of the Ministry of MSME. Representative from State Government ► Official from concerned industry department, ► Official from concerned department of technical education/training.	► Secretary, Industries ► Commissioner/Director, Technical Education & Training
(ii) Institutional members	
► Representative of state level industrial promotion body ► Representative of association of small scale industries ► Representative of the local chambers of commerce and industries/ Industry Promotion Institution/NSIC.	► TANSTIA, PIPDIC ► Puducherry Small Scale Industries Association ► Puducherry Chambers of Industry and Commerce PCIC
	Contd..

Representation in the Governing Council	Suggestive recommendations
(iii) Professional and other members	
► One expert representing the fields of finance & accounts/ law/management, ► One representative of small scale electronics producers, ► One representative of OEM, ► One representative of major ESDM manufacturer in the region ► Representative of Technical University of the state which governs engineering colleges	► To be nominated by O/o DC-MSME ► To be decided by O/o DC-MSME
(iv) MD/Executive Director/GM/PD of the Society	
On his appointment, the Executive Director or General Manager of the Society shall automatically become ex-officio member of the Governing Council during the tenure of his office, as *Member Secretary*.	

► **Role of the governing council**

The Governing Council will discharge such duties and responsibilities, exercise such powers and undertake and carry out such activities as considers essential with a view to attain the aims and objectives as per the Memorandum of Association of the Society, with particular reference to the following;

- To prepare and execute plans and programmes for the establishment of the TC based on the plan of operation and to carry on its administration and management after such establishment.
- To prepare, consider and approve the policies and strategies of the Society and to reconsider and amend the said policies and strategies whenever appropriate.
- To receive grants and contributions and to have custody of the funds of the society.
- To prepare, consider and approve the budget estimates of the society every year.
- To prepare and maintain accounts and other relevant records and annual statement of accounts including the balance sheet of the society.
- To open, conduct and prescribe courses of study, training and research in ESDM (design and manufacturing) and subjects.
- To fix and receive such fees and other charges from persons undergoing training as may be necessary.
- To prescribe rules and regulation for the admission of candidates to the various courses of training.
- To lay down standards of proficiency to be demonstrated before the award of diplomas, certificates and other distinctions to the trainees.

- To institute and award scholarships, prizes and medals.
- To provide for and supervise the residence, health, discipline and the well-being of the trainees in the Society.
- To create subject to the provisions of Rule 68 supra technical, training, research, administrative, ministerial and other posts under the Society and to make appointments thereto on such terms and conditions as deemed appropriate.
- To co-operate with any other organisation in the matters of education, training, management and allied subjects.
- To enter into arrangements for and on behalf of the society.
- To sue and defend all legal proceedings on behalf of the Society.
- To appoint committee or committees for the disposal of any business of the Society or for advice in any matter pertaining to the Society.
- To delegate to such extent it may deem necessary any of its power to any officer or committee of the Governing Council.
- To consider and pass such resolution on the Annual Report, the annual accounts and the financial estimates of the Society as it thinks fit.
- To make, inform, adopt, amend, vary or rescind from time to time rules and by-laws for the regulation of and for any purpose connected with the management and administration of affairs of the Society and for the furtherance of its aims and objectives.
- To make, adopt, amend, vary or rescind from time to time rules and by-laws for
  - For the conduct of the business of the Governing Council and the committee(s) to be appointed by it,
  - For delegation of its powers,
  - For fixing quorum.
- To sell, lease, mortgage or exchange and otherwise transfer all or any portion of the properties of the Society.
- To establish a provident fund for the benefit of the employees of the Society.
- To perform such additional functions and to carry out such duties as may from time to time be assigned to it by the Society.
- To establish procedure in respect of services and technical advice to be rendered to the industry by the Society and the levy and collection of charges for the same.
- To delegate its powers as may be deemed fit and appropriate but not the powers for:
  - Altering, extending or abridging the purposes of the TC within the meaning of the Societies Registration Act, 1860.
  - Amalgamating the TC either wholly or partially with any other TC having similar aims and objectives.
  - Altering, extending or abridging the Rules and Regulations of the TC within the meaning of the Societies Registration Act, 1860.

- Shifting the existing location or altering the capacity of the TC.
- Making capital investment exceeding the approved budget.
- Borrowing money except for working capital exceeding the approved budget.
- Transferring by way of mortgage, pledge, hypothecation or otherwise any assets, moveable or immovable, except as security for working capital.
- Appointing bankers and auditors.
- Generally anything extraordinary and of major importance.

► **Roles and responsibilities of the member secretary (GM/PD/MD)**

- Plan, direct, co-ordinate, organize and supervise day-to-day work of the society.
- Implement policies, strategies and such programs of the society and attend to all statutory requirements imposed thereon.
- Prescribe the functions, duties and responsibilities for all officers and staff of the society, give them appropriate instructions and exercise such supervision and disciplinary control as may be necessary.

► **Roles and responsibilities of the O/o DC-MSME in management of the TCs**

- Support DC-MSME in executing the responsibilities as the Chairman of the Governing Council of all TCs.
- Support in implementation of strategic projects and policies from the central to the TC levels.
- Act as the nodal point of coordination between the TCs and the DC-MSME.

Marketing Plan

10. Marketing plan of Puducherry TC

The marketing of Puducherry TC would require specific actions in order to engage with potential customers and clients in the catchment area. A series of activities is therefore required to be planned for effective marketing of Puducherry TC to promote its business, product or services. The broad suggestive framework for marketing of Puducherry TC would include the following;

Figure 13: Suggestive framework for marketing of TC

Define
Defining Vision
Mission
Values and Objectives of the TC

Formulate Strategy
Work closely with the CNM
Engaging internal stakeholders
Increasing visibility to external audience and work on the recommendations
Competitive pricing

Methodology
Product/Service positioning
Website
TC fast facts
TC online email newsletters
High quality promotional videos
High quality print promotions
Industry tie-ups
Consistent social media presence

In line with the above suggestive framework, a detailed Go to Market plan of the proposed TC will be prepared subsequently by the Cluster Network Manager (CNM) along with the GM and marketing team of the TC. The role of CNM for marketing would be very crucial and will act as an additional arm of the marketing wing of the proposed TC. It will further strengthen its market linkages with the MSMEs in the cluster it serves. CNM will also market the TC within the trade and industry associations, academia, educational institutions, applied research institutions, service providers, other government support institutions, workers and skill seekers.

As part of the marketing initiative, CNM would work closely with MSME clusters in the region to understand their needs and requirements and involve OEMs/ tier 1 players in the region. Based on the observations, the marketing strategy of the TC would be customized targeting various focus groups including technical and training institutes. Further, the CNM would be part of the consolidation of the results and recommendations of the diagnostic into a strategic plan for cluster development. The CNM would also represent the TC in various industry oriented outreach programmes and workshops. This would help in two ways; promoting the TC and understanding industry perspective and future areas of focus. The same will help to identify key areas of focus for the TC and align the future marketing strategies accordingly.

Hence, the CNM would promote the TCs in among the newly developed partnerships for mutual benefit around identified programmes / initiatives.

The plan should clearly position the proposed TC's marketing mix with respect to its four Ps - product, price, place and promotion. The suggestive points which need to be taken care while designing the Go To Market Plan for the Puducherry TC has been highlighted below:

Figure 14: Positioning of marketing mix for proposed TC

Product
An ESDM TC is proposed to be developed at Puducherry based on the growth of the electronics system and the ecosystem for entrepreneurship in Puducherry. The product and service offering of the proposed TC therefore has been carefully derived keeping in view the existing gaps to address specific requirements of this sector. Further the shortlisted specialisations and respective courses to be offered by the proposed TC have been done keeping in view the shortage in the availability of required skill sets in the labour force across the industry. The existing ESDM focussed MSME TCs majorly focus on tool room requirements for the ESDM industry, PCB design and manufacturing, and design, testing and repairs. There is a need for a unit for electronics assembly, as well as for end-to-end consultancy services for entrepreneurs, including concept creation, product ideation, and creation of prototypes. As a differentiator and keeping the market needs in mind, we have proposed an ESDM TC in Puducherry with a focus on medical electronics. We have also proposed an electronics assembly unit, testing and calibration services, and an innovation centre for budding entrepreneurs. The centre would encourage final year trainees to start their own ventures by providing necessary support like finance, machining, availing benefits of Government schemes etc. for a period of 3 years. The summary is provided below:

The key offerings of the proposed TC will be ESDM focused (with a special emphasis on medical electronics) like; design and consultancy, creation of prototypes, electronics assembly, testing and calibration, training for skill development with respect to various specialisations. Focus areas would include:

- Innovation, design, and consultancy services: This includes concept creation, product ideation, business plan creation, and manufacturing prototypes, as well as consultancy services in the field of product design.
- Electronics Assembly, Testing and Calibration services.
- Long and short term training programmes in software for electronic design and manufacturing, etc.
- Incubation support to the trainees/budding entrepreneurs for their start-up ventures

Price

As per the study and discussions with GMs of some of the existing TCs, the proposed TC should adopt the cost plus pricing approach for its products and services during its initial years of operation and thus ensuring operating profit for sustainability. Most of the existing MSME TCs follow the cost plus pricing approach only for all of their products and services

As a differentiator from the existing MSME TCs, it is proposed that once the TC will strengthen its brand and credibility in the market it should gradually move towards market-based pricing with defined margin levels (margin based costing). Then, the TC will have to work towards optimisation of its processes and operations to sustain its margins in the competitive environment.

The above mentioned pricing models are suggestive and will depend on the detailed analysis while preparing the Go To Market Plan with the support of the CNM

Promotion

Promotion of TCs products and services is one of the most important components of the Go To Market Plan for a new set-up. Hence, below are some of the suggestive points which might be considered while making the final Go To Market Plan for the proposed Puducherry TC.

► Increasing visibility to external audience
- Encourage and execute early communication and promotion of activities by TC which are relevant to key external audiences including industry, media, technical media etc.
- Producing a steady, reliable stream of quality outbound communications that highlights;
  - Research innovations and technology evaluations coming from the TC and its partnerships.
  - Special events and conferences hosted or supported by TC.
- Working with industry partners to identify projects for joint publicity.
- Develop Facebook/ LinkedIn/ Twitter/ YouTube presence to connect to students.

- Ensure current marketing message is being maintained with all social media platforms administered by these TC.

► Engaging internal stakeholders

- Conduct media and website training on a regular basis for all interested faculty and staff.
- Leverage active partnerships with the industry and community, inviting departmental and staff participation.
- Ensure department faculty and staff are informed of the progress of the TC with respect to each goal.

► Other Activities

- Website: Develop a website showcasing all highlights of the TC.
- TC fast facts: Fast fact can be a two-page information sheets describing the highlights of TC. It can be made available online and increase the visibility to external audiences.
- TC online email newsletters: Preparation and delivery of high-quality email newsletters from TC to industrial units, associations and other partners with the latest research announcements, news and more of engaging and interesting information to these external audiences.
- High quality print promotions: High quality print promotions coordinated by TC communications, which maintains the Puducherry TC as a brand to be utilised in outreach efforts.
- Industry tie-ups: Partner with Industries and other technical education institutes to increase the visibility of TC. Explore opportunities to participate in publications and other co-branding opportunities with these partners from time to time.
- Maintain consistent social media presence: Ensuring consistent, exciting messaging is posted on active social media platforms including the TCs Facebook page, Twitter account, YouTube channel and others. Promote the presence of TC on these platforms to students, alumni and supporters while acting as a social media hub for internal departments
- Roadshows to promote the TC and engage industry players

Place
Puducherry and its catchment area is an ESDM hub, with several large players as well as MSMEs. An ecosystem for ESDM is already in place, with MSMEs across the value chain located around the region. Puducherry is a key location for foreign investments in the ESDM sector. All these location advantages will be leveraged while preparing the detailed marketing plan to establish the proposed TC as one of the prominent TCs catering to the ESDM Sector.

As a part of developing the go to market plan GM would work with the CNM, during the final stages of the construction, to prepare a detailed marketing plan keeping in view the focus areas of the TC. This team, with support from CNM, would be responsible to conduct the suggestive activities as mentioned in the promotion component and lead the marketing initiative for the TC.

In view of the above broad framework the following would be undertaken for marketing of the TC during its inception to start with. It is proposed to keep aside an initial one time marketing budget for completing most of the below mentioned activities through third party vendors:

Table 18: Suggestive marketing activities, ownership and timeline

Phases	Activity	Ownership	Timeline
Preparation of promotional materials	• Designing brochure of TC (through outsourcing) • Short video film of TC infrastructure and facilities available (through outsourcing- post completion of the infrastructure/construction) • Development of TC website (through outsourcing)	Marketing team, GM and CNM	Construction and Post construction phase
Pre marketing activities	• Preparing list of industrial association bodies in the Puducherry catchment, district and state. • Preparing list of industries in consultation with DIC. • Shortlisting of perspective players' with respect to product range and process. • Design a brief questionnaire. • Preparing list of engineering colleges, ITIs, polytechnics, in the catchment area.	CNM and GM	Construction phase
Targeting the manufacturing units	• Send the brochure along with cover letter and short questionnaire to the shortlisted industries. • Seek time from large industries and industry body associations to give presentation on the capability statement of Puducherry TC with respect to Assembly, testing and calibration, design and consultancy services, etc. • Send representatives to get the filled questionnaire or fill the questionnaire circulated earlier. • Analyse the questionnaires received with respect to production, consultancy, training requirements of industries.	GM, Manager Marketing, CNM and TP	During installation and commissioning of machines for manufacturing

Phases	Activity	Ownership	Timeline
	• Meeting the key industrial units identified in the analysis to further understand their needs with respect to Assembly, testing and calibration, design and consultancy services, etc. • Organise as well as participate in industry oriented outreach programmes/ seminars/ workshops/ boot camps etc.		
Targeting OEMS	OEMs are important because they involve many industries including MSMEs in the manufacturing of a product. The TC will plan for targeting the same through the following; • Take appointment and meet the OEMs in the region to understand their specific needs with respect to support required in the ESDM sector and training of employees etc. • Presentation on the capability statement of Puducherry TC with respect to Assembly, testing and calibration, design and consultancy services, etc. • Get their vendor details and understand their portfolio of product requirement at various levels • Plan to Increase product portfolio to cater to the OEMs and their vendors	GM, Manager Marketing, CNM and TP	During installation and commissioning
Targeting technical and vocational training institutes and high schools	• Meet the principle/ HoD of the institutes and present on the capability statement of Puducherry TC with respect to training infrastructure, faculty, real time learning with on job learning etc. • Seeking permission and presenting the same to final and pre final year students • Getting permission to display the brochure of TC on the notice board of these institutes. • Organise as well as participate in industry oriented outreach programmes/ seminars/ workshops/ boot camps etc.	Marketing team (GM) and CNM	During installation and commissioning of machines for training

Quality System

11. Quality system

The new TC would further aim to obtain various process certificates to enhance its competitiveness like;

Table 19: Indicative certifications of quality systems

Name of certification	Area	Details
ISO 9001	Quality Management System	► This would help to monitor, control, and improve quality of the TC ► It is a series of standards that define, establish, and maintain a quality assurance system for manufacturing and service industries ► ISO 9001 deals with the requirements that organizations wishing to meet the standard must fulfil
ISO 14000	Environmental Management System	► Will help to address various aspects of environmental management of the TC ► It provides practical tools to identify and control environmental impact and constantly improve their environmental performance ► These standards call for analysis of the entire life cycle of a product, from raw material to eventual disposal and focus on awareness of the processes and procedures that can affect the environment
ISO 29990	Learning services for non-formal education and training	► For quality professional practice, performance and enhance transparency ► Allows for comparison on a worldwide basis of learning services, and management standards in the field of non-formal learning
ISO 50001	Energy management systems	► Gives requirement for energy management systems ► Establishes framework for industrial plants; commercial, institutional and government facilities and entire organisations to manage energy usage
OHSAS 18001	Occupational Health and Safety standard	► Is an internationally-applied British Standard for occupational health and safety management systems ► It provides for the elements of an effective safety management system which can be integrated with other management systems and help organizations achieve better occupational health and safety performance and economic objectives

Name of certification	Area	Details
TS 16949	Automotive Industry Quality Management Standard	► Is an international Quality Management Standard specifically for the Automotive Industry to improve quality and assure the integrity of supplies to the industry ► Results in substantial improvements in all aspects of quality, delivery and overall efficiency throughout the supply chain ► It prescribes for technical specification aiming to the development of a quality management system that provides for continual improvement, emphasizing defect prevention and the reduction of variation and waste in the supply chain

► The TC will essentially adopt the 5S technique for process improvement to clean and organise its workspace to improve the workflow. Further trainees will be trained and exposed to 5S process improvement technique. This would require the TC to do the following;

- **Sort:** To de-clutter the workspace and prioritise tools and materials used frequently, the TC will sort everything in the work area so that unnecessary items (tools, parts, equipment, storage bins, etc) can be removed and either discarded or stored elsewhere.

- **Straighten:** This will involve creating storage solutions that would facilitate orderly work flow of everything in the TC by placing more frequently used items for quick and easy access.

- **Shine:** This will require efforts in the initial phase involving painting and installing better lighting to make the workspace clean and tidy. Further during ongoing activities at the TC, the work space and equipment will be cleaned and restored to their proper place at the end of each shift. Basic preventative maintenance tasks like tightening, oiling, restocking will also be part of this. The workstation would then be ready for the next user (or the next day) and the order created in the first two steps will be preserved.

- **Standardize:** The objective of the same would be to make everyone in the TC familiar about the current steps in order to follow and establish expectations. TC would conduct training, create documented procedures, work instructions, use visual guides, checklists, and/or photos for easy understanding of any changes made. Standardised ways will increase efficiency and be user friendly for TC employees and others.

- **Sustain:** Sustaining the processes would be important to ensure that focus doesn't drift away from 5S. TC would adopt strategies like daily meetings, mini-audit and ongoing continuous improvement efforts to sustain the 5s.

Infrastructure and Facilities

12. Infrastructure and Facilities

The infrastructure of the proposed TC at Puducherry has been developed based on the requirements, recommended norms, capacity data of the existing TCs capacity, discussions with key stakeholders and the experience of the team in providing professional advice on similar projects. The team has studied the applicable AICTE/ NCVT norms for development of infrastructure facilities for engineering and technology institutes and detailing out the infrastructure provisions for the proposed TC in view of the same. Leading practises form international training institutes have also been considered. The TC will be built on area of around 10 acres and the layout will have following blocks with required infrastructure:

► **Electronics Block**: This block will house the Prototyping, Testing and Assessment Centre and highest priority has been given to the allocation of space for installation of machines for product prototyping, assembling, testing and assessment activities. Depending on the space required by the machines, the area for these activities should be demarcated which would also include other facilities like toilets, washrooms and change rooms, adequate space for their mobility, clean drinking water in their vicinity etc. In addition to the other facilities this block will house a 216 square meter ISO Class 7 (Class 10,000) Cleanroom for assembly of PCB and product assembly. Details on the Cleanroom classification, requirements and cleaning and maintenance procedures are provided at the end of this section.

► **Training Block:** This area will have classrooms, labs, conference hall, faculty rooms and facilities for training / seminars/ workshops etc.

► **Administrative Block:** This block will have GM and DGMs Office and secretariat. It will also house office and desk space of all management, professional staff, administrative and support staff, library and other amenities such as conference room with video conferencing facility, meeting rooms etc. This block will also house the Innovation and Design Centre which will consist of office for the innovation and design teams and conference rooms for client interactions.

► **Manufacturing Incubation Block:** This block will consist of 20 demarcated rooms of 40 square metres for house EMS facilities for 10-15 entrepreneurs. In addition the block will include office facilities, conference room with video conferencing facility, meeting rooms, reception area etc. for common use of the entrepreneurs.

► **Mechanical Block:** This block will consist of machine shop and metrology and mechanical testing lab which will be spread over an area of approx. 500 square metres. Also, the block will include office facilities, meeting rooms, reception area etc.

► **Utilities Block:** The utilities block comprises of areas that will house main electrical meter, VCBs, HT panel, distribution panel and power back up DG plant. The utilities block will also house water pumps, purification plant and chilling plant, water treatment plant, etc. The open areas around the building will also have some utilities provision such as rain water harvesting pits and panels for the operation of external lighting. Utility will also include sewage treatment plant at an appropriate location.

► **Hostel and staff accommodation:** The hostel blocks will comprise of accommodation for the students (separate for males and females). A few staff quarters (for driver, security officer, wardens – boys and girls hostel, maintenance –mechanical and electrical, electrician, store keeper etc.) will also be constructed to house some of the emergency staff or on need basis.

► **Open Areas:** The open areas comprise of drive way, rain water harvesting pit and landscaped areas including the facade and main entry of the TC. The size of the open area will depend on the design strategy adopted by the CMC.

► **Others:** This will include canteen, parking, security room etc.

► **Basic amenities:** Apart from the above facilities the campus will have basic amenities with provision for;
  - Drinking water
  - Toilets
  - Dining room as a hygienic area and place away from the work environment for rest breaks and the consumption of food
  - Change rooms to enable employees to change (e.g. uniforms or dirty work clothing) with privacy and security. Such facility helps to reduces employee exposure to and potential spread of contaminating substances used in work processes
  - Personal storage for the secure and clean storage of personal belongings or clothing, lockable where necessary
  - Immediate availability of doctors, health supervisors and ambulance and sufficient first aid kits
  - Fire safety with smoke alarms to protect people against death and injury from fires. Providing fire safety awareness to employees and conduct fire drill from time to time
  - Fire assembly area in case of fire or natural calamity
  - Dustbins with proper colour coding in green for organic, yellow for glass, white for paper, grey for metal, blue for plastic, red for hazardous products

Table 20: Details of proposed infrastructure

Details	Nos.	Total Area (Sq. mt.)
Production Block		4,039
Entrance/Reception	1	50
HOD room/Senior manager room	1	33
Design office -1	1	125
Conference room	1	34
Design office-2	1	125
Seminar hall	1	250
Multipurpose room	1	60
Toilet	1	150
Electronic Assembly Unit/Clean room	2	216
Testing labs	10	540
Calibration labs	3	162
Server room/AHU room/Electrical room		250
EMI/EMC Room	1	219
Staircase/circulation etc.		1825
Training Block		3,937
Reception	1	40
Placement cell with VC	1	50
HOD room and training office	1	50
Counselling/placement cell	1	25
Manager room	1	24
Faculty room	1	35
Record room	1	23
Classroom	8	600
Electronics Labs	8	528
Examination cell	1	76
Tool store	1	22
Server room	1	14
Language lab	1	50
Mechanical Training Section including Metrology and Mechanical Testing Lab	1	575
Drawing hall	1	175
Library	1	350
Toilet		150
Staircase/circulation	1	1150

Details	Nos.	Total Area (Sq. mt.)
Admin Block		**455**
Director office with secretary	1	30
Board room	1	20
Purchase	1	10
Account	1	10
HR/Admin	1	10
Reception Area	1	50
IT server room	1	10
Sr. Manager	1	15
DGM	1	15
Manager	1	10
Toilet (Male and Female)	1	50
UPS/Electrical	1	10
Pantry	1	10
Examination control office	1	30
Staircase		50
Maintenance	1	10
Housekeeping	1	10
Circulation and wall		105
Canteen		**814**
Entrance	1	10
Dining	1	350
Kitchena and its accessories	1	100
Hand wash area	1	15
Preliminary washing	1	10
Dispensary	1	10
Stationary/Printer room	1	10
Boys common room	1	100
Girls common room	1	100
Staircase		25
ATM	1	10
Circulation and wall		74
Others		**801**
Utilities room		200
Security room (Guard room)		25
		Contd.

Details	Nos.	Total Area (Sq. mt.)
Staff Quarters/ Guest House	8	576
Manufacturing Incubation Block		**880**
EMS/Production Units + Office Space	22	880
Total		10,926

► **Hostel and staff accommodation:** The hostel block will comprise of accommodation for students enrolled under fulltime courses along with the hostel warden. On the basis of study conducted and discussions with heads of some of the existing MSME TCs, the provisioning of hostel facility has been done for approximately 130 trainees. Therefore, it is proposed to develop the hostel capacity for around 130 trainees and out of which 30% (around 35) will be reserved for female trainees. The hostel building has been planned to be G + 3 structures with provision for further vertical expansion depending on future requirements. Part of the ground floor of the hostel building will be reserved for use as hostel office, other common facilities etc. The space on rest of the floors will be developed as rooms for accommodation of students. The details of proposed hostel infrastructure have been given in the following table. Additionally, eight emergency staff quarters will also be constructed to house some of the key management officials as per requirement. Initially the staff quarters block will be a G+1 structure with a provision of further expanding it vertically depending on future requirements.

Table 21: Details of proposed infrastructure for hostel

Hostel	Category	Floors	Trainees per Room	Number of trainees	Area per trainees (sq. mt.)	Total Area (sq. mt.)
Hostel No.1	Boys	G+3	4	96	12	1152
Hostel No.2	Girls	G+3	4	36	23	828
Total						1980

Note: All viable options will be studied to decide on the design of the proposed block for hostel and staff quarters. The number of floors for these facility buildings and all other associated details can be further finalised with the appointment of CMC for development of the campus for TC.

As per the details of proposed infrastructure given in above two tables, the construction of the Puducherry TC will include development of 12,906 (10,926 + 1,980) square metre of built up area in total. Per square metre cost of construction has been estimated to be INR 30,876. Further, the tentative cost for development of underground water tank, rain water harvesting system, storm water drainage network, water treatment plant, sewage treatment plant, street lighting, development of internal roads, landscaping and grey water treatment plant for entire campus has

been estimated to be around INR 923 lakhs. Further as per the estimates of CMC the development of boundary wall is estimated to cost around INR 246 lakhs. However, the final bill of material and the cost estimate for construction of the TC are yet to be finalized by the CMC. The detail for development of campus infrastructures is as follows;

Table 22: Cost for development of campus infrastructures

SN	Hostel	Cost (in INR lakh)
1.	Cost of development of build-up area @ 30,876 per sq. mt. for 12,906 sq. mt.	3,984
2.	Underground water tank, rain water harvesting system, storm water drainage network, water treatment plant, sewage treatment plant, street lighting, development of internal roads, landscaping and grey water treatment plant and boundary wall	1,169
3.	Total	5,153
4.	Contingency @ 5%	258
5.	Grand total	5,411

Further provisioning towards establishment of other associated infrastructure will be done for the planned capacity and is listed in the following table;

Table 23: Details of other infrastructure

SN	Other Infrastructure	Value (In Lakhs).	Nos.	Total Cost (INR lakhs)
1	Office & Storage Furniture	0.5	60	30
2	Hostel Furniture	0.25	132	33
3	Canteen and Hostel Dining hall furniture	0.6	20	12
4	Kitchen equipment	20	2	40
5	Other Office equipment,IT infra etc	1	50	50
6	Laptop	0.6	20	12
7	Desktop	0.5	50	25
8	Photocopier cum printer	2	8	16
9	Vehicle	12.5	2	25
10	Preliminary and Pre-operative expenses	258	1	258
11	Others (Misc & Unforseen)	50	1	50
	Total			551
	Contingency @ 10%			55
	Total			606

Above all, the development of campus infrastructure will be done keeping the following guidelines in mind;

► **Campus Layout/ Plan:** Campus layout is crucial for successful performance of the TC. At least 30% green area will be maintained and landscaping will be done to improve aesthetics of the surrounding while maintaining habitats conductive to natural fauna. Also, efforts will be made to conserve existing vegetation and other rich biodiversity in the premises as well as vicinity. Apart from this, there will be the following considerations while planning the campus layout:

- **Site drainage:** Existing drainage pattern of the available site will be studied and the drainage system required for the TC will be constructed in line with the drainage pattern. Storm water drain will be constructed separately so as avoid mixing of the fresh and the waste water.

- **Heat island effect:** Site will be planned properly to mitigate the heat island effect (Thermal gradient difference between developed and undeveloped areas) by following measures:
  - At least 40% of the non-roof impervious surfaces on the site (including parking lots and walkways) will be shaded
  - Pavements and walkways should be painted in light colour (solar reflectance index > 0.5)

- **Boundary:** The campus will be provided with boundary wall in all the directions to avoid encroachment, theft and safety.

- Trees will be planted in large numbers to provide natural shade in the open areas. This helps to reduce the temperature on campus in comparison to the vicinity

- Efforts will be made to utilize natural light to the maximum possible extent and provision should be made for natural ventilation

- Green building codes may be adopted while designing the building layout so as to ensure following environmental safeguards;
  - Renewable energy in terms of solar water heater, solar panels, solar street light may be used
  - LED/CFL lights will be used within the premises to reduce the energy consumption
  - Provisioning of water treatment and recycling facility to reduce water consumption
  - Water harvesting arrangement to recharge the ground water and/or reduce dependency on ground water
  - Provisioning of waste management including practices to minimize waste generation, etc.

- Criteria mentioned in the National building code will be followed so as to ensure that all the safety precaution like escape routes/emergency exits, setting of machinery providing appropriate working space, etc. is maintained

- Hazardous material like asbestos sheets should be avoided in any part of the structure

- Substitutes to natural resources will be encouraged in appropriate ratio so as to decrease natural resource consumption while maintaining the required strength (example: Fly ash may

be used in small percentage instead of cement for construction, composite material may be used construction of doors instead of wood, etc.

- Provision of toilets for both men and women will be made in appropriate number so as to ensure comfortable and hygienic working conditions

- Energy efficient products like 5 star rated air conditioner, refrigerator, energy efficient motors, etc. will be used in the TC's

▶ **Detailed building plan preparation:** The building design is crucial for sustainable performance of the TCs. A number of factors including energy efficiency, materials of construction, natural light and ventilation, insulating, etc. must be kept in mind in order to maintain eco-friendly operations. Also, adherence to aspects related to safety like, resistant to earthquakes, proper evacuations, etc. will ensure successful operations of the TC.

▶ **Construction management:** Construction at the site involves a number of activities. These activities may lead to certain EHS impact on the existing natural settings and therefore, appropriate mitigation measures will be required to be put in place so as to minimize or avoid this impact. A snapshot of the issues with the basic principles to be kept in mind during construction is given in the EHS section of this DPR.

ISO 7 (Class 10,000) Clean Room requirements, cleaning and maintenance procedures						
A cleanroom is a controlled environment, typically used in manufacturing processes and scientific research facilities. A cleanroom is designed to control contamination by monitoring airborne and surface particles, liquid levels, and static electricity. More accurately, a cleanroom has a controlled level of contamination that is specified by the number of particles per cubic meter at a specified particle size. The following table indicates the maximum allowed particles in a ISO 7 or Class 10,000 (as per US FED STD 209E) clean room						

US FED STD 209E Class	ISO Equivalent	maximum particles/ft3				
		≥0.1 µm	≥0.2 µm	≥0.3 µm	≥0.5 µm	≥5 µm
10.000	ISO 7	350,000	75,000	30,000	10,000	70

Contamination can be caused by a number of environmental factors such as people, activities (such as movement), outside contaminants, HVAC systems and more. Therefore contamination control needs to be achieved by using the proper high-efficiency particulate air (HEPA) filtration system, installation of air shower at entry (may not be required for an ISO 7 air shower), furniture, procedures, garments, cleaning tools, wipes and more. In addition, to maintain an anti-static clean room for electronic assembly, provision for antistatic mats on the floor and working benches,

Antistatic bags, antistatic component storage bin, wrist strap , static charge meter, antistatic storage rack, antistatic tools etc. needs to be made.

Some of the common do's and don't's for the clean room include:

a) Only authorized personnel will be allowed inside the cleanroom.

b) All personnel entering the clean room should use a face mask, hair cover, gown, antistatic wrist bands and anti-static slipper.

c) Before entering the anti-static areas personnel must use the static charge meter to ensure they are safe to enter the area.

d) Wooden/mechanical pen/pencils, perfumes, colognes, watches, jewellery, cassette players, phones, beepers, combs, cardboard or non-cleanroom approved papers are not allowed inside a clean room

e) The clean room workstations, floor and ceiling must be cleaned regularly using specialized equipment only

f) The clean room should be tested on annual basis to ensure that the air quality within the clean room is being managed.

Figure 15: TC layout plan[33]

Level 1
1 : 500

The given TC layout is tentative and the site plan will be further finalized by Tata Consulting Engineers which have been appointed as CMC for the programme.

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[33] The given TC layout is tentative and the site plan will be further finalized by Tata Consulting Engineers which have been appointed as CMC for the programme

Expenditure pattern

13.   Expenditure pattern

13.1   Capital expenditure

Total capital expenditure to the tune of around INR 12,157 lakhs is envisaged for the setting up of new TC at Puducherry. Summary of the Capital Expenditure is provided as below:

Table 24: Capital expenditure

Capex	Cost (INR Lakhs)
Plant and Machinery (including contingency)[34]	6,168
Infrastructure (including contingency)[35]	5,989
Total Capex including contingency	12,157

Note:- The final Bill of Materials and the cost estimate for construction of the TC are yet to be finalized by the CMC

The above mentioned capital expenditure includes pre-operative expenses to the tune of INR 258 lakhs which will be incurred towards consultancy fees, obtaining clearances and approvals.

13.1.1 Plant and machinery

Total expenditure on machines to the tune of around INR 6,168 lakhs is envisaged for the setting up of new TC at Puducherry.

Table 25: Plant & Machinery[36]

Capex	INR Lakhs
Production Machinery and equipment	4,034
Training machines and equipment	1,840
Contingency @ 5% of capex	294
Total Capex including contingency	6,168

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[34] Plant and machinery list provided in Section 6.3.2, 6.4 and 6.6
[35] Infrastructure details provided in Chapter 12
[36] Comprehensive list of machines provided in annexure 18.4

The capital cost estimate for the proposed modernisation project has been prepared jointly by O/o DC-MSME and EY team based on inputs from the following:

- ► Stakeholders workshop at Chennai and Puducherry by EY team along with MSME DI, Chennai

- ► Discussions at existing technology centres such as IDEMI Mumbai and ESTC Ramnagar

- ► Market opportunity assessment by EY team

- ► Validation of technology needs by detailed discussions with EMS players such as Eaton, Lenovo, Ford India, Flextronics etc.

- ► Site visits and discussions with local industry and industry associations such as CLIK, IESA, Commerce and Industries Department, Pondicherry Industrial Promotion Development and Investment Corporation Limited.

- ► Inputs from Office of DC MSME

13.1.2 Land & building cost

Puducherry has around 10 acres of land available for new TC. Land has been provided by state government free of cost.

Table 26: Land & building cost

SN	Building & Other Infrastructure	Cost (in INR lakh)
1	Cost of development of build-up area @ Rs 30,876 per sq. mt. for 12,906 sq. mt.	3,984
2	Underground water tank, rain water harvesting system, storm water drainage network, water treatment plant, sewage treatment plant, street lighting, development of internal roads, landscaping and grey water treatment plant and boundary wall	1,169
3	Other Infrastructure (furniture, office, kitchen equipment, office equipment, desktops, vehicle, etc.)[37]	551
4	Total	5,704
5	Contingency @ 5%	285
	Grand total	5,989

13.2 Operating expenditure

The operating expenditure for the TC has been classified into variable operating expenditure and fixed operating expenditure.

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[37] Details of other infrastructure provided in Chapter 12

13.2.1 Variable operating expenditure

Variable operating expenditure has two key heads. Expenditure under each head has been identified for the key income streams:

a) Raw materials and Consumables
- ► Raw materials for electronic assembly
- ► Raw materials for 3-D prototyping
- ► Raw material for PCB manufacturing
- ► Raw material for tooling, finished goods etc.
- ► Consumable tools for finished goods and training

b) Utilities (electricity and water)

Table 27: Variable cost assumptions

Assumptions for Variable operating cost	Unit	Norms
Raw material and consumables		
RM for Electronic Assembly	% of Assembly revenue	10.0%
RM for 3-D Polymer Additive Machine	% of 3-D printing revenue	10.0%
RM for PCB manufacturing	% of PCB manufacturing revenue	10.0%
Raw materials for tooling, finished goods etc.	% of Mechanical Training Revenue	1.0%
Consumable tools for finished goods and training	% of Mechanical Training Revenue	0.6%
Utilities		
Electricity and Water	% of total revenue	4.0%

13.2.2 Fixed operating expenditure

Fixed operating expenditure has four key heads. Expenditure under each head has been identified for the key income streams:

c) **Salary and wages/ establishment expenses**
The salary expenses include salary for employees of proposed TC at Puducherry. There will be 60 employees on regular contract and ~ 59 will be on temporary contract/honorarium visiting.

d) **Repairs and maintenance (R&M)**
Cost of repair and maintenance has been calculated for

- ► Plant and machinery installed
  R&M for plant and machinery has been taken as a percentage of plant cost in an operating year with a yearly increment of 8%.
- ► Buildings

R&M for building has been taken as a percentage of building cost in an operating year with a yearly increment of 3%

e) **Testing and Calibration Charges**

All the testing and calibration equipment will need to be calibrated on a regular basis. Calibration charges have been taken as a percentage of plant and machinery cost for the testing and calibration equipment with a yearly increment of 5%.

f) **Training expenses**

Training expenses primarily comprise of expenses incurred for external faculty visiting to the TC from time to time as part of Short term and Long term trainings. These expenses typically include faculty fees, hotel and transportation.

g) **Other production and administration expenses**

These include expenditure on heads like transportation/entry tax/ freight, Vehicle expenses, Printing and stationery, traveling and conveyance, audit, consultancy, advertisement, publicity, marketing, telephone, internet, bank charges, miscellaneous expenses. Expenditure under each head has been identified for the key income streams- Finished goods and Training

h) **Insurance of new plant and machinery**

Insurance expense for new plant and machinery includes the insurance cost for the new machinery to be installed. The same has been calculated as a percentage of the gross block of new machines with a yearly depreciation of 8% on plant and machinery values.

i) **Marketing Expenses**

Marketing expenses have been taken as fixed values for first year and second year onward

Table 28: Fixed operating expenditure assumptions

Assumptions for Fixed Operating Cost	Unit	Norms
Salaries & Wages	Detailed assumptions given in a separate table	
R&M (Plant & Mach)	% of Plant	3.5%
R&M (Building) per year	% of Building	2.0%
Calibration Charges (take as 10% of P&M cost after every 5 years)	% of P&M cost for testing and calibration equipment	2.0%
Training Expenses	% of training revenue	10%
Other Prod. & Admin. Exps	% of overall revenue	8%
Insurance cost (New P&M)	% of P&M	0.5%
Marketing expenses (1st year)	Rs. Lakhs p.a	50
Marketing expenses (2 year onward)	Rs. Lakhs p.a	25

► **Manpower and Salary Cost**

Manpower numbers have been designed in line with the expansion plan of the TC and ramp up of the production, training and consultancy.

Manpower salary numbers are in line with the salary structure of existing TCs

Table 29: Manpower and salary assumptions

		Monthly Comp (Rs/month)	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Top Management													
	GM	1,53,861	1	1	1	1	1	1	1	1	1	1	1
	DGM	1,29,327						1	1	1	1	1	1
Sub Total			1	1	1	1	1	2	2	2	2	2	2
Management and Support staff													
Sales and marketing	Manager Marketing	82,777	1	1	1	1	1	1	1	1	1	1	1
	Officer Sales	35,744			1	1	1	1	1	1	1	1	1
Administration and accounting	Manager Admin. and Accounting	69,204	1	1	1	1	1	1	1	1	1	1	1
	Sr. Officer Admin and HR	62,371						1	1	1	1	1	1
	Sr. Officer Accounting	62,371						1	1	1	1	1	1
	Officer Procurement	35,744			1	1	1	1	1	1	1	1	1
	Officer Accounting	35,744		1	1	1	1	1	1	1	1	1	1
	Officer Store	35,744		1	1	2	2	2	2	2	2	2	2

Department	Role	Salary											
Innovation, Design and consultancy	Senior manager	86,857		1	1	1	1	1	1	1	1	1	1
	Manager Design (Electronics)	82,777			1	1	1	1	1	1	1	1	1
	Innovation Coach	82,777		1	1	1	1	1	1	1	1	1	1
	Sr. Engg. Design (Electronics)	64,806		1	1	1	2	2	2	2	2	2	2
	Sr. Engg Design (Mechanical)	64,806			1	1	1	1	1	1	1	1	1
	Finance Guide	64,806			1	1	1	1	1	1	1	1	1
	IPR Guide	64,806			1	1	1	1	1	1	1	1	1
	Consultant	64,806			1	1	2	2	2	2	2	2	2
Production	Senior Manager Production	86,857		1	1	1	1	1	1	1	1	1	1
	Manager Assembly	82,777			1	1	1	1	1	1	1	1	1
	Manager Testing and Calibration	82,777			1	1	1	1	1	1	1	1	1
	Manager Planning	82,777		1	1	1	1	1	1	1	1	1	1
	Manager Maintenance	82,777		1	1	1	1	1	1	1	1	1	1
	Sr Engg. Assembly	64,806				1	1	1	1	1	1	1	1
	Sr. Engg. Testing and Calibration	64,806				1	1	1	1	1	1	1	1
	Sr. Engg Production	64,806				1	1	1	1	1	1	1	1
	Sr. Engg. Maintenance	64,806		1	1	1	1	1	1	1	1	1	1

Department	Role	Salary											
	Engineer	34,240		2	3	4	5	5	5	5	5	5	5
	Senior Technician	29,512		1	2	2	4	5	5	5	5	5	5
	Senior Technician Maintenance	29,512		1	1	1	1	1	1	1	1	1	1
Manufacturing Incubation Centre	Manager MIC	82,777		1	1	1	1	1	1	1	1	1	1
	Officer MIC	35,744			1	1	1	1	1	1	1	1	1
Mechanical Facility	Manager Production/Training	82,777		1	1	1	1	1	1	1	1	1	1
	Engg. Maintenance	34,240			1	1	1	1	1	1	1	1	1
	Senior Technician Maintenance	29,512			1	1	1	1	1	1	1	1	1
Training	Senior Manager	86,857		1	1	1	1	1	1	1	1	1	1
	Manager Long Term	82,777			1	1	1	1	1	1	1	1	1
	Manager Short Term	82,777			1	1	1	1	1	1	1	1	1
	Sr. Engg.	64,806		1	3	5	5	5	5	5	5	5	5
	Engg.	34,240		1	3	5	5	5	5	5	5	5	5
	Senior Technician	29,512		1	1	1	1	1	1	1	1	1	1
Placement Cell	Manager Placement Cell	82,777		1	1	1	1	1	1	1	1	1	1
	Officer Palcement Cell	35,744			1	1	1	1	1	1	1	1	1
Sub Total			2	22	42	49	55	58	58	58	58	58	58

Total (Management & Support Staff)			3	23	43	50	56	60	60	60	60	60	60
Number of Employees on Contract													
	Training	15,000		3	8	10	10	20	20	30	35	40	45
	Contractual Employees (Production)	10,000			4	10	10	10	12	12	12	12	12
	Contractual Employees (Consulting)	2,00,000			1	1	3	3	3	3	3	3	3
Sub Total			0	3	13	21	23	33	35	45	50	55	60

Financial Analysis

14. Financial Analysis

14.1 Key assumptions

Project construction and commencement of operations

The project construction is expected to start in the financial year 2016-2017. It is assumed that, the construction period and installation of machines shall be completed in 15 months. Full-scale operations will commence at the end of the construction period of 15 months. The infrastructure development will coincide with the arrival of machines to be able to start the operations as planned.

Table 30: Key assumptions

Start of Project	1-Sep-16
Construction period (Months)	15
Commencement of operation, date	1-Dec-17
Number of years, useful life of machines and equipment (as per depreciation rules)	10
Maximum days of operation in a year	300

14.1.1 Income assumptions

► **Production**

Table 31: Production, Testing and Calibration Assumptions

Equipment	Estimated Machine Rate/Hour*	Shift	Hours
Safety Testing			
Temperature Recorder	150	1	8
Digital storage Oscilloscope	80	1	8
High voltage probe	50	1	8
Electronic load	250	1	8
Digital multimeter	30	1	8
Electrical Safety Tester	300	1	8
Gas detector	20	1	8
Environmental Testing			
Environmental chamber	600	1	8
Thermal Shock Chamber	500	1	8
Vibration Test system	500	1	8
Bump/Shock Test system	850	1	8
Altitude Test Chamber	500	1	8
			Contd..

Equipment	Estimated Machine Rate/Hour*	Shift	Hours
Fire Safety Test Equipment			
Horizontal and Vertical Flame Chamber	500	1	8
Heat deflection temperature test set	500	1	8
Ingress Protection Test			
Test Probe IEC 61032 – 1 set	80	1	8
Digital force Gauge	10	1	8
Dust Chamber	100	1	8
Ingress of water test system- 1 set	2,000	1	8
EMI/EMC Test Equipment			
Electrostatic Discharge Simulator	150	1	8
Anechoic Chamber, Radiated susceptibility and Radiated Emission test system	8,500	1	8
RF Shielded chamber	500	1	8
Electrical fast transient/burst simulator	500	1	8
Conducted RF immunity simulator	400	1	8
Noise Simulator	400	1	8
Surge Simulator	600	1	8
Power frequency magnetic field test system	300	1	8
Pulse magnetic field test system		1	8
Harmonics/Flicker Measurement test System	600	1	8
Line Impedance stabilizing network	150	1	8
Automatic Impedance Measuring Machine	200	1	8
Electronic Calibartion			
Multifunction Calibrator	450	1	8
Decade Mega Ohm Box	200	1	8
Decade Resistance Box	250	1	8
Standard Resistors	100	1	8
Sound Level Calibrator	100	1	8
Sound Level Meter	50	1	8
Tachometer Calibrator	100	1	8
AC/DC Current source	150	1	8
CT Analyzer	120	1	8
Mobile CT/PT Calibration System With Van	2,000	1	8
Electronic Manufacturing and Assembly Unit			
20 person Electronic Assembly Unit with Class 10,000 Clean Room	3,000	2	16
3D Polymer Additive Manufacturing Machine + 3D Scanner (Basic Model)	1,000	2	16
Bare board manufacturing PCBs machine with Carbon Track Technology	500	2	16
PCB Labelling Machine	150	2	16
Pin Stitching machine for PCBs	1,000	2	16
Screen Printing Machine with SMT	350	2	16
Pick and place machines with SMT	500	2	16

Equipment	Estimated Machine Rate/Hour*	Shift	Hours
Reflow Soldering Oven with SMT	500	2	16
Pick and place machines with Through Hole Technology	500	2	16
Automated Optical Inspection Equipment for PCB	400	2	16
PCB Manufacturing and Testing Equipment	1,500	2	16
Design Unit			
Electronic and PCB Design Softwares	3,000	2	16
Mechanical Facility			
Injection Moulding Machine (80T)	750	1	8
CNC Lathe Machine	500	1	8
CNC Milling Machine (3 Axis)	1,000	1	8
CNC Wirecut	450	1	8
CNC EDM	350	1	8
Conventional Lathe	0	1	8
Conventional Milling	0	1	8
Surface Grinder	100	1	8
Cylindrical Grinder	200	1	8
Surface Table Big (Granite and CI)	0	1	8
Sheet Bending Machine	100	1	8
Power Press 50 Mt	100	1	8
Air Compressor (Upto 250 CFM)	0	1	8
Metrology and Mechanical Testing Lab (include Universal Testing Machine, Hardness Testing Machine, Impact Testing, Surface Polishing Kit, Equipment for Non-Destructuve Testing, Quality Control Equipment including CMM)	1,000	2	16
Radial drill machine (25mm)	0	1	8
Tooling and Other Accessories	0	1	8

Machine utilisation	
1st year of production	10%
2nd year of production	20%
3rd year of production	30%
4th year of production	40%
5th year of production	55%
6th year of production	70%

Post the 6th year, the machine utilization has been kept constant at 70%, and a year-on-year increase 5% is assumed in the production revenue to account for periodic revision in the machine rates owing to inflation.

► **Training revenue assumptions**

Table 32: Training Revenue Assumptions

No.	Trade	Course name	Duration (months)	Fee/ student (INR)	Batch size	No. of Batch/ year
1	Electronic Design and Manufacturing	Advanced course in Embedded Technology	6	80,000	30	2
		Basic course in Embedded Technology	3	25,000	40	4
		Electronic/PCB Design and Manufacturing	6	30,000	40	2
		PLC Based Automation Techniques	3	30,000	30	4
		Microcontroller Programming Skills	3	10,000	20	4
		Microprocessor Programming	3	10,000	30	4
		PLC Programming	1	10,000	20	6
		Advance PLC Programming and SCADA	1	10,000	20	6
		Computer Aided PCB Design and Manufacturing	12	30,000	40	2
		PCB Assembly	6	10,000	40	4
		Multilayer PCB Design & Manufacturing on ALTIUM Software	2	8,000	40	6
		Embedded System Design	3	18,000	30	4
		Masters Course in Electronics Design and Manufacturing	6	45,000	25	3
		Advance Diploma Industrial Automation	6	45,000	25	3
2	Hardware Repair and Maintenance	Computer Hardware Repair, Maintenance, Installation, Networking and Multimedia	2	8,000	30	6
		Mobile/HDD Repair and Maintenance	2	12,000	40	6
		Refrigerator Repair and Maintenance	6	10,000	30	4
		Electronic Mechanic	12	18,000	30	2
		Electrician Trade Practices	12	18,000	30	2
		Auto Electrician	6	7,000	30	2
		Electronic and Instrumentation Technician	12	18,000	30	2
		SMD Work and rework and electronic repair	1	5,000	30	6
		Small Transformer and Stabalizer Manufacturing and Repair	1	5,000	20	6
		Repair and Maintenance of Telecom Equipment	1	8,000	30	6

No.	Trade	Course name	Duration (months)	Fee/ student (INR)	Batch size	No. of Batch/ year
		Air Conditioner Repair and Maintenance	6	10,000	30	4
		Certificate Course in Solar Panel Installation	1	5,000	20	6
		UPS/Inverter Repair and Maintenance	6	10,000	30	4
3	Computer Hardware and Software	Adavance course in Computer Software	6	25,000	30	3
		Advanced course in Computer Hardware	6	25,000	30	3
		Advanced Computer Networking	2	7,500	30	4
		Diploma in Information Security Management	4	35,000	30	3
		Diploma in Software Programming	3	25,000	30	4
		Diploma in Oracle PL, SQL and DBA	4	25,000	30	3
		Diploma in Software Testing	3	15,000	30	4
		Core Java and Java Programming	2	8,000	30	6
		Certificate Course in VLSI Design	2	8,000	30	4
		Visual Basics	2	8,000	30	4
		C	2	8,000	30	6
		Computer Hardware Repair, Maintenance & Networking	3	10,000	30	4
		C++	2	8,000	30	6
		Computer Fundamentals	2	8,000	30	6
4	Other Trades	Basic Milling	3	6,000	30	4
		Basic Turning	3	6,000	30	4
		Certificate Course in Machine Maintenance	12	25,000	20	2
		Tool Design	12	25,000	30	2
		Certificate Course CNC Machining (Milling & Turn)	12	40,000	30	2
		Certificate Course in Metrology & QC	12	30,000	30	2
		CNC Lathe Programming and Operation	4	10,000	40	4
		CNC Milling Programming and Operation	4	10,000	40	4
		Certificate Course in Machine Tool Operations (Conventional L, M, G)	12	30,000	40	2
		Basic Grinding	2	4,000	30	4
		CAD using CATIA, CRE-O	1	9,500	40	6
		CNC Programming and Machining	3	8,000	30	4

► Consultancy revenue assumptions

Revenue from consultancy is expected to start in 1st year of operation i.e. 2017-18 when the TC is fully operational and all infrastructures are in place. The below mentioned estimates are on a conservative side and are purely based on the expert judgement and prevailing market rates.

Table 33: Consultancy Revenue Assumptions

S. No.	Consulting Areas	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
				30%	30%	40%	50%	10%	10%	10%	10%	10%
1	Product Road mapping and Architecture	0	2	2.6	3.4	4.7	7.1	7.8	8.6	9.4	10.4	11.4
2	Concept Creation Support	0	5	6.5	8.5	11.8	17.7	19.5	21.5	23.6	26.0	28.6
3	Electronic and PCB Design	0	25.0	32.5	42.3	59.2	88.7	97.6	107.4	118.1	129.9	142.9
4	IT Systems hardware and design support		6	7.8	10.1	14.2	21.3	23.4	25.8	28.3	31.2	34.3
5	Process Design and Engineering	0	8	10.4	13.5	18.9	28.4	31.2	34.4	37.8	41.6	45.7
6	Value Engineering/ Cost Competitiveness	0	2	2.6	3.4	4.7	7.1	7.8	8.6	9.4	10.4	11.4
7	Development Productivity and Lean Manufacturing	0	4	5.2	6.8	9.5	14.2	15.6	17.2	18.9	20.8	22.9
8	Low Cost Automation Solution Support	0	2	2.6	3.4	4.7	7.1	7.8	8.6	9.4	10.4	11.4
9	Financial Services (Project Financial , Business Plans for funds, Book Keeping, etc)	0	6	7.8	10.1	14.2	21.3	23.4	25.8	28.3	31.2	34.3
10	End User Driven innovation and Open innovation	0	3	3.9	5.1	7.1	10.6	11.7	12.9	14.2	15.6	17.1

	Consulting Revenue											
S. No.	Consulting Areas	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
				30%	30%	40%	50%	10%	10%	10%	10%	10%
11	Certifications and accreditations for industrial, consumer electronics (Electronic Testing and Calibration)	0	3	3.9	5.1	7.1	10.6	11.7	12.9	14.2	15.6	17.1
12	Environment Health and Safety Standards for ESDM Units	0	3	3.9	5.1	7.1	10.6	11.7	12.9	14.2	15.6	17.1
13	Market Development Support to find the vendors, customers and other enablers	0	2	2.6	3.4	4.7	7.1	7.8	8.6	9.4	10.4	11.4
14	IP harnessing and support in IP filling / Legal Advisory	0	2	2.6	3.4	4.7	7.1	7.8	8.6	9.4	10.4	11.4
15	Other Consultancy Services	0	4	5.2	6.8	9.5	14.2	15.6	17.2	18.9	20.8	22.9
Total			77.0	100.1	130.1	182.2	273.3	300.6	330.7	363.7	400.1	440.1

14.1.2 Project cost and financing

The project construction will be undertaken in a phased manner. In the initial phase, construction of infrastructure for basic training courses is planned along with procurement of basic machines.

Table 34: Project cost and financing[38]

Project cost and phasing		INR lakhs
Particulars	2016-17	2017-18
Project Cost	1,497	10,660
Total	12,157	

The Greenfield TC project will be funded by a grant from Government of India which would be sourced through World Bank loan and equity funding from MoMSME.

14.1.3 Other Financial Assumptions

Terminal value assumptions:	
Discount rate	9.25%
Growth rate in perpetuity	5.0%
Cost of equity	9.25%

Working Capital Assumptions		
Margin Money	%	100%
Cash in Hand	Days	60
Accounts Receivables	Days	90
Suppliers Credit (A/P)	Days	30
Finished goods Storage	Days	30
Inventories (RM, Consumables)		
Finished goods	Days	90
Jobwork	Days	90
Training	Days	90

Inflation (Salary etc)	10%

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[38] Details provided in Chapter 13

Depreciation Rates		
Asset Class		WDV
Tangible Assets		
	Plant and machinery	13.91%
	Buildings	10.00%
	Vehicles	15.00%
	Furniture & fixture	10.00%
	IT hardware & software	60.00%

14.2   Working capital and cash flow statement

Overall net working capital requirement for the TC is expected to grow from about INR 94 lakhs in 2017-18 to INR 569 lakhs by year 2025-26.

Figure 16: Net working capital requirement
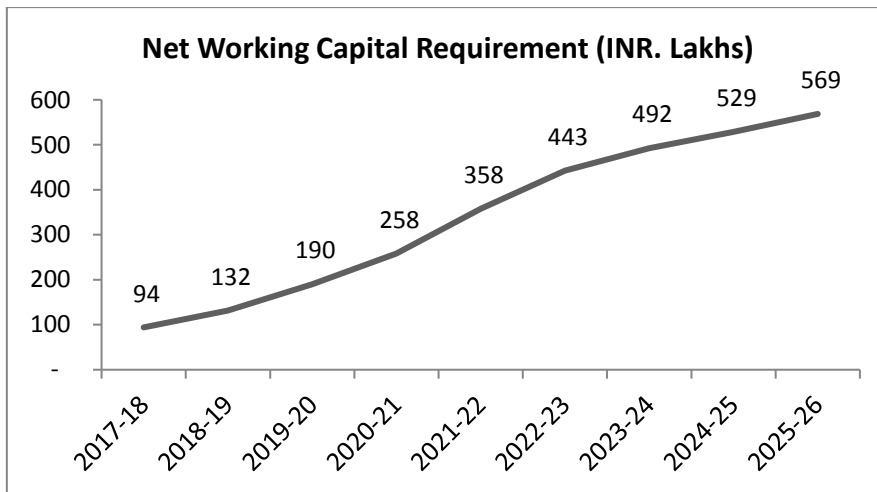
Figure 17: Cash flow closing balance
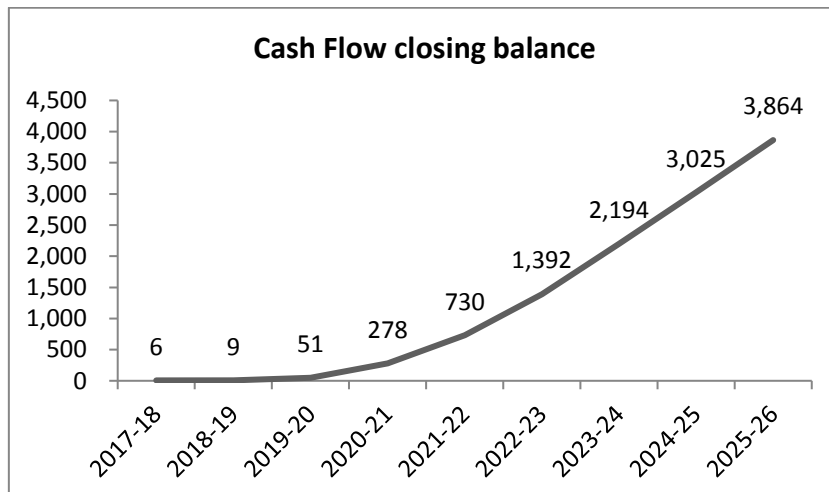
Table 35: Working Capital Schedule

Working Capital Schedule (in Rs. Lakh)											
Year	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Raw Material Storages											
Electronic Assembly and Prototyping	-	0.43	0.86	1.30	1.73	2.38	3.02	3.18	3.33	3.50	3.68
Accounts Receivables	-	93.94	131.09	189.53	257.31	357.01	441.14	490.82	527.34	566.88	609.71
Gross Working Capital Requirement	-	94	132	191	259	359	444	494	531	570	613
Suppliers Credit	-	0.14	0.29	0.43	0.58	0.79	1.01	1.06	1.11	1.17	1.23
Net Working Capital Requirement	-	94	132	190	258	359	443	493	530	569	612

Table 36: Cash flow statement

Cash Flow (in Rs. Lakh)												
Years	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Income post Depn and interest	-47	-333	-1,665	-1,263	-982	-658	-290	4	197	288	367	455
Add: Depreciation		150	1,395	1,229	1,082	954	842	743	655	579	512	452
Inflow from Grant / Capital Fund	1,497	10,660										
Capital to balance -ve cash flows, if any	50	200	350	75								
Total Cash Inflow	1,501	10,677	80	40	100	296	552	747	852	867	878	907
Investment in Assets	1,497	10,660										
Net Change in WC			94	37	59	68	100	85	50	37	40	43
Total Cash Outflow	1,497	10,660	94	37	59	68	100	85	50	37	40	43
Opening Balance		3	20	6	9	51	278	730	1,392	2,194	3,025	3,864
Surplus/Deficit	3	17	-14	3	41	228	451	662	802	830	839	864
Closing Balance	3	20	6	9	51	278	730	1,392	2,194	3,025	3,864	4,727

14.3   Income & expenditure statement

The income to the proposed centre from training will start accruing from year 2017-18 with completion of phase 1 (basic training infrastructure and procurement of basic machines) and start of basic courses. Initially an income of INR 90 lakhs is expected in year 2017-18. Once the overall construction is complete, the TC revenue is expected to grow from INR 671 lakhs in 2018-19 to INR 3,410 lakhs by year 2026-27.

Income and Expenditure (Rs. Lakhs)												
	Construction period		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income												
Training Income		91	364	638	820	911	985	1,083	1,192	1,251	1,314	1,379
Prototyping, Assembly ,Testing and Calibration			170	228	342	456	627	798	838	880	924	970
Consultancy Income		-	77	100	130	182	273	301	331	364	400	440
Manufacturing Incubation Centre			66	109	160	220	290	372	468	514	566	622
Total Income	0	91	677	1,075	1,452	1,769	2,175	2,554	2,828	3,009	3,203	3,412
Expenditure												
Variable Operating expenditure												
Raw materials and Consumables												
Electronic Assembly & PCB Manufacturing			1	3	4	6	8	10	11	11	12	12
3-D Prototyping			0	1	1	2	3	3	4	4	4	4

Income and Expenditure (Rs. Lakhs)												
	Construction period		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Utilities (Electricity & water)			27	43	57	70	87	102	113	120	128	136
Total Variable Operating expenditure			28	47	64	78	98	116	127	135	144	152
Fixed Operating Expenditure												
Salary & Wages/ Establishment expenses	47	208	421	532	698	759	838	951	1,062	1,186	1,323	1,456
Repairs and Maintenance												
P&M			152	152	159	167	176	184	194	203	213	224
Buildings			108	108	111	115	118	122	125	129	133	137
Calibration charges for Testing and Calibration Equipment			75	76	78	79	81	82	84	86	87	89
Training Expenses		9	36	64	82	91	98	108	119	125	131	138
Other Prod. & Admin. Exps		7	54	86	116	141	174	204	226	241	256	273
Marketing expenses		50	50	25	25	25	25	25	25	25	25	25
Insurance of new machines			22	20	18	17	16	14	13	12	11	10
Fixed Operating Expenditure	47	274	918	1,062	1,288	1,394	1,526	1,691	1,849	2,007	2,181	2,352
Total Expenditure	47	274	947	1,109	1,351	1,473	1,623	1,807	1,976	2,142	2,325	2,505

Income and Expenditure (Rs. Lakhs)												
	Construction period		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income (Gross Margin)	(47)	(183)	(270)	(35)	100	296	552	747	852	867	878	907
Depreciation	0	150	1395	1229	1082	954	842	743	655	579	512	452
Income post Depn and interest	-47	-333	-1665	-1263	-982	-658	-290	4	197	288	367	455

Note: Figures may not match due to rounding

14.4 Balance Sheet

Table 37: Balance sheet

Balance Sheet (INR Lakhs)												
Years	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Liabilities												
Capital fund	1,497	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157
Capital for -ve cashflows	50	250	600	675	675	675	675	675	675	675	675	675
Reserves & Surplus	(47)	(379)	(2,044)	(3,308)	(4,290)	(4,948)	(5,238)	(5,234)	(5,037)	(4,749)	(4,382)	(3,928)
Total	1,501	12,028	10,713	9,525	8,542	7,884	7,594	7,598	7,795	8,083	8,450	8,905
Assets												
Gross Block	1,497	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157	12,157
Less: Depreciation	-	150	1,545	2,774	3,856	4,810	5,652	6,394	7,050	7,629	8,140	8,592
Net Block	1,497	12,008	10,612	9,384	8,301	7,347	6,506	5,763	5,108	4,529	4,017	3,565
Cash	3	20	6	9	51	278	730	1,392	2,194	3,025	3,864	4,727

Balance Sheet (INR Lakhs)												
Years	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Current Assets	-	-	94	132	190	258	359	443	493	530	569	612
Total	1,501	12,028	10,713	9,525	8,542	7,884	7,594	7,598	7,795	8,083	8,450	8,905

Note: Figures may not match due to rounding.

During the operational period of the Puducherry TC, the TC may utilise the accumulated depreciation towards upkeep, maintenance of existing machines or purchase of new machines to offset any impact of change in technology.

14.5 Profitability

Overall project profitability has been estimated considering phased investment in plant & machinery and infrastructure. The full-fledged operations are expected to start from the year 2017-18. The project IRR for a period of 12 years till 2026-27 is 8.5%.

Table 38: Profitability with investment plant & machinery

Project IRR	7.7%
Payback period	>11 years

The project is expected to generate positive net free cash flows starting year 2022-23. The TC is also projected to generate a positive operating expense from the 7th year of operations. However equity of about INR 675 lakhs will have to be infused in first four years to balance the negative cash flows.

Figure 18: Net free Cash flows and Cumulative Cash flows
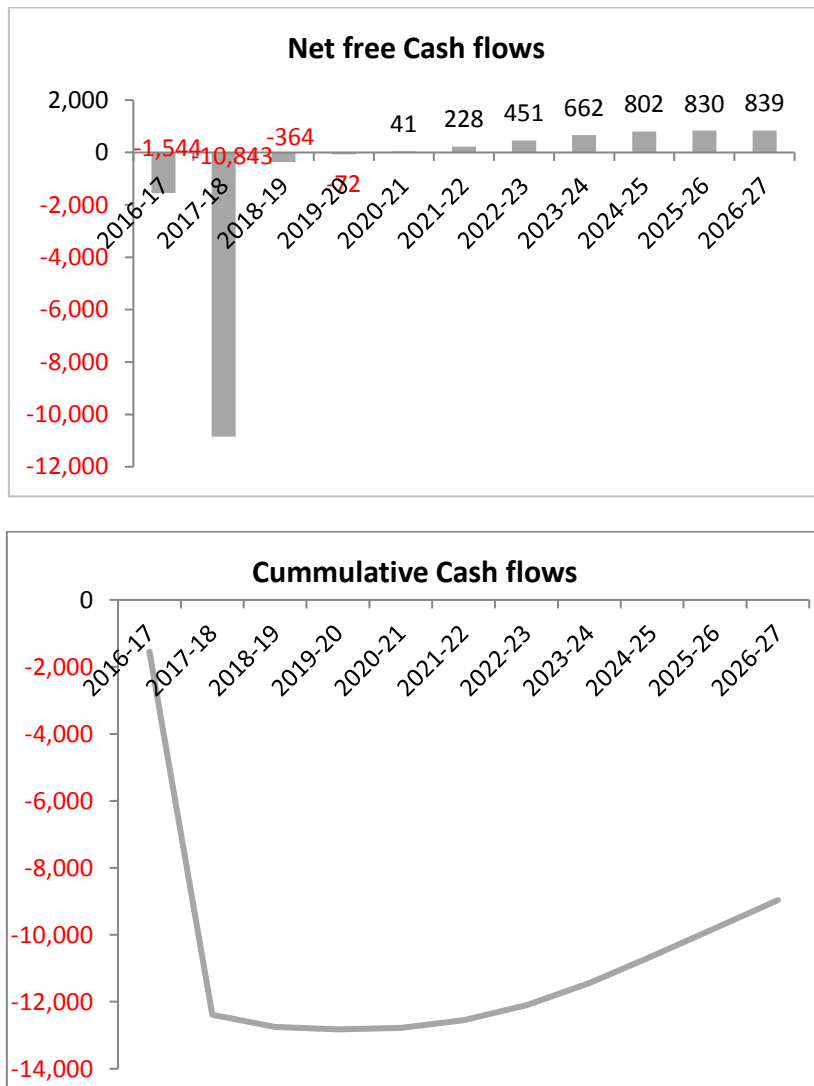
14.6 Sensitivity analysis

Sensitivity analysis of Project IRR has been carried out with respect to the key project parameters.

- ► Project cost
- ► Construction period
- ► Revenue from Training
- ► Revenue from Finished Goods
- ► Revenue from Job work
- ► Revenue from Consultancy

The project IRR is most sensitive to changes in Production, testing and calibration, followed by changes in project cost, training revenue, and consultancy revenue.

Training revenue form majority of revenue for the TC followed by production and consultancy. 5 percent increase/decrease in training revenue increases / decreases the project IRR by about 0.7%.

5 percent increase/decrease in project cost decreases/ increases the project IRR by about 0.5%

5 percent increase/decrease in Prototyping, Assessment, Testing and Calibration cost increases / decreases the project IRR by about 0.5%.

5 percent increase/decrease in consulting revenue increases / decreases the project IRR by about 0.3%.

Sensitivity of IRR to

		Construction period 15.00
Increase in Project cost	-5%	8.2%
	0%	7.7%
	5%	7.2%
	10%	6.7%

		Construction period 15.00
Increase in Training revenue	-7.5%	6.5%
	-5%	6.9%
	0%	7.7%
	5%	8.4%
	10%	9.2%

		Construction period 15.00
Increase in Consultancy revenue	-10%	7.2%
	-5%	7.4%
	0%	7.7%
	5%	7.9%
	10%	8.2%

		Construction period 15.00
Increase in PTC revenue	-10%	6.5%
	-5%	7.1%
	0%	7.7%
	5%	8.2%
	10%	8.8%

Environment, Health and Safety

Environment, Health and Safety

Effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations at various levels during project implementation. An assessment has been done of the proposed operations of the TC and their EHS impacts are highlighted below:

15.1 Environmental Screening

As per the environmental screening conducted for the Site on 8th April, 2015. The Site is located to the north of Pillaichavady village in the Indian State of Puducherry. The Site is accessible via East Coast Road. During the Site visit, the Site was observed to be undeveloped and vacant with few trees. A beach is located approximately 500m to the east of the Site.

As per the Site Representatives, the Site has remained vacant throughout. The presence of trees on the Site, vicinity of the Site to the sea were identified as major potential environmental issues. Puducherry has had a history of Cyclones and Floods. It was declared as natural calamity affected area in 2012 due to devastation caused by Thane cyclone. The probability of such incidences in future and the same effecting operations of TC is not predictable but appropriate measures shall be undertaken to ensure minimal / no damage in case of such natural calamity.

15.2 Planning and design

Planning stage plays a crucial role in planning the execution of the project. Planning of the TC's will incorporate considerations on minimizing cutting of tress and strength considerations in design phase depending on site specific observations.

Activities and anticipated EHS issues during planning and design phase

Activity	Associated impact	Mitigation measures
Clearing of land (before initiating the construction work, clearing of the mango and coconut trees shall be carried out)	Loss of green cover	► Planning of the TC should be done in such a way so as to minimize the number of trees required to be cut at the site; ► In case trees are required to be cut for construction, compensation of the trees should be ensured; and ► Compensatory afforestation should be considered.
Proximity to the sea and probability of cyclones in the region	Strength	► The planning and design parameters should will consider the site being prone to cyclone. Building structure should be made strong enough to sustain certain degree of cyclones; and

Activity	Associated impact	Mitigation measures
		► · Foundation of the building shall be appropriately prepared so as to ensure that the level of floor of the building remains constant over the period of time

15.3   Construction phase

The activities during the construction phase in this project have potential to cause some environment impacts if they are not managed appropriately. Major issues associated with this phase include management of debris waste, the top soil, the waste generated during the construction activities, the use and storage of diesel for the running of D.G sets, the concrete mix plant and the labor camps at the construction site.

Table 39: Activities and anticipated EHS issues during construction phase

Activity	Associated impact	Mitigation measures
Clearing of land (before initiating the construction work, clearing of the mango and coconut trees shall be carried out)	Loss of green cover	► Planning of the TC should be done in such a way so as to minimize the number of trees required to be cut at the site.
Excavation, drilling and levelling for the construction of foundation and base of building and roads	Air pollution	► Water sprinkling at regular intervals during excavation and drilling activities should be practiced to avoid generation of dust. ► The excavated soil should not be stored in the direction of the wind. Also, the pile of excavated soil should be covered to avoid dust. ► Construction machinery should be properly maintained to minimize exhaust emissions.
	Loss of Top soil	► Effort should be made to use the overburden, especially top soil, within premises for landscaping. ► During levelling, gradation across the land (If any) would be reduced to the extent possible.
	Noise pollution	► Noise prone activities should be planned during day time and shall be avoided, to the extent possible, during night time.

Activity	Associated impact	Mitigation measures
	Occupational health hazards	▶ Adequate personal protective equipment like safety helmets, face masks, safety shoes, safety goggles etc. should be provided for the safety of workers. ▶ The excavated area should be provided with a visible boundary (Usually created using a tape and sticks) to ensure safety at site. ▶ Training should be imparted to workers on occupational safety and technical aspects of job undertaken by them.
	Disposal of debris and other wastes	▶ The waste and debris should be disposed of at an identified place preferably wasteland and appropriate approval should be taken for the same from land owner or revenue authorities. ▶ The disposal site would be at least 1000 meters away from the areas including notified forest land, water bodies and productive lands.
Establishing labour camp (The labour camps at the project site will be temporary in nature)	Health Risks	▶ Contractor should provide garbage bins to all workers' accommodation for dumping wastes regularly in a hygienic manner in the area; ▶ Awareness program shall be undertaken for the construction workers to make them aware about diseases including AIDS; ▶ Adequate drinking water facilities should be provided in the temporary sheds of the construction workers; ▶ First aid box would be provided at every construction campsite and under the charge of a qualified person to provide first aid. Availability of such person should be ensured at all time. The first aid box would contain the following in case of less than 50 workers at the site; i) Twelve small sterilized dressings. ii) Six medium size sterilized dressings. iii) Six large size sterilized dressings. iv) Six large size sterilized burn dressings. v) Six (1/2 oz.) packets sterilized cotton wool.

Activity	Associated impact	Mitigation measures
		vi) One (2 oz.) bottle containing a 2 per cent alcoholic solution of iodine. vii) One (2 oz.) bottle containing sal-volatile having the dose and mode of administration indicated on the label. viii) One roll of adhesive plaster. ix) One snake-bite lancet. x) One (1 oz) bottle of potassium permanganate crystals. xi) One pair of scissors. xii) One copy of the first-aid leaflet approved by the Chief Inspector of Factories.
	Water pollution and/ or land contamination	► Provision of separate mobile toilet facilities for men and women should be made. The effluent from the toilets should be disposed in soak pits;
Movement of vehicles (Vehicle movement shall prevail at the site to transfer the material and workers at site. Apart from this, third party vehicles delivering the material and equipment shall also be there.)	Air pollution	► All the vehicles entering the site should be asked to have updated PUC (Pollution under control) certificate; ► Trucks/dumpers will be covered by tarpaulin sheets during off site transportation of friable construction materials and spoil; ► Maintenance of vehicles will be carried out regularly; ► Sprinkling of water will be practiced at the site.
	Water contamination and / or Soil contamination	► Proper maintenance of vehicle will be carried out to avoid any leakage of oil or grease.
	Safety risks	► Vehicle speed will be restricted to 15km/hour at site; ► Necessary safety trainings will be provided to the drivers.
Use of D.G set (D.G sets shall be used at site to provide electricity to	Air pollution	► D.G should be optimally used with proper orientation and adequate stack height. ► Proper maintenance of the DG should be carried out on regular basis.

Activity	Associated impact	Mitigation measures
labour camps and construction activity)	Noise pollution	► Acoustic enclosures should be provided with the D.G sets to minimize the noise levels.
Storage of diesel	Soil contamination	► A covered area should be defined for storage of HSD with concrete flooring
	Safety risks	► The diesel storage area should not be in proximity of the labour camps. ► Inflammable substance should not be allowed at the project site.
Handling of waste (During construction phase there may be generation of both hazardous and non-hazardous waste which needs to be carefully handled to ensure environment safeguard)	Land contamination and Water contamination	► Waste will be stored at designated place after segregation on the basis of category (hazardous and non-hazardous); ► Hazardous waste should be disposed of to the authorized vendors only; ► A waste management plan should be chalked out to properly dispose the debris generated from the site.
	Safety risks	► Adequate PPE's should be identified and provided to the workers at site.
Installation and operation of concrete mix plants and batching plants (In case, these are installed on temporary basis at the project site)	Noise pollution	► Noise shielding will be used where practicable and fixed noise sources will be acoustically treated for example with silencers, acoustic louvers and enclosures. ► Provision of make shift noise barriers near high noise generating equipment will be made to minimize horizontal propagation of noise in case of residential area in the vicinity.
Construction labour management	Child labour and forced labour	► Provision of clause in contractor's agreement will be made that bans child labour and forced labour at project site. ► Adequate procedures to avoid or prevent hiring/entry of child labour at the project site will be undertaken; ► Random check will be undertaken at the site.
	Health and safety risks	► Temporary crèche facility will be provided in case of migrant labourers children residing in the camps to ensure safety.

Activity	Associated impact	Mitigation measures
	for children of workers	
	Loss of green cover	► Fuel will be made available to construction workers for food preparation; ► Construction workers will be warned not to cut and use the trees available on the project site as fuel wood. Random checks will also be done to ensure same.

15.4 Operation and maintenance

The operations at TC shall majorly involve assembly of PCB units and testing and calibration of the electronic equipment apart from imparting training. Some potential EHS issues that may be related to these activities are as follows:

15.4.1 Operation of the TC

a) **Manufacturing and Assembly of PCBs**

Table 40: Potential hazards during manufacturing and assembly of PCBs

Activity	Associated impact	Mitigation measures
Handling of raw material	Cut injury	► Gloves should be provided to workers handling the raw material
Soldering	Health hazard	► Lead free soldering paste shall be used in the process; ► Appropriate fume extracting equipment shall be installed in the TC where soldering operations are undertaken; ► Appropriate gloves shall be provided to the operators.
Use of solvents for cleaning	Land contamination	► Solvents should be kept in small quantities at the workstation
	Air pollution	► Fumes extraction shall be installed in the TC where solvents will be used
	Contact with eye	► Eye wash shall be installed in the TC so as to enable eye wash in case of contact with solvent ► Eye goggles may be provided to employees and trainees in case there is a risk of splashing of solvent.

Activity	Associated impact	Mitigation measures
	Skin reaction with solvent	► Appropriate gloves must be provided to the operators and trainees handling the solvent
Disposal of rejected PCBs	Land contamination / water pollution	► All the electronic waste including rejected PCBs shall be collected and stored in an appropriate place and disposed to an authorised e-waste recycler and appropriate records shall be maintained for the same
Use of UPS	Land contamination due to leakage of battery	► Dry batteries shall be used in the UPS room
Use of D.G sets	Noise pollution	► D.G sets with acoustic enclosures shall be purchased to avoid noise pollution
	Land contamination	► Diesel should be poured in D.G set using funnel to avoid land contamination due to spillage. Also, concrete flooring shall be provided under and near the D.G set
	Air pollution	► Chimney with appropriate height shall be provided to minimize air pollution and ensure compliance with the legislation
	Water contamination due to leakage and/or spill over	► All the waste shall be stored under a shed so as to avoid contamination and washing away of waste in nearby water stream or ground water in case of rain
Generation of domestic effluent	Land contamination	► Sewage treatment plant will be installed in the TC to treat the domestic effluent released from the hostel and the toilets in the TC.
Canteen operations	Fire incident	► Fire extinguishers should be provided in the canteen; ► Cylinders should be regularly checked for leakage; ► Hose pipes should be regularly replaced to avoid any incident of leakage
	Land contamination to due food waste	► Efforts should be made to reduce food waste; ► Option of converting food waste into compost shall be explored.

b) **Product assessment and Testing activities:**

During the testing and calibration e-waste will be generated that should be disposed to an authorised e-waste recycler. Rotation policy shall be adopted for employees who are engaged on the testing process to mitigate/minimise fatigue and ergonomic issues.

If radioactive testing is being used for the components following precautions shall be taken to ensure that there is not radioactive pollution and the employees and trainees in the TC are not exposed to the same:

► Only authorised personal should be allowed to operate the machine;

► Proper protective suite should be worn while operating the machine;

► In no circumstance the check door should be opened while the machine is operating;

► Training shall be imparted to all the employees and trainees on the measures to be adopted in case of a radioactive leakage or incident

15.4.2 Maintenance of the TC

Table 41: Potential hazards during O & M phase

Potential impact	Recommendation for mitigation
Deterioration of the structure over the period of time	► A structural stability certificate would be taken from a chartered engineer every 5 years. ► Approvals would be taken for any change in the layout of the TC from the factory inspector. ► Regular maintenance and repair work shall be undertaken throughout the TC over the period of time.
Fire risk	► Fire extinguishers shall be placed throughout the TC prone to fire incident; ► Fire extinguishers will be checked for pressure on annual basis; ► Electrical wiring in the premises would be regularly checked and repair should be undertaken wherever required.

The protection of public health, safety and general welfare will also be ensured through adherence to the building codes since these are related to the construction and occupancy of buildings and structures.

15.5 Basic requirements for EHS management

The following section outlines the details of the essential measures to be undertaken for sound EHS management within the TC;

► Storm water management

► Fire risk management,

► Rain water harvesting, if practical,

► Sewage treatment,

► Ventilation system.

► Monitoring of EHS performance

15.5.1 Storm water management

Storm water includes any surface runoff and flows resulting from precipitation, drainage or other sources. Typically, storm water runoff contains suspended sediments, metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), coliform, etc. Rapid runoff, even of uncontaminated storm water, also degrades the quality of the receiving water by eroding streambeds and banks. In order to reduce the need for storm water treatment, the following principles would be applied:

- Storm water would be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge
- Surface runoff from process areas or potential sources of contamination would be prevented
- Where this approach is not practical, runoff from process and storage areas would be segregated from potentially less contaminated runoff
- Runoff from areas without potential sources of contamination would be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate would be reduced (e.g. by using vegetated swales and retention ponds)
- Where storm water treatment is deemed necessary to protect the quality of receiving water bodies, priority would be given to manage and treat the first flush of storm water runoff where the majority of potential contaminants tend to be present;
- When water quality criteria allows, storm water would be managed as a resource, either for groundwater recharge or for meeting water needs at the facility;
- Oil water separators and grease traps would be installed and maintained as appropriate at refuelling facilities, workshops, parking areas, fuel storage and containment areas.
- Sludge from storm water catchments or collection and treatment systems will contain elevated levels of pollutants and would be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety , and conservation and long term sustainability of water and land resources.

15.5.2 Fire risk management

a)   Fire alarm system

- ► Automatic Fire alarm system will be provided in all buildings of the campus excluding student hostels and emergency staff quarters.
- ► The system will have appropriate provisioning of smoke detectors and beam detectors with respect to the sensitivity and probability of fire.

► Fire alarm panels will be provided at appropriate locations with easy and convenient accessibility for manual activation of alarm in case failure of automatic system.

► A control panel will be provided at control station with a repeater panel in security cabin to activate, deactivate and reset the fire alarm system.

► The instrumentation, panels, sensors and equipment used will be of certified make confirming to relevant standards.

► Smoke detectors and beam detectors will be installed above and below false ceiling as applicable.

b) Firefighting system – overview

► Mapping of potential fire risk shall be done across TC and fire extinguishers (CO2 and powder based) should be placed in relevant areas;

► Maintenance of fire extinguishers shall be undertaken on annual basis.

15.5.3 Rain water harvesting

► The campus will be divided in to 4 or 5 areas and the storm water from the roof top of each building in each area will be collected in the specified area.

► The storm water outlets on building roofs will be checked for adequacy with respect to size considering maximum rainfall intensity in past 100 years.

► Additional outlets will be provided to the building roof, in case the existing outlets are found to be insufficient.

► The outlets will be provided with vertical down take pipes, which will be connected to the existing underground storm water lines through nearby chambers.

► Suitable locations for ground water recharge pit will be identified in each area as mentioned above.

► Considering geology, ground water tables, applicable rules and regulations and available space, ground water recharge pits with bore holes and pipes will be designed with adequate capacity.

► The ground water recharge pits will be connected to the storm water line through nearest chamber to fetch storm water (collected on roof) to the pit.

► Overflow will be provided to the ground water recharge pit at suitable level, to take off excess water back to the storm water network and discharge off.

► The ground water recharge pits will be protected with fence around to prevent ingress of people, animals etc.

► Suitable provision will be made to cut off and on the flow to the ground water recharge pits.

15.5.4 Sewage treatment plant

► Sewage Treatment plant with integral effluent treatment will be provided for primary and secondary treatment;

► The treated effluent will be used for gardening and/or recycled for use in toilets to the extent possible.

15.5.5 Ventilation system

a) Internal buildings

► The TC premises will have provision for sufficient ventilation. This will be done keeping in view the amount of space in the TC, number of people expected to occupy the space, type and amount of machines/equipment, and overall size of the space. The designing will be done keeping in view proper distribution of air for ventilation throughout all occupied spaces across the TC.

► Natural ventilation - The premises will have adequate openings, such as doors, windows and/or vent opening to clean environment. Roof vents would be placed wherever applicable to reduce the reliance on air conditioning systems

► Air input, smoke exhaust will also be installed and maintained for proper ventilation.

b) **Manufacturing/ Production area**: The production area will be provided with central air conditioning.

c) UPS room

► Appropriately designed ventilation system will be provided to the UPS room.

► The ventilation system will mainly comprise of air conditioning units providing cold air at lower temperature and exhaust system taking out hot air coming out of the UPS.

► The system will be designed to maintain adequate temperature around the UPS equipment as per manufacturer's requirements/ specifications.

15.5.6 Monitoring

EHS monitoring programs would be undertaken to verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant EHS aspects, and the implementation of prevention and control strategies. The monitoring program would include;

► EHS inspection/Audits
► Calibration of the equipment
► Surveillance of the working environment
► Surveillance of workers health

Key risks and mitigation

16. Key risks and mitigation

The key risks associated with implementation of the project along with possible mitigation measures are e summarized in this section. It must be noted that risks universe is dynamic and is likely to change periodically. It is recommended that frequent analysis is carried out and mitigation plans are drawn. Below are risks that may impact this project;

Table 42: Risk & mitigation

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Project Planning	Risk of inadequate planning of time, effort and resources required to complete the project	► Adequate time and cost buffer to be kept to deal with contingencies. ► Appointment of CMC for detail design and project management during construction of the TC	✓	✓	✓
Approvals and Clearances	Risk of delay in clearances from local authorities like ► Plan Sanction – Town Planning Authority/ Local Body ► Commencement Certificate – Town Planning Authority/ Local Body ► Fire NOC – Provisional and Occupancy – Local Fire Authority ► Plinth Checking Certificate – Town Planning Authority/ Local Body	► Appointment of PMC firm. ► Timely application of approvals for relevant authorities by CMC ► Monitoring of status of Approvals.		✓	

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	► Building Completion Certificate – Town Planning Authority/ Local Body ► Consent to Establish and Operate – Pollution Control Board ► MAP Approval and Factory License – Directorate of Industrial Health and Safety ► Labour License – Labour Commissioner ► Fuel Storage – Chief Controller of Explosives ► Tools, Tackles, Pressure Vessels, Hoists – Competent Engineer ► Electrical Systems – Electrical Inspector				
Environmental risk	Loss of top soil	► Top soil excavated from the site should be carefully handled. It should be collected separately and stored as a heap which is appropriately covered. The heap should not be put in the direction of wind to avoid dust generation ► Maximum effort should be made to utilize the top soil for landscaping within the site	✓		✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	Air pollution due to digging and levelling activities	► Water sprinkling shall be practiced ► Construction machinery shall be properly maintained to minimize exhaust emissions of CO, SPM and Hydrocarbons ► These activities shall be avoided in very high wind and cover should be provided for loose construction material	✓		✓
	Water contamination and health risks associated with setting labour camp for construction	► Toilet shall be earmarked for both men and women contractual workers ► Adequate drinking facilities shall be provided at the construction site; ► Temporary crèche facility may be provided in case of migrant labourers children residing in the camps to ensure safety	✓		✓
	Land and water contamination due to waste generated at site	► Waste shall be stored at designated place after segregation on the basis of category (hazardous and non-hazardous) ► Hazardous waste shall be disposed of to the authorized vendors only	✓		✓
	Air pollution due to use of D.G set.	► D.G set to be optimally used with proper orientation and adequate stack height ► Stack monitoring carried out on regular basis	✓		✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
		► Proper maintenance of the DG Set should be carried out on regular basis ► Acoustic enclosures are to be provided with the D.G sets to minimize the noise levels			
Construction	Delay in construction due to cost overrun, management of building contractors.	► Appoint a PMC for a design and build contract for managing construction. ► Strict timeline will be made and agreed with PMC. ► Regular M&E, Built in mechanism for penalty for delays and incentive for timely completion, ensuring timely payment based on milestones.	✓	✓	
Deviation in project scope	Change in project scope ► initiated by MoMSME, ► Machinery supplier constraints ► Product discontinuation	► Clear buy in on project plan and execution planning. ► Identification of Machinery suppliers based on the top current suppliers and technology available.	✓	✓	✓
Maintaining World Class Construction quality	Construction quality may not be up to the mark.	► Appointment of third party Government quality assurance agency.		✓	
On-boarding of Key players	Delay in on boarding of key project stakeholders • Technology Partner	► Clearly defined scope and incentives for stakeholders.		✓	✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	• Construction Network Manager • Construction Management Consultant Quality Assurance	► Timely contracts with the project stakeholders.			
Procurement of machinery	Delay in procurement of machines and goods due to high Lead time and time taken for clearances	► Machines and equipment chosen should be standard and popular models available in market. Early release of order confirmation and advance if any. ► Appointment of efficient and pre-approved Clearing & Handling Agency (CHA) to ensure timely clearances and transportation of machines.	✓	✓	
	Variation in Equipment required and finally procured. Too stringent specs may lead to high price and low competition, loose specs may lead to low price but low quality	► Neutral specifications to be drafted based on thorough research on TC requirements and current models available.	✓	✓	
Trained resource availability	Availability of trained manpower for operation of new machines	► Machine specific training programmes to be conducted for training of key personnel and knowledge sharing.			✓
Market	► Change in product mix ► Change in customer mix ► Change in technology ► Change in product pricing	► Expansion of product base. ► Increase in customer base. ► Develop a backup plan for retiring of obsolete machines.	✓		✓

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
	► Competition from Govt./Public tool rooms ► Lack of cluster development in the target region				
Policy	Change in Government Policy/ Schemes for ► Training ► key sectors E.g. Change in Government space programme, increase in imports may affect orders from major clients	► Increase existing customer base. ► Diversify into new sectors.	✓		✓
Taxation	Change in service tax policy on training may adversely affect training revenue	► Institute should keep abreast with policy changes and the same should be considered while designing the course and fee structure.	✓		
Human resource	► Labour availability ► Retention of key employees (Flight of key talented people can make it difficult to achieve centre's growth plans)	► Planning for holidays and lean periods. ► Good incentive scheme and career development plans.	✓		✓
Management risk	Lack of capable management to run the TC	► Leadership training. ► Succession planning.			✓
Maintenance risk/ spares - Availability of spares & services	Delay in availability of spares and service support at a reasonable cost	► Procure models that are likely to continue for at least next 5 yrs. to ensure better availability of spares and services.	✓		

Key broad area	Risk	Mitigation	Impact on		
			Cost	Time	Resources
Performance of key stakeholders	Poor performance of Outsourced agencies like TP, CNM and PMC	▶ Establishment of KPIs ▶ Periodic review of performance. Suitable penalty clauses to be added in the ToRs.			✓
Weather	Delay in construction due to monsoon season	▶ Planning for lean periods and periods of low construction activity.	✓	✓	

Conclusion

17. Conclusion

The TC at Puducherry is proposed to be an ESDM focused TC with a focus on segments such as industrial electronics, IT systems and hardware, automotive electronics etc. not only in the catchment area but also outside the catchment area. There is an opportunity for the TC to grow further catering to other upcoming sectors like general engineering etc.

The TC will generate revenue from services like advisory/consultancy, manufacturing support, assembly, prototyping, product assessment and testing of electronics and its components; Consultancy services for product design and development, manufacturing, and innovations in process and productivity; Manufacturing incubation services; and training would be the prominent activities through which revenue would be generated by the TC. Apart from this the TC would also support MSME clusters in technology and engineering solutions, for improvement of their quality systems and productivity, and for patent registration and harnessing. The TC will make a concerted effort in reaching out to MSMEs for these works

TC will contribute towards skilling youth to make them employable in industry by designing courses relevant to them. The focus areas for the proposed TC are in line with objectives of the program. This will be further complemented by the proposed innovative ideas for the TC like;

► The new TC will take steps to form consortium with MSMEs including TRs to jointly cater to the focus sectors. Once formed, the TC would further formalise and institutionalise the consortium. The TC should provide handholding/ support and special machining & testing facility to members of this consortium and prepare a road map for the next 3-5 years to ensure that these MSME can develop the required expertise and become more competitive

► **Manufacturing Incubation Centre**: A MIC is proposed at the Puducherry TC with the basic shell infrastructure and world class manufacturing plant and machinery on rental basis for a 2 year period (as part of Phase 2). This MIC is expected to fuel the growth of enterprises which have successfully crossed the stage of pilot order and are ready to execute larger orders. The MIC would provide shell infrastructure, latest technologies, support business facilities, provide IT support, provide electricity and power connection, and assist with registration and clearances for setting up a manufacturing unit. In addition to this, the TIC would help entrepreneurs to connect with suppliers and skilled workers.

► The TC will form an Entrepreneur Club. By joining this club, entrepreneurs would receive all services of the TC including concept creation support, product design, intellectual property services, consultancy services, prototyping, assembly testing, calibration,

access to Manufacturing Incubation Centre at a subsidized rate. The TC would facilitate access of entrepreneur club members to service providers who can help in creation of start-up. e.g. Charted accountants , Banks, Intellectual property office, etc. The TC would organize workshops and group discussions for entrepreneurs with key experts to help and guide members with their ideas.

► The TC will form Productivity and Quality club for cluster of engineering industry and support them for a period of 12 months in which each cluster club of about 10 MSMEs will be assigned a mentor (Sr. Engineer Production/ Design/ Training and above). The mentor will make periodic visits to the MSMEs. He will plan and handhold in the execution of the plan at the MSMEs so as to have a visible improvement at the end of 12 months period. Membership can be for a nominal fee. Quality club and Productivity club may be formed separate and the KPI of mentors will be decided based on the results achieved by MSME units. .

All these initiatives of the TC would not only strengthen the expertise of MSMEs in manufacturing but also help to develop a sustainable ecosystem for MSMEs in the region in the long run. On the same line, even investments have been proposed keeping the focus area and adherence to EHS guidelines in mind.

Above all, TCSP program will enable TC to showcase the best practices not only in the adoption of new technologies and skilling the youth but also managing all the associated environmental and social aspects.

Annexures

18. Annexure

18.1 List of MSMEs / other manufacturers / associations contacted in primary survey

Company	Name	Designation
MSME DI, Chennai	Gadde Ravi	Dy. Director
	V. Ramakrishnan	Dy. Director (Mechanical)
	S.D Harmaselum	Dy. Director
	G. Shanmuganathu,	Advisor
	Dhayalan K	Assistant Director
FASII, CDISSIA	T.V. Hariharan	Vice President
Department of Industries & Commerce, Govt. of TN	Dr. E. Bhaskaran	Deputy Director
	S. Ramachandran	Regional Jt. Director
TN Small and Tiny Industries Association	C.K Mohan	Vice President

Vijay Industrial Controls	S. Mani Sankar	Chief Executive
Pondicherry Chamber of Industries	V. Thirumal	Secretary
	S.Kanagasabapathy	President
	S. Krishnamurthy	Jt. Secretary
	G. Uthirarajan	Executive Member
	C. Radjou	Executive Member
Pondicherry Industries Association	Georgekutty Abraham	President
All Pondicherry Plastic Traders & Manufacturers Association	S. Babu	President
Pondicherry Plastic Association	M. Arusehan	Jt. Secretary
Rishabh Intermediates Pvt. Ltd.	R. Anil Kumar	Managing Director
T.G. Tex Pvt. Ltd.	G. Thiruppathy	MD
SG Industries	Amarnath	Vice President

Company	Name	Designation
CII	M.P Nagendra Rao	Head & Deputy Director
	I.Maditi	Chairman
Govt. of Puducherry	V. Pethaperumal	Former Power & Industries Minister
PIPDIC, Electronic Park Industrial Estate	S. Ramkumar	President
	M. Thiruvengdam	Secretary
G.S. Polymers	G. Sridhar	MD
Accurate Industries Industrial Estate	K. Rajendran	Secretary
Bestow Packaging	K.R Shekhar	MD
Sattva Logistics	S. Narasimhan	MD
Adithya Engineering	K. Sai Sathya Kumar	Managing Partner
Flextronics	Karthikeyan Kannan	Senior Manager – Sourcing
Ford Motor Pvt. Ltd.	G.N. Gokulakrishnan	Manager – STA
	Vijay Anand Kumar T	Manager – STA
Lenovo India Pvt. Ltd.	Shrikanth R D	GM - India
	Praful Mehta	Head Production
Industries & Commerce, Govt. of TN	S. Chokkalingam	Jt. Director
Eaton Power	I.Syed Sajjadh Ali	MD - India (APAC Region)
	Pasupathirajan T	Manager - New Product Development
M.K. Engineering Works	M. Dinesh Kumar	CEO
SIDCO	Kannah	DGM
Issojet Burner Pvt. Ltd.	Dr. K Ramalingam	MD
Manatec Electronics Pvt. Ltd.	R Manathan	Chairman
Chemin C & I	P. Rangaraj	Chairman cum MD
	M.P. Krishnamoorthy	Sr. VP Operations
Unistrong Engineers	A. Natarajan	MD

18.2 Key questions asked primary survey

ESDM: Market Need Assessment Survey

Organization Name		CEO/MD/Owner name	
Person Filling form		Location:	
Email ID		Phone Numbers	
Range of Turnover	Less than 25 Cr	25 -50 Cr	50-150 Crore	Above 150 Cr
Number of Employee	Less than 25	25 – 100	100-250	Above 250
% of Employee (Tech Skill wise)	Unskilled [ ]	Skilled (ITI+)[ ]	Graduate[ ]	P.G. [ ]

1. Which segment of Electronic industry your firm belongs to?

   (a) Consumer Electronics   (b) Medical Electronics

   (c) Semiconductor design service   (d) Electromechanical Electronics

   (e) Embedded systems   (f) Strategic (Defence & Aero) Electronic

   (g) Industrial Electronics   (h) Power Electronics

   (i) Automotive Electronics   (j) Light Emitting Diodes

   (k) Renewable (Solar/Wind) Electronics (l) Electronics Components (PCB, etc.)

   (m) Telecom Electronics   (n) Electronics Manufacturing Systems

   (o) Other Please specify……….

2. Please tick the activity (s) of your firm:

(a)	Raw Material Supplier	
(b)	Basic Component Manufacturing	
(c)	Component Assembly	
(d)	System / Subsystem Assembly	
(d)	Electronics Manufacturing Design Services	
(e)	Semi-Conductor design services	
(f)	Electronics Component / Product Sourcing	
(g)	Testing, Calibration, and Quality Assurance	
(h)	Packaging	
(i)	Warehousing & Logistics	
(j)	Any other	

3. Please list top three types of products from your firm. If required please expand the list.

   1.   4.
   2.   5.
   3.   6.

4. If diversification is planned in your firm, what will be the new products produced/services?

    1.   4.
    2.   5.
    3.   6.

5. If expansion is planned by your firm which will the capabilities/resources required additionally?

    1.
    2.
    3.

6. Which are major raw materials for your firm? If needed extra space please use additional pages.

S.N.	Raw Material	Imported (%)

7. Manpower requirement of your firm :

S. No	Option	Area 1	Area 2	Area 3
(a)	Skilled Workers			
(b)	Engineers & Technicians			
(c)	Managerial			
(d)	Unskilled/Others			

Area e.g. Assembly, Testing, Soldering, printing, etc.

7. What are the top three manufacturing process trends in your sector?

1.

2.

3.

8. Which are the top three requirements of your firm with respect to improvement in Manufacturing Technology that will improve firm's competitiveness? If needed extra space please use additional pages.

1.

2.

3.

9. Which are the top requirements your organization needs with respect to common facilities?

S.N.	Focus	Requirement 1	Requirement 2
(a)	Common Hi-Tech Production Machinery		
(b)	Research & Development Centre		
(c)	Testing Labs		
(d)	Integrated Logistic system		
(e)	Training Centre		
(f)	E-waste management		
(g)	Any other (Please suggest)		

If required please provide additional details in the last page.

10. What are the top skill gaps or areas of skill upgrade you have identified in the workforce that is holding you from being more competitive in the market?

1. Un-skilled workers

2. Skilled Workers

3. Engineers & Technicians

4. Managerial

11. Name three requirements you would like access to that will help in improving Quality of your output?

1.

2.

3.

12. What are the top three challenges you face in catering to the needs of international customers?

1.

2.

3.

13. What are the top three areas of improvement for you suppliers that will help the quality of your output?

1.

2.

3.

14. What are the top three priorities you need assistance in the product development to grow your market?

1.

2.

3.

15. Please list name of technical institutes from where you have been taking technical support / guidance?

1.

2.

3.

16. Please list the sources from where you have been hiring the work force?

1.

2.

3.

17. Please list the industry association / chambers you are part of and for which purpose?

1.

2.

3.

18. Please list the conferences / workshops / seminars where your firm is regular participant?

1.

2.

3.

19. Please suggest ideas or actions which can expand the ESDM sector rapidly?

1.

2.

3.

20. In which of the areas have you taken the support of MSME Technology Centre (Please tick all services used)?

1. Testing	2. Production Support
3. Skill Development	4. Process improvement
5. Product / Tool Development Consultancy	6. Technical / Business

21. How would you like to rate the overall services offered by centre?

Very Bad   2. Bad   3. Average   4. Good   5. Excellent

22. Suggest at least three areas of improvement for MSME Technology Centre? Use additional pages if needed.

1.

2.

18.3 Key discussion and Minutes of Meeting during primary survey

Date	8 Sep 2015
Time	1000 - 1830 hrs

Key Points Discussed	► Discussion with Mr. Dhayalan
	
	   ► Mr. Dhayalan informed that North of Chennai is hub for petroleum/ petrochemical products
	
	   ► Guindy & nearby region is hub of mechanical products and almost 500 MSME players are present in this region
	
	   ► East Coast Road & Old Mahabalipuram Road are known for Software & Electronics sector and there is a SEZ developed by SIPCOT focusing on these sectors. Name of the SEZ is Siruseri.
	
	   ► Several Electronics & Automobiles players present in Sriperumbdur SEZ (~40 km from Chennai).
	
	   ► In Changalpettu there are Electronics & Software players that focus on ancillary services.
	
	   ► Coimbatore region is known for foundry units.
	
	   ► There are about 12 SEZ under SIPCOT.
	
	   ► There is a Chemical SEZ on East Coast Road, Cholayer/Cholayil
	
	   ► There is an Electrical SEZ in Kakkadasam, Thiruvallur District (Near Bangalore)
	
	   ► Puducherry is also known for Pharma Companies
	
	► Key points discussed in the stakeholders workshop
	
	   ► Representative of TASIA emphasized that TC should focus on "creating more manufacturers" rather than focussing on training which is not new to the region
	
	   ► One of the stakeholder requested to introduce taylor made training program for Solar PVs
	
	   ► It was informed that TC should provide technology & manufacturing process support to Entrepreneurs for manufacturing ESDM components.
	
	   ► Associations also informed that TC should also start Govt. Rating Programs/ Certifications which will help MSMEs in clearing quality/technical etc. standards of OEMs.

	► Some Association also talked about having robotics lab in Industrial Electronics at TC
	
	► Discussions with Mr. Chokkalingam (Jt. Director of Industries & Commerce, Govt. of TN – I/c Electrical & Electronics:
	
	    ► He informed that there should be advocacy for MSME Schemes
	    launch by Govt. of India and State Govt.
	
	    ► He suggested that there should be testing & development
	    centre at TC

Date	9 Sep 2015
Time	0900 - 1900 hrs

Key Points Discussed	► Discussion with Flextronics, Sriperumbudur Plant:
	
	    ► Flextronics is only into assembling at its plant in Sriperumbdur.
	
	    ► 70% of components are imported by Flextronics based on the specifications of OEMs
	
	    ► Flextronics also informed that they are willing to procure the materials locally, subject to availability and suppliers complying with OEMs quality and environmental standards.
	
	    ► Following equipment's are imported
	        ► Resistor, Capacitor, Display, Antenna, Battery, PCB Assembly, Ear Phones
	
	    ► Following items are procured from India only:
	        ► Plastic, Wiring, Packaging
	
	    ► Out of 70% imported items, 40% are Electro-Mechanical components. Following are the major electro-mechanical components:
	        ► Display, Battery, Ear Phones, Antennas
	    Flextronics suggested that TC should focus on few of the above components so that import can be reduced.
	
	    ► PCB upto 6 layers are being manufactured in India and Flextronics use PCB upto 32 layers which are being imported. Also they procure upto 6 layers from SN Circuit (Hosur)

	► Flextronics informed that major challenge they face for suppliers is that they are not complied with various certifications/regulations like ISO, OSEAS, EMS.
	
	► Following are the players from which Flextronics procured its few items:
	  ► Display – Innolux, China
	  ► Antenna – Amphenol, China
	  ► Battery – China/Taiwan/Japan
	
	► It was also suggested that local units can tie up with Chinese company and can start manufacturing in India.
	
	► It was informed that for companies like Flextronics, training is
	not a challenge and they have in house training programs.
	
	► It was informed that to manufacture a PCB from 6 to 32 layers, following process/raw material are major challenge;
	  ► Punching, Latching, Lot of water (major challenge)
	
	► Discussions with Dr. K. Ramalingam, MD, Issojet Burner Pvt. Ltd.
	  ► Krishnagiri District near Hosur has been declared as Electronic Cluster.
	  ► It was informed that there are 3 PCB manufacturers present over in Hosur, namely;
	    ► Anand Electronics, IQ Electronics, SN Circuit

Date	10 Sep 2015
Time	15:00 – 17:00 hrs

Key Points Discussed	► Discussion with Ford Motor Pvt. Ltd.
	  ► Ford is manufacturing its engines in Chengalpattu facility and also it is manufacturing Eco Sport & Ford Endeavour.
	  ► Ford is using PCBs with 5 to 8 layers and they have got in-house capability of same. Like in Engine Control Module, PCB of 4 layers is used and similarly in circuit and cluster PCB of 1 layer is used.

	► Bare PCBs are imported because of cost benefit. Indian manufacturers can only flourish if they have volumes and compete globally. For ex. ATNS Mysore supplies bare PCBs but it is more costly.
	 ► Bare board PCBs with Carbon Tracks technology is not available in India presently.
	 ► Following equipment's are imported
	   ► Sensor（In India Contena & Stoneridge are manufacturing but are not competent in terms of cost & quality)
	   ► Connectors & Components – Imported from Taiko, Molex
	   ► Relay – Imported from Molex and Ford is exploring to get the same from OEN Kochi.
	   ► Sync Module – Ford to localize the same within 2 years.
	   ► Speakers – Imported from Armon
	 ► Pin Stitching machine is a very useful machine and it is required across the field for connectors, PCB with higher level of connector.
	 ► Testing standards are not met by local OEMs and MoMSME can help them in same. Ford follows Automotive Electronics Council standards which are as per them are better than European standards and if any OEM is able to pass AEC standards then they can easily pass European standards.
	 ► For local OEMs suppliers volume is the issue and there cost is not competent with China. Ford informed that it's cheaper to import items than procure locally.

Date	11 Sep 2015
Time	0900 - 1830 hrs

Key Points Discussed	► Key points discussed in the stakeholders workshop:
	   ► Mr. S. Mani Shankar of M/s Vijay Industrial Controls requested for following facilities at TC:
	     ► MSMEs need standard testing lab and certification of calibration and testing equipment's and instruments

	for
	electrical and electronics manufacturing.
	► Ancillary component manufacturers, multi-tasking machines and training of skilled labour.
	► Skill training in tool room technology with robotic equipment.
	► Training of skilled labour for trouble shooting electronic equipment.
	► Equipment's manufacture for energy conservation.
	► Mr. S. Babu of M/s Vimprotech requested for following facilities at TC:
	► Automobile parts making
	► Material Testing facilities
	► Extrusion in co polymers packing material
	► Technology in Vaccum forming & Twinsheet forming
	► Mr. V. Pethaperumal , former minister & polymer industrialist requested for following facilities at TC
	► There should be facilities for flat hoses, garden hoses, braided hoses
	► There should be support for lamination, pouch making and bag making.
	► There should be multilayer blown film upto 8 colour.
	► Mr. G. Sridhar of G.S polymers requested for following facilities at TC:
	► Facilities for surface coating lab
	► Facilities for polymer coating lab
	► Training for coatings & painting
	► Quality certifications of various coatings
	► Hi tech speciality coatings
	► Facilities for plastic moulding, blow moulding
	► Facilities for re-processed plastic machine and printing machine technology
	► Facilities for plastic extruders
	► Mr. V. Thirumal of Advanced Laboratories Pvt. Ltd requested for following facilities at TC :
	► There should be facilities for solar power production
	► Dye, tools etc. should be made available for MSMEs

- ► Representative of M/s SureSoft Systems requested for following facilities at TC:
  - ► Design house for TV and set top box
  - ► Training on PCB board repairing
- ► Other key points which were discussed:
  - ► Training people in textile industry especially in knitting.
  - ► Developing a cutting machine to cut knitted pole fabrics in bulk.
  - ► Lack of guidance for Chemical Industry i.e. testing, quality etc.
  - ► Lack of trained/skilled labours for processing/ manufacturing
  - ► Facilities for plastic processing and printing technology.
- ► Discussions with Lenovo
  - ► Lenovo is into assembling and they import 98% of its components. Mr Shrikanth also informed that though there are suppliers in and around but there quality is not good or they don't have quantity to survive.
  - ► Only packaging, publication and power cord are done internally/with help from domestic players
  - ► It was also informed that shell cost is more in India even for players like Flextronics, Foxconn.
  - ► Following components were explained and there manufacturers in India/abroad
    - ► Motherboard
      - ► Smartlink in Goa
      - ► Digilink in Bangalore
    - ► Memory
      - ► Giga byte (Taiwan)
    - ► Adapter is imported but companies like VMC, Delta are trying to make adapters in India
  - ► Mr. Shrikanth informed that following trainings/skills can be start with in TC:
    - ► Assembly training
    - ► Soldering training
    - ► PCB SMT training
    - ► PCB Manual training

- ► Through Hole training
- ► BGA rework training based on latest BGA technology

    which can be used for prototype
- ► Debug/Repair skills
- ► Assembly skills
- ► Programming & Testing skills
- ► Packaging skills
- ► Soldering a SMT component

► Mr. Shreekanth informed that following technologies can be looked into:

- ► 3D Printing of PCB
- ► Fab manufacturing facilities, as of now Intel is the largest manufacturer
- ► BGA technology
- ► Pin technology
- ► Auto Optical Installation (AOI)
- ► Manufacturing/technology facilities for manufacturing battery and PCB.

► Mr. Shrikanth also informed about local industries players and their current status:

- ► Eaton is present in Puducherry and they assemble UPS and manufacture fuses.
- ► NCR corporation is into manufacturing/assembling ATM machines was also present in Puducherry, though now they have moved to Chennai
- ► There are 2/3 companies present in Puducherry which manufactures/imports LED lights. Ex. K light

► It was informed that Lenovo is providing on the job training to students. The training includes following:

- ► 3 day classroom programme
- ► 8-10 shop floor programme
- ► At the end, certificate is provided to each students.

► It was informed that 95% of Integrated Circuits (ICs) are manufactured by Intel and rest 5% is manufactured by AMD.

	► Lenovo supplies 1.6 million PCs in India, out of which only 400k are manufactured/assembled in India.

Date	12 Sep 2015
Time	0900 - 1800 hrs
Key Points Discussed	► Discussions with Eaton: ► Mr. Ali informed that Eaton is producing following items at its plant in Puducherry: ► Solar fuses ► High speed fuses ► NH dual indicator fuses ► MV Din fuses ► Apart from this Eaton is into assembling of UPS for which more than 80% equipment's are imported ► Eaton is the largest manufacturer of fuses and controls almost 41% of market share and 80% of fuses produced in Puducherry plant are exported. ► Most of the equpments which are used to make UPS components are capital intensive, due to which not many players are present in India which manufacturers UPS components. ► Mr. Ali told that following facilities should be there and since he was past CII chairman, he also talked about tools which should be made available to MSME players. Following are the tools/facilities: ► Facilities for testing of diodes, transistor, thryristor etc. ► Machines for CNC controlled processes

	► Injection Plastic Moulding facilities for tools & dye
	► Tools and Die making facilities
	► Eaton has design lab in Puducherry, where they offer following facilities:
	► Electronics lab
	► Hydraulics lab
	► Power electronics lab
	► It was informed that in next phase of its project India, Eaton is closing down its factories in Manesar & Baddi. Also as a next step they are talking to vendors who can supply few components for its manufacturing facility of UPS in Puducherry.
	► Mr. Ali of informed that Eaton can start testing/training facilities related to UPS and fuses in association with Ministry of MSME. The model can be similar to the one which is being used by Samsung in association with MoMSME.
	► Discussions with Manatec Electronics:
	► Major equipments manufactured by Manatec are:
	► Pollution Checking Equipment
	► Wheel Alignment Equipment
	► Wheel Balancing Equipment
	► Lifting Equipment
	► Components like sensors, micro-controllers, digital cameras etc. are imported.
	► Manatec has following facilities in there design lab:
	► FFFT Analysis
	► Mechanical material strength testing
	► Heat treatment test
	► Software testing like Matlab, Image processing etc.
	► Manatec manufactures tools like spanner, allen key, plier etc.
	► Manatec requested to have following facilities in the Technology Centre:
	► PCB testing
	► Electronic Testing
	► Software/hardware testing

	► Training in assembly of various components for engineers etc. ► Training for Tool and pattern making ► Machines for PCB design, prototyping and development ► PCB assembling machines ► Vertical milling machines

	► Discussion with Chemin Controls:
	 ► Chemin supplies instrumentation and control panels to DAE, ISRO etc.
	 ► Chemin has full-fledged Instrumentation training lab, where it trains more than 400 students annually
	 ► Chemin also supplied Advance Process Control Simulation Labs to Dow Chemicals, Kuwait University etc.
	 ► Chemin is into manufacturing solar powered multipurpose dismantable & portable readymade houses. They have also supplied portable toilets to companies like NTPC etc.
	 ► Mantec requested to have following facilities Technology Centre:
	    ► Pre Heated welding & hydraulic testing facilities
	    ► Test certificate for materials
	    ► Latest CNC machines, tools and dyes
	    ► Precise welding training institutes in the vicinity where there welders can get the certification. It was informed to them that Ministry of MSME is already in the process of setting up TC focussed on welding in Vizag.

18.4 Machine List

S.No	Machine	Area in Square Meter
	Production Machines & Labs	
1.	3D Polymer Additive Manufacturing Machine + 3D Scanner	9.3
2.	Bare board manufacturing PCBs machine with Carbon Track Technology	5.9
3.	PCB Labelling Machine	9.3
4.	Pin Stitching machine for PCBs	9.3
5.	Screen Printing with Surface Mount Technology	13.4
6.	Pick and place machines with Surface Mount Technology	13.4
7.	Reflow Soldering Oven with Surface Mount Technology	
8.	Pick and place machines with Through Hole Technology	20.9
9.	Automated Optical Inspection Equipment for PCB and Other Electronic Items	Included in S.No 5
	Sub Total	81.5
1.	Photo Plotter	20.9
2.	Photo film processing	20.9
3.	Sharing machine, Punching machine	13.4
4.	Pre Forming Machine	13.4
5.	CNC PCB Drilling Machine	27.9
6.	CNC PCB Routing Machine, V-Cut Machine	20.9
7.	Single Spindle Drilling Machine with X-Ray	20.9
8.	Scrubbing Machine	20.9
9.	Dry film laminator	20.9
10.	Dry film exposure, screen exposure	
11.	Dry film developer	
12.	PCB Assembly Jig	20.9
13.	PCB Storage Rack	
14.	PCB Screen Printing Machine	13.4
15.	Hot Air Levelling Machines for PCBs	20.9

16.	Automatic and Manual Etching Machines for PCBs	
17.	Component Storage Bins	
18.	Tool kit consisting of (Soldering iron, De soldering pump, Wire cutter, Wire cutter/stripper, Automatic wire stripper, Different types of Screw drivers , Pliers, Tweezers, IC Slip extractor etc.)	9.3
19.	Soldering Station	
20.	Temperature Controlled Soldering Station	16.7
21.	De soldering Station.	
22.	SMD Rework/Repair Station	11.2
23.	Wave Soldering Machine	16.7
	Solder Mask Exposure & Developer Machine	
	Oven	16.7
	Multi-Layer press machine	
	Plating Line (PTH Line, Pattern Plating Line, Gold Plating Line)	27.9
	Bare Board Testing Machine (BBT)	
	Coated PCB Test apparatus	16.7
	Enclosure Impact	
	X-Ray Fluorescence Test kit	11.2
	PCB fault locator test set	
	In Circuit test kit	11.2
	Functional Test kit	
	Microscope	
	LCR Meter	9.3
	Digital Multimeter	
	Sub Total	382.2
	Basic Requirement/ Infrastructure	
1.	Voltage Stabilizer/ CVT	
2.	Three phase regulated variable power source	
3.	Single Phase regulated variable power source	
4.	Split AC	13.4
5.	Dehumidifier	
6.	Purchase of New IEC/IS/UL/ISO/EN and other standards, etc.	
	Sub Total	13.4
	Safety Testing	
7.	Temperature Recorder	13.4

8.	Digital storage Oscilloscope	
9.	High voltage probe	
10.	Electronic load	
11.	Digital multimeter	
12.	Electrical Safety Tester	
13.	Gas detector	
Sub Total		13.4
Environmental Testing		
14.	Environmental chamber	
15.	Thermal Shock Chamber	
16.	Vibration Test system	
17.	Bump/Shock Test System	
18.	Altitude Test Chamber	
Sub Total		
Fire Safety Test Equipment		
19.	Horizontal and Vertical Flame Chamber	
20.	Heat deflection temperature test set	
Sub Total		
Ingress Protection Test		
21.	Test Probe IEC 61032 – 1 set	
22.	Digital force Gauge	
23.	Dust Chamber	
24.	Ingress of water test system- 1 set	
Sub Total		
EMI/EMC Test Equipment		
25.	Electrostatic Discharge Simulator	
26.	Anechoic Chamber,	
27.	Radiated susceptibility and Radiated Emission test system	
28.	RF Shielded chamber	
29.	Electrical fast transient/burst simulator	
30	Conducted RF immunity simulator	

31	Noise Simulator	
32.	Surge Simulator	
33.	Power frequency magnetic field test system	
34.	Pulse magnetic field test system	
35.	Harmonics/Flicker Measurement test System	
36.	Line Impedance stabilizing network	
37.	Automatic Impedance Measuring Machine	
38	Compressor Area	
	Sub Total	219
	Electro-Technical Calibration	
38.	Multifunction Calibrator	
39.	Decade Mega Ohm Box	
40.	Decade Resistance Box	
41.	Standard Resistors	
42.	Sound Level Calibrator	
43.	Sound Level Meter	
44	Tachometer Calibrator	
45.	AC/DC Current source	
46	CT Analyzer	
47	CT/PT Calibration System	
	Sub Total	
	Grand Total for Production Area (Excluding Incubation Centers)	709
	Training Machines & Labs	
	Mechanical Facility	
1.	Injection Moulding Machine (80T)	8
2.	CNC Lathe Machine	4.5
3.	CNC Milling Machine (3 Axis)	10
4.	CNC Wirecut	10.5
5.	CNC EDM	2.25
6.	CNC Simulator	30
7	Conventional Lathe	3.75

8	Conventional Milling	6
9.	Surface Grinder	3
10.	Cylindrical Grinder	3
11.	Surface Table Big (Granite and CI)	1
12.	Sheet Bending Machine	3.75
13.	Power Press 50 Mt	4
14	Air Compressor (Upto 250 CFM)	4
15	Metrology and Mechanical Testing Lab (include Universal Testing Machine, Hardness Testing Machine, Impact Testing, Surface Polishing Kit, Equipment for Non-Destructuve Testing, Quality Control Equipment including CMM)	150
16	Radial drill machine (25mm)	2
17	Tooling and Other Accessories	0
18	CAD/CAM Labs	330
	Sub Total	575.75
	Training Labs	
1	PCB Manufacturing Set Up (25 person)	0
2	PCB Assembly Setup (30 person)	0
3	Clean Room Facility	0
4	FPGA Kits + Software	0
5	8052 Kits + Software	0
6	PIC Kits + Software	0
7	Automation Kits+Software	0
8	Control Kits + Software	0
9	Electornic Repair and Maintenance Kits	0
10	PCB Design Software - 40 users Education license	0
11	Solar Energy Lab	0
	Sub Total	0
	Classes	600

Grand Total (Electronics + Mechanical Training)	1175.75

Area of the machines is approved by mentor TC i.e. CITD, Hyderabad

18.5 Social Screening Certificate

Location and Address of the Technology Centre: (This table to be filled by Head Quarter, New Delhi)

NAME OF THE TECHNOLOGY CENTRE	NAME OF THE CLUSTER
Street Address:	Phone: Fax:
Email ID:	Website:

Person-in-charge of Technology Centre: (This table to be filled by Head Quarter, New Delhi)

NAME OF PERSON-IN-CHARGE	DESIGNATION
CONTACT DETAILS Phone: Fax: Mobile:	Email ID:

Name, Location, Address and Details of Industrial Area

NAME OF INDUSTRIAL AREA (e.g.Industrial Growth Centre, Borai) Industrial Estate, Thatanchavady (IET) (10KM far from TDC) Industrial Estate, Mettupalayam (IEM) (12 Km far from TDC)	YEAR OF ESTABLISHMENT Industrial Estate, Thatanchavady (IET): 1970 Industrial Estate, Mettupalayam (IEM) :1975
TOTAL AREA OF LAND (IN ACRES): Industrial Estate, Thatanchavady (IET): 50 Acres Industrial Estate, Mettupalayam (IEM): 300 Acres	**TYPES OF INDUSTRIES (Tick Appropriate Ones)** **Manufacturing: ✓** **Service: ✓** **Energy:** **Others (Specify)**

List of Industrial Units Surrounding the Allotted Plot

S. No	NAME OF INDUSTRIAL UNITS	TYPE OF INDUSTRY
	No industrial Units Surrounding the allotted plot. The Allotted plot is surrounded by Educational Institutions (Puducherry Engineering College & Puducherry University) and Software Technology park of India). The nearby Industrial units are as mentioned in the previous table.	Manufacturing & Services

Details of Plot of Land Allotted:

PLOT/SERIAL NO.	AREA OF LAND (IN ACRES)	DATE OF ALLOTMENT	DATE OF POSSESSION

170/2B/2, 1702B/5, 180/3B, 181/1B, 181/3B	10 Acres	03/10/2014	10/12/2014
NAME OF ALLOTTING OFFICIAL Under Secretary to Govt. of Puducherry, Directorate of School Education.	**NAME OF ALLOTTING ORGANIZATION** Directorate of School Education.	**ALLOTMENT LETTER NUMBER** PIPDIC/SP/IT G.O.Ms. No: 35 dated: 03/10/2014	**DATE OF LETTER** 03/10/2014

CERTIFICATION (This is to be certified by Head Quarters, New Delhi)
This is to certify that the proposed Technology Centre will be located on a plot of land allotted by a Competent Authority of the State Government and that the plot of land is located within clearly demarcated, protected and functioning Industrial Area and that the allotted land is free from any claims, use and encumbrances.
This is also to certify that copies of the following original documents are attached with this Social Screening Certificate.

1. Site Plan of the Industrial Area with clearly marked allotted plot;
2. Letter of Allotment of Land;
3. Certificate of Handing Over of Land;
4. Certificate of Non-Incumbency

SIGNATURE OF COMPETENT AUTHORITY

Name: --   Designation: ------- ---------------
Date: ---   Place: -----------------------------

18.6   AICTE norms for engineering and technology institutes

a)   Land requirement for technical institutions

Other than Rural Places			Rural Areas		
UG Programs	Diploma	Standalone PG Programs	UG Programs	Diploma	Standalone PG Programs
2.5	1.5	2.5	10	5	10

Land area requirements in acres

►   Land Area Requirements:

- Land area shall cover hostel facilities, if any
- Land shall be in one continuous piece
- Considering hilly nature of land in North Eastern States, land may be made available in 3 pieces which are not away from each other by more than 1 Km

►   Number of students generally allowed per acre land available when FSI = 1 is 300.

►   Built up Area Requirements

- The Institution area is divided in, Instructional area (INA, carpet area in sq. m.), Administrative area (ADA, carpet area in sq. m.), Amenities area (AMA, carpet area in sq. m.)
- Circulation area (CIA) is equal to 0.25 (INA+ADA+AMA).
- Total built up area in sq. m. is equal to (INA+ADA+AMA) + (CIA)

► Instructional area (carpet area in sqm)

	Number of Divisions (UG class of 60)	Duration of course (in yrs)	Class Rooms (C)	Tutorial Rooms(D) PG class rooms (H)	Laboratory	Research Laboratory	Work Shop	Additional WS/Labs for Category X courses	Computer centre	Drawing Hall	Library and Reading Room	Seminar Halls
Carpet area in sqm per room			66	33	66	66	200	200	150	132	400	132
Engineering/ Technology (Degree Institute)												
Number of rooms required for new institution	A	4	C=A	D=C/4	10	-	1	-	1	1	1	1
Total number of rooms (UG)	A	4	C=Ax4	D=C/4	10/Course*	-	1	2/Course (Max 4)	1	1	1	1/Course
Total number	F	2	-	H=Fx2	1/Specialization	1/Specialization	1	2/Course (Max 4)	1	1	1	1/Course

	Number of Divisions (UG class of 60)	Duration of course (in yrs)	Class Rooms (C)	Tutorial Rooms(D) PG class rooms (H)	Laboratory	Research Laboratory	Work Shop	Additional WS/Labs for Category X courses	Computer centre	Drawing Hall	Library and Reading Room	Seminar Halls
of rooms (PG)												
Where,												

- Category X of courses: Mechanical, Production, Civil, Electrical, Chemical, Textile, Marine, Aeronautical and allied courses of each.
- Classrooms, Tutorial rooms and Laboratories required for 2nd, 3rd and 4th year may be added progressively to achieve total number as stated.
- Additional Library (Reading room) area of 50 sq m / per 60 student (UG+PG) intake beyond 420.
- UG laboratories if shared for PG courses shall be upgraded to meet requirements of PG curriculum
- Progressive requirement, 2nd year onwards shall be calculated as 3+3+2 labs/course
- Additional 5 Labs/Course when number of divisions are more than 2/course.
- Round off fraction in calculation to the next integer.

Engineering/ Technology (Diploma and Post Diploma Institute)												
Carpet area in sqm per room			66	33	66	200	200	150	132	400	132	

	Number of Divisions (UG class of 60)	Duration of course (in yrs)	Class Rooms (C)	Tutorial Rooms(D) PG class rooms (H)	Laboratory	Research Laboratory	Work Shop	Additional WS/Labs for Category X courses	Computer centre	Drawing Hall	Library and Reading Room	Seminar Halls
Number of rooms required for new institution	A	Y	C=A	D=C/4	06	1	-	1	1	1	-
Total number of rooms	A	Y	C=AxY	D=C/4	06/Course*	1	2/Course (Max 4)	1	1	1	1

Where;

- Category X of courses: Mechanical, Production, Civil, Electrical, Chemical, Textile, Marine, Aeronautical and allied courses of each.
- Classrooms, Tutorial rooms and Laboratories required for 2nd, 3rd and 4th year may be added progressively to achieve total number as stated.
- Additional Library (Reading room) area of 50 sq m / per 60 student (UG+PG) intake beyond 420.
- #Progressive requirement, 2nd year onwards shall be calculated as 2+2 labs / course
- Round off fraction in calculation to the next integer.

b)   Duration and Entry Level Qualifications for the Technical Program (Engineering and Technology Programs/ Degrees)

SN	Diploma/ Degree	Duration	Eligibility

1	Under graduate degree program (full time)	4 years	► Passed 10+2 examination with Physics and Mathematics as compulsory subjects along with one of the Chemistry / Biotechnology / Biology ► Obtained at least 50% marks (45% in case of candidate belonging to reserved category) in the above subjects taken together
2	Diploma Programs (full time)	3 / 4 years	► Passed 10 std. / SSC examination Obtained at least 35% marks at the qualifying examination
3	Post diploma programs	1.5 years/ 2 years	► Passed Diploma examination ► Obtained at least 50% marks (45% in case of candidate belonging to reserved category) at the qualifying examination.

c)   Norms for Intake & Number of Courses / Divisions in the Technical Campus

Diploma/ Degree	Intake per division	Maximum Number of UG/PG courses and/ or divisions allowed in the new division (single shift working)	
		Divisions	Intake
Diploma/ Post diploma level	60	5	300
Undergraduate level	60	5	300
Post graduate degree and post graduate diploma level	18	6	108

New technical campus in Engineering and technology shall necessarily opt for courses from the following:

► Applied Electronics & Instrumentation

► Chemical Engineering/Technology

► Civil Engineering/Technology, Construction Engineering Computer Science, Computer Science and Engineering, Computer Science & Information Technology

► Computer Technology Electrical Engineering or Electrical & Electronics Engineering

► Electronics and Communication Engineering

► Information Technology

► Instrumentation and Control Engineering

► Mechanical Engineering

► Production Engineering

d) Norms for Essential and Desired requirements for Technical Campus (Marked as essential need to be made available at the time of the Expert committee visit)

SN	Details of requirement	Provisioning
1.	Language Laboratory The Language Laboratory is used for language tutorials. These are attended by students who voluntarily opt for Remedial English classes. Lessons and exercises are recorded on a weekly basis so that the students are exposed to a variety of listening and speaking drills.	Essential
2.	Potable Water supply and outlets for drinking water at strategic locations	Essential
3.	Electric Supply	Essential
4.	Backup Electric Supply	As required
5.	Sewage Disposal	Essential
6.	Telephone and FAX	Essential
7.	First Aid facility	. Essential

SN	Details of requirement	Provisioning
8.	Vehicle Parking	Essential
9.	Institution web site	Essential
10.	Barrier Free Built Environment for disabled and elderly persons including availability of specially designed toilets for ladies and gents separately	Essential
11.	Safety provisions including fire and other calamities	Essential
12.	General Insurance provided for assets against fire, burglary and other calamities	Essential
13.	All weather approach road	Essential
14.	General Notice Board and Departmental Notice Boards	Essential
15.	Medical and Counselling Facilities	Essential
16.	Public announcement system at strategic locations for general announcements/paging and announcements in emergency.	Desired
17.	Enterprise Resource Planning (ERP) Software for Student-Institution-Parent interaction	Desired
18.	Transport	Desired
19.	Post, Banking Facility / ATM	Desired
20.	CCTV Security System	Desired
21.	LCD (or similar) projectors in classrooms	Desired
22.	Group Insurance to be provided for the employees	Desired
23.	Insurance for students	Desired
24.	Staff Quarters	Desired

e)   Norms for Faculty requirements and Cadre Ratio for Technical campus

►   Diploma

Diploma	Faculty: Student ratio	Principal/ Director	Head of the Department	Lecturer	Total
		A	B	C	D
Diploma/ Post diploma	1:20	1	1 per department	S/20	A+B+C

S = Sum of number of students as per Approved Student Strength at all years

► Degree

Degree	Faculty: Student ratio	Principal/ Director	Professor	Associate professor	Assistant professor	Total
		A	B	C	D	A+B+C+D
Undergraduate	1:15	1	(S/15 x R) - 1	(S/15 x R) x2	(S/15 x R) x6	S/15
Postgraduate	1:12	-	(S/12 x R)	(S/12 x R)	(S/12 x R)	S/12

Note:

For undergraduate: S = Sum of number of students as per Approved Student Strength at all years, R = (1+2+6)

For Postgraduate: S = Sum of number of students as per Approved Student Strength at all years *R = (1+2), #R = (1+2+6)

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Ernst & Young LLP

Assurance | Tax | Transactions | Advisory

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