Report on

Publication of Achievements / Impact of DSIR Scheme "Promotion of Innovations in Individuals, Start-ups and MSMEs (PRISM)" from 2015-2020

Submitted to

Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM)
Department of Scientific and Industrial Research
Ministry of Science & Technology
New Delhi

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भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय
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Government of India
Ministry of Science and Technology
Department of Scientific & Industrial Research

20 March 2023

Message

It gives me an immense pleasure that Department of Scientific and Industrial Research (DSIR), Government of India is bringing out the Report on "Publication of Achievements/Impact of PRISM Scheme for the last five years" by DSIR Outreach Centre i.e. TePP Outreach cum Cluster Centre (TOCIC), Sri Padmavati Mahila Vishva Vidayalam (SPMVV), Tirupati.

I take this opportunity to reaffirm my faith on the entrepreneurial spirit of PRISM innovation to translate their innovative ideas into deliverable prototypes and marketable products.

I wish that report will mobilize more individual innovators and channelize strong platform to support innovation eco-system of India.

N. Kalaiselvi

(N. Kalaiselvi)

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MINISTRY OF SCIENCE AND TECHNOLOGY
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Date: 16.03.2023

Message

I am happy to convey that the report on "Publication of Achievements/Impact of PRISM Scheme for the last five years", has been executed by TePP Outreach cum Cluster Centre (TOCIC), Sri Padmavati Mahila Vishvavidayalam (SPMVV), Tirupati. The report covers success and failure of projects supported under "Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM) Scheme of DSIR".

This report will give a message among budding innovators of this country to understand the innovation support system, requisite process flow to translate an innovative idea into a proto-type or deliverable product.

This report has well captured societal output in respect of Intellectual Property Rights (IPR), proto-types, innovators benefit, socio-economic benefit and techno-commercial benefit of regions of this country.

Dr. P.K Dutta
Scientist G & Head, PRISM, DSIR

Recommendations of the Project Review Committee

Report of the Committee constituted for reviewing the outputs and value of Promotion of Innovations in Individuals, Start-ups and MSMEs (PRISM) of the Department of Scientific and Industrial Research (DSIR), MoST, Govt.of India

The committee constituted by Former Secretary, DSIR, Dr. Shekhar C Mande for the purpose of reviewing the scheme, "Promotion of Innovations in Individuals, Start-ups and MSME (PRISM)" studied in detail, the research carried out by Sri Padmavati Mahila Visvavidyalayam (SPMVV) of Tirupati on the outputs and outcome emanating from the implementation of the scheme during the period 2015-21.

Some remarkable observations have been made by the review committee.

The key observations are listed hereunder.

1. PRISM is a Unique and valuable scheme which has strived to democratize innovation as a process by extending support to individuals regardless of formal educational qualifications and credentials as well as Start-ups in the early stages of their development process which could promote the innovation supply chain for Micro, Small and Medium Enterprises. Principle of democratization as an objective is laudable and merits special mention.

2. Total expenditure under the scheme released to a total of 12 TOCICs is around Rs 827 lakhs over the project review period of 2015-2020. Under the scheme, total of 17017 people has been outreached. Among the 1082 proposals received for creating innovations, 132 have been supported with an average outlay of Rs 6.4 lakhs.

3. The reach of PRISM is Pan India and an important observation is the North East region has participated enthusiastically in the measures to democratize innovations.

4. Outputs emanating from the research study of SPMVV list that 42 patents, 39 start-ups with cumulative turnovers far exceeding the total expenditure of Rs 820 lakhs have resulted during the review period of

Recommendations of the Project Review Committee

2015-20. Value for money of PRISM is remarkable and the committee appreciates the scheme and its implementation strategy.

5. PRISM offers unique potentials for promoting affordable innovations which bear potentials for serving the un- and under-severed markets and reach innovations to people in the Base of Economic Pyramid.

6. The pro-poor agenda and local connects of the innovations emanating from PRISM support projects are praiseworthy.

7. PRISM seems to have made special contributions by way of spreading innovations among women with higher rates of successful proposals supported under PRISM.

8. The report of SPMVV has captured succinctly the role and power of PRISM in providing innovation supply chain for the vibrant start-up ecosystem developing in India.

The review committee makes six unanimous recommendations for leveraging the likely potentials of PRISM in future as a step of the Government of India towards democratization of innovations.

1. The name could be modified as "Promotion of Innovations among (**instead of in**) Individuals, Start-ups and MSMEs. (The change signifies that innovation is an inherent activity of people and the scheme focuses only upon nourishing them).

2. The high return on investments provides a compelling case for upscaling the democratization process of innovations by orders of magnitude while retaining the essential features of

a) Indian citizenship as the only eligibility parameter for proposers,

b) Keeping the two-phase approach of proof of concept and deepening of the proved concept and

c) Retaining the local connect of the innovations supported for reaching the benefits of the scheme to people of the region. The project outlay for the scheme may be increased in quantum by the department for developing PRISM as flagship of DSIR.

Recommendations of the Project Review Committee

3. In order to deepen the outcomes of PRISM with larger outlay, the department might consider partnering with Ministry of Micro, Small and Medium enterprise and set up a mechanism and institutional arrangements for standardization, testing, calibrating and accrediting the products emanating from Start-ups and MSME sector commercializing the innovations supported under PRISM.

4. Steps may be taken to increase the number of TOCICs from the current 10 to at least 20 during the next five years.

5. It is observed that several academic staff deployed by university centred TOCICs for mentoring individual innovators undertake the exercise pro bono and their contributions either may go un-recognized. An Incentive scheme for such mentors by way of recognition may built in as a measure of democratization step.

6. The revised scheme may create a provision for enrolling both professional and financial participation of the successful Start-ups and MSMEs receiving support from PRISM. (Specific guidelines may be developed for financial participation the successful Start-ups and MSMEs and by considering the turnover of the startups)

7.TOCICs may be encouraged to set up a mechanism for institutionalising Alumni of PRISM beneficiaries and help upscaling the scheme with enhanced levels of support for phase 2 from the current levels.

8. The Committee strongly recommends continuation of the DSIR-PRISM scheme increasing the project outlay in quantum and converting it as flagship scheme of DSIR.

Professor Sachin Chaturvedi
Chairman, Project Review Committee
and
Director General
Research and Information System for Developing Countries (RIS)
Autonomous Organization under Ministry of External Affairs, Govt. of India

Acknowledgements

We would like to express our sincere gratitude to Department of Scientific and Industrial Research (DSIR) and Sri Padmavati Mahila Visvavidyalayam (SPMVV) for providing us the opportunity to conduct the study and supporting us through the entire process. We are also grateful to the DSIR-PRISM for providing us with the resources and support we needed to complete this project.

First and foremost, we would like to thank Dr. Shekhar C. Mande The Then Secretary, DSIR & Director General CSIR, Govt of India, New Delhi, Dr.(Mrs.) N. Kalaiselvi, Director General, CSIR & Secretary DSIR. We would like to express our heartfelt thanks to Shri Surinder Pal Singh, Joint Secretary, DSIR.

We would like to thank Shri Chetan Prakash Jain, Financial advisor & Joint Secretary, DSIR and CSIR.

We would like to express our gratitude towards Mr. Prabhat Kumar Dutta, Head, PRISM for his for his valuable insights and suggestions. We also express heartfelt thanks to Mr. Ramanuj Banerjee, Member Secretary, PRISM whose invaluable guidance, stimulating suggestions and support throughout the research process were instrumental.

We would also like to acknowledge with much appreciation the crucial role of the DSIR officers for providing necessary information regarding the PRISM scheme. In particular, we would like to thank Dr.Rajesh, Dr.Sarika, Mr.Purusotham, Dr.Anil Kumar, Dr.S.P.Varma, Dr.R.C.Joshi, Mr.Sanjay Kapoor, Mr. P.R. Hariharan and all DSIR officials / Staff for their valuable contributions to impact analysis.

A special thanks is due to Mentor of the Review Committee, Padmashri Ramasami garu, his expertise and insights were instrumental in shaping the direction and focus of our research. We would like to express our special gratitude to the Chairman of Review Committee, Dr. Sachin Chaturvedi whose help and encouragement helped us in all time of fabrication process and in writing this report. Many thanks go to the all members of Review Committee, Prof. Sunil Bhand, Prof. Lalitha Guruprasad, Dr. Indranil Biswas, Prof. Sujit Pruseth and Dr. Ramanuj Banerjee who have given their full effort in reviewing and guiding the team in achieving the goal as well as their encouragement to maintain our progress in track.

We would like to express our sincere thanks to Prof. Duvvuru Jamuna, Vice-chancellor, SPMVV and Prof. D.M.Mamatha, Former Registrar and Prof.N.Rajani, Registrar, SPMVV for their continued support.

We would like to take this opportunity to express our gratitude to all the TOCIC coordinators.The PRISM impact analysis would not have been successful without their cooperation and inputs. We thank all the innovators that we met at various TOCIC centres across the India, for giving us an in depth view into the process of their innovation, outcomes of the PRISM scheme, successful innovations, patents and startups emerged through the PRISM scheme.

We would like to express our special gratitude to Prof. Pradeep Krishnatreya, for his valuable contribution in the compilation of research report. Finally, we express our profound appreciation towards to Dr.Harsha, Dr.M.Vani and Ms.B.Padma for spending their time in helping and giving support whenever we need it in fabricating the research report.

With special appreciation and gratitude towards DSIR-officials

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2	**Dr. Ramanuj Banerjee**	Scientist-F & Member Secretary
3	**Dr. Rajesh Kumar**	Scientist-E
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With special appreciation and gratitude towards TOCIC –Coordinators

S. No	Name of the TOCIC	Name of the Coordinator	Co-Coordinator
1	IIT -Kharagpur, West Bengal	Prof. Siddhartha Das	Prof.Tapas Kumar Bandyopadhyay
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11	University of Madras, Chennai	Dr. G. Gangi Reddy	-
12	Sri Padmavati Mahila Visvavidyalayam (SPMVV), Tirupati, Andhra Pradesh	Prof. P. Uma Maheshwari Devi	Prof. P. Josthna

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Executive summary

DSIR launched its flagship programme Promoting Innovations in Individuals, Start-ups and MSMEs PRISM is designed to support untapped creativity of individual innovators, extend funding, provide mentoring, patenting and facilitate networking with industry. PRISM identified thrust areas like Green technology, Clean energy, Industrially utilizable smart materials, Waste to Wealth, Affordable Healthcare, Water & Sewage Management and any other technology or knowledge intensive area aligned with our national objectives to develop innovations.

DSIR has established a robust mechanism to implement this scheme across the country through TePP Outreach cum Cluster Innovation Centres (TOCICs) in Universities and National research laboratories and PRISM Advisory and Screening Committee PASC at Delhi to receive and evaluate the proposals from innovators for funding.

TOCICs are located in CSIR Centers in Bengaluru (Karnataka), Chandigarh (Union Territory), Durgapur (West Bengal), Jorhat (Assam), Kolkata (West Bengal), IITs in Kharagpur (West Bengal), Kanpur (Uttar Pradesh) and Guwahati (Assam), and Higher Educational institutions in Udaipur (Rajasthan), Chennai (Tamil Nadu), Tirupati (Andhra Pradesh), and State Biotechnology Mission, Gujarat . However, DSIR has identified TOCIC at SPMVV to examine the activities of PRISM for the period 2015- 2020 to understand the process and output of PRISM to further strengthen to reach the unreached.

Methodology adopted for the Study

Mixed met approach was employed for the study. The quantitative survey based on closed ended structured questionnaire collected relevant information from coordinators and innovators. In addition, qualitative in-depth interviews were conducted with coordinators of all 12 TOCICs which were operational during the assessment period. In addition, we built a database of all innovators with a brief description of their innovation. The study was carried out between 2021-2022.

Sample Size

In all, 132 innovators received funding from DSIR during the assessment period. We sent out questionnaires to all of them with support from TOCIC Coordinators. However, 74 innovators sent back filled-in questionnaires. The coordinators' report indicates the data of 132 innovators but responses of 74 innovators only was documented. The research team visited 10 of the 12

Centers between 9th Dec, 2021 and Oct, 2022 to conduct interviews with both coordinators (10) and innovators (40) .

Major Findings

1. In the five years between 2015 and 2020, the 12 TOCIC Centers conducted 571 workshops/outreach activities and reached 17017 individuals in the country.
2. The 12 TOCICs together received a total of 1082 proposals during the assessment period of 2015-2020.
3. DSIR received a total **420** proposals from various centers on different technological innovations. DSIR sanctioned 132 proposals.
4. DSIR has disbursed a total amount of Rs.**827.34** lakhs to different centres during the assessment period.
5. Majority of innovators have developed prototypes in Clean energy and industrially utilizable material (40) which is followed by innovations in the area of affordable health (37) and other areas.
6. Both men and women submitted proposals for funding. Put together, both the genders submitted 420 proposals. Men submitted substantially more proposals than women (342 versus 78).
7. The southern region of the country contributed most innovators (28). The study indicates that on average each region has around 15 innovators.
8. The data indicates that 24 of the 74 innovators (32 percent) were 35 years or less. A small percentage (13 percent) was above 45 years.
9. Out of 74 innovators, 50 were male (68 percent). The rest were female (24). However, although a higher percentage of men (81.42%) than women (18.5%) submitted proposals, the latter received almost a third of the amount disbursed.
10. Majority of innovators received financial assistance either for Proof of Concept/Prototypes/Models (39) and to develop a working model (32).
11. 83 % of innovators had completed the projects and 17% of innovators' projects are ongoing. TOCIC centers in the South completed the maximum number of projects (23) followed by East (14) and North East (10).
12. Overall, 30 innovators established networks with incubation centers /industry in all the five regions and 38 did not. Innovators in South and North East developed the maximum number of networks (12 and 7 each).

13. Innovators focused principally on Green technology (20), Affordable healthcare (20) and Clean energy, industrially utilizable smart materials (19). Other areas of innovations (Waste to wealth and Water and sewage management) were, relatively less.
14. The innovators generated 42 patents in different technological sectors (56%). Some of the innovations were also registered for international patent.
15. A total of 38 Startups were noted till date
16. The capacity building of the individuals who received funding and also of the local people by training is noted in the study.
17. The southern, eastern and north-eastern regions identified lack of marketing skills as an important challenge. The in-depth interviews conducted with innovators from various TOCICs indicate the challenges include technical, process, networking, funding to scale up, lack of marketing skills etc.

Challenges

1. Majority of the innovators experienced technical challenges for experimentation in the process of developing prototype to product. They faced difficulty in fabrication & networking. Hence they required to seek technical assistance from various institutions to develop the prototype.
2. The medical innovators shared the delay in clinical trials and obtaining necessary administrative approvals to market the product. The innovators also desired to conduct exhibitions and symposium with marketing experts on business models to scale up their innovations.
3. The coordinators expressed that some of the innovators were from interior parts of the country and lacked confidence while presenting their ideas. Encouraging girls and women innovators was also a challenge. The social and cultural background they belong to discourages them from opting for this scheme. This has resulted in fewer women participating in the scheme. The working pressures in their respective profession was also a constraint.

Recommendations

1. PRISM may organize “Annual Symposium of Innovators” in different regions along with industry partners for industrial translation of successful products.
2. The scheme should be continued with higher allocation of funds for manpower engagement at TOCIC.
3. The Mentor pool database can be created to mentor succeeding stages of innovation in entrepreneurship; Knowledge of IPR; Technology Transfers policies; Exposure to Industry; Knowledge of Startups policies, National Innovation policies; Tie-ups with Incubation center, Venture Capitals, Banks, etc.
4. Each TOCIC should develop database of technical and marketing experts to mentor innovators.
5. DSIR may consider establishing Rural Incubation Centers

Introduction

Innovation Eco-System in India: An Introduction

India is among the fastest-growing economies of the globe. This is mainly due to its achievements in the field of Science and Technology. Innovations in Science and Technology help address developmental challenges such as reducing hunger, providing access to drinking water, improving sanitation or public health services, and promoting sustainable agriculture (OECD Report, 2012, UNCTAD Report, 2017). On the other hand, social Innovation is seen as providing new solutions and instruments to cope up with economic crisis and other global dilemmas such as climate change, energy and resource scarcity, health and demographic imbalances, which are becoming more urgent and require rapid resolution (Bowling et al., 2003). Therefore, the importance of understanding the innovation competencies is necessary and is becoming more relevant as an engine of economic growth under the global change (Ko & Lu, 2010).

Until the late 1980s, innovation was widely considered as the commercialization of scientific discovery that creates new knowledge (Schot and Steinmueller, 2016). Innovation is now considered as processes of adjustment to existing technologies, rather than on considerable novelty alone – and is therefore recognized as involving practices and techniques that are new to a country or firm, as well as new to the world (UNCTAD, 2017). A more recent understanding of innovation recognizes that capabilities are important not only in formal research and development but also in design, engineering, management and entrepreneurship and social practices. Hence, innovation is not new creation but can also be something that offers solutions to the problems. Schumpeter has said that innovation is the introduction of new or significantly improved products, processes, and organization methods. He emphasized that innovation is the result of investment in research and development (R&D) and human capital. There are several evidences to indicate the role of R&D as a catalyst for economic growth and technological innovations to address social challenges (EAS, Report, 2015).

Improvement in innovation capacity cannot be achieved without appropriate inputs of national innovation systems. The two crucial elements for building such capacity are R&D expenditure and R&D resources (Audretsch and Feldman 2004). Innovations will only have profound effect when they are converted into start-ups, applied on large scale and bring about societal challenges, drive economic growth and generate employment opportunities.

Initiatives to promote innovations: A brief

The Government of India has played a significant role in the formation of innovation system in the country. In order to nurture and build start-up ecosystem, Hon'ble Prime Minister of India has announced "Startup India initiative" on 15th August 2015. The government under the 'Start-up India' initiative aims to promote research parks, technology business incubators, and patent management companies that would promote innovative ideas until they become commercial ventures. These initiatives are based on startup policy and implementation, incubation support, seed funding, angel and venture funding, simplification of regulations, easing public procurement, and outreach (Startup India at https://www.startupindia.gov.in/) The Government of India further launched the Startup Action Plan (SAP) which addressed various aspects of the startup ecosystem and provided innovative entrepreneurs with a launch pad and support system, in 2016.

The SAP proposed to address three key areas for empowering potential startups: (i) handholding and simplification; (ii) funding support and incentives; and (iii) incubation and industry–academia partnership. The driving objective behind the action plan was to fast-track the spread of the startup movement from the digital/technology sector to a wide array of sectors, including the social sector, manufacturing, agriculture, education, and healthcare, and from existing Tier-1 cities (like Delhi, Mumbai, Bengaluru, etc.) to Tier-2 (Agra, Lucknow, Nagpur, etc.) and Tier-3 cities, including semi-urban and rural areas (Startups India - An Overview,2016).

The Department for Promotion of Industry and Internal Trade (DPIIT), Government of India was established to formulate the industrial policies and develop strategies for implementation at the industrial level. It is DPIIT's mandate to coordinate the implementation of Startup India initiative with other government departments. Apart from DPIIT, the initiatives under Startup India are driven primarily by five Government Departments viz. Department of Science and Technology (DST), Department of Bio-technology (DBT), Ministry of Human Resource Development (MHRD), Ministry of Labour and Employment and Ministry of Corporate Affairs(MCA), and NITI Aayog (Dept for Promotion of Industry and Internal Trade, Ministry of commerce and Trade,2022). Further, the Department for Promotion of Industry and Internal Trade (DPIIT) created the Startup India Seed Fund Scheme (SISFS) with an outlay of Rs.945 crores in the year 2021 to provide financial assistance to the startups for prototype development, proof of concept, market-entry, product trials, and commercialization (Economic Times, Jan, 6th, 2023).

The Government of India has contributed 56 per cent of the gross expenditure on R&D, which is three times the average contributed by Governments in the top ten economies. Yet, India's gross expenditure on R&D at 0.65 percent of GDP is much lower than that of the top 10 economies (1.5-3 percent of GDP) primarily because of the disproportionately lower contribution from the business sector. Indian residents contribute 36 per cent of patents filed in India as compared to 62 percent on average in the top ten economies. India's gross expenditure in R&D has tripled between 2008 and 2018. The Gross expenditure on R&D (GERD) in the country has been consistently increasing over the years and has nearly tripled from Rs. 39,437.77 crore in 2007-08 to Rs. 1,13,825 crores in 2017-18. According to the Economic Survey of India, 2021-22, Start-up India could take the ecosystem to tier 2 and tier 3 cities as well. Tier 1 cities accounts for 55% of the recognized start-ups. Tier 2 and tier 3 cities contributes about 45%. It has also been found that the Indian start-up ecosystem has a healthy representation of women, as percentage of female led start-up stood at about 45%. (Press Information Bureau. Retrieved from https://pib.gov.in/ Press Relese Detail. aspx? PRID=1786148).

DSIR Focus on Innovation

The Department of Scientific and Industrial Research (DSIR) is a part of the Ministry of Science and Technology was established in January 4, 1985 as per the 164th Amendment of the Government of India Rules, 1961. It undertakes activities related to indigenous technology promotion, development, utilization and transfer. Its endeavour is to promote Research & Development by the industries, support a larger cross section of small and medium industrial units to develop state-of-the art, globally competitive technologies of high commercial potential. It has numerous initiatives to catalyse faster commercialization of lab scale R&D and facilitate scientific and industrial research in the country. DSIR is mandated to promote and support industrial research and innovations, implement fiscal incentives announced by Govt. of India from time to time and channelize benefits thereof to the society. It extends support through different schemes such as PRISM (Promoting Innovations in Individuals, Start-ups, & MSMEs), PACE (Patent acquisition, Collaborative Research & Technology Development), CRTDHs (Common Research & Technology Development Hubs), A2K+ (Access to Knowledge for Technology Development and Dissemination) and TDUPW (Technology Development & Utilisation Programme for Women), etc. Other schemes through which it promotes research are Industrial R&D Promotion Programme (IRDPP) with its various component schemes, viz. Recognition of in-house R&D Units (RDI), Scientific and Industrial Research Organizations (SIRO), Public Funded Research Institutions (PFRI) and Fiscal Incentives for Scientific Research (FISR).

PRISM: A DSIR flagship programme to drive Innovations

Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM) is DSIR's flagship programme. It focuses on supporting individual innovators, start-ups and MSMEs to convert innovative ideas into demonstrable working models / prototypes / processes and assists them to become technopreneurs. The PRISM scheme, on the other hand, supports individual innovators who will help to achieve the agenda of inclusive development – one of the thrust areas of 12th Five Year Plan (2012-17). Research has shown that small enterprise R&D activities has brought large returns to the national economy through new technologies (Comin, 2004). The PRISM scheme has been extended until 31.03.2026 as a component scheme of Industrial Research and Development (IRD) Programme of DSIR.

	2014-2015	2015-2016	2016-2017	2017-2018
New Projects supported	17	13	16	21
Projects successfully completed	23	10	14	15

Innovations and entrepreneurship are key factors for ensuring sustainable development in fields such as education, housing, water and energy, healthcare, climate change, etc. The innovations will create a larger societal impact and fasten economic growth when they are converted into enterprises. Entrepreneurs add value by commercializing new goods, creating new employment, and forming new businesses by combining current resources with inventive ideas (Afolabi, A., 2015). According to the Global Economic Monitor, countries with greater levels of entrepreneurial activity had stronger economic development. Entrepreneurs are, in a nutshell, the connection between fresh ideas and economic progress. Individuals with these abilities are needed to lead and sustain the industrialization process (Pattanayak, Kalee Prasanna & Chitrasena Padhy.2022.). However, innovation is often perceived as a skill of highly educated people who conduct research in higher educational institutions or R& D laboratories or industries and centers of scientific excellence. The distinctiveness of PRISM scheme is that it reaching out to a variety of individuals including those who are illiterate.

The start-up ecosystem generally suffers from capital inadequacy at the stage of 'Proof of Concept' development. The capital required at this stage often presents a make-or-break situation for startups with good business ideas. Funding from angel investors and venture capital firms becomes available to Start-up only after the proof of concept has been provided. Similarly, banks

also have limitations in providing loans. It is essential to provide seed funding to individuals with an innovative idea to develop proof of concept. PRISM is initiated to transform an individual innovator into a successful Technopreneur by promoting, supporting, funding untapped creativity of individual innovators. It is for budding students, professionals and common citizens interested in innovation and having an implementable and commercially viable, novel innovative product for the society. Since 2104, it has been providing grant to any Indian citizen from any socio-economic and educational background for developing a proof of concept or a prototype or model/process.

PRISM is the erstwhile "Technopreneur Promotion Programme" (TePP). The latter was implemented from 1998 and the scheme is relaunched in 2014 as "PRISM". Since then, the scheme has been instrumental in supporting individual innovators, startups and MSMEs to achieve inclusive development of India.

This programme has been designed to meet the following objectives:

- To promote and support untapped creativity of individual innovators
- To assist the individual innovators to become Technopreneurs
- To assist the Technopreneur in networking and forge linkages with other constituents of the innovation chain for commercialization of their developments

PRISM also provides technical mentoring and financial assistance for idea development, prototype development and pilot scaling, and patenting. PRISM aims to reach out budding students, professionals, farmers, homemakers, any citizen who have novel idea that can be converted into commercially viable product which has social relevance. The uniqueness of this scheme is ownership of the IPR generated through the project, patent rights, licensing the know-how and the use of the know-how generated through the project shall rest with the individual innovator(s).

PRISM is an unique scheme of DSIR creating new diversity of innovators and entrepreneurs with a social and economic perspective thus contributing to build a strong innovation & Start-ups eco system in India. PRISM captures young budding Science & Technology innovators from IITs, IIM and universities to mentor and extend handholding in establishing startups across different regions in the country.

Dr. P.K. Dutta, Scientist G & Head, PRISM, DSIR

PRISM extends its support to any citizen of the country to develop innovations in the areas of Green technology, Clean energy, industrially utilizable smart materials, Waste to Wealth, Affordable Healthcare, Water & Sewage Management and any other technology or knowledge intensive area aligned with our national objectives. PRISM offers support to scale up the innovation for initial trials/ testing/user's acceptance/international patenting etc. Further , PRISM invites R&D project (Technology Solution) proposals from autonomous institutions/ public funded R&D laboratories or Academic Institutes etc in consultation/ collaboration with MSME cluster for developing technology solutions aimed at helping MSME clusters but DSIR shall not have any rights on the IPR (https://dsir.gov.in/#files/12plan/prism/guide_msme.html). The noteworthy issue is PRISM promotes extensive collaboration between corporate industry, academia, and governments at the village, district, state and central levels which eventually contributes to the promotion of individual innovations in the country.

Indian innovators with an out-of-box idea can submit proposal to DSIR under PRISM Scheme for translating their innovative idea into a marketable product. Affiliation of any organization or language is neither an advantage nor a barrier. DSIR-PRISM scheme has local outreach Centers called TePP Outreach cum Cluster Innovation Centres (TOCICs) for hand holding innovators and translating their idea from regional language (if any) to English for submission to DSIR. The grant support is credited to the bank account of Indian citizens (innovators) directly as Direct Benefit Transfer (DBT) giving enough leeway to innovators. The Intellectual Property Rights (IPR) generated from the project shall rest with the innovator. The slogan of PRISM "Mind to Market" is to deliver make in India product and to implant strong platform towards innovation eco-system in India.

Dr. Ramanuj Banerjee, Scientist F and Member Secretary, PRISM, DSIR

PRISM has created an ecosystem to develop innovations that can contribute to capacity building, utilization of indigenous knowledge, address societal issues and inclusive development. It has created an innovative framework to bring the students, academicians, professionals, farmers, artisans and common masses to contribute to innovation and start-up system.

PRISM makes several efforts to reach innovators directly by organizing and participating in number of activities which include awareness programs, workshops cum symposium, exhibitions, and outreach camps for students, faculty and entrepreneurs to sensitize academia, individual innovators, entrepreneurs, and common people. The Department of Scientific & Industrial

Research reach out individual innovators through the established centres named as TePP Outreach cum Cluster Innovation Centre (TOCICs) in different parts of the country.

TOCIC: Focal Point to connect Pan-India PRISM Innovators

The Department of Scientific & Industrial Research (DSIR) has established 12 TePP Outreach cum Cluster Innovation Centres (TOCICs) in different parts of the country to facilitate innovation and entrepreneurship among individuals. It identified TOCICs by inviting proposals from public funded institutions or organizations viz. registered autonomous Organization or Society involved in promotional activities related to innovation / entrepreneurship/Micro, Small and Medium Enterprises (MSMEs) / Science & Technology / R&D etc., which have good track record and sufficient infrastructure to undertake the activities of PRISM. The identified agency will undertake various activities for promoting and implementation of PRISM objectives in their regions in close association of with DSIR. The R&D institutions of Council of Scientific & Industrial Research (CSIR) which are known for their cutting-edge R&D knowledge base in diverse S&T areas, Indian Institute of Technology, central government owned public technical institutes and Public Universities were chosen to set up TOCIC centres.

Twelve TOCICs are currently operational which include CSIR Centres in Bengaluru (Karnataka), Chandigarh (Union Territory), Durgapur (West Bengal), Jorhat (Assam), Kolkata (West Bengal), IITs in Kharagpur (West Bengal), Kanpur (Uttar Pradesh) and Guwahati (Assam), and Higher Educational institutions in Udaipur (Rajasthan) Chennai (Tamil Nadu), Tirupati (Andhra Pradesh), and State Biotechnology Mission, Gujarat (Figure.1) .

The institution made an MOU with DSIR by appointing coordinator and co coordinators to conduct various activities of TOCIC such as

- Organisation of seminars/Workshops on" Grant writing and PRISM schemes" at different institutes for promoting innovations in Science & Technology Outreach activities at MSMEs and incubation centres.
- Selection of Domain knowledge experts from Central & State universities, IISER, CFTRI, IIT and JNTUs.
- Periodical screening committee meetings for the evaluation of the proposals
- Circulation for evaluation by domain knowledge experts
- Interactive sessions with innovators through e-mails/ skype / mobile phones
- Communicating the expert comments for Submission of revised proposals
- Regular Project Committee Review meetings (6 monthly PRC meeting)
- Interaction meeting with Innovators

DSIR provides an annual grant of Rs 12.00 lakhs to each TOCIC to carry out the activities listed above.

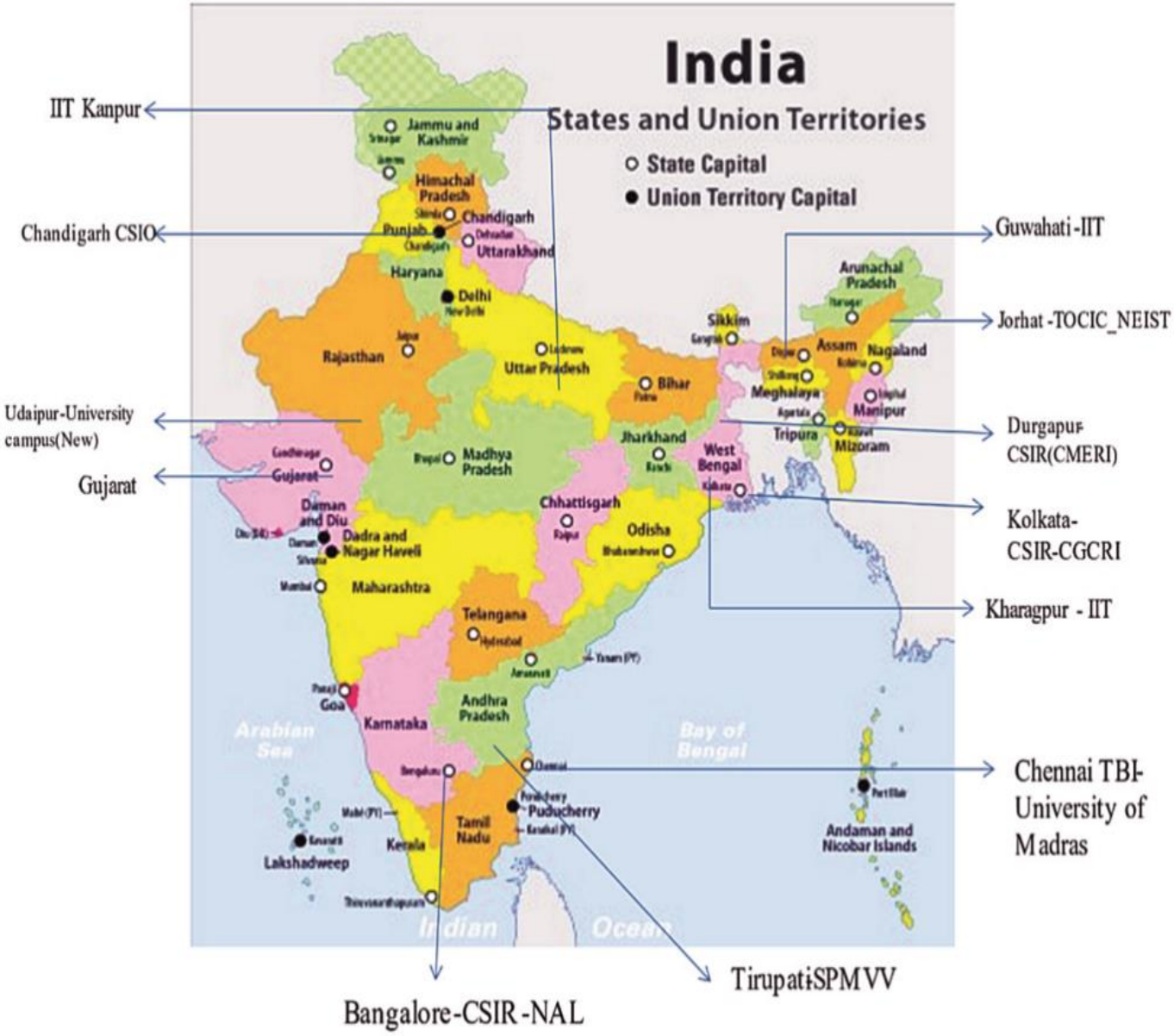


Figure: 1 Location of TOCIC Centres across India

TOCIC Coordinators: Key Facilitators to drive PRISM innovations

The coordinator and co coordinators play a crucial role in the promotion of innovations in their respective region. They invite proposals by advertising in regional language newspapers as per the DSIR guidelines, circulate brochures, place hoardings at central railway stations, establish direct contact, and publicize activities through institutional websites, press, electronic and social media to reach innovators.

We have 10 TOCICs at present but exploring to set up more such TOCIC possibly in maximum states in future so that maximum number innovators may be reachable with their innovative idea in their own language

Dr Rajesh Kumar , Scientist-E, PRISM, DSIR

Each TOCIC chooses a small geographic area – innovator group/MSME cluster for intensive reach. The TOCICs support and mentor innovators to write proposals with inputs on technology feasibility, novelty of the idea etc. The innovators can also meet the TOCIC coordinators and seek advice before submitting their application. The proposals directly received at DSIR are also forwarded to the relevant TOCIC for counselling/ local screening. The TOCIC coordinators initially screen the proposals for completeness. Subsequently, the 'Domain Knowledge experts' associated with the TOCIC evaluate them.

The coordinator will also evaluate the proposal and give his / her report by considering back ground of the idea, novelty of Innovation, report of the work so far done, innovators capabilities in design and arrangements made for fabrication & testing, justification for the budget and activity milestones. The recommended proposals will be sent to DSIR with expert comments and TOCIC coordinator's comments for consideration by National Level "PRISM Advisory and Screening Committee" PASC.

PRISM invites proposals under the following categories:

PRISM Phase-I :

a) Category I: Proof of Concept/Prototypes/Models: This is limited to a financial assistance of up to 2.00 lakh or 90% of the approved project cost, whichever is lower. The support is for micro budget innovations primarily aimed at encouraging student innovators Selected projects are provided financial support to demonstrate his/her idea in the form of basic stage model/prototype/process thus providing proof to the concept.

b) **Category II**: Fabrication of working model/prototypes/know-how/testing and trial/patent filing/technology transfer etc.: In this category, a maximum financial assistance up to 20.00 lakhs or 90% of the approved project cost, whichever is lower, is provided to the short listed innovative and novel proposal based on expert evaluation. Proposals to convert an original idea/invention/know-how into working prototype/process and proposals to demonstrate novel delivery models to take S&T innovations leading to inclusive growth can be considered. The proposals in the thrust areas such as Green Technology, Clean Energy, Industrially utilizable smart materials, Waste to wealth, Affordable healthcare, Water & sewage management, any other technology or knowledge intensive area can be considered.

Funding by PRISM

Phase I

Category-I Upto 2.00 lakh or 90% of the approved project cost

Category II - Up to 20.00 lakhs or 90% of the approved project cost

Phase II

Up to Rs. 50.00 lakhs or 50% of the approved project cost

PRISM Phase-II

In this phase, an amount of up to Rs. 50.00 lakhs or 50% of the approved project cost, whichever is lower, is provided to the Innovators. Specifically, proposals from successful PRISM innovators who have developed products/process at concept proving stage under PRISM Phase-I and that have significant market potential are considered. The purpose is two-fold: One, to facilitate the innovator to turn into an entrepreneur; two, to encourage Innovators who have successfully demonstrated proof of concept with the support of other Government Institutions / Agencies and who desire to take innovation to market and become a Technopreneur.

Proposals from autonomous institutions/R&D labs/IITs/NITs/other statutes etc. who have developed products/process at concept proving stage and has potential for deployment in MSME clusters to facilitate MSMEs become more competitive and economically rich.

In the PASC, the proposals were sanctioned based on the novelty of innovation and the commercial viability of the prototype /process/product. The DSIR releases the grant to the approved projects.

Three basic reasons to unable to clear the maximum proposals are due to lack of innovation, targeted milestones and deliverables. Innovators may try with new ideas, and targeteted unmet needs with the rationalised budget, for awarding more projects under PRISM scheme

Dr.Sarika Madan,Scientist -E, DSIR

The first release is based on activity milestones/deliverables projected in the project proposals and as recommended by PASC. The subsequent releases are based on the assessment of progress of the project. This task is undertaken by the Project Review Committee (PRC), which is constituted by the TOCIC in close consultation with DSIR.

The grassroot innovators sometimes lack technical vigour in their proposal. TOCIC may provide inputs to innovators from experts to strengthen technical part of the proposal especially innovators who do not have formal educational background.

Dr.Puroshotham Kumar , Scientist D, DSIR

For the approved and sanctioned projects, TOCIC convenes a meeting within six months with minimum of two technical experts for each project. Besides, TOCICs review the projects on quarterly basis on site and submit the report to DSIR. However, the periodicity of PRC may vary based on the nature of the project and its deliverables.

Like innovators ,industry and Startups are also DSIR stakeholders. DSIR can arrange a meeting between industry and innovators for sharing the marketing / commercial experience of the industry . TOCICs can also arrange the industrial visit to the innovators to improve the commercial / marketing skills of the innovators.

Dr.S.P.Verma, Scientist – C, PRISM, DSIR

PRISM scheme can help the women innovators- who have not been supported by any other sources. Through PRISM scheme, we may promote Technology & Engineering innovations targeting women innovators in India. It will be beneficial for women, who work at home, agriculture sectors enabling an impact on innovation ecosystem with inclusiveness.

Dr. Anil Kumar,Scientist-D, DSIR

TOCICs also attend to any other issues as per the guidance of PRISM Advisory and Screening Committee (PASC) of DSIR. The IP ownership and rights to technology commercialization rests with the innovator.

Grassroots innovators with Indian citizenship may be benefitted out of this PRISM scheme of DSIR –

Mr.R.C.Joshi, Scientist-B ,DSIR

Sum up

PRISM created an innovative model to motivate the innovators through TOCICs to develop innovations and initiate start-ups. It connects innovators with appropriate institutions and technical experts, support for transfer technology, for filing patent and help to scale of innovations. The TOCICs organize workshops and exhibitions, showcase innovations, and connect innovators with industrialists.

Methodology

Research approach of Study : Rationale

The scheme for Promoting Innovations in Individuals, Start-ups, & MSMEs (PRISM) of the Department of Scientific and Industrial Research (DSIR), Ministry of Science & Technology, Government of India redefines the relationship between government and citizens by providing transparent and accountable system to augment innovations in the country. The flagship scheme extends its support to any citizen of the country through direct benefit transfer in the core technology areas such as Affordable Healthcare, Water, Sewage Management, Green Technology, Clean Energy, Industrially Utilizable Smart Materials, Waste to Wealth aligned with the national objectives.

The PRISM scheme is divided into two phase. Phase-I aims to support individual innovators / scientists / researchers having innovative ideas to develop a proof-of-concept deliverable as a prototype / working model. The proof-of-concept prototype is greatly encouraged if it is driven by social need. In effect, the scheme promotes inclusive development - one of the thrust areas of XII five year plan (2012-2017).

PRISM Phase-II, on the other hand, enables translation of proof-of-concept prototype into pilot products. It specifically encourages innovators from different socio-economic and educational backgrounds to generate locally relevant technologies for commercialization.

Since the inception of PRISM scheme in 2012, DSIR has established a robust mechanism of outreach centres (TePP Outreach cum Cluster Innovation Centre or TOCIC) at several higher educational institutions, IITs, CSIR institutions across the country to disseminate the scheme, promote innovations and efficiently manage them. Apart from acting as nodal agencies for the PRISM scheme, the regional TOCIC centres publicize the scheme to broaden their reach, extend mentorship for writing of grant, defending the proposal, Phase wise monitoring of the progress of sanctioned and implemented projects, and commercialization and scaling up of innovations.

About a couple of years of its existence, DSIR has initiated a study to understand the impact of the scheme on innovations in Science &Technology, its achievements, challenges, and outcome in the period 2015-2020. More specifically, it seeks answers to questions such as: How is the scheme supporting local knowledge and helping harness technology? What is the kind of technologies developed and in which areas? How are innovators working for innovation and contributing to employment generation? How are the technologies developed under the scheme contributing to Sustainable Development Goals? What are the major challenges that coordinators confront in the process of implementation? In other words, the core objective of DSIR to undertake such a study is to obtain comprehensive information and understanding of the impact of PRISM scheme in order to take it forward more vigorously.

Toward this end, a high-level Review Committee was constituted under the chairmanship of Prof. (Dr.) Sachin Chaturvedi, DG, Research and Information System for Developing Countries (RIS) along with members representing Central and State Universities, IITs and National Research institutions to provide direction to the research team. Dr. Thirumalachari Ramasami, Former Secretary, DST, MoST acted as a Mentor for the Project Review Committee. Dr. Ramanuj Banerjee, Scientist-F, DSIR, was the Member-Secretary of the Review committee. A research team was constituted with Prof P. Uma Maheswari Devi, Coordinator, TOCIC, Sri Padmavati Mahila Visvavidyalaym (SPMVV) as Principal Investigator and Prof P. Jyostna, Co- Coordinator, and Prof.P.Vijaya Lakshmi from Department of Communication and Journalism as Co-investigators to study the impact of the scheme.

Field study

Mixed met approach was employed for the study. We initially conducted desk research to familiarise ourselves with the PRISM scheme and its various facets. This helped us develop a set of instruments. The quantitative survey based on closed ended structured questionnaire collected relevant information from coordinators and innovators. In addition, qualitative in-depth interviews were conducted with coordinators of all 12 TOCICs which were operational during the assessment period. In addition, we built a database of all innovators with a brief description of their innovation.

The study addressed how individual innovators contribute to society through small innovations. Further, the data captured the contribution of innovators for capacity building, community development, employment generation, commercialisation and scaling up of innovations. The field study was carried out between 2021- 2022. The Coronavirus pandemic interrupted the process of data collection.

Project Review Committee

A Project Review Committee was formed to track the progress of the report.

1. **Dr. Thirumalachari Ramasami, Former Secretary, DST, MoST- Mentor**
2. **Prof. (Dr.) Sachin Chaturvedi, DG, Research and Information System for Developing Countries (RIS), New Delhi, India - Chairman**
3. **Prof. Lalitha Guruprasad, University of Hyderabad, Hyderabad - Member**
4. **Prof. Sunil Bhand, Dean, SR&;CD, BITS Pilani, Goa - Member**
5. **Dr. Sujit Kumar Pruseth, Faculty, IIPA, New Delhi -Member**
6. **Dr. Indranil Biswas, Principal Scientist, PP&;BD, CSIR-CGCRI, Kolkata-Member**
7. **Dr. Ramanuj Banerjee, Scientist-F, DSIR, New Delhi - Member-Secretary**

Two project review committee meetings were conducted in Tirupati on 23.12.2021 and 07.10.2022 to review the progress of the study and offer suggestions on the report (its objectives, methodology, sample size, and structure).

Objectives

Based on the overall objectives (given above), two specific objectives were formed to frame the instruments and collect data – one from the Coordinators and the other from the innovators.

The following specific objectives were framed to document the activities of TOCICs:

- Activities taken up by TOCIC coordinators to promote the objectives of PRISM scheme
- Number of Innovators mentored at each TOCIC during the assessment period.
- Number of proposals received from innovators and forwarded to DSIR for funding,
- Number of projects sanctioned and disbursement of funds by DSIR.
- Document the contribution of PRISM scheme in promoting innovations in areas of innovations generated, innovations adopted, patents generated and start-ups established, centre-wise and region-wise.
- Evaluate the performance of TOCIC in terms of reaching and mentoring the innovators, monitoring the progress of innovative grants, and facilitating the commercialisation of the innovation.

Document the challenges that TOCIC centres encountered during the implementation of the scheme.

Sample Size: 12 TOCICs

As indicated, 12 TOCICs were operational during the assessment period. The data from all the 12 coordinators was collected on different dimensions of PRISM and innovation eco-system keeping in view of the role and responsibilities of coordinators.

The following specific objectives were framed to document the innovators' opinions.

- Document the profile of innovators.
- Assess the support extended by TOCIC in terms of fund release, Technical support, Mentorship and Coordination with PRISM.
- Document areas of innovations generated, adoption of innovations, patents generated, scaling up, and start-ups established, centre-wise and region-wise.
- Analysing Mechanism adopted by innovators in terms of networking with other agencies for raising funds from other sources apart from DSIR and Incubation Centers/Research Centres/ Universities for technical help and commercialisation of the prototype/ Process.
- Assess the novel solutions offered by innovation in terms of Economic and Social Relevance, Environmental Impact, Regional Impact, Manpower trained, Manpower employed and Utilization of local knowledge
- Document usefulness of the innovation and its impact on the community.
- Assess contribution of innovation to Sustainable Development Goals (SDGs)
- Document the challenges faced by innovators during the assessment period.
- Document the change of household expenditure after commerciali-zation of innovation.
- Document the experiences of unsuccessful innovators.

Consultation with stakeholders

The research team interacted with Coordinators and coordinators of TOCICs, innovators, officials of DSIR, experts and the evaluators before finalising research tools to collect the data.

The research team interacted with Coordinators and coordinators of TOCICs, innovators, officials of DSIR , experts and the evaluators before finalising research tools to collect the data.

The TOCICs are grouped into five regions (Table 1) as per their geophraphical locations to present the data collected from coordinators and innovators.

North - CSIR-CSIO - Chandigarh, IIT - Kanpur

North East - NEIST - Jorhat, IIT - Guwahati

East - CSIR-CMERI - Durgapur, IIT - Kharagpur, CGCRI - Kolkata

West - CATE-Udaipur, GSBTM - Gujarat

South - SPMVV - Tirupati, University of Madras - Chennai. NAL – Bangalore

Region	TOCIC centres	No of Innovators	Responses recived from Innovators
North	CSIO- Chandigarh	3	3
	IIT-Kanpur	18	5
North East	NEIST-Jorhat	7	6
	IIT -Guwahati	10	7
East	CMERI-Durgapur	10	7
	IIT-Kharagpur	11	3
	CGCRI- Kolkata	9	4
West	CTAE-Udaipur	21	9
	GSBTM- Gujarat	3	2
South	SPMVV-Tirupati	25	18
	UoM- Madras	7	6
	NAL-Bangalore	8	4
Total	12 centres	132	74

Table 1 : Geographocal location of TOCIC centres

In all, 132 innovators received funding from DSIR during the assessment period. We sent out questionnaires to all of them with support from TOCIC Coordinators. However, 74 innovators sent back filled-in questionnaires. The remaining did not respond though the research team contacted them directly through mails and WhatsApp group. Some of the innovators' mails bounced back and some of the innovators were not reachable, as they had settled outside India.

Virtual Interaction with TOCIC Coordinators

As part of the pilot study, the research team also conducted virtual interaction with coordinators of 9 centres (IIT-Kanpur, IIT-Guwahati, CSIR-NEIST, Jorhat Assam, CSIR-NAL, Bangalore, GSBTM, Gandhi nagar, University of Madras, Chennai, SPMVV, Tirupati, College of Technology and Engineering (CTAE), Udaipur, and CSIR-NAL, Bangalore) in order to revise the

questionnaire. Relevant suggestions from coordinators of TOCIC were incorporated in the questionnaire.

Details of the questionnaires developed for the coordinators and the innovators in presented next.

Co PI of Impact Study is conducting virtual interview with innovator during pandemic

Research tool for Coordinators

To begin with, the research team conducted desk research on the objectives of the PRISM scheme and annual report of a TOCIC to understand the objectives, nature of activities performed, and process and disbursement of funds granted by DSIR. Based on it, two types of questionnaires were developed, one for the TOCIC coordinators and another for the innovators. Respondents were contacted through mail to participate in the pilot study. The purpose of the pilot study was to check the appropriateness of question and the comprehensiveness of the questionnaire (coverage of all relevant domains). The draft questionnaire was shared with members of the Project Review Committee and coordinators of all 12 centres of TOCIC. The pilot study was conducted during June 2021 and August 2021.

- The questionnaire developed for TOCIC coordinators had 30 questions (Annexure-1) of which the first 6 questions sought details of TOCIC centre (Name of the coordinator, year of establishment, name of the host institution etc.).

- Questions 7 to 15 were open ended questions that sought information on the outreach activities, number of innovators that applied, mentored, funded and funds disbursed from DSIR to innovators, year wise, during the assessment period.
- Questions 16 and 17 collected data on the current status of the projects at the centre.
- Question 18 to 20 collected data on major areas of Innovations, scale-up of innovations and output of innovation.
- Finally, question 21 to 30 were open ended that aimed to find out the extent of entrepreneurship leveraged, the outcome of the innovations, and contribution made to SDGs.

Research Tool for Innovators

The questionnaire developed for innovators had 33 questions of which 5 were open ended questions and 28 were "yes" or "no" / multiple choice questions (Annexure-II). Questions 1 to 10 dealt with innovators' project details like their affiliation with the TOCIC Centre, year, and the amount sanctioned for the project. Questions from 11 to 13 enquired about the areas and the nature of innovation, and support received from TOCIC. Questions from 14 to 17 were open-ended and sought information about technological and other challenges encountered, and strategies adopted to demonstrate the success and output of Innovation. Questions from 18 to 28 dealt with the relevance, impact, commercialization, marketing and novel solutions offered by the innovations. Questions 29 to 32 sought information from the innovators on the contribution of their innovation to SDGs. Finally, question 33 dealt with the challenges experienced in establishing a Start-up.

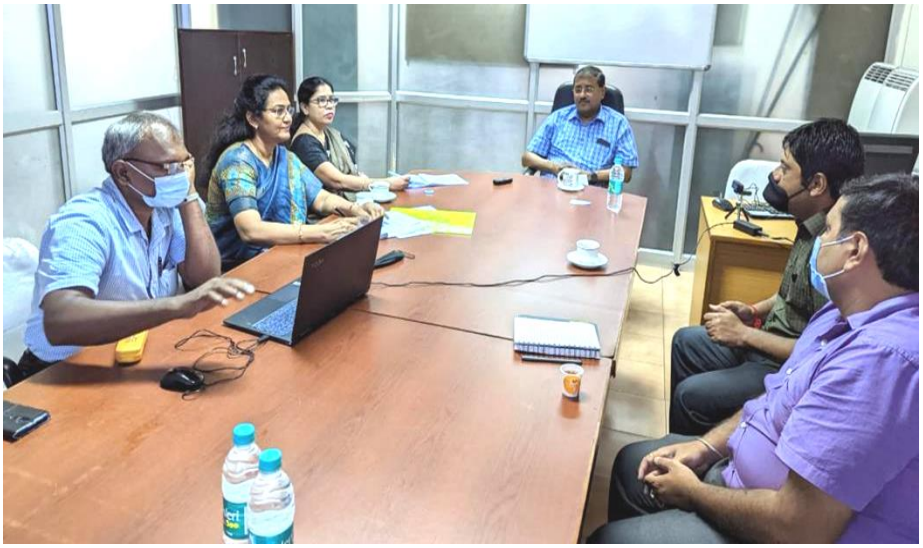
System Investigation

The research team undertook fieldwork during 2021-22 (The pandemic affected the data collection schedule). It visited 10 of the 12 Centers between 9th Dec, 2021 and Oct, 2022 to conduct interviews with both coordinators and innovators. Specifically, it conducted one-on-one in-depth interviews with coordinators (10) and selected innovators (40) at the TOCIC Centers located in Kolkata, Udaipur, Durgapur, Chennai, Bangalore, Jorhat, Guwahati, Chandigarh, Khargapur and Tirupati.

Team with TOCIC with Coordinator and innovators at Udaipur

Research team in TOCIC in IIT, Guwahati

Team with TOCIC with Coordinator and innovator University of Madras, Chennai.



Conducting in-depth interviews with Coordinator and innovators at TOCIC IIT, Kharagpur

Research Team with Coordinator, TOCIC- CGCRI, Kolkata

Research Team with innovators & Coordinator-TOCIC-NEIST-Jorhat

Research Team with Present and Former Coordinator of TOCIC, Durgapur

Coordinator of TOCIC, NAL, Banglore

The In-depth interviews conducted with the present and former coordinators of TOCIC centres ('former' because some of them had changed jobs) enabled us to understand several concepts and practices such as the average funding received per innovator, project completion period, experiences of women innovators, technical support extended, challenges in developing business plans, converting prototype to start-up, association between timely release of funds, project performance, and TOCIC networking with MSME. This enabled us to understand the underlying determinants of the project scope and its impact. The team also interacted with innovators of ongoing projects to capture their experiences.

PRISM: Evolution for last 5 years

Funding Support under PRISM budget

The PRISM (Promoting Innovations in Individuals, Startups and MSMEs) Scheme is an initiative of the Department of Scientific and Industrial Research (DSIR) aimed at transforming an individual innovator into a successful technopreneur by promoting, supporting, and funding novel, implementable and commercially viable innovations created for the society.

To deliver effective results in the implementation and execution of the scheme, DSIR has identified 12 TOCIC (Technopreneur Promotion Programme Outreach cum Cluster Innovation center) throughout the country.Each centre has a coordinator and some of the centres have appointed co-coordinators as facilitators between the DSIR officials, innovators and various stakeholders involved in the execution of the PRISM scheme.

The responsibilities of coordinators include:

- Reaching the innovators to create awareness about the PRISM scheme
- Building capacity of the innovators to write proposals
- Establishing linkages with Local Engineering colleges, Universities, Research institutions and incubation centers to promote innovation culture among students, academicians and common citizens
- Seeking proposals from innovators, guiding and supporting them to enhance and build prototype and then market it to form a successful business.
- Identifying and addressing local technological issues
- Arranging evaluation of the proposals by domain knowledge experts
- Phase-wise monitoring of the progress of sanctioned and implemented projects

- Motivating the innovators to initiate start-ups in collaboration with incubation centers
- Leveraging successful innovators with entrepreneurship

TOCIC's core responsibility is implementation of the scheme, which requires conforming to a standard procedure, expertise and direction. The performance of the TOCICs is assessed based on their ability to adhere to pre-determined outcome indices, timelines and a set of monitorable targets particularly in conducting workshops, outreach activities, submission of proposals, linkage with institutions & MSMEs and timely conduct of project review committee meetings.

TOCICs receive proposals for innovations from different areas of Science &Technology. Since innovators belong to different backgrounds (some of them may be illiterate or semi-skilled), coordinators help and guide them to draft the proposal and, in the process, make them aware of the subsequent steps leading to commercialization of the innovation..

More specifically, the Coordinators and Co-coordinators at TOCIC extend the following services to innovators:

- Motivating the innovators from various sections of society to apply for the PRISM scheme
- Mentoring innovators during all the phases of innovation from ideation to development of process/prototype.
- Support in providing expertise in documentation for patenting and fulfilling the technical queries during the procedure.
- Guiding the innovators to apply for phase II grant with PRISM or other funding agencies for scale up and commercialization
- Conducting exhibitions to demonstrate successful prototype(s) and increasing the market viability of innovations.

Proposals received and Funded by DSIR

The 12 TOCICs together received a total of 1082 proposals during the assessment period of 2015-2020 which is shown in Figure.2.

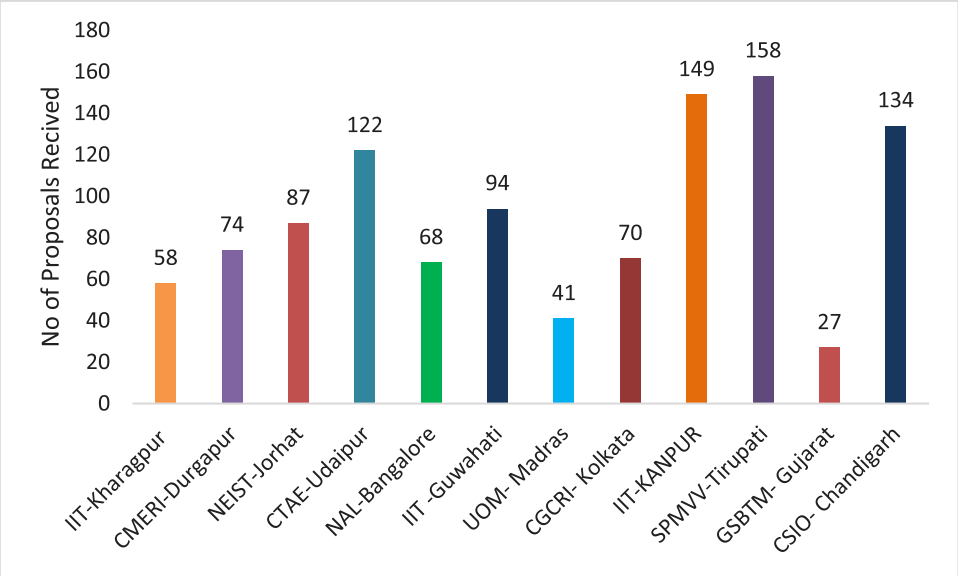


Figure.2. Total number of proposals received – 2015 – 2020.

Number of Proposals Received by TOCICS (2015-2020)

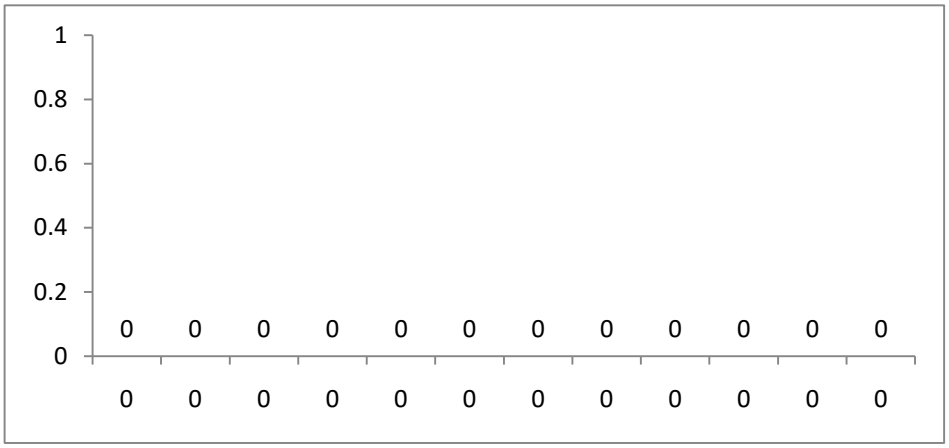


Figure.3. Total number of proposals received - 2015-2016.

In the first year, 2015-16, eight of the 9 TOCIC centers received 207 proposals (Figure.3) out of which CMERI-Durgapur received the maximum number of proposals (74) followed by SPMVV-Tirupati (47) and IIT-Kharagpur (27). Three TOCIC such as IIT-Guwahati,NAL-Bangalore and GSBTM-Gujarat were established in 2016.

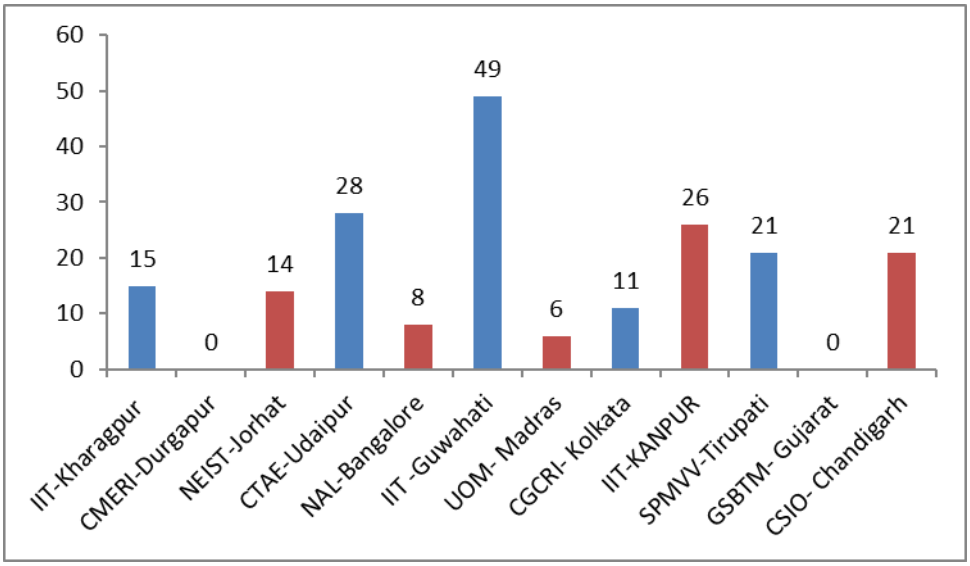


Figure.4. Total number of proposals received - 2016-2017.

In 2016-17, ten TOCIC centers received 199 proposals (Figure.4). IIT-Guwahati received the maximum (49) number of proposals followed by CTAE-Udaipur (28) and IIT-Kanpur (26). CMERI-Durgapur and GSBTM-Gujarat showed nil data for this period.

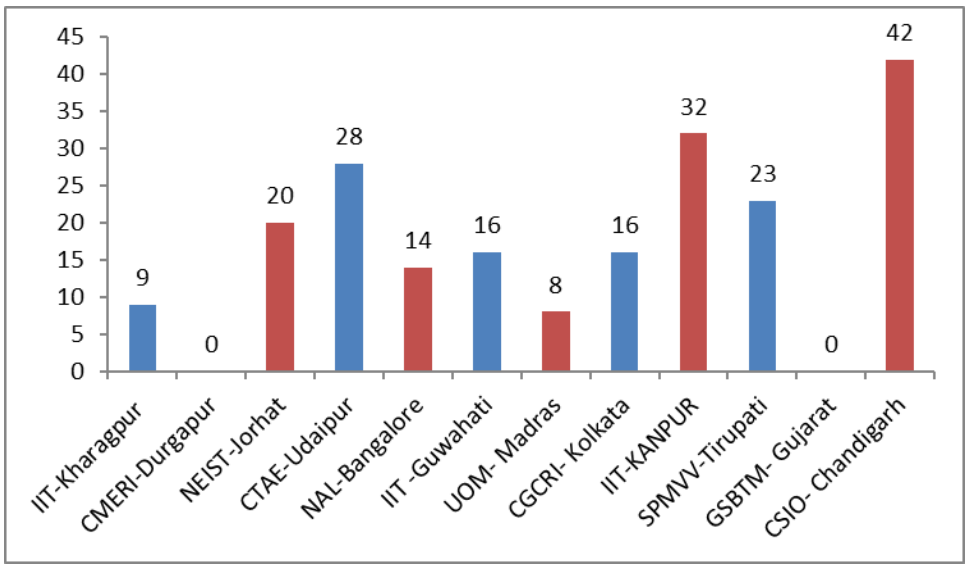


Figure.5. Total number of proposals received - 2017-2018.

The TOCIC centre of CMERI-Durgapur was discontinued in 2017-2018 from the PRISM scheme. However, the total number of proposals received by the remaining centers increased to 208 (Figure.5). GSBTM-Gujarat presented nil data.

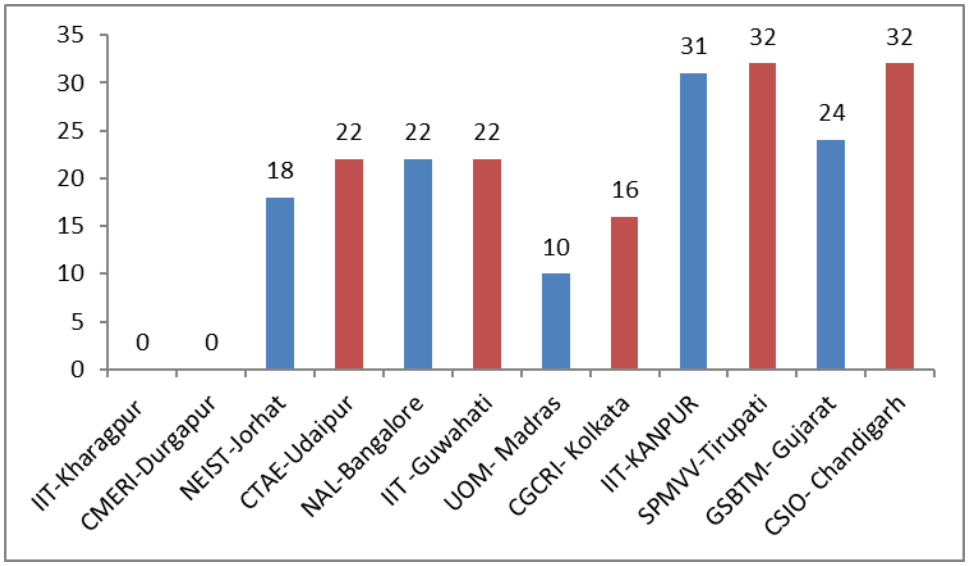


Figure.6. Total number of proposals received - 2018-2019.

In 2018-19, IIT-Kharagpur did not receive any proposals (Figure.6). The remaining nine centers received 10 or more proposals with SPMVV-Tirupati and CSIO-Chandigarh receiving the maximum number (32).

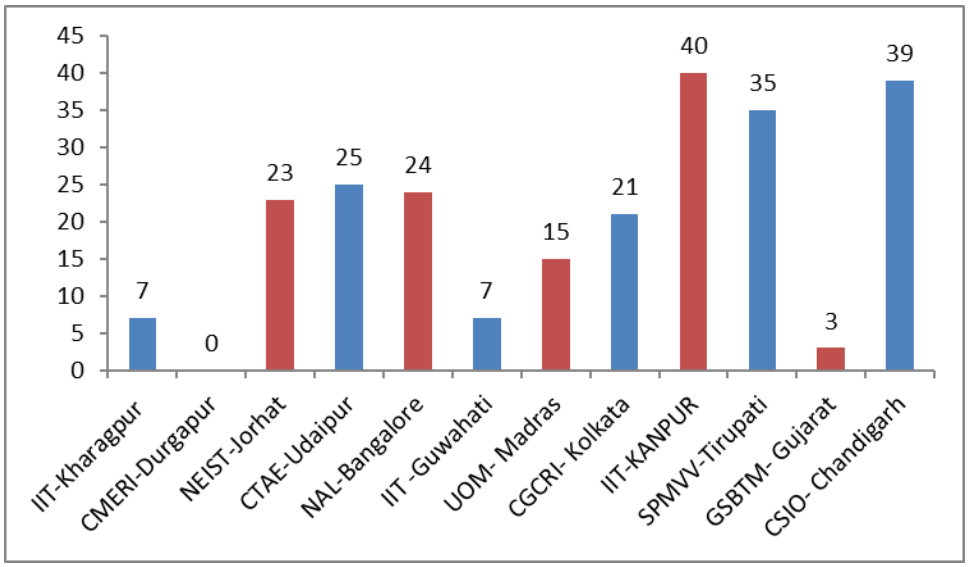


Figure.7. Total number of proposals received - 2019-2020

2019-20 saw the highest number of proposals received (239). All the TOCIC centers received proposals. IIT-Kanpur received the maximum number (40) followed closely by CSIO-Chandigarh (39) and SPMVV-Tirupati (35) (Figure.7).

Funding across Centers and Regions

DSIR received a total 1082 proposals from various centers on different technological innovations. DSIR sanctioned 132 proposals and the Innovators received an amount of Rs 827.34 for development of innovations (Table 2).

TABLE 2: Overview of proposals submitted and funded (2015-2020)

TOCIC	Proposals Received by TOCIC	Proposals Submitted to DSIR	Proposals Sanctioned by DSIR	Amount disbursed by DSIR (lakhs)
IIT-Kharagpur	58	29	11	127.11
CMERI-Durgapur	74	17	10	19
NEIST-Jorhat	87	14	7	9.55
CTAE-Udaipur	122	60	21	115
NAL-Bangalore	68	68	8	54.65
IIT -Guwahati	94	28	10	50.05
UoM- Chennai	41	24	7	65.19
CGCRI- Kolkata	70	17	9	54.44
IIT-KANPUR	149	51	18	70.36
SPMVV-Tirupati	158	59	25	206.82
GSBTM- Gujarat	27	27	3	25.1
CSIO- Chandigarh	134	26	3	29.45
Total	**1082**	**420**	**132**	**827.34**

Number of proposals submitted & sanctioned - 2015-2020

In the first year, 2015-16, seven centers submitted 71 proposals for funding. Of these, 31 proposals were sanctioned (Figure.8). Three centers viz IIT Kharagpur, CMERI-Durgapur and SPMVV-Tirupati submitted more than 10 proposals. However, two centers (UoM)-Chennai and CSIO-Chandigarh did not submit any proposal during this period. During this year, the TOCIC centres on the whole received grants for the fifty percent of the proposals submitted except SPMVV.

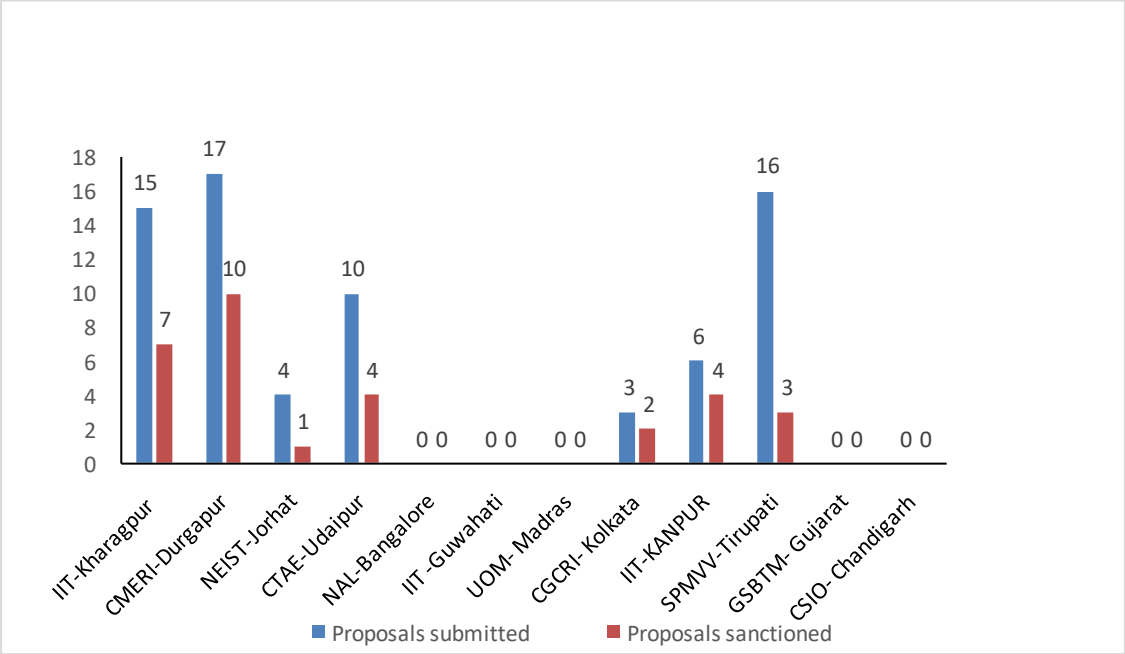


Figure.8. Total number of proposals submitted & sanctioned - 2015-2016

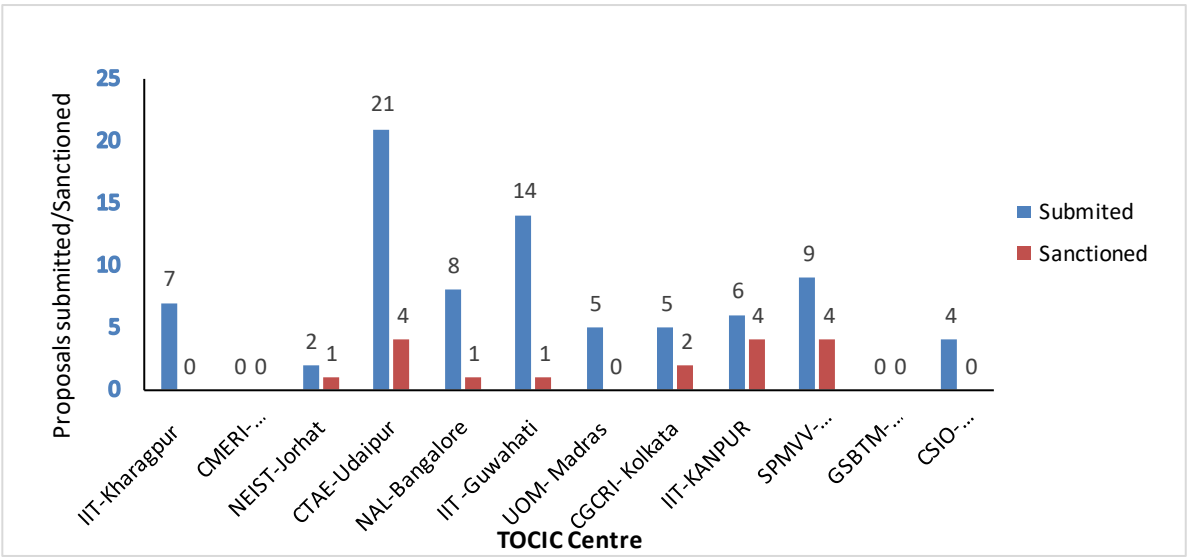


Figure.9. Total number of proposals submitted & sanctioned during 2016-2017

Next year in 2016-17, the total number of proposals submitted by the 12 centers increased to 81 but only 17 proposals were approved by DSIR which accounts to 20% of the success rate (Figure.9). Only 2 centers submitted more than 10 proposals. Two centres did not submit

proposals (CMERI-Durgapur and GSBTM-Gujarat). We see an inverse relationship between proposals submitted and sanctioned. For example, CTAE-Udaipur submitted the highest number of proposals (21) but only four of them were sanctioned. So was the case with IIT – Guwahati (submitted 14, sanctioned 1), but CGCRI-Kolkata, IIT-Kanpur and SPMVV-Tirupati submitted fewer proposals and about 40 percent of them were sanctioned.

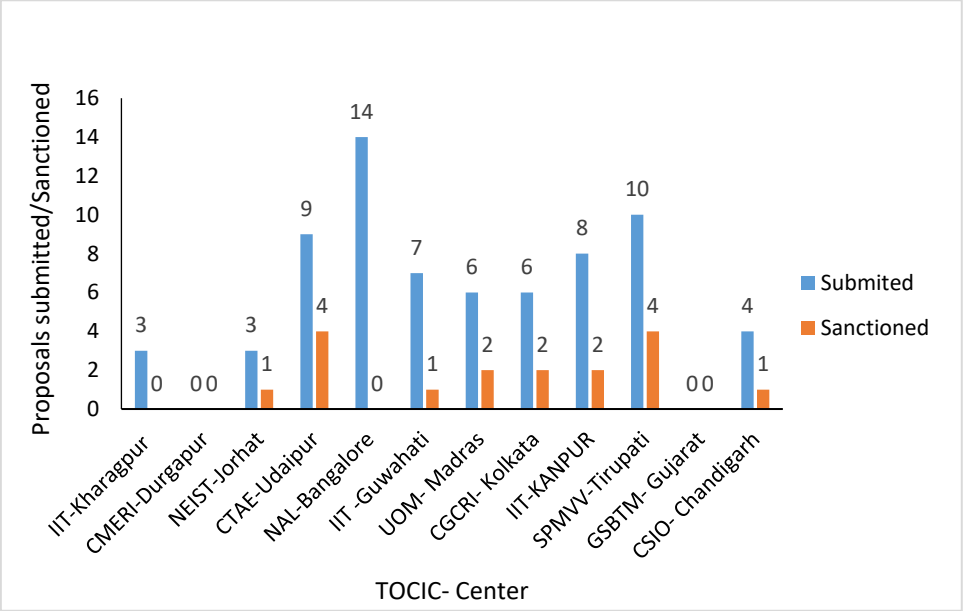


Figure.10. Total number of proposals submitted & sanctioned - 2017-2018

In the year, 2017-18, all the 10 centers together submitted 70 proposals except GSBTM-Gujarat. Two centers, NAL-Bangalore and SPMVV submitted the highest number of proposals 14 and 10 respectively but none of the proposals submitted by NAL-Bangalore was sanctioned. Tirupati was sanctioned 4 proposals (Figure.10). Overall, the number of proposals submitted declined; however, all the centers that submitted proposals were sanctioned some funding except IIT-Kharagpur and NAL-Bangalore. In 2017-18, 70 proposals were submitted by all TOCIC centres and 17 were sanctioned with a success rate of 24 percent.

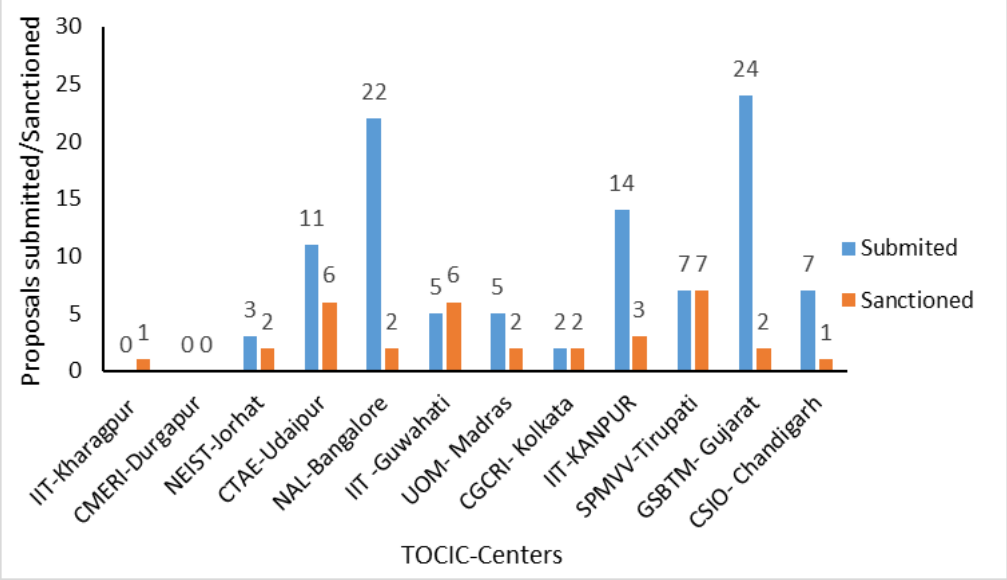


Figure.11. Total number of proposals submitted & sanctioned - 2018-2019

The year 2018-19 saw the highest number of proposals submitted (100); 34 of them were sanctioned (~36 percent). Two features stand out for this year. One, both CGCRI-Kolkata and SPMVV-Tirupati centers were sanctioned all the proposals that they submitted (Figure.11). Two, Kharagpur and IIT-Guwahati were sanctioned funds for more proposals than they had submitted (Kharagpur did not submit any proposal but received sanction for one, and IIT-Guwahati submitted five proposals but received sanction for 6). This can be due to proposals carried over from the preceding year(s).

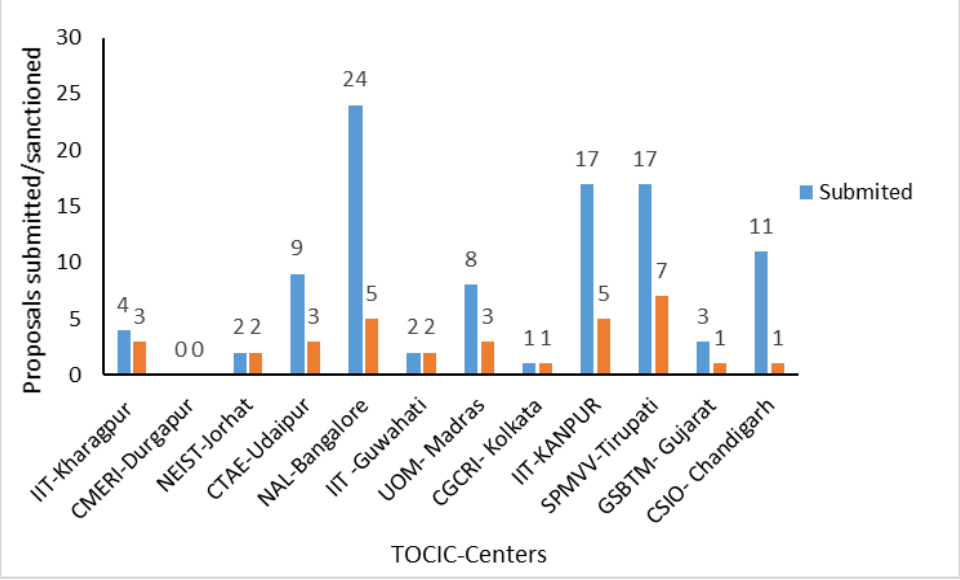


Figure.12. Total number of proposals submitted & sanctioned - 2019-2020

In the last year (2019-20), were 98 proposals submitted and 33 of them were sanctioned (Figure.12) with a success rate of ~34 percent. The centers such as IIT-Kharghpur, NIEST-Jorhat, IIT-Guwahati, CGCRI-Kolkata submitted four proposals or less but their hit ratio was very high (100 percent in the case of Jorhat, Guwahati and Kolkata).

Projects funds disbursed by DSIR

DSIR has disbursed a total amount of Rs.**827.34** lakhs to different centres during the assessment period, 2015-16 to2019-20 (Figure.13).

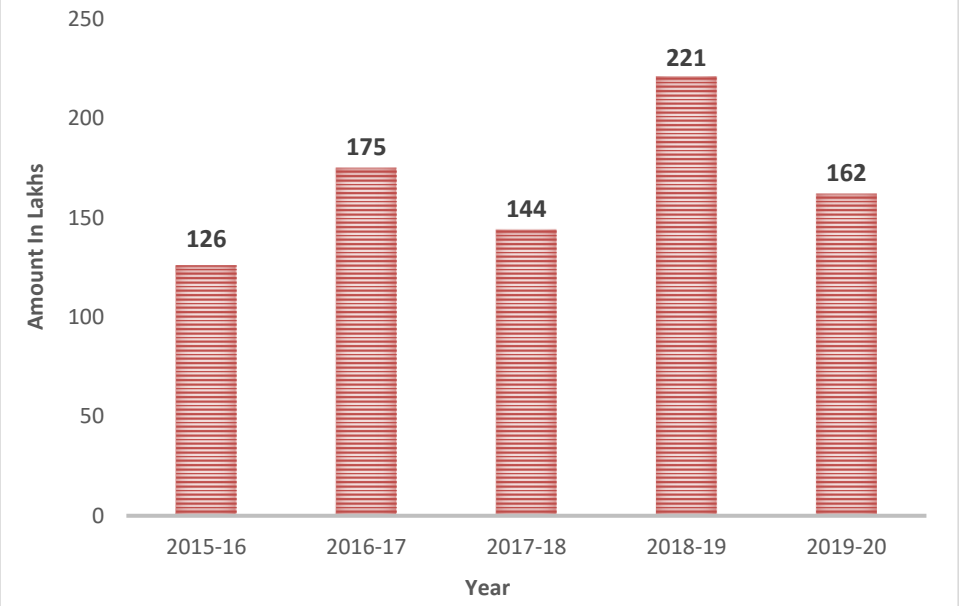


Figure.13. Funds disbursed by DSIR - 2015-2020

In the first year, 2015-16, six TOCIC centers received funds from DSIR. IIT-Kharagpur received the highest amount (44.1 lakhs) and NIEST-Jorhat received the lowest amount (1.8 lakhs). The total amount disbursed was Rs 125.77 lakhs (Figure 14). CSIO-chandigarh showed an amount of Rs16.95 which seems to be the grant allocated towards the projects sanctioned in 2014-2015. Eventhough, two proposals were sanctioned to CGCRI-Kolkata the grant was not released probably due to the non-submission of required documents by the innovators.

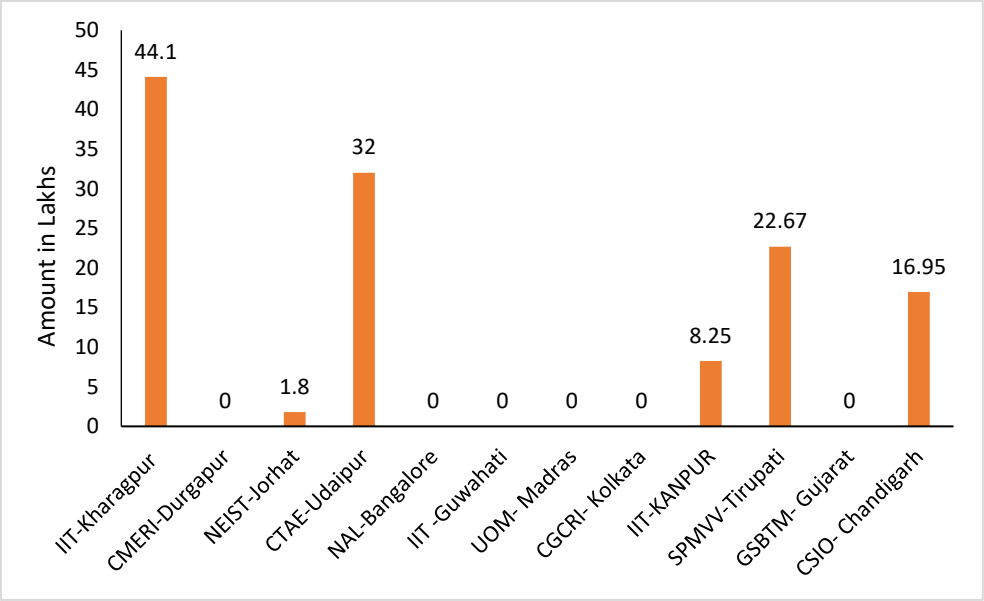


Figure.14. Total funds sanctioned to TOCICs - 2015-2016

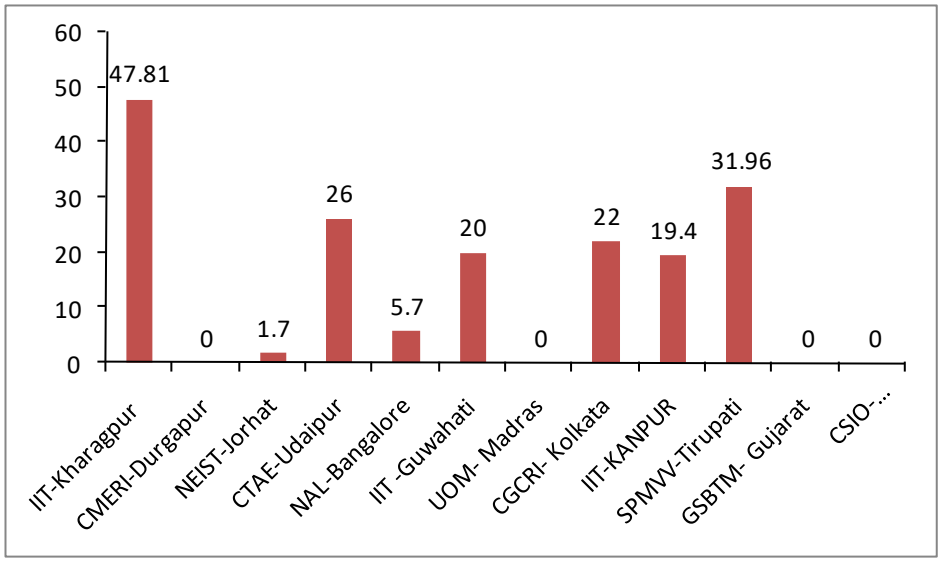


Figure.15. Total fund sanctioned to TOCICs - 2016-2017

Next year (2016-17), eight centers received DSIR funding with five centers receiving substantial amount of Rs 20 lakhs or more.IIT-Kharagpur again received the highest amount (47.81 lakhs). The total amount disbursed was Rs 174.57 (Figure. 15). The funding for many centres is increased from the previous year.

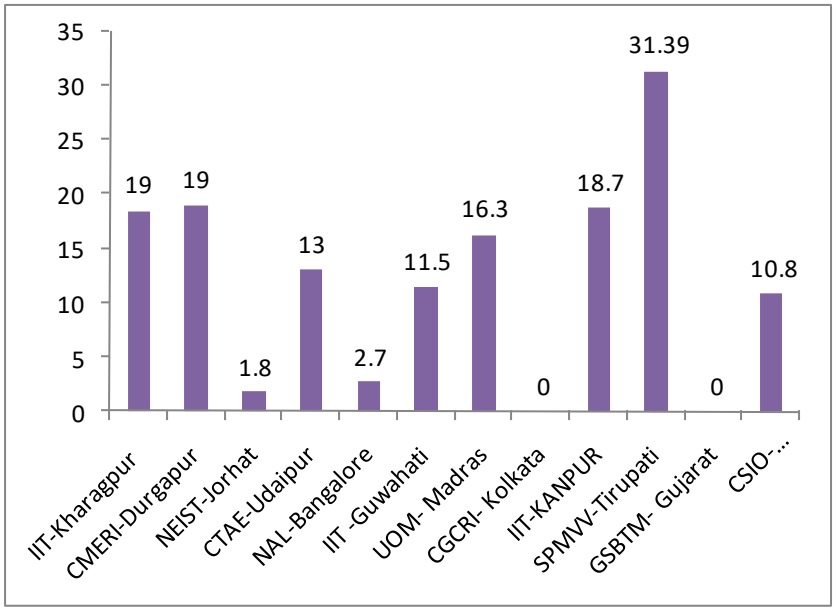


Figure.16. Total funds sanctioned to TOCICs- 2017-2018

In the third year, 2017-18, the number of centers receiving DSIR funding further went up. Ten centers received funding with SPMVV-Tirupati receiving the highest amount (31.39 lakhs). The total amount disbursed was Rs 144.19 (Figure.16)

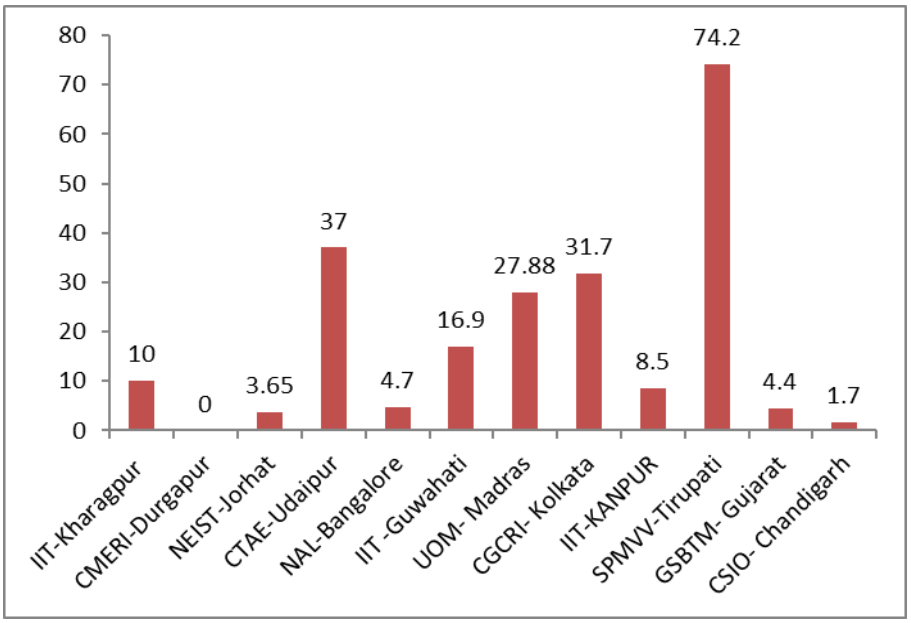


Figure.17. Total Funds sanctioned to TOCICs - 2018-2019

In the year 2018-19, 11 centers received DSIR funding with SPMVV-Tirupati receiving the highest amount (74.2 lakhs) and CSIO-Chandigarh receiving the lowest amount (Rs 1.7 lakhs). The total amount disbursed was Rs 220.63 (Figure.17)

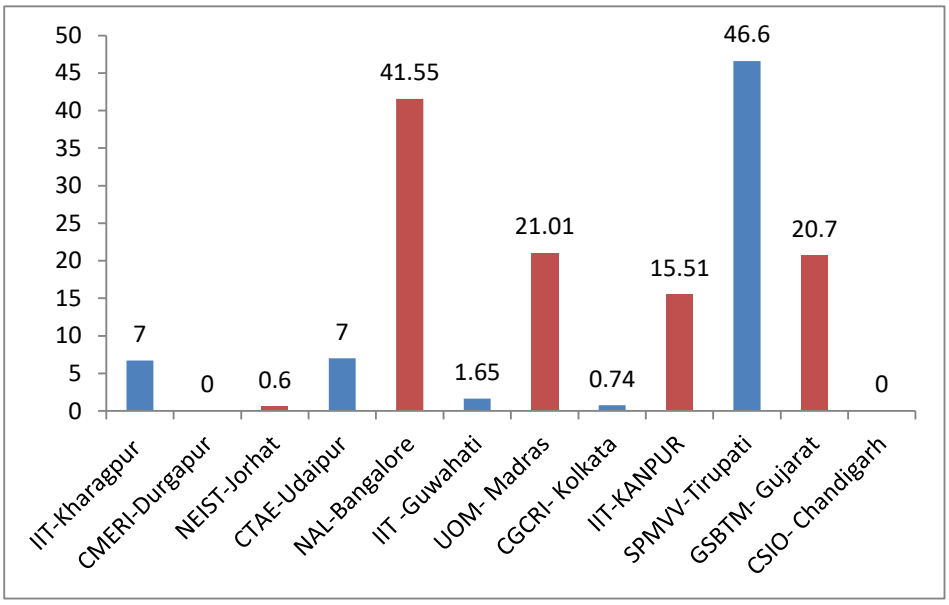


Figure.18. Total funds sanctioned to TOCICs - 2019-2020

In the year 2019-20 ten centers received DSIR funds with SPMVV-Tirupati again receiving the highest amount (Rs 46.6 lakhs) followed closely by NAL-Bangalore (41.55 lakhs). The total amount disbursed was Rs 162.36. (Figure.18).

DSIR's provision to sanction innovation grants to individual innovators' personal accounts on Direct Beneficiary Transfer basis is impressive. This will enhance the individual innovator's confidence level and help them to keep away from bureaucratic hurdles from TOCIC- Host institutions. This facilitates the innovators to spend autonomously to make progress in a time bound manner " - Dr. S K Jain , Coordinator, TOCIC Udaipur

Projects completed during the assessment period

The number of projects completed between April 2015 and March 2020 was 100 (Figure 19).The rate of completion of projects is very high in all the centres. Majority of TOCICs have completed more than 90% of the projects against sanctioned proposals .Some of the centres have 90 percent to 100% success rate. Some of the TOCICs received funding in the year 2019 - 20 will be completing their projects after this assessment period as the project completion period is generally 12 to 24 months.

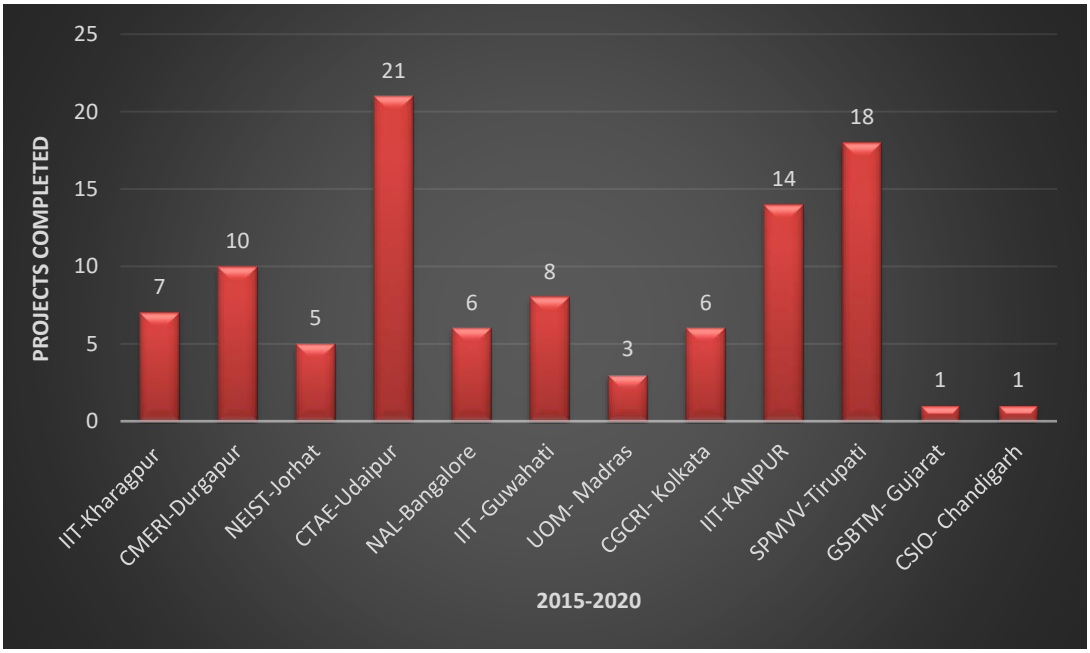


Figure.19. Total number of projects completed - 2015-2020

On-going projects during the assessment period

Thirty two projects are currently underway in 11 TOCIC centers. University of Madras has the highest number of such projects (8) followed closely by SPMVV-Tirupati (7). CTAE-Udaipur does not have ongoing projects (Figure.20).

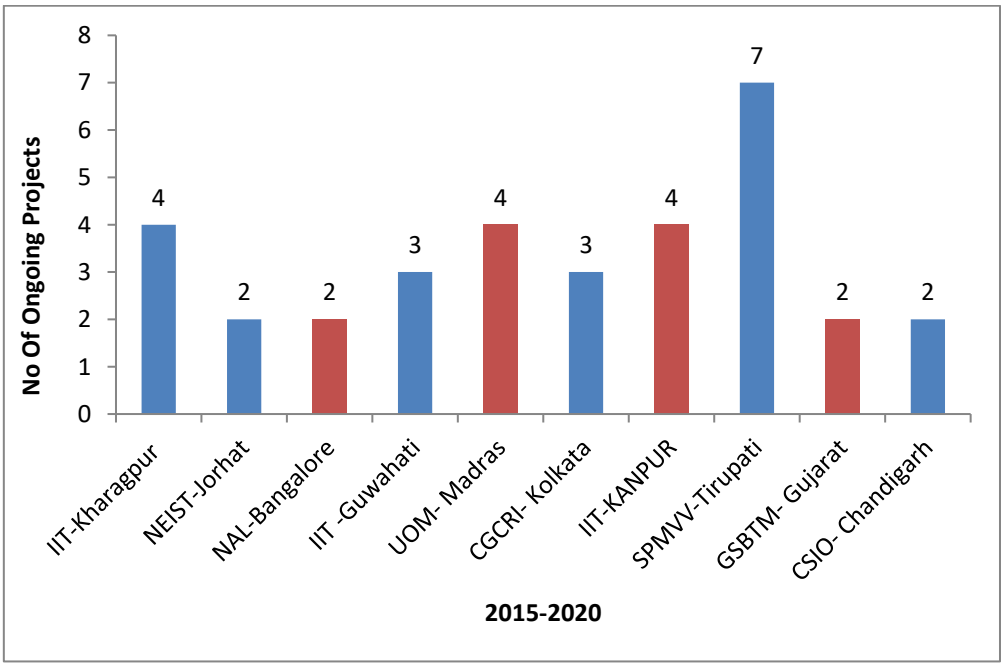


Figure.20.Total number of ongoing projects - 2015-2020

Funding innovations by Technology

The PRISM scheme promotes innovations in a wide variety of technological areas like Green technology, Clean energy, Industrially utilizable smart materials, Waste to Wealth, Affordable Healthcare, Water & Sewage Management and any other technology or knowledge intensive area. Majority of innovators have developed prototypes in Clean energy and industrially utilizable material (40) which is followed by innovations in the area of affordable health (37). (Figure.21). The innovations mentored by TOCIC have contributed to solving local problems and helped the local government.

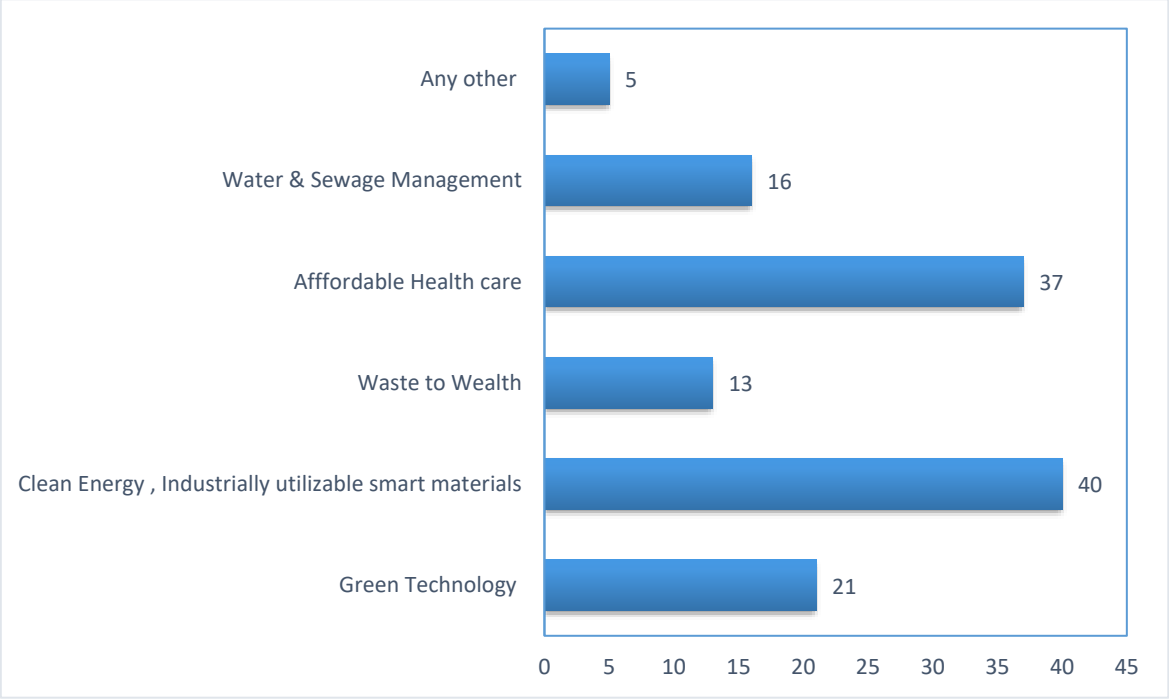


Figure.21. Areas of innovations supported - 2015-2020

PRISM: the evolving Context in India

(Reaching the Unreached with inclusiveness)

Reflections from TOCIC Coordinators

The study conducted with coordinators of TOCICs indicates that PRISM has played a significant role in promoting innovations by tapping the creativity of diverse group of individuals belonging to different socio economic and educational backgrounds across the country. Though 132 innovators received funding, 74 innovators only responded to the questionnaires. Hence, the research team considered the responses provided by the coordinators to present the data particularly about total number of proposals received, submitted, funded by DSIR and the grant disbursed by DSIR to various innovators during the assessment period.The responses of 74 innovators on mentorship by TOCIC, area of technology developed, category and status of projects, innovative strategies adopted to scale up innovations, impact on the family and community, contribution to Sustainable Development Goals, Startups and challenges and suggestions were presented in Chapter 4, 5 and 6.

Outreach Programmes by TOCIC

The TOCIC centers adopted novel strategies such as workshops, outreach programmes and student hackathons to reach innovators. Through them, they reached a wide variety of innovators like student innovators, entrepreneurs, academicians, individuals, unemployed youth and MSMEs. In general, the centers explored a variety of innovative ways of promoting their outreach activities. Some of the specific activities they undertook are indicated here:

- Organization of workshops and seminars at various institutes and Incubation centres.
- Advertising through print media.
- Conducting Bright Idea competitions and promoting the Center's activities in the conferences held at different centres.

Moreover, information regarding PRISM schemes and its thrust areas was circulated to different institutes through

- Brochures and Posters
- Publication of monthly newsletter
- Institutional website

Table 3 shows the number of workshops and outreach activities conducted.

TABLE-3 Number of Workshops/Outreach activities (2015-2020)

Centers	No. of workshops organized	Outreach activities	Delegates participated
12	229	298	17017

In the five years between 2015 and 2020, the 12 TOCIC Centers conducted 527 workshops/outreach activities and reached 17017 individuals in the country (Table.3).

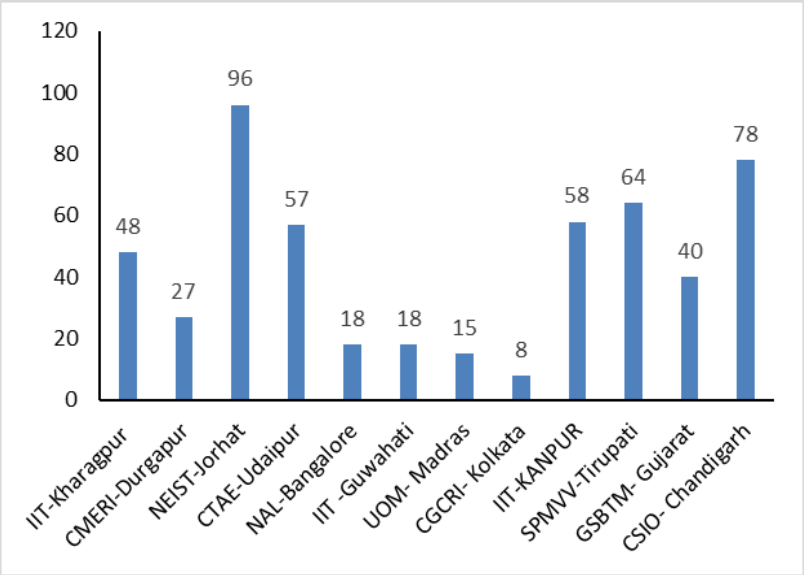


Figure.22. Number workshops/outreach activities- Centre wise

Out of the 12 TOCIC centres, three centres namely NAL- Bangalore, GSBTM- Gujarat and IIT-Guwahati were established during 2016-2017. The number of workshops/ outreach activities conducted by TOCIC centres varies a great deal (Figure.22). On the one hand, NEIST- Jorhat conducted the highest number of workshops and outreach activities – 96 but, on the other hand, CGCRI – Kolkata conducted the least number – 8. Five centers conducted more than 50 workshops and outreach activities. During 2018-19, the regional centers were able to organize the highest number of outreach programmes. Interestingly, the pandemic years did not dampen participation. Most delegates participated through webinars and online bright idea competitions. Despite the constraints that the pandemic imposed on them, the coordinators continued to experiment with new ideas and ways to facilitate innovators.

To illustrate, the IIT- Guwahati had several projects underway in North-eastern regions like Manipur, Mizoram, and Arunachal Pradesh. The team regularly visited these areas and popularized many indigenous technologies. It conducted various seminars and interaction programmes involving villagers. It established a youth center in remote villages so that it could maintain rapport with the young people of the villages and familiarize them with the scheme. Similarly, to deal with the issue of marketing the product, the center developed a pavilion with the help of CSIR-CGCRI (Central Glass & Ceramic Research Institute).

In addition, some of the centers came up with thematic ideas to reach the targeted audiences. For instance, Sri Padmavati Mahila Visvavidyalayam (SPMVV) TOCIC center, Tirupati, Andhra Pradesh organized events with interesting themes like "Innovation equity of Science and Technology", and "Innovation and Translation on Foods and feed: The Journey of an entrepreneur".

Prof P.Uma Maheswari Devi, Coordinator of TOCIC, Tirupati, narrated that "The center has developed a data bank of 100 technical experts and taken necessary approvals from DSIR. The domain knowledge of experts was utilized based on the field of innovation, wherever applicable and necessary. This has facilitated the Center to monitor the work of innovators very closely which enabled many of them to successfully win the projects and complete them within time period." The Center stood in the First Position continously from 2018 to 2002.

During the pandemic, SPMVV-TOCIC conducted several awareness and capacity building webinars in association with national institutes like Shiv Nadar University, BITS Pilani, VIT Bhopal and Vellore. These programs significantly increased the number of proposals received by the center.

Dr. Dipankar Neog , Coordinator NEIST-sJorhat, started TECHNODIA (technology based Innovative idea) event in the year 2017. This event was initiated for the promotion of PRISM scheme but has now become a yearly event. Here efforts are made to nurture the student innovators and motivate them towards science and technology driven innovations.

In addition, different types of lectures and workshops are conducted by NEIST-Jorhat to generate an innovation ecosystem in the region-and the centre attempts to reach major reachable location points in the north eastern region such as Arunachal Pradesh, Meghalaya, Manipur, and Assam. The events have generated favourable response from undergraduate students and rural artisans.

Dr. Biplab Choudhury, CSIR-CMERI, TOCIC, Durgapur, West Bengal, captures its spirit when he says, "We have mentored many innovators and firstly we have scouted applications from innovators from different fields cutting across all the sections of the society from student innovator to illiterate or low level of education qualification to PhD student, farmers and engineering students. We have people with many innovative ideas but innovation has been raised basically from a requirement/necessity".

Many coordinators joined hands with various organizations, including funding agencies, industries NGOs, colleges and universities in their respective locations.

Similarly, Coordinator Dr. Anand Bhadalkar from theGSBTM-Gujarat center availed of an opportunity to promote at the state government's biennial event "Vibrant Gujarat" where companies from a variety of industries participated in the mega-event.

Prof. Siddhartha Das, Coordinator TOCIC, IIT Kharagpur, West Bengal, shared his experience that, "Though there were pandemic challenges, the center has exclusively worked on the outreach programmes like newspaper advertisements, weekly workshops with Self-help Groups and field activities. The workshop has involved small innovators from this region. PRISM is the unique programme supporting the innovator in various phases. The scheme needs more awareness across the country. Most of them are not familiar with writing, modification and finalizing the proposal, the center has reached out to the grassroots in the region to help the innovators to write proposals".

It was observed that the outreach programmes have effectively mobilized prospective innovators and entrepreneurs to scout for proposals. Applicants belonging to unemployed youth,

researchers, entrepreneurs, illiterates, scientists, engineers and faculty members from educational institutions applied under the scheme.

Mr. Narinder Singh Jassal, Coordinator, CSIR-CSIO, Chandigarh promoted TOCIC through outreach programmes in association with various professional bodies like NABARD (National Bank for Agriculture and Rural Development), ASSOCHAM (Associated Chambers of Commerce & Industry of India), NITTTR (National Institute of Technical Teachers Training and Research), CSIR-integrated skill initiative (CSIRISI) programme.

The coordinators have made sure that the innovations are completely solution based with green technology and environment friendly. The materials used in the innovation are mostly environment friendly. The innovations on waste to wealth, water and sewage management, clean energy technologies, industrially utilizable smart materials were encouraged.

The innovation developed by Dr. Narendra Reddy from TOCIC, SPMVV on "biodegradable and compostable sapling bags and trays" by using agricultural waste has contributed to the waste to wealth category as well as smart utilization of agriculture waste category. His innovation will also help the farming community to overcome seasonal unemployment problems

The innovative solutions in the category of affordable healthcare are impressive and can be used by individuals. Another excellent example is Dr. Sandip Chatterjee 's (TOCIC-CSIR- CMERI, Durgapur) innovation is effective and preventive Prosthesis for treatment of multiple neck ailments. The innovation is helpful to treat cervical spondylosis, disk prolapse and other neck related issues (Neck-related ailments are on the rise because of overuse of laptops and mobiles).

Innovative strategies to demonstrate prototypes

TOCICs have adopted a variety of strategies to demonstrate the prototypes through regional and state level exhibitions, industrial meets, and Prototype Expo at Indian Science Congress events. For example, Dr. S K Jain, Coordinator, Udaipur has shared some of the strategies adopted by the Center in demonstrating prototypes. He said that expert mentors assisted the innovators in preparing the design of innovation. Similarly, they interfaced with the

industries and fabricators for the development of their prototype and the testing of developed units. On another occasion, the TOCIC offered facilitation service for innovators to sign MoUs with industries for fabrication and marketing of their unit.

Mr. T. Karthikeyan, Coordinator, TOCIC-NAL stated that the center has built prototypes with the description of local adoption of innovation. The PoC prototype Energy efficient smart transformer was demonstrated to KAVIKA (Karnataka government PSU making Transformers) and is in the evaluation stage.

The Coordinator, Prof. Tapas Kumar Bandyopadhyaya from Kharagpur utilized all mediums and platforms to promote the PRISM scheme. They also created a Whatapp group to reach the prospective innovators. They reached their target audience through advertisements in local dailies and platforms in educational institutions.

At 104th Indian Science Congress, SPMVV-TOCIC invited innovators of all TOCIC Centres to showcase their successful prototypes through “Science &Technology Innovation Expo”.

Science &Technology Innovation Expo at 104th Indian Science Congress

Technology(PoC/Prototype/Product) development at different TRL level

Vivek Pandey innovator from IIT-Khargpur developed a solar powered farm level cold storage with battery less refrigeration and thermal storage

Solar powered farm level cold storage- Mr. Vivek Pandey (second from left), IIT-Khargpur

Micro Cold Storage is small-scale solar powered cold storage system. It is a pioneering product in the cold chain space that bundles various innovations together. The system contains both pre-cooling and storage arrangement. It comes with every feature of an ideal cold storage system and is complete standalone. It can be hybridized with any other source of energy as the need be. Using novel technologies developed endogenously, the product is set apart from any of its counterparts. Targeted mainly at the unelectrified with lucrative value propositions for each customer. Coupled with smart control along with user-interface, it maintains temperature, humidity and air-quality parameters inside the room at recommended conditions thereby ensuring freshness and long shelf for commodity that is stored. The unique battery-less back-up system entails virtually zero maintenance and running costs. With our central control system, the power system and the refrigeration system work in tandem to ensure maximum efficiency at all points of time thereby minimizing solar panel requirement, bringing down the production cost and ensuring seamless operation.

Self-Propelled Three Row Potato Seeding Device' for Restricted Holdings-- SK. Abdul Aziz ,TOCIC Durgapur,

The 'Self Propelled Three Row Potato Seeding Device for Restricted Holdings' innovated by Mr.SK. Abdul Aziz , a farmer aged 70 years with the support of PRISM funding. He provides an ideal mechanized means for seeding potato and dispenses with necessity of repeated manual seeding and affords large savings in terms of time. It can handle easily, 3-row adjustable from-18" to26", automatically distribute the fertilizer, covers the seed, and make the irrigation path. It can cover 1 acre per hour with one operator and two assistant can save huge manpower.

West Bengal is one of the largest potato-growing states in the country. The 'Self Propelled Three Row Potato Seeding Device for Restricted Holdings' helps in reducing the time of seeding. Mechanization further helps in keeping down the price of the produce since engaging manual labour on a repeated basis adds to the production cost. It has been estimated that use of this device can afford savings up to 80% in the labour cost and up to 75% in the time required for sowing potatoes. He has international patent.

Shital Premraj Sonawane, CTAE- Udaipur developed Hina (mehandi) harvesting machine in order to increase work efficiency and reduce burden on henna harvesting workers

Hina (mehandi) harvesting machine- Shital Premraj Sonawane, CTAE- Udaipur

It was the first attempt to build a henna harvesting system because there was no henna harvesting machine available at the time. The first hurdle I faced was locating a manufacturer to create a prototype based on the initial design. Many system components, such as differentials and gear boxes, were not easily accessible in needed specifications, thus they were constructed independently, adding to the overall cost.Several difficulties with the machine's transmission system were discovered during the initial demonstration of the created system and were resolved during the machine's development.

The prototype was tested on a farmer's field in the village of Rai Ka Bag, district of Sojat, Rajasthan. Prior to the actual demonstration of the developed system, I went to the local Sarpanch and presented my innovation through a few images and videos. He is certain that this newly created technology would assist farmers in his village in lowering harvesting costs and reducing losses caused by manual harvesting. Farmers were sure that the innovation would benefit them in a variety of ways.

The scarcity of labour and heavy labour charges imposing additional burden on the henna cultivators. Manual henna harvesting is considered as a very laborious task creates drudgery and Musculoskeletal Disorders among the workers. Therefore, need of mechanized henna harvesting in order increase work efficiency and reduce burden on henna harvesting workers was identified. The developed system will reduce the risk of drudgery and Musculoskeletal Disorders of the manual henna harvesting workers.

Vineeta srivasttava from SPMVV-TOCIC developed a Single Device for Detection of three most prevalent mosquito born diseases (Malaria, Chikungunya and Dengue)

- 100 samples were validated in comparison to market available Kits like J- mitra, Adi diagnostic, SD biolene.

Market Available Kit Results	ASSURED Kit Results	Sample Tested
		Dengue Positive Sample
		Malaria Positive Sample
		Malaria Positive Sample
		Negative sample

Malaria, Dengue, and Chikungunya are highly prevalent diseases in India and several other emerging countries. Absence of instant diagnostics lead to inaccurate diagnosis, untimely treatment & increased economic burden to the patient. ASSURED kit tests all three at one go in 10 minutes, detecting co-infections, significantly improving on time and convenience without compromising on quality and accuracy in half the cost – ASSURED offers several benefits over competitors and there is nothing like this product in the market today – Metal nanoparticles based vertical flow immuno dot technology minimizes error and Highly sensitive (100%) & >97% specific – Ability to detect Co-infection, which is the major challenge in INDIA – Reduction of two-third medical waste, leading to lesser environmental pollution. As per market research expected revenue INR 88 Cr to INR 120 Cr. ASSURED offers benefits to patients, doctors, pathology labs, and the overall healthcare system.

Gait analysis based patient specific prosthetic polycentric knee joint and socket for trans-femoral amputees to improve their walking pattern by S.Kanakaraj - IIT Guwahati

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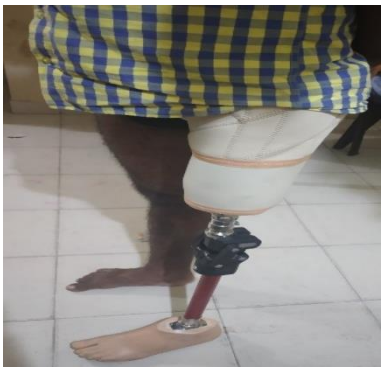
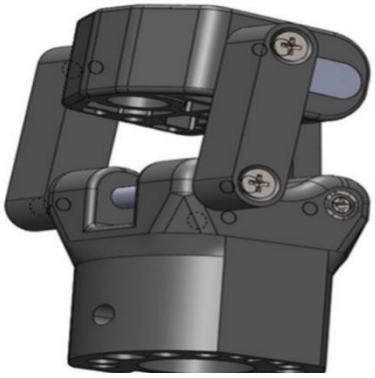




It is a polymer based 4 bar mechanical knee joint with novel feature to generate a similar Gait pattern as that of a sound leg. The main focus was to support the activities of Indian rural population. It is noted that none of the available mechanical knee joint support deep squat. Therefore, it becomes extremely difficult to use in activities in rural areas. This knee joint assists the deep squat motion which helps in the use of Indian toilet usage. It is design to be injection moldable for mass manufacturing. It is easy to use and low maintenance which can be used by elderly and young people.

The knee joint is designed to have 135 degree flexion angle to assist in deep squat. The knee locm arrests the knee joint flexion such that it can be used in initial training and difficult terrains such as Uneven surfaces and while climbing stairs. Furthermore, the knee joint in topology optimise to reduce its weight. This reduces the metabolic cost of the amputee which allows for longer walking distance and reduces the stress. The knee joint also contains pyramidal adaptor on the top and a hole on the bottom to be able to connect & align to a socket and a pylon respectively.

It is a vacuum assisted custom socket fabrication device. A positive mould is made from the negative mould of the residual stump of the amputee which was acquired by the prosthetist. The obtained positive mould is placed in the vacuum system over which few layers of carbon fibre are draped. A polyurethane bag is placed over the carbon fibre layer & vacuum is applied. This epoxy gradually enters the Carbon fibre layers with help of gravity and vacuum. The epoxy hardens after sometime to yeild the Carbon fibre composite prosthetic. This is then put in the oven for final curling process the final light weight patient specific Carbon fibre composite prosthetic socket is attached to an adaptor which connects to the top part of the knee joint.

Ultrasonic impact test unit for enhancing the fatigue performance of HSLA Steels- Dr S.Shankar-CSIO-chandigarh

Ultrasonic impact test to transfer impact energy at ultrasonic frequency and at low amplitude so that the residual stress setup during welding operation on steel structures could be relieved at ease and effectively. the stress relieving using UIT has been proved to be at least 20 20 to 25% more efficient than any other stress relieving methods. The uniqueness of the product was that the job could be placed on the machine for stress relieving and the stress relieving act can also be made possible by taking the vibrating unit to the spot where stress relieving is to be done. the advantages are a) the process is Highly Effective and efficient in stress relieving b) no noise produced and so less human fatigue c) no surface damage caused on the work material and so no structural alterations.

The UIT machine to be fabricated is indigenous in nature that enhances and increases the fatigue strength of the treated parts by negating tensile residual stress with beneficial compressive residual stresses and by reducing the stress concentration in the critical region by improving the woeld toe geometry.The tool is used to impact the weld toe, UIT uses a 3 mm diameter rod to impact the welds.The rod vibrate at an ultrasonic frequency of 30,000+ HZ. A significant advantage of UIT over the conventional methods from an occupational health and safety perspective is that it is a much quieter device compared to other peening methods. The vibrations felt by the equipment operator are also significantly less.

Using UIT equipment to process toe zone after welding, we can make a smooth transition to decrease stress centralization by excess weld metal, dispersing defects in the surface of toe zone. At the same time, it creates compression stress thereby compression plastic deformation and adjust residual stress field. enhancinv the stress and hardness of toe zone.

Development of Pedal Boat Based Water Weed Cleansing Mechanism (Jalweedu) - by Dr. S. Selvarajan TOCIC at National Aerospace Laboratories (NAL), Bangalore.

The innovator has successfully developed and demonstrated Pedal Boat Based Water Weed Cleansing Mechanism fitted with a 5.5 HP petrol engine, hydraulic system based scoop and saw-toothed weed cutters. The developed system includes a rugged hydraulically operated water weed cutter, a scoop for removing the floating weeds and wastes present in a water body. The baseline vessel chosen is a common pedal boat. For effective water weed cutting innovator has adopted a Saw-toothed pair of 'V' shaped, one side fixed and other sliding, 4 ft long cutter type installed at the front of the boat. The cutter can have rotary as well as a linear oscillatory motion. The weeding operation is enabled by hydraulic cylinder movement. Highlights of the product are: innovative development of hydraulic based propulsion system as the third channel of control that makes use of a hydraulic motor that runs the propeller like an OBM and capacity to additionally retrofit about 30 kgs of subsystems which may be populated at various locations of the boat without comprising on adverse c.g shift in all three x, y and z directions.

Mr.Abhijeet Dutta, innovator, TOCIC, CGCRI, Kolkata –Solar Baby Warmer

I have created a solar baby warmer that is portable and useful in remote locations. It helps to maintain the body temperature of the babies and thereby reduces the infant mortality rate. My innovation is an affordable solar baby warmer. The equipment does not require electricity and operates on solar energy. The medical centers can own the product. It runs on 7 watt power; it can also run on mobile batteries for three hours." The innovator has developed the prototype and is awaiting clinical trials. The innovation will be helpful for health centers located in remote locations and will be an add-on to the medical infrastructure. This innovation is more useful in rural areas as the rate of premature babies born there is higher. It also helps avoid the risk of fatality.

Arvind S A The Activities of Daily Life (ADL) of the person using Axillary crutches are the same as an abled person. Since crutches consume an extra volume as compared to a person using a prosthesis, it has some usability issues. In practice, ADL covers bathing, dressing, using stairs, but nowadays users are also concerned about using a mobile phone, picking up crutches, walking in the dark, traveling in public transport. Considering this need, Arvind developed a design of crutches that has the Kinetic shape and dynamic characteristics helping the user in spending less energy, higher stability, higher shock absorption as compared to available crutch. In detail, it absorbs the impact when the person tries to propel, and it causes the body to move very little against the gravity, and later while the person tries to lift the crutch for the next gait motion, the stored energy is released leading to the easier lifting of crutches. The ultimate result for a user is that less energy is used for movement and there are no impact forces conveyed to the body thus mitigating side effects. The design additionally increases grip on rough terrains such as sand, pebbles, and wet surfaces.

A novel cell therapeutic product for the treatment of Diabetic foot ulcers and other non-healing wounds to prevent amputations – Mr. Senthil Natesan, GSBTM - Gujarat

Diabetic foot is one of the most significant and devastating complications of diabetes, characterized by ulceration of the lower limb with neuropathy and/or peripheral arterial disease. It is estimated that around 15% of all people with diabetes are affected by foot ulcers during their lifetime and 1 in 4 people with diabetes develop at least one ulcer, which lead to amputation of one leg for every 30 seconds. Cell based therapy is one of the advanced options for treating Diabetic foot ulcer. We are developing a novel cell based therapeutic product (BioGen-CT), which is a personalized, autologous, tissue remodelling cellular therapeutic product to promote wound healing. It will be formulated in the form of a gel. In BioGen-CT gel, the cells will be suspended the gel containing extracellular matrix like collagen and it will be used for local topical application over the wound following cleaning. We have identified novel Lympho-Myeloid Niches which gave rise to myeloid and lymphoid cells and had potential to promote wound healing. With the help of PRISM funding, we have developed a novel cell therapy technology and validated in the preclinical models for its efficacy to promote wound healing. Functional assessment of the prototype was tested by assessing the expression of certain marker and through various in vitro as well as in vivo models. In preclinical animal models, the therapeutic prototype showed the ability to promote wound healing. The other aspects of healing such as development of hair follicles, proper uniform deposition of collagen, angiogenesis, sebaceous gland etc. were seen in treated wounds. The product was tested in clinical settings in human beings suffering from chronic non-healing wounds. The results of the product is very encouraging. In the next phase, a clinical trial to prove the efficacy of the product under the regulatory approval from DCGI is planned and approval of the product for treating the patients in the clinic will be obtained from the DCGI after completion of the trial.

A radio frequency device for detection, imaging, and mapping of underground utilities - PRAGYAN PRASU PATNIK University of Madras Chennai

A prototype was designed and developed to detect buried objects like electrical cables, water pipes lines, metal pipes etc, under the ground to a depth of 2 meters. The sensors were designed to radiate electromagnetic energy in a wide band of frequencies (400 MHz to 4800 MHz).

A final prototype 2.5 as shown in the figure was able to detect buried metal pipes and cavities till 4 meters in our pilot trials.

A data acquisition software RUDI DAQ was developed to collect data from the field and save it in required format. After the data collection, the RUDI webapp was used to clean the signals using different post processing algorithms developed by us. This app is deployed in the AWS clous server and can be accessed by anyone with internet.

The RUDI webapp can also be used to process and clean any data collected from any other commercial equipment's also. Hence this software can also be used to generate revenues separately.

Scaling up of innovations

The coordinators have taken up various measures to scale up innovations.

Prof. Amitabha Bandyopadhyay from IIT Kanpur initiated several measures for successful field testing and trials, developing the prototype based on the user's feedback, taking domain industry expert mentorship for establishing brand identity, establishing connection with different funding programs and schemes, and planning and maintaining office space with in-house Legal, Finance, and HR support amongst others. They could scale up nine prototypes at the national level and three at the international level.

Mr. Nikhil Updadhye, Innovator from IIT-Kanpur, developed a prototype of drone (Aarav unmanned system) to deliver blood samples at high altitude mountainous district of Tehri in Uttarakhand, India. The drones are highly useful in states that are geographically difficult to traverse. Now Mr. Nikhil Updadhye, has established CD Space Robotics Pvt. Ltd. at Bangalore and is acting as CEO of the company.

Unmanned Aerial Vehicle –Mr. Nikhil Upadhye (second from left), IIT Kanpur

Likewise, Dr.Venu Polineni, an innovator from SPMVV-TOCIC, developed a new generation nematicide cocktails to effectively target the plant parasitic pathogen, the root knot nematode Meloidogyne incognita. Dr. Polineni started Telluris biotech, an early stage Life sciences company with a focus to develop biological controls against root-knot and cyst nematode related plant

diseases with the support of US $4 million (approximately Rs.2900 lakhs) from “Innovations In Food & Agriculture fund”.USA

New generation nematicide cocktail - Dr.Venu Polineni (left), SPMVV-TOCIC

Mr. Sandeep Khuba Zope from the CSIR-CSIO, Chandigarh developed the Peripheral Blood Smear Instrument. Since then, he has received enormous response and orders from leading hospitals like Hinduja, AIIMS, Max, CMC, etc. This blood test gadget will also serve rural patients through Primary Health Centre (PHC) field camps.

Mentorship and Networking

Of the five regions, the East reached the highest number of student stakeholders: 137 out of 165. The southern region nurtured the highest number of academic stakeholders, 126 out of 141. Illiterate stakeholders were nurtured by TOCIC centers of all regions. All put together, the five regions (North, South, East, West, North East) nurtured eight stakeholders who were illiterate. The five regions together nurtured a large number of unemployed youth stakeholders. In all, the total number of unemployed youth nurtured was 271. They collectively nurtured a large number of scientist stakeholders. In all, the total number of scientists nurtured were 375. Engineer stakeholders were nurtured the most by the five regions. In all, the total number of engineers nurtured was 519 (Figure.23).

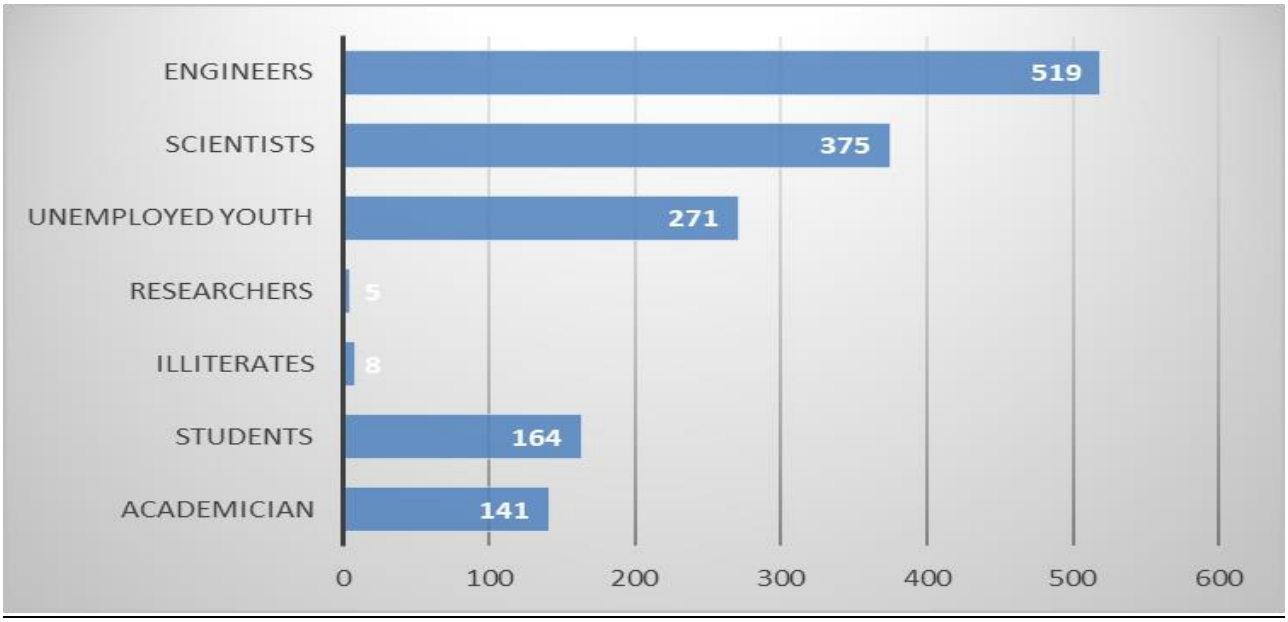


Figure.23. Diversity of stakeholders mentored by TOCICs

Ratio of men and women innovators

Both men and women submitted proposals for funding. Put together, both the genders submitted 420 proposals. Men submitted substantially more proposals than women (342 versus 78).

Table 4 : Flow of Proposals- Overview

Center	Total No proposals Submitted	Proposals submitted by men	Proposals submitted by women	Total Sanc-tioned	Funding received by men	Funding received by women
IIT-Kharagpur	29	28	1	11	10	1
CMERI-Durgapur	17	15	2	10	9	1
NEIST-Jorhat	14	10	4	7	4	3
CTAE-Udaipur	60	48	12	21	18	3
NAL-Bangalore	68	64	4	8	8	0
IIT -Guwahati	28	23	5	10	8	2
UoM- Chennai	24	18	6	7	7	0
CGCRI- Kolkata	17	14	3	9	6	3
IIT-KANPUR	51	43	8	18	14	4
SPMVV-Tirupati	59	32	27	25	19	6
GSBTM- Gujarat	27	22	5	3	3	0
CSIO- Chandigarh	26	25	1	3	3	0
Total	**420**	**342**	**78**	**132**	**109**	**23**

Challenges at TOCIC:

Though TOCICs have significantly contributed for promotion of innovations by tapping individual creativity, the coordinator and co-coordinators experienced several problems in networking, commercialization, language & branding, social barriers, amongst others. While interacting with the research team, coordinators narrated several challenges in strengthening the scheme further. For example, innovators coming from rural places or remote places like Arunachal Pradesh, Sikkim have less connectivity, making it difficult to communicate with them in an effective way. Similarly, illiteracy was another drawback. Even though innovators have amazing innovative ideas, they lack the skills to present them in the form of formal proposals and have difficulty in understanding the jargon, marketing their ideas or product, and patenting their innovations.

The coordinators expressed that some of the innovators were from interior parts of the country and lacked confidence while presenting their ideas. To address this issue, the Coordinators had to handhold them and guide, support and encourage them at every step. Encouraging girls and women innovators was also a challenge. The social and cultural background they belong to discourages them from opting for this scheme. This has resulted in fewer women participating in the scheme. Some of the innovators experienced problems in defending proposals and technical issues during the experimentation stage. The working pressures in their respective profession was also a constraint.

Conclusion

PRISM's objective is to tap the creativity, imagination and facilitate innovators to develop technological devices and process to address complex societal issues. The responses of coordinators indicate the contribution of PRISM and TOCICs in reaching the individuals across the country to engage student and academic community, scientists, farmers, professionals and illiterates innovation eco system. TOCICs were able reach to around 17,000 individuals through outreach programmes/workshops to utilize the funding opportunities to foster innovations. PRISM has funded a sum amount of Rs 827.34 lakhs to 132 innovators who transformed their ideas into technology successfully to cater to health needs and industry requirements, address the challenges of water sewage and farming. Several prototypes/ products/ processes developed on various theme are addressing the challenges posed at regional/state and also national level.

Thus, the PRISM scheme is playing a pivotal role in promoting the innovations in Science & Technology through diversified group of innovators.

Though the government is keen on promoting women entrepreneurs, their participation on the PRISM scheme is not very encouraging. However, although a higher percentage of men (81.42) than women (18.5%) submitted proposals, the latter received almost a third of the amount disbursed. The TOCICs need to initiate specific strategies to encourage women to submit proposals. The number of proposals submitted and funds disbursed has steadily grown over the assessment period. Equally important, a diverse group of innovators has participated in the scheme and some have done extremely well. This augurs well for promoting inclusivity and sustainability. The government will do well to strengthen the scheme further. The coordinators have shared social, gender, language and mentorship challenge they face. The technical and marketing mentorship at TOCIC and networking with industrialists to enhance the opportunities for innovators is suggested.

Output of Innovations

Dissemination of Innovation culture through PRISM scheme

PRISM has developed a unique and innovators-friendly strategy to reach individuals cutting across the geographic and educational barriers.(Table-5) The scheme aimed to involve imaginative and creative people to establish their own businesses and achieve inclusive development.

As was discussed in methodology chapter, SPMVV-Tirupati was tasked to document the opinion and experiences of innovators to develop strategies to further reach the unreached. Toward this end, the University formed a research team which developed a questionnaire and shared it with all the 132 innovators who received funding during the assessment period (2015-2023). The research team received filled-in questionnaires from 74 innovators. The graphs and the data presented here is based on the responses received from 74 innovators. The limitation with this study is only 8 responses were received from IIT kanpur despite the centre has 18 sanctioned projects during the assessment period.

Region	TOCIC Centers
North	IIT Kanpur CSIR-CSIO, Chandigarh
North east	IIT Guwahati NIEST, Jorhat
East	IIT Kharagpur CSIR-CMERI, Durgapur CGCRI, Kolkata
West	GSBTM, Gujarat CATE, Udaipur
South	SPMVV, Tirupati NAL, Banglore UOM, Chennai

Table-5. Grouping of TOCICs

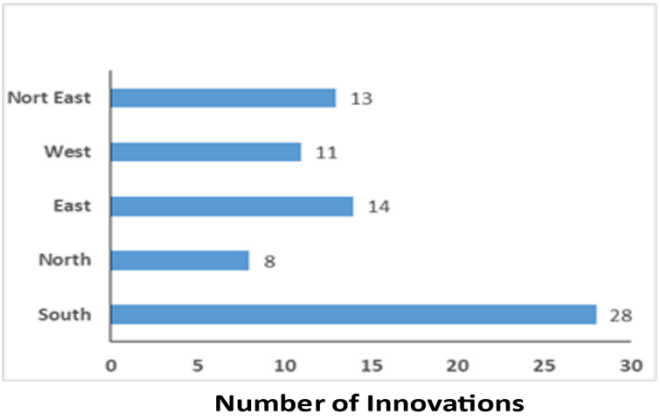
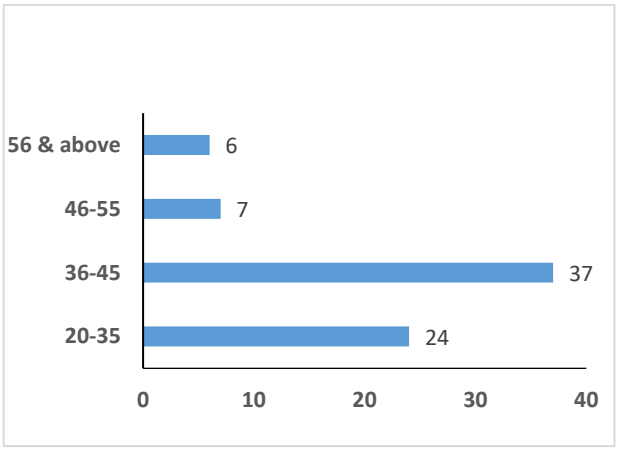


Figure. 24. Innovators Region wise

The southern region of the country contributed most innovators (28). The northern region contributed the least (8). The study indicates that on average each region has around 15 innovators. In India, cities in Southern region have witnessed considerable growth and greater response to PRISM scheme. But the positive trend is that TOCICs in North east (13) and East(14) have taped the potential innovators and promoted them. The intense outreach programmes, academic collaborations, and networking with MSME have contributed to the progression in receiving funds in Eastern and North Eastern regions.



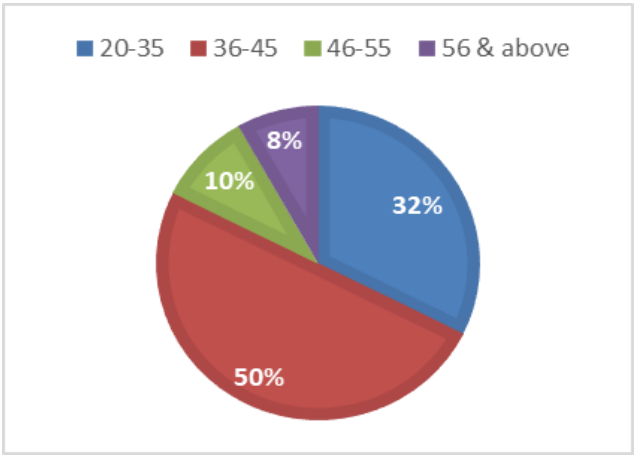
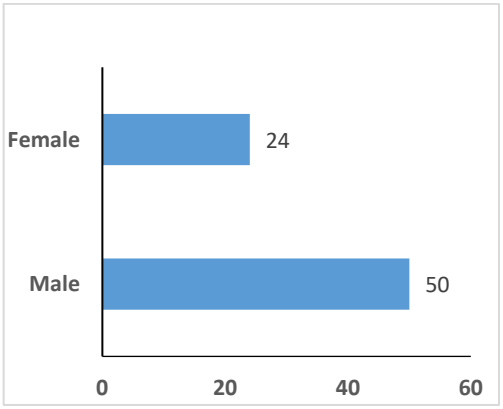


Figure:25. Age wise distribution of innovators

The above data indicates that 24 of the 74 innovators (32 percent) were 35 years or less. A small percentage (13 percent) was above 45 years. It is interesting to note that one third of innovators (32.4%) fall in the age group of 20-35 and contributed to improving the innovation capabilities of young people. The significant contribution of this scheme is the opportunities it provided to individuals who are not part of any formal setup irrespective of age.



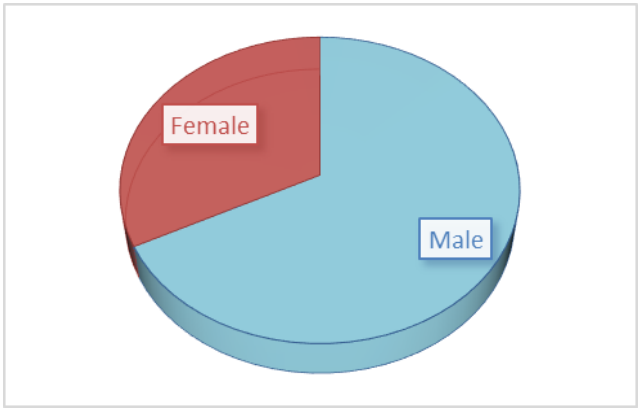


Figure: 26. Gender breakup of innovators

Out of 74 innovators, 50 were male (68 percent). The rest were female. The coordinators data also indicates a wide gap in submitting the proposals between men and women. But the percentage of women(24) who received funding (32 percent) is very encouraging. The gender gap in innovation and entrepreneurship is rooted in a tradition where girls are encouraged to choose safe careers, where conditions in the family are unfriendly as is their mobility.

Source information about PRISM

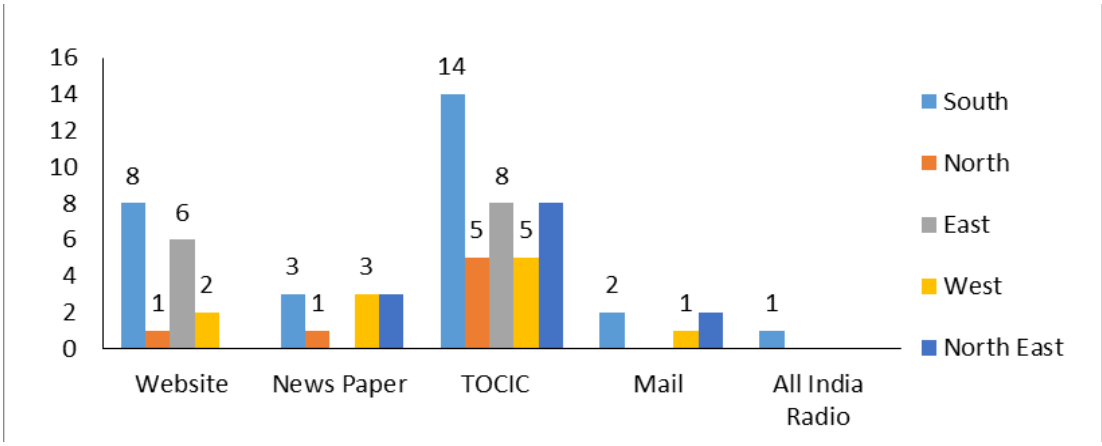


Figure: 27. Region wise awareness about the PRISM scheme

TOCIC centers were the principal source of information about the PRISM scheme across the five regions (South, North, East, West and North East). Moreover, the southern region was the only region exposed to all the five sources of information about the scheme (website, newspaper, TOCIC, mail and ALL India Radio). Nearly 81 % of the respondents learned about PRISM through a variety of sources like media, website, mails and TOCIC .

Category of proposals

Figure 28 does not show a clear pattern in the proposals submitted for funding during the two phases across the five regions.

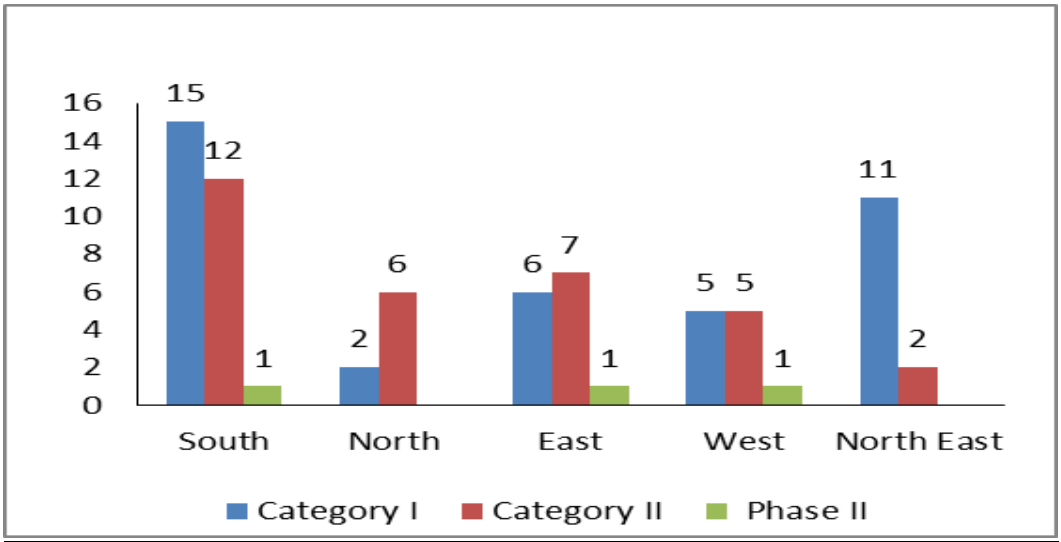


Figure: 28. Region wise category of proposals

Phase I comprised of two categories: Category I and Category II. Some regions (like the South and North East) submitted more proposals during the initial phase of Phase 1 and their numbers declined subsequently. In general, it is observed that the number of proposals submitted in Phase II was much less than the number submitted in any category of Phase 1. The graph also shows that two regions, North and North East, did not submit any proposal in Phase II. Majority of innovators received financial assistance either for Proof of Concept/Prototypes/Models (39) and to develop a working model (32). Some of the innovators might have utilized other schemes or private funding for commercialization. The TOCICs need to adopt radical measures to motivate innovators whose prototypes have significant market potential to make use of the funding opportunities in Phase II to become successful technopreneurs.

RUDI, Radar for Utility Detection & Imaging - Mr. Pragyan Prasu Patnik

Status of projects

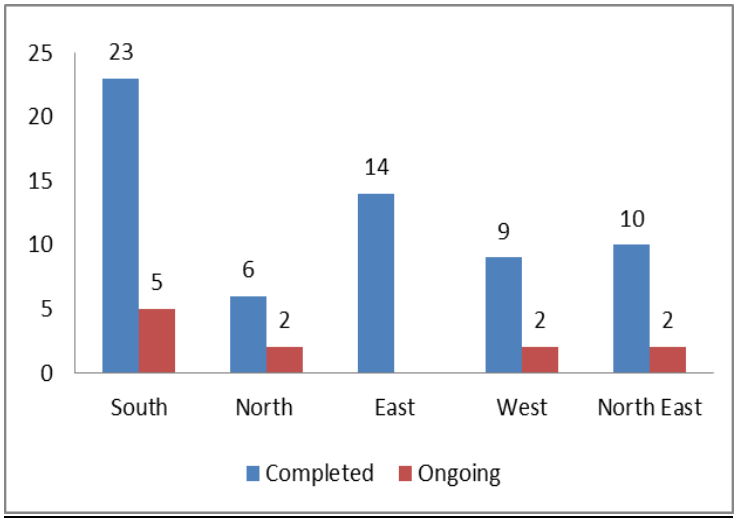


Figure: 29. Region wise status of the projects

TOCIC centers in the South completed the maximum number of projects (23) followed by East (14) and North East (10). Moreover, the East had no projects that were ongoing; the other regions --- East and West, had two projects each that were ongoing. Figure. 29 implies that 83 % of innovators had completed the projects and 17% of innovators' projects are ongoing. The innovators' commitment and enthusiasm for technology, support from TOCIC and autonomy given by PRISM have contributed to the successful completion of the projects.

Trends in differential technology domain areas

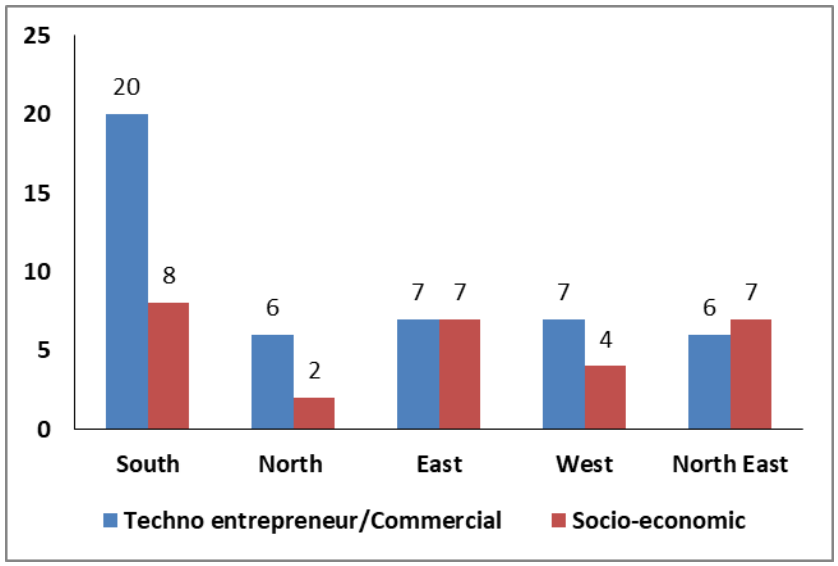


Figure: 30. Nature of the Innovation

The innovations emerged from TOCICs indicate a balance between techno-entrepreneurial/ commercial and socio-economic innovations (Figure.30). The southern region has 20 techno-entrepreneurial/commercial products and 8 in the category of Socio-economic innovations. The North East that focused slightly more on socio-economic innovations than techno-entrepreneurial.Those who developed techno-entrepreneurial innovations adopted technology for commercial products but still have social relevance. For example Bi-gender electro magnetic machine, Energy-efficient air conditioner using a customized ejector, Design, development, fabrication, testing and validation of a 1000 watt calibration grade solid state power source with multiple unit synchronizing/IoT capabilities etc, are developed which have a social relevance. The socially relevant products like from Biowaste, Low power portable muga and eri spinning machine, antibacterial Ash base dish wash bar, prosthetic polycentric knee joint, Affordable water transport carrier etc which are useful to rural popolulation are developed by North eastern region.

Capacity Building to cultivate individual innovations

"The mentorship has completely helped me by pushing me to apply for the innovation, advised and directed in all the stages from proposal, process of prototype and also understanding the procedure. I have faced a major challenge in fabrication and identification of material. The scheme has supported the idea and brought it in physical form"- Ms Devaleena Das, Innovator, TOCIC, Kolkata.

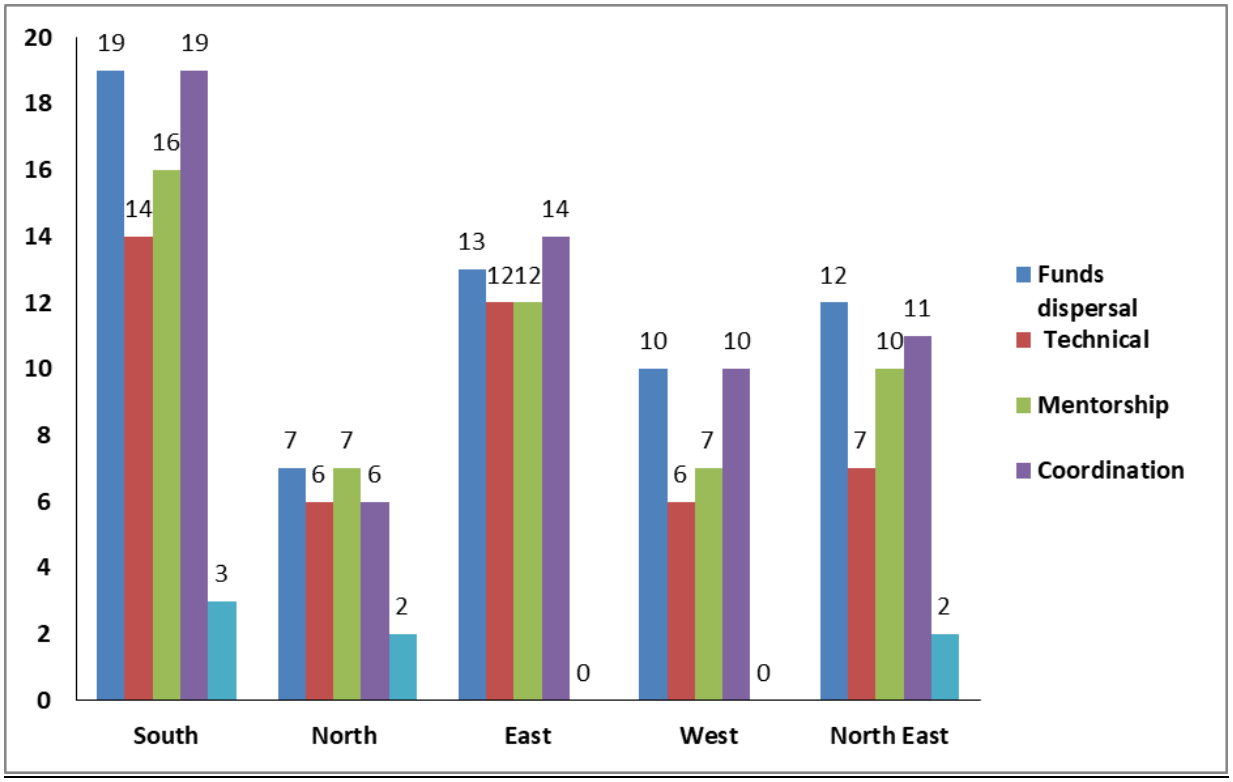


Figure: 31. Region wise support received from TOCIC

The TOCIC centers provided a range of services to the innovators(Figure.31). The services ranged from fund raising to technical, mentorship and coordination. In all the types of support services, the southern centers provided the maximum support to the innovators (71).

The innovators commented that the TOCICs were helpful in connecting them to the mentors and the technical experts. They further said that the PRISM scheme is the only opportunity to give a physical form to an idea. They were very happy with the disbursement of funds done directly to the innovator's account. They recognized that some of the TOCICs provided them with a platform to interact with industry experts and other innovators. Networking with fellow innovators and industry experts exposed them to various technical aspects related to process of innovation and marketing. Overall, they appreciated the mentoring role of TOCIC has in planning the grant to be spread across the process.

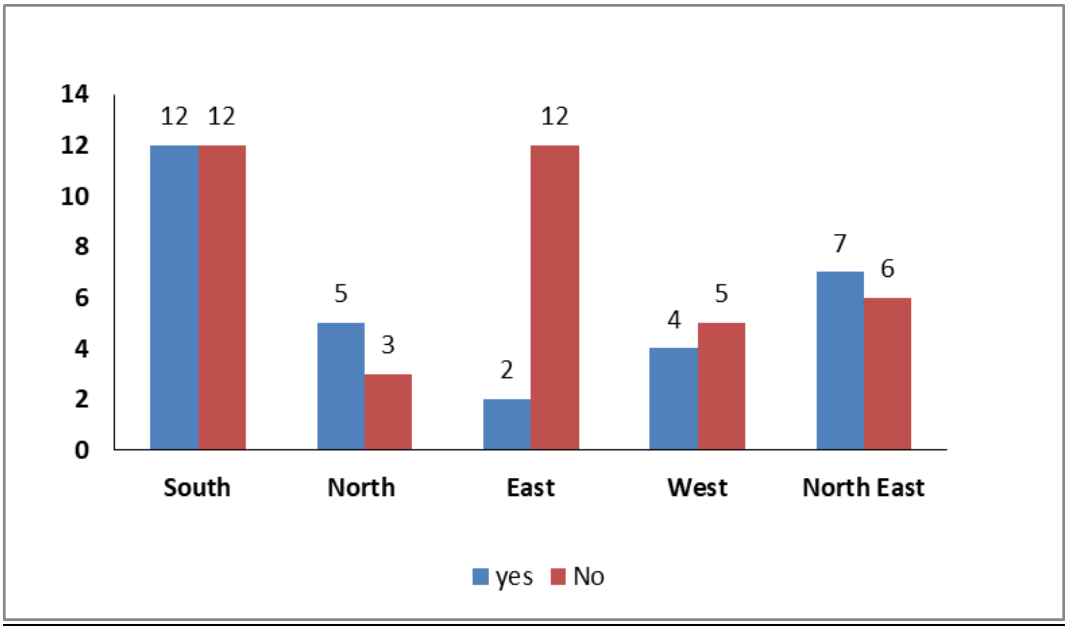


Figure: 32. Networking on innovators with incubation center and industry

Innovators have several advantages if they network with either the incubation center or the industry (or both). Innovators were therefore asked whether they have developed network with them. Innovators in South and North East developed the maximum number of networks (12 and 7 each) but other innovators from the other centers could not do so. At each center some innovators networked but others did not. Overall, 30 innovators established networks in all the five regions and 38 did not (Figure.32). Many innovators said that individual innovators have to be dynamic in the process of developing ideas into prototypes and converting them later into products. The innovations were basically providing community solutions, and it was important for them to work on the budgeting from the early stages. Some of the student innovators had moved to higher education which is another key factor to holding them back form networking with industry.

Innovations by Technology

The PRISM scheme aims to provide opportunities to individuals who have ideas for innovations that have societal impact. The innovations have created employment, provided indigenous solutions for regional issues thereby contributing to the community's growth. Innovators have contributed ~~to~~ significantly to different sectors. They have had an impact on rural entrepreneurship and women employment. They provided affordable solutions to agricultural and health infrastructure. Some solutions focused on reducing the stress on workers or laborers and deliver efficient results with simple technology.

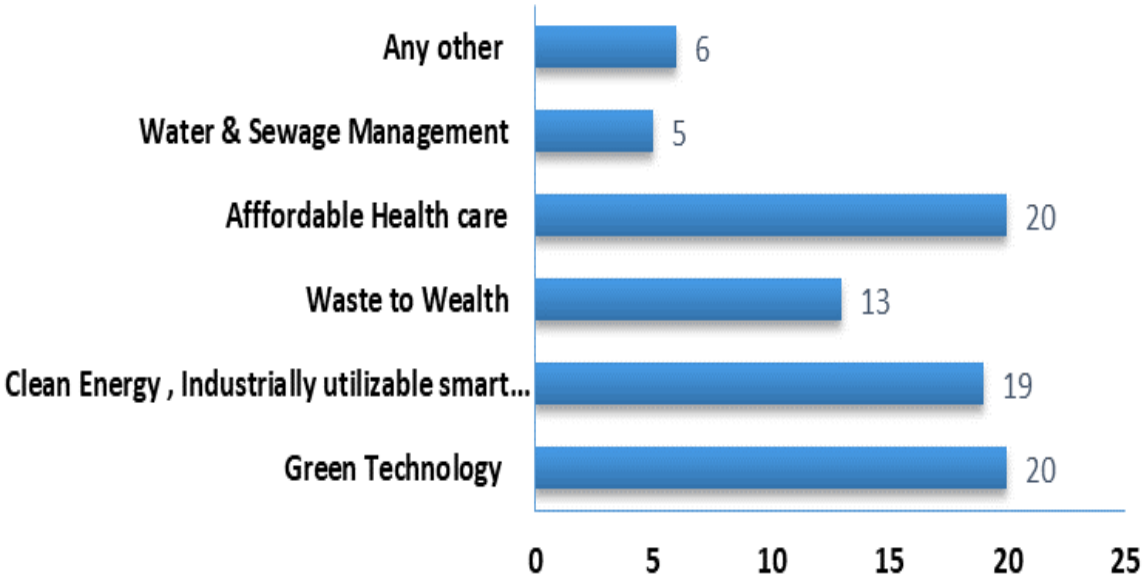


Figure: 33. Technology wise Innovation

Innovators focused principally on Green technology (20), Affordable healthcare (20) and Clean energy, industrially utilizable smart materials (19). Other areas of innovations (Waste to wealth and Water and sewage management) were, relatively speaking, focused on less. The innovations under waste to Wealth sector is significant(Figure.33).

Several innovators worked on prototypes to provide affordable healthcare to Indian citizens, especially for those belonging to low- and middle-income groups.

Dr. Anantha Prasad, TOCIC-SPMVV, Tirupati developed Novel 3-Dprinted splints for Arthritis and Arm injured patients. Dr Sandeep Chatterjee, TOCIC-CSIR-CMERI, Durgapur developed an effective and preventive prothesis for treatment of multiple neck ailmentis. The innovators have to go through tough pauses for clinical trials and approvals of healthcare gadgets. Ms Debeshi Dutta, TOCIC-CSIR-CMERI, *Durgapur* developed loT based affordable cattle management system for the empowerment of Indian farmers. It monitors body temperature of cattle, determines best time of insemination and tracks cattle's movement to avoid theft. Dr.Jayaprakash from TOCIC-SPMVV, Tirupati developed a Counter irritant against contact Dermatitis for Cashew nut Women Workers. Meanwhile, Kundlik Vitthalrao Mali TOCIC, Udaipur is working on energy-efficient air conditioner using a customized ejector that reduces carbon emissions and monthly energy expenses by 15 to 20%.

Mr. Shantana Dhara, Innovator from IIT Kharagpur, said that clinical trials are costly and innovators face fund crunch making it is difficult for them to move the technology forward for commercialisation. There is need for certified and accredited labs, clean room and ISO facility for clinical trials. The process of patenting requires funds for which the innovator has applied in individual capacity. For the patenting process the innovator looks out for further guidance and direction from TOCIC. He suggested that the government could have a wing to assist in marketing the innovations. Patenting, marketing and infrastructural facilities are the challenges for the innovator.

The challenges of the agricultural sector drew attention of innovators in the study. The agricultural innovations are helpful for farmers as they reduce the cost of production by adopting a solution-based technology. A novel and intelligent drip bio fertilization, high end monitoring and controlling system for agronomical practices under protected- wireless sensor network was completed under Category by S. Murugaanandam, SPMVV**,** Tirupati.

Bidus Kanti Das, IIT-Khargpur, developed biochar based cattle feed supplement which has the potential for commercialization. It does not harm the cattle as far as capacity of milking and digestion. Biochar alone can do most of the betterment like milk yield and milk solid enhancement.

Value added and environmental pollution free products have high societal impact and contribute to the economy. Dr V V Lakshmi, SPMVV, Tirupati, established a startup on the formulation and development of Keratinase treated feather waste based organic manure which contributes to pollution free environment. Shital Premraj Sonawane, CTAE- Udaipur developed Hina (mehndi) harvesting machine in order to increase work efficiency and reduce burden on henna harvesting workers.

Mr. Chandrashekar, UoM- Chennai shared that the innovation of Security Gadgets for Tirumala Pilgrims is a solution for safe travel by avoiding wild animal attacks. The prototype can identify animals from a distance of 20 meters distance. The innovator is working on a long distance sensor system. Amiya Das Adikary, IIT- Kharagpur developed OBU for in cab signalling and control of train to provide real time bi-directional data for communication with a back end server.

Dr Shankar, Innovator, Chandigarh said that the innovation focuses on mechanical engineering,. The design is indigenously developed and the efficiency is tested in the field. The innovation is useful in ship building, construction, bridge construction and other mechanical works. He said, "I appreciate the PRISM scheme as there is no discrimination in any form of eligibility, it's only an idea and the dreams to get fulfilled." .I am planning to scale up my innovation by applying for Phase 2 in DSIR and also looking for financial support from industry..

Moving forward with IPR (viz. Patents)

The innovators in the southern region led the way in offering benefit to primary and secondary beneficiaries and end users(Figure.34). In all, 62 beneficiaries gained from the innovations. The southern region was also able to generate more number of patents (12). East and North East followed with nine patents each. The innovators generated 42 patents in different technological sectors (56%). Some of the innovations were also registered for international patent (Figure.35).

I received UK patent grant with the support of DSIR – PRISM; other patents from Japan & Australia are under process. I have completed phase – I, what I feel is the PRISM scheme & system is in good shape. Since my project is technically oriented, in order to procure some sophisticated instruments, the funding level should be slightly higher; it would be much helpful to the individual innovators. They can be independent; they need not dependent on any other research institution- Mr. Anantha Ramakrishna Selvaraj, Innovator, SPMVV

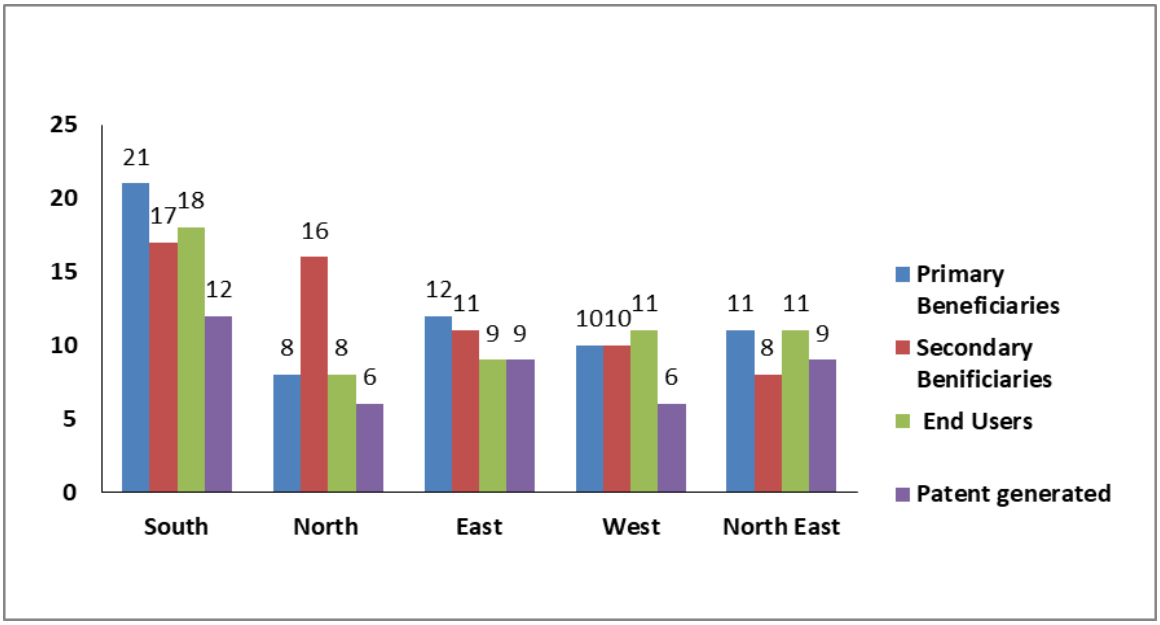


Figure: 34. Output of the Innovation

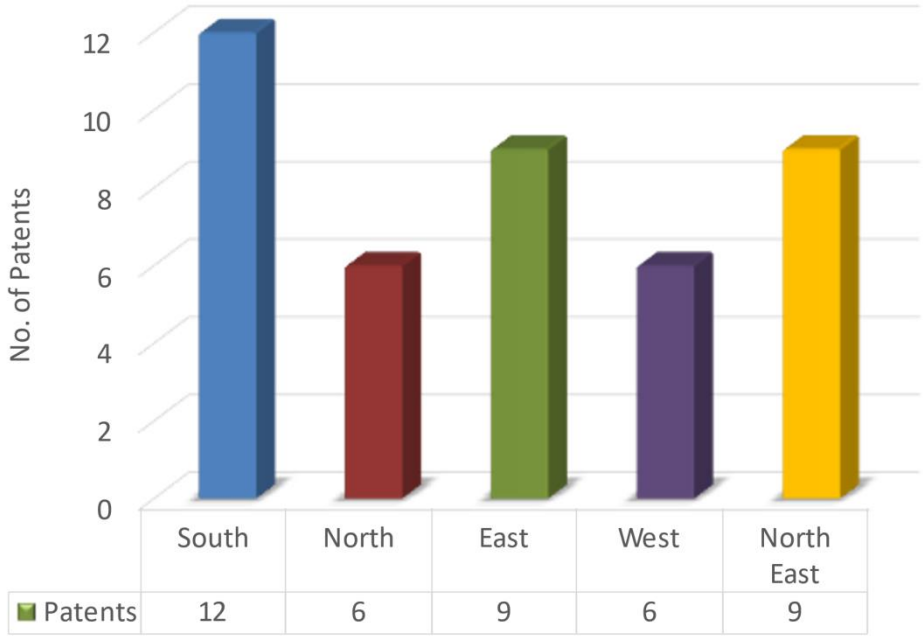


Figure: 35. Patents Generated

Contribution to local / regional variability

Innovators identified several positive benefits of their innovations on the community. Innovators in the southern region scored high on all parameters. Across all regions, innovators said that their innovations were based on use of local technology, local raw materials and local human resources (Figure.36). The capacity building of the individuals who received funding and also of the local people by training is noted in the study. For instance Dr. R. Kumara Velu, SPMVV-Tirupati, developed a Novel Jacquard Punched Card Reader (Weaving Aid) Portable Card Reader For Extracting Woven Design Images From Old/Used Punched Card and trained around 300 women whose drudgery is reduced while weaving sarees.

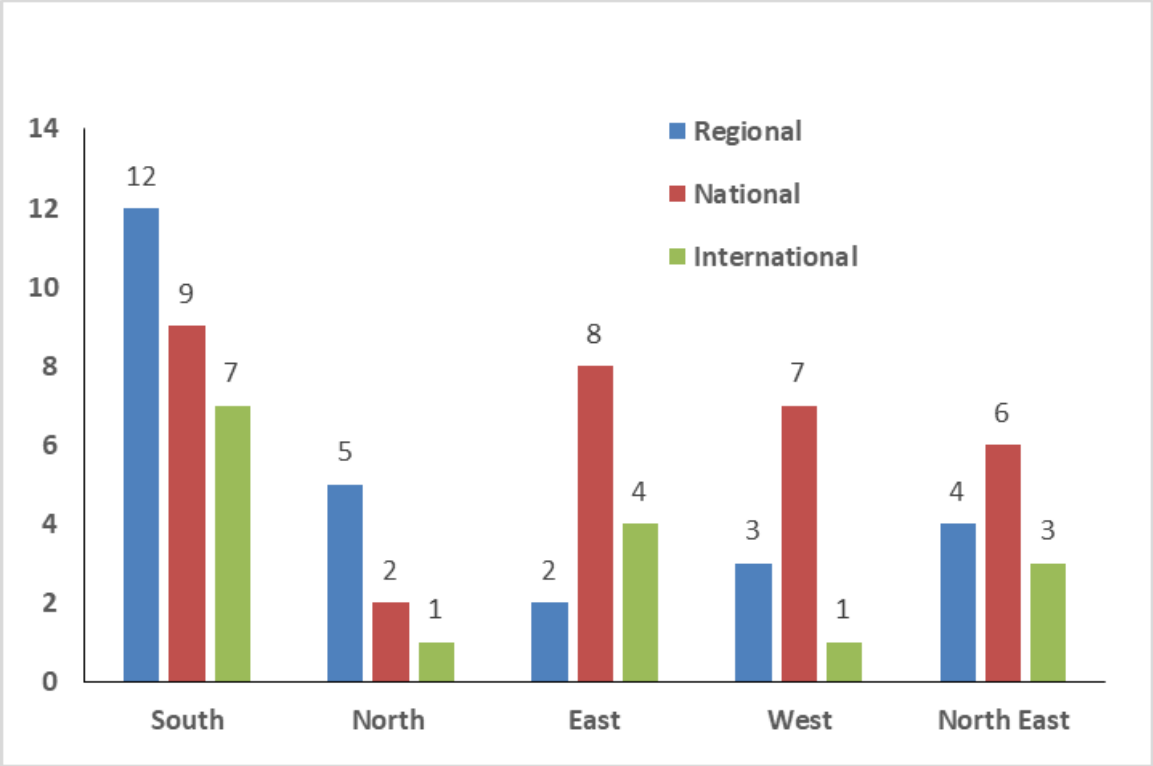


Figure.36. Geographical area of marketing of Innovation

Impact of Innovation on Community	South	North	East	West	North East
Educating members of the Community	11	7	9	4	1
Decent work and Economic growth	11	8	8	4	4
Use of local technology	13	4	8	7	6
Use of local raw material	11	5	7	7	6
Use of local human resources	11	4	8	8	6
Skill training to locals	9	6	9	5	6
Innovative technological solutions	14	8	12	8	5
Provided Services/Products which are Coast effective	14	4	9	7	5
Creation of job opprtunities	13	5	3	4	3
Suppliers of green goods or Services/Contributing to eco industry	10	6	7	6	5

Table 6. Benefits of innovations to the community

Every innovation is a solution to a problem and at times has a larger impact on community and the society at large. Mr.Biju Varghese developed a portable device for hand control of the brake, clutch and accelerator called “Retro fitment for four-wheel vehicle” that enables physically challenged persons to operate the vehicle. This hand controlled device can be fixed on the vehicle without any modification/ alterations with low cost and minimal maintenance.

It was very helpful for the initial stage of the development of the product. We have developed cost effective Dhatun which is great benefit, which will generate revenue, also will give endless of job opportunities to the women in a rural part of the country, as it is the Dhatun, most of the work will be through the self help groups, people are getting into the material products, we are giving back to the society with our product- Avijeet Dutta Sailender Rakis(Kolkata, CGCRI)

Contribution to Family

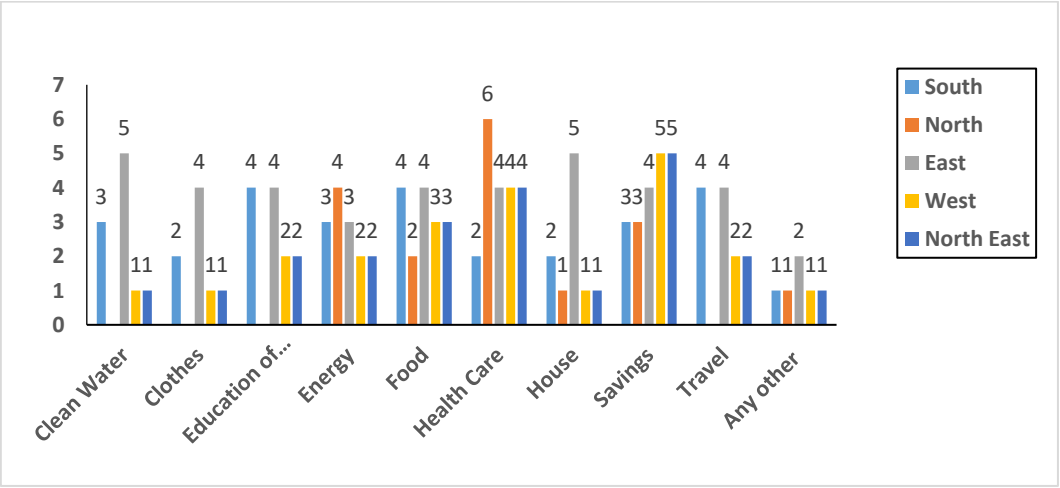


Figure: 37. Contribution to Family

One of the important contributions of the PRISM scheme is to contribute to the quality of life of communities. The study makes an attempt to understand the change in income levels of individual innovators due to marketing their products. The income generated could help the innovators to spend on different household needs like education of their children, health care, food, clothing and travel. Some of the innovators mentioned that they could save small amount of money. (Figure.37)

Contribution to Sustainable Development Goals (SDGs)

Table.7. Map the innovation with SDGs

Contributions to sustainable development goals	South	North	East	West	North East
Good Health & Well -Being	12	3	6	5	5
Clean Water & Sanitation	2	-	1	-	1
Afforable & Clean Energy	8	2	4	1	3
Decent Work & Economic Growth	8	-	5	2	5
Industry, Innovation & Infrastructure	9	3	5	6	8
Sustainable Cities & Communities	4	-	4	-	1
Life Below Water	1	-	-	-	2
Life on Land	2	-	3	2	2

TOCIC centers in the five regions contribute to Sustainable Development Goals(SDGs). The innovators identified eight areas where their innovation contributes. While the southern and eastern regions contribute more to health and well-being (12 and 6 projects respectively), the western and northeastern regions contribute more to industry, innovation and infrastructure (6 and 8 projects respectively). Except for the northern and western regions, all other regions contribute to all the eight SDGS.

Jacquard punched card reader for digitizing the woven designs – Dr.Kumar Velu,– TOCIC, SPMVV, Tirupati

Design data could be acquired from the old and used punched cards such as 120 Hooks and 240 Hooks.Any kind of Design shuffling types can be adapted during design parsing and generation. (20 or 6 Hooks for 120 Hooks, 30 or 8 Hooks for 240 Hooks).The Woven Design data is stored in the FAT (File Allocation Table) File system which enables the Computer interface efficiently.From the FAT – File System the graphics image is generated and it would be stored in the conventional graphics file format such as .BMP, .JPG, .GIF etc.,.After the conversion the woven design shall be edited by any graphics software.The Punched Card Reader data storage shall be ported to any graphics software.

I have created a solar baby warmer which is portable and useful in remote locations. The infant mortality rate can be reduced by maintaining the body temperature of the babies. My innovation is an affordable solar baby warmer. The equipment does not require electricity and operates on solar energy. The medical centers can own the product, run through 7 watt power and also run through mobile batteries for three hours. The innovator has developed the prototype and is awaiting for clinical trials. The innovation will be helpful for the health centers located in remote locations and will be an addon to the medical infrastructure. This innovation is more useful in the rural areas as the rate of premature babies born is higher and the risk of fatality can be avoided.

Mr.Abhijeet Dutta, innovator, TOCIC, CGCRI, Kolkata

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals emphasize the importance of working on innovative models to promote products or services to meet the basic needs of people while reducing environmental pollution. PRISM 's support to develop innovations for affordable health especially in rural areas is noteworthy. For example single Device for detection of three most prevalent mosquito borne diseases (Malaria, chikangunya and Dengue,) was developed by one of the female innovators..

The innovations developed on the whole were catering to environmental efficiency, reduce the depletion of natural resources and public health. Majority of innovations developed with support of PRISM funding during the assessment period are closely aligned with the SDGs .

It would be helpful if a website is developed to place all the innovations of PRISM for public purpose. This enables researchers / industrialist / venture capitalists to contribute to technological progress of the innovation. I am 70 years old and have family issues. I am willing to transfer my technology, **Self-Propelled Three Row Potato Seeding Device' for Restricted Holdings which will be highly use for farmer community.**

- SK. Abdul Aziz, TOCIC Durgapur, West Bengal.

Challenges of Innovators

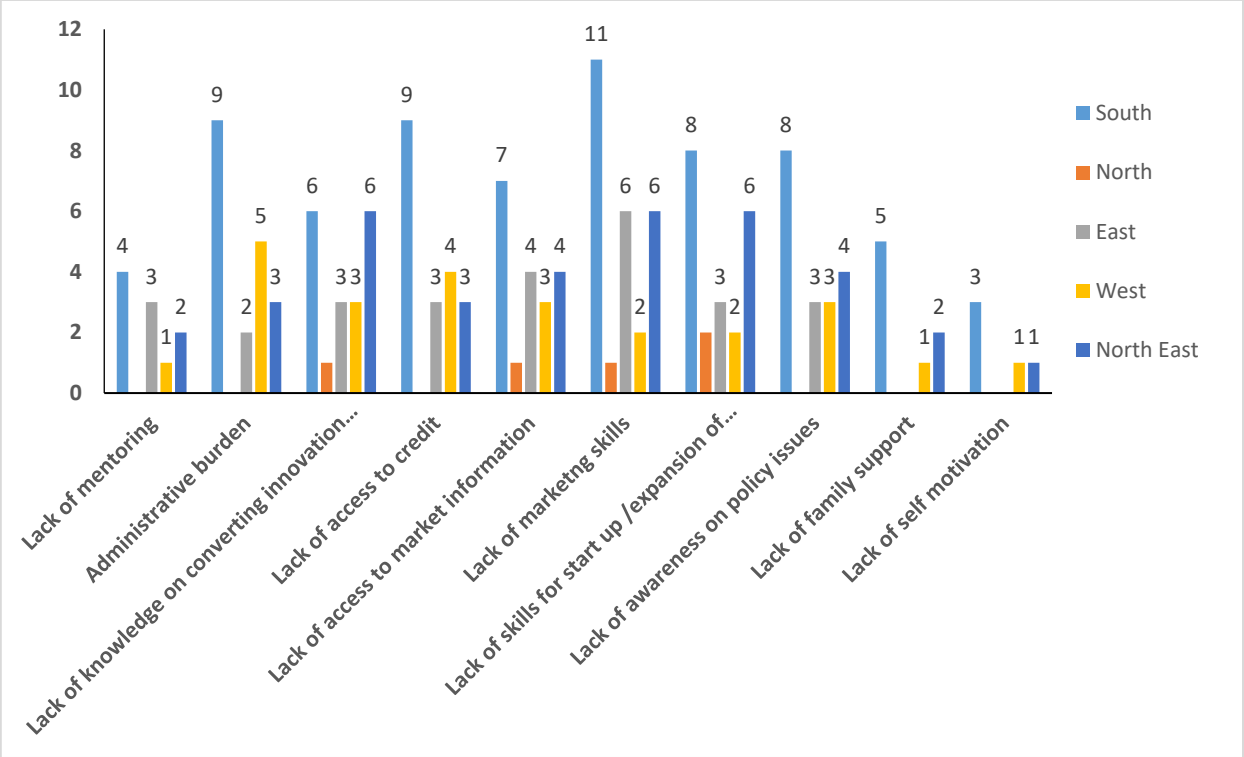


Figure: 39. Challenges faced by innovators

Innovators identified challenges they face while setting up their start-ups. The southern, eastern and northeastern regions identified lack of marketing skills as an important challenge. The western region found the administrative details for establishing a startup burdensome. The northern region identified only five challenges and that too in very small numbers. The in-depth interviews conducted with innovators from various TOCICs indicate the challenges include technical, process, networking, funding to scale up, lack of marketing skills etc.

Most of the innovators shared that to develop a market viable product they need to have facilities for successful testing and trials of the prototype. There were hurdles in designing, manufacturing, patenting and marketing of their innovations. The innovators had to develop prototypes by involving many manufacturers, which resulted in several iterations before having a viable prototype model. For instance, products like Prosthetic Polycentric Knee Joint and Socket for transferral amputees to improve walking patterns had to find the patients and improve the innovations based on feedback. Though the innovator could generate the idea, he had to do a scientific study to understand the technology for its efficiency of performance and quality.

DSIR will ask novelty, I don't think novelty would be an issue. Because, you need to understand the value of the product which will be able to find the needs of the customer, that is very much important, Novelty is for the research papers, not for the product- Kanthi Das (Kharghpur, IIT)

Mr. Shital Premraj Sonawane from TOCIC, Udaipur of Henna Harvesting Machine faced hurdles to locate a manufacturer to produce the initial prototype and components required for developing a prototype. The process of developing a prototype using various components increases the cost of production. The procedure and planning for standardization of design which is cost effective needs an understanding of market and availability of raw materials. The innovations required access to casting and manufacturing facilities which were not available easily.

Some of the innovators were in search of expert services. For instance Dr. Sudhanu Kansal, Innovator and also a dental surgeon had to seek services of a mechanical engineer for fabrication and product development.

Pandemic has had an impact on the country's policy decisions which resulted in the import of some specific equipment or technical parts which were not available in the indigenous market.

The PRISM innovators can interact with each other, so that each will be benefited from each other's learning. Peer interactions among different zones & different TOCIC centers would be beneficial rather working an individual; we can work as a group and help each other and can motivate and promote the scheme- Ms Pragnan (University of Madras, Chennai)

Some niche innovators like R Sujatha, (Eco Friendly processing of Eri silk to promote value chain) faced hindrances like availability of weavers, material procurement and collection of natural dye. Santanu Dhara's, experienced technological challenges to develop a prototype in a remote location using an advanced facility. Mr. Nripen Kalita, innovator, developed workshop facilities in his local residing area. The Tahmoy Goswami's challenge was entirely different from other innovations like the identification of incubation facility to manufacture the machine for digital paper at the time of commencement.

Majority of the innovators experienced technical challenges for experimentation in the process of developing prototype to product. They faced difficulty in fabrication and networking and were required to seek technical assistance from various institutions to develop the prototype. The medical innovators shared the delay in clinical trials and obtaining necessary administrative approvals to market the product. The innovators also desired to conduct exhibitions and symposium with marketing experts on business models to scale up their innovations.

Canvas of Successful Innovations

Start-ups incubated from DSIR-PRISM funding as on 04.03.2023

PRISM is the initiative to transform an individual innovator into a successful entrepreneur. The benefit of PRISM scheme is that the grant is sanctioned for both prototype development as well as for commercialisation of the project. The experts at TOCICs also extend technical and strategic assistance to the innovators for the commercialisation of the project, right from the stage of idea development .Since start-ups are centres of novel innovations, they generate jobs, more employment leads to a stronger economy, and a healthier economy has a direct bearing on the growth of regions where startups locate. The following section provides information about Startups established by innovators during assessment period of study.(Table-8)

Table.8. Start Up by Innovators

	TOCIC	No. of start-ups created by Innovators after graduated from PRISM through TOCICs
1.	CSIR-CGCRI, Kolkata	2
2.	CSIR-CMERI, Durgapur	2
3.	CSIR-NEIST, Jorhat	2
4.	IIT Kharagapur	3
5.	University of Madras, Chennai	5
6.	CTAE, Udaipur	6
7.	CSIR-CSIO, Chandigarh	2
8.	SPMVV, Tirupati	8
9.	IIT Guwahati	2
10.	IIT Kanpur	4
11.	GSBTM, Gandhinagar	1
12.	CSIR-NAL, Bangalore	2
Total		**39**

DSIR-PRISM funding incubated 39 start-ups. The innovators at SPMVV Tirupati TOCIC created the maximum number of start-ups (8) followed closely behind by CTAE-Udaipur and

University of Madras, Chennai. Details of the innovators, the technology area they worked in, the name of the startup are shown in the table - 9.

Table-9 : Number of Startups generated during 2015-2020

Sl. No.	Name	Address of Innovator	PRISM project title	Start up company name	Approximate turnover per annum (in Rs.)	Manpower employed
CSIR-CGCRI, Kolkata						
1	Ms. Jayeeta Pal	KalnaKalinagarpara, PO- Kalna, Dist- Burdwan West Bengal, Pin-713409	Banned Ivory-its replacement (coconut shell)	M/s. Joy Handicraft	1.5 Lakhs	04 (Part-time)
2	Mr. Avijeet Dutta	7-B, Balaram Bose Ghat Road, Bhowanipur, Kolkata- 700025, WB	Affordable Solar Power Baby Warmer	M/s. Anukrity	5.00 Lakhs	02 (Part-time)
CSIR- CMERI, Durgapur						
3	Shri Madan Mohan Reddy	Villa No.5, Ashoka A-La Maison, Dulapally Road, Quthbullapur, SecunderabadHyderabad TG 500100 IN	Low Specific Cost SolarParabolic Dish Concentrator System Comprising Dish Concentrator (Module1) & Central Receiver System (Module 2)	M/s. Solwedish Solar Pvt Ltd.	50.00 lakh	10 / 200
4	Mr. Shri Rohan Kaundal	Shop No 1, Ground Floor, Safal Ganga CHS, ChemburColony, Mumbai 400074	Automatic Window Washer & Dryer Machine for High RiseBuilding\	M/s. Cleo Tech LLP.	20.00 lakh	05 / 50
CSIR-NEIST, Jorhat						
5	Mr. Tanmoy Goswami	Narengi Housing Colony, Guwahati, Assam 781006 Phone: 7086051056; 9706393227	DIGITAL PAPER INFRASTRUCTURE FOR A SECURED CERTIFICATE WITH AUTHENTICATION AND TRACKING	M/s Sumato Globeltech, Guwahati	----	2 Nos
6	Mr. Nripen Kalita	Vill- Jiakur-1, P.O-Kukurmara, District- Kamrup (R), Assam, Pin-781134;	LOW POWER PORTABLE MUGA & ERI SPINNING MACHINE	M/s ELAN Engineering, Guwahati	----	2 Nos
IIT, Kharagpur						
7	Dr. Bidus Kanti Das	Vill & P.O. Tilkhoja, P.S. Moyna Dist: PurbaMedinipur, West Bengal-721629	Development of biochar based formulation and preparation for cattle feed supplement	M/s. Zelence Industries Pvt. Ltd.	Rs. 40 lakh (FY21-22)	14
8	Mr. Vivek Pandey	Ecofrost Technologies Private Limited, Sr No 134/1, Tathawade, Pune	Solar Powered Farm level cold storage with battery-less refrigeration and thermal storage	M/s. Ecofrost Technologies Pvt. Ltd.	Rs. 47.21 crores FY 20-21	175

9	Dr.Santanu Dhara	B 100, IIT Kharagpur	Transient 3D Framework for Seeding and Expansion of Cells towards Delivery in Vivo and Therapeutics	M/s. Amnivor Medicare Pvt. Ltd.	NIL	3
UoM, Chennai						
10	Mr. David Roshan	UoM, Chennai 1B, 5th Floor, C Block, Phase 2, IIT Research Park, Taramani, Chennai 600113.	A novel acupuncture treatment planning and navigation support device for accurate positioning and needling for acupuncture practitioners	Curneu MedTech Innovations Private Limited	10 Lakhs	7
11	Mr. Pravin Kumar	No.149, F2, Pandian Street, Alwarthirunagar, Chennai – 600087	A user friendly & affordable head movement based mouse for computers and smartphones designed for the upper limb disabled	Dextroware Devices Pvt. Ltd.	Nil	4
12	Pragyan Prasu Patnaik	MIG 122 Kalinga Vlhar, Patrapada, Khandagiri, Bhubaneswar-751019	A radio frequency device for detection, imaging and mapping of underground utilities	Aavrtti Technologies Pvt Ltd	Nil	3
13	Mr. Atul. S.C	No.25 Sidco Industrial estate, Thaneer Kulam, Thiruvallur 602025 Tamil Nadu	A novel process for multi component diffusion coating	Diffuson Coatech LLP	Nil	2
14	Mr. Venkataraman Subramanian	57, Anna Salai, Chitlapakkam, Chennai 600064	Power appliance for toilet cleaning	YYH Innovative Solutions (P) Ltd	12.6 lakhs	4
CTAE, Udaipur						
15	Mr. Subojit Roy	9-Punjabi Bagh, Kalkamata Road, Pahada, Udaipur Rajasthan-313001 Mob. No-9935438895 E-mail: quenchitro@gmail.com	Eco Friendly Health Pro Reliable Water Purifier & Enhancer	QUENCHIT-RO	10 Lakhs	5
16	Ms. Neha	B-206/24, Sagar Tarang, JP Road, Versova, Andheri- West, Mumbai, Maharashtra -400061 Mob.:7738455002; Email: post.epatr@gmail.com	Waterless Urinal Technology	Tapu Sustainable Solutions	25 Lakhs	10
17	Mr. Eobin Alex	Paradise Villa, Mathe Nagar-230, Cochin-33,Ernakulam Kerala Mob. No.-7204076371 E-mail:eobing@gmail.com	Real time 3Ds canner based Psycho-Physical Rehabilitaton	Isgoing.online	1 Crore	25
18	Mr. Senthil Natesam			QRL Bioscience		
19	Mr. Sachin Bhardwaj			Somarshuf Support Pvt.Ltd		

20	Mr. Deepak Singh			Divy heavy electric Pvt Ltd		
CSIR-CSIO, Chandigarh						
21	Mr. Sandeep zope	401, Navkar, Patankar Park, Nallasopara west, Palghar-401203; Mob: 9320744667 Email: supremetechno@hotmail.com	Pheripheral blood smear instrument	M/s.Stainz Scientific Pvt Ltd	79 lakhs	07
22	Mr. Prabhjot Singh			Mobilimb Prosthesis	3.5 lakhs	12
SPMVV, Tirupati						
23	Dr. Venu Polineni	8-2-120/112/A/1, Plot no.101 Jubilee Hills, Road No.9, Beside Harmony Heights Apartments, Hyderabad - 500033, Telangana, India	Cocktail nematicide to control plantparasitic pathogen-	M/s. Telluris Biotech India Pvt. Ltd Innovation Food and Agriculture Fund	6 Crores Funding	Permanent employees-43 Contract employees-28
24	Dr.Anantha Prasad	CEO, Atal Incubation Centre, Jyothi Institution of Technology Foundation, Off Kanakapura Road Tataguni Bangalore – 560062	Novel 3D Printed Splints and Arm Supports for Arthritis and Arm Injured Patients	M/s. Altem Pvt ltd	6 Crores	67 Members
25	Prof.V.V.Lakshmi	Women Biotech Incubation Facility-Bio Nest, Sri Padmavati Mahila Visvavidalayam, Tirupati	Green Technology for conversion of feather waste to value added products - poultry feed /organic manure	M/s. Dharani Pvt. Ltd	Initiated	Initiated
26	Mr. Abhhijit Kulkarni	166/1, Nanded Phata, Behind Sujata Mastani Factory, Sinhgad Road, Pune, Maharashtra 411041	Highly Miniaturized Process Intensified Distillation Unit	M/s. Flow RHEX Technologies	FY 2021-2022 approximately INR 1 Cr	5 Members
27	Dr. Narendra Reddy	Atal Incubation Centre, Jyothi Institution of Technology Foundation, Off Kanakapura Road Tataguni Bangalore – 560062	Biodegradable sapling pots and trays from Agricultural wastes	M/s. Agringenium Innovations Pvt Ltd	Initiated	Initiated
28	Dr. A.B. Marathe	AGUA HYDRAULICS, 718/2, Chaya Bldg, Angol Road, Opp. Appolo Pharmacy, Angol, Belgaum – 590 006 , Karnataka	Conversion of Vegetable / Fruit market / Kitchen Waste into Organic Manure and Bio-gas	M/s.Waste Bin Solution	2.16 Crores	04 Members
29	Mr. Narayan Sambhu Pandit-	No. 37, Shambhavi,2nd cross, Vidhana Soudha Layout, Laggere, Bangalore- 560058, Karnataka	Cost-effective improved biomass cook stove for domestic utility-	M/s. Koushalya Sustainable Technologies	Initiated	Initiated
30	Dr. Binita S. Tunga. PhD	Atal Incubation Centre, Jyothi Institution of Technology Foundation, Off Kanakapura Road Tataguni Bangalore -	Validation of Single device for detection of three most prevalent mosquito born diseases	M/s. Ameliorate Biotech Pvt. Ltd	Initiated	Initiated

		560062	(Malaria, Dengue and Chikungunya)			
IIT, Guwahati						
31	Dr. Uddip Kashyap	H.NO-28, Byelane-2, Anil nagar, Rajgarh link Road, P.O.-Ulubari, Guwahati-781007	Elimination of viruses such as SARS-CoV-2 in condition recirculated air using electrostatics	M/s. Mecentro Private Limited	1.8 lakhs	3
32	Dr.S.Kanagaraj	Qrt. No. E-145 IIT Guwahati campus Guwahati - 781039	Gait analysis based patient specific prosthetic polycentric knee joint and socket for trans-femoral amputees to improve their walking pattern	M/s. Assistive Devices Technology Private Limited, Guwahati	Nil	Nil
IIT, Kanpur						
33	Mr. Premendra Singh	Village: Basu,Post: Gaju, Dusty.: Mathura (U.P.) Pin. 281206	Thermal Insulation, Fire Protecting Materials and Process of Their Development	M/s. Securefire Industries SafetyPvt. Ltd.	10 Lakhs	8
34	Mr. Eshan Sadasivan	PROSOC Innovators Pvt Ltd 123/362, Fazalganj, Kanpur-208012, Uttar Pradesh, India	Design &Developmentof Compact , Low costPaper Carry Bag Making Machine	M/s. Prosoc Innovators Pvt. Ltd.	50 Lakhs	7 Full Time UnderDirect Payroll 25 Part Time/ Indirect Payroll
35	Mr. Jitendra Bhardwaj	H.No- 135 A/19, Plot No-369, Nankari Post Office, Kanpur, U.P.	Automated Perfect spherical Shape (Laddu) Making machine for eatable	M/s. Innosium Technologies Pvt. Ltd.	5 Lakhs	5
36	Mr. Anuj Awasthi	325, Baba Nagar, NaubastaKanpur - 208021 Uttar Pradesh	Development of a multipurpose instrument for study of magneto-electrochemical with custom software for data display recording & analysis	M/s. Kanopy Techno Solutions Pvt. Ltd.	80 Lakhs	10
GSBTM, Gandhinagar						
37	Mr. JAYENDRA DIWAN	F-405 Bhagwat Green, Nr Akruti Township,opp: Syndicate Bank, Narol-Ahmedabad-382405	Making of Transfemoral & Transtibialmechanical Prosthetic Leg	Mobilimb Prosthesis Pvt Ltd	35 lakhs	12
NAL, Bangalore						
38	Mr.D.Chandrasekar	4th Floor, No :58, Anand Nagar Main Road, Hebbal, Bangalore 560024 ; Ph:9980222870	Wave Energy Converter	Alpha MERS Ltd	90 lakhs	07

39	Mr.Rajasekar Elavarasan	No 5, Tank Street, Opp.to Surya Hospital, Hosur – 635109, Krishnagiri Dt, Tamil Nadu. Phone : 9944677040	Automised high precision crystal growth puller system	Raana semiconductors pvt Ltd	10 lakhs	04

Several start-ups have begun commercial exploitation of their innovation. Specifically, 25 of the 39 start-ups (~64 percent) show varying amounts of annual turnover. The turnover ranges from a few lakhs to a few crores. Tirupati and Kharagpur have start-ups whose turnover is Rs. one crore or more. Tirupati has 4 start-ups whose turnover is one crore or more --- the highest among all TOCICs. Kharagpur has one start-up whose turnover is the highest among all TOCICs (over 47 crore).

Several companies have initiated start-ups but did not indicate the number of people employed. Of those that have employed, the number varies widely from as low as 2 to more than 50. Start-ups that are well-established and whose turnover is more than 25 lakhs tend to employ more people .

Region wise startups

Table-10 : Region-wise Startups

Region	No of Start-ups
South	15
North	6
East	7
West	7
North East	4

In terms of the region where start-ups were created, the southern region led the way with 15 start-ups. The eastern and the western regions followed behind with 7 start-ups each.

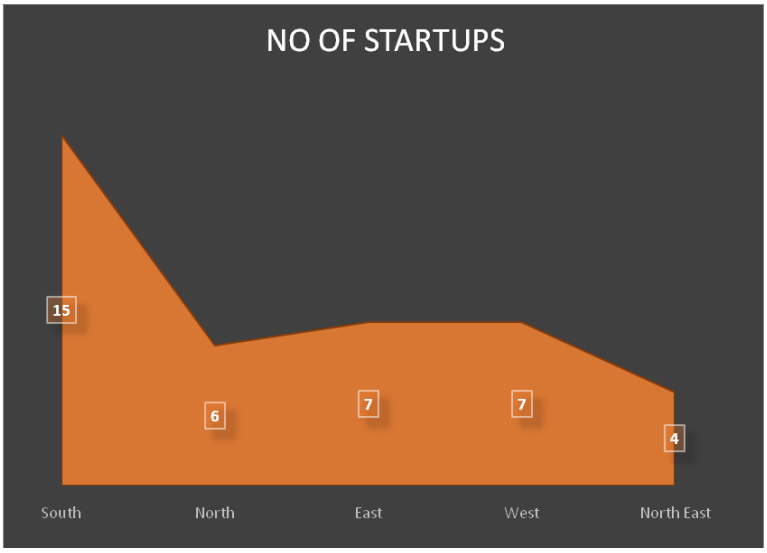


Figure: 40 Region wise distribution of Startups

Turn over of start-ups

Table-11 : Turn over of the Startups

Turn Over (in Lakhs)	No of companies
1 to 10	9
11 to 25	3
26 to 50	4
51 to 75	3
More than 75	6

17 of the 39 start-ups showed promise of economic viablity. Six start-ups had turn over of more than Rs. 75 lakhs. Others had turnover ranging from less than 10 lakhs to 75 lakhs.

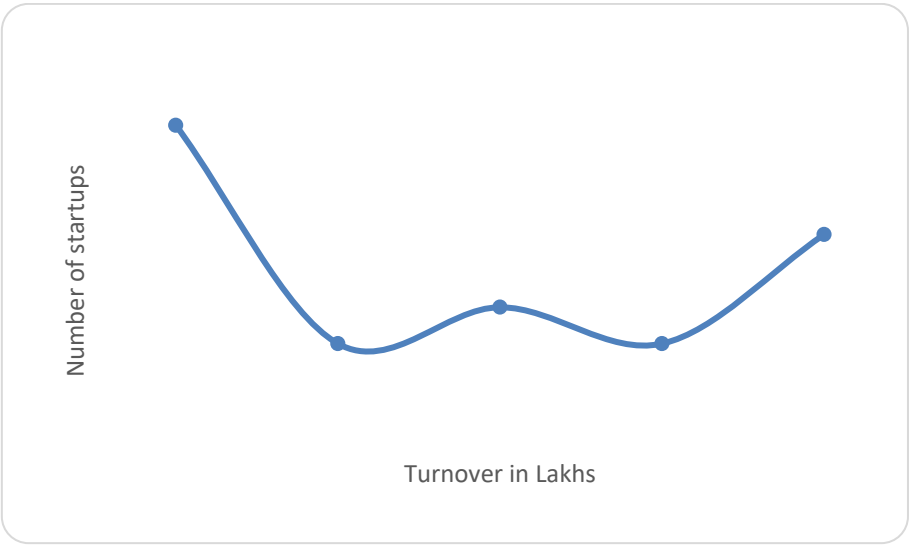


Figure:41 : Turnover of the Startup companies

Mr Vivek Pandey, IIT Kharagpur, West Bengal, with the funding from PRISM scheme developed solar powered farm level cold storage with battery less refrigeration and thermal storage .It is a small scale solar powered cold storage system which uses thermal storage system as its primary backup. It is a pioneering product in the cold chain space that bundles various innovations together. The system contains both pre-cooling and storage arrangement. It can be hybridized with any other source of energy as the need be. It maintains temperature, humidity and air-quality parameters inside the room at recommended conditions thereby ensuring freshness and long shelf for commodity that is stored. The unique battery-less back-up system entails virtually zero maintenance and running costs. It brings down the production cost and ensuring seamless operation. The modularity of the product enables us to scale its physical attributes according to user needs. The features of the product include battery-less backup system, one small battery for auxiliary operations-cooling and storage space ,roof mounted solar panels, intelligent control system with integrated user-interface and air quality control and controlled atmosphere. It has led to generation of clean energy, save food wastage and uplift farmer's income. The end product has been endogenously developed cold storage system for Commodities like Fruits, Vegetables, Flowers, Seeds, Grains with approximately 3.5 metric ton of storage capacity with an in-built pre-cooling capacity of 0.5 metric tonnes. The Product, primarily designed for the rural segment, does not depand on grid electricity and after a 2-year breakeven, claims to lead to over 40% increase in profits.

Green Technology for conversion of feather waste to value added products - poultry feed /organic manure using keratinase enzyme Cost effective KTF With the low cost of production in a week time compared to other organic manures which take months time for composting, it is cost effective and can generate wealth. Further it is reduces the health hazards due to extensive use of chemical fertilizers and also easy sewage management during farming. The developed KTF product was shown as superior/equivalent to the much more costly fish meal/soyabean meals currently used in poultry. KTF having other applications like organic manure. The results have shown that KTF improve water retention capacity - **M/s. Dharani Pvt. Ltd, V.V.Lakshmi, SPMVV**

Technology-wise Start-ups

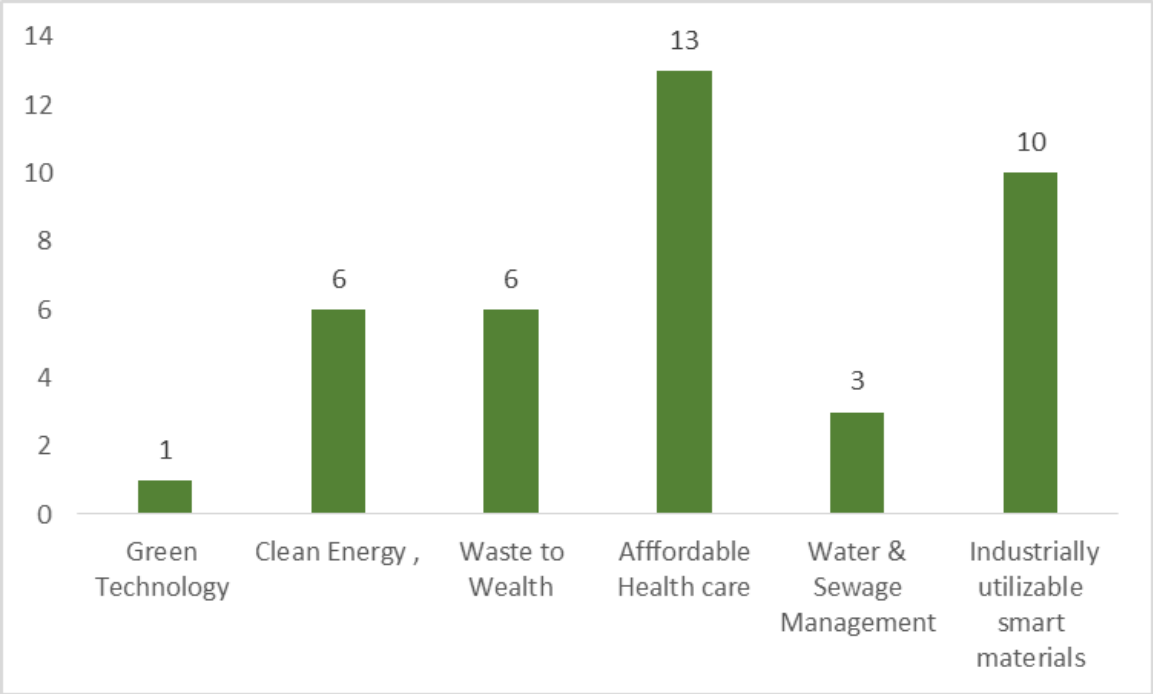
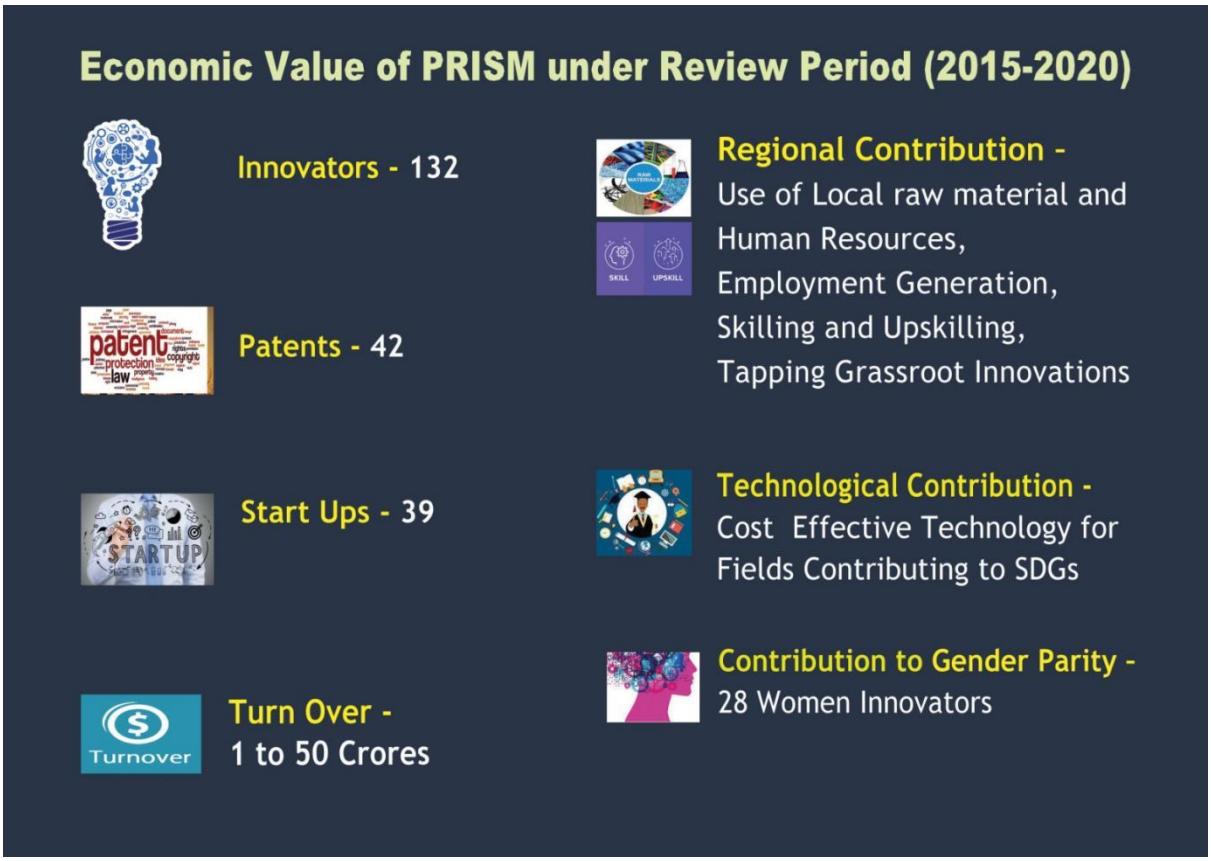


Figure: 42 Technology-wise Start-ups

The innovators mainly focused on six technology areas to create start-ups: Green technology, clean energy, waste to wealth, affordable healthcare, water and sewage management and industrially utilizable smart materials. The maximum number of start-ups were created in the area of affordable healthcare (13) followed by industrially utilizable smart materials (10). Other start-ups were in single digits.

The in-depth interviews with innovators shared challenges in starting a startup. To develop a market viable product and start a company, the innovator needs to have successful testing and trials of the prototype. There were hurdles in designing, manufacturing, patenting and marketing. The procedure and planning for standardization of design which is cost effective needs an understanding of market and availability of raw materials. The medical innovators have faced challenges in Networking and outreach challenges for non-technical innovators with technical experts. The scheme should have substantial financial support in Phase II to strengthen startup eco system in the country.

Economic Value of PRISM



The most important catalysing effect of innovation is its enormous long term economic and social value. Tracking the impact of an innovation activity for the value of the money invested is crucial. The economic value of PRISM is presented by drawing upon the findings of the assessment study.

DSIR under PRISM sanctioned an amount of Rs 827.34 lakhs to 132 innovators for the development of innovations across the country. The innovators developed technologies that contribute to sustainable development goals which in turn positively impact economy and society. For instance, Green technology not only protects environment but importantly helps to handle resources which translates into increased efficiency in the economy. Reducing dependency on grid electricity reduces the cost per unit produced which leads to enhanced profits. DSIR-PRISM funding incubated 39 start-ups which have provided employment opportunities many . The innovators during review period are engaged into industry which fall in the categories of Green technology , Affordable healthcare and Clean energy, industrially utilizable smart materials ,Waste to wealth and Water and sewage management.

The innovators generated 42 patents in different technological sectors .. The turnover ranges from a few lakhs to 50 crores. The number of innovations and startups emerged from different regions resulted in avenues for self-employment and provision of opportunity for training local people and contributed to regional growth.

DSIR has invested Rs 827.34 Lakhs on 132 innovators over a span of 5 years(2015-20). Despite 39 start-ups emerged in the study , only 25 have quoted their turnover which is Rs 2201.00 lakhs. PRISM generated financial success rate of 266.03% on the investment during the review period which is remarkable.

The PRISM successfully translated small funding into a greater value by raising capital for developing innovation and entrepreneurship. The utilisation of local raw materials, employment generation, development of entrepreneurship, linkages with incubation centres and marketing of innovation beyond their region etc have a long term economic impact.

Conclusion

The number of startups emerged from the study are impressive despite the regional variations. The increase in funding for innovators under Phase II would lead to more startups thus contribute to employment generation, regional growth and stronger economy of the country. The women innovators need special assistance to establish startups. The TOCICs should have an interface with industry to motivate innovators for commercialisation. TOCIC can organize workshops on digital marketing and emphasis on business strategies will equip the innovators to move towards commercialisation.

Recommendations

Recommendations

This study illustrates how innovative approaches to nurture innovation eco system can contribute to technological development, capacity building of individuals , regional growth and community. The new models of innovation and entrepreneurship adopted by DSIR could reach the unreached and contributed to the technological innovations in the field of health, agriculture, industry , green technology and able to contribute to Sustainable Development Goals. However, TOCICs , the implementing agency of PRISM objectives and innovators have experienced challenges in their journey. The following recommendations have emerged from the responses of coordinators , co-coordinators of TOCICs and innovators.

Policy Considerations

- The scheme works across class, age, geography, sector, and is unique in the space of innovation. The scheme shall be continued with higher allocation of funds for manpower engagement.
- Enhance the fund under Phase I Category.
- Funds under Phase II may also be extended to the innovators with Startups to scale up their innovations.
- PRISM may organize “Annual Symposium of Innovators” in different regions along with industry partners for industrial translation of successful products.
- DSIR may consider establishing Rural Incubation Centers to provide technical motoring
- The TOCICs should alsoconsider challenges in innovation pathways and be able to document in annual reports by taking inputs from innovators regularly.
- One dedicated assistant is needed at TOCICs to attend to activities like maintaining the files, following up the mails received, organizing payments, data and helping in convening PRC meetings. Presently PRISM funds are allotted for part time assistants. DSIR PRISM needs to make separate provision for hiring an assistant as per prevailing MHRD pay structure.
- A website may be developed to place all the innovations of PRISM for public purpose. This enables researchers / industrialist / venture capitalists to contribute to technological progress of the innovation.

- The co-ordinators should be empowered to select and disburse the funds for Phase I – Category I approvals.
- Some of the TOCIC Host Institutions are not permitting /not willing to pay honorarium to TOCIC coordinator and DSIR may consider to have uniform policy for payment of honorarium.
- Digitalization of data of innovators may be considered.

Strengthening Innovator's Capabilities and Networking

- The Mentor pool database can be created to mentor succeeding stages of innovation in entrepreneurship; Knowledge of IPR; Technology Transfers policies; Exposure to Industry; Knowledge of Startups policies, National Innovation policies; Tie-ups with Incubation center, Venture Capitals, Banks, etc.
- Each TOCIC should develop database of marketing experts to mentor innovators.
- Conduct of workshops with marketing experts on business models to scale up their innovations, networking , p*atenting and marketing.*
- TOCICs may encourage peer interactions of innovators among different TOCIC centres and regions.
- Training on digital marketing may extended to innovators.

Acronyms

CFTRI	Central Food Technological Research Institute
CGCRI	Central Glass & Ceramic Research Institute
CMERI	Central Mechanical Engineering Research Institute
CSIO	Central Scientific Instruments Organisation
CTAE	College of Technology and Engineering, Udaipur
DSIR	Department of Scientific and Industrial Research
DST	Department of Science and Technology
GSBTM	Gujarat State Biotechnology Mission
IPR	Intellectual Property Rights
IISER	Indian Institute of Science Education and Research
IIT	Indian Institutes of Technology
JNTU	Jawaharlal Nehru Technological University
MSME	Micro, Small and Medium Enterprises
NAL	National Aerospace Laboratories
NIEST	North East Institute of Science and Technology
PASC	PRISM Advisory and Screening Committee
PRC	Project Review Committee
PRISM	Promoting innovations in individuals, Start-ups and MSMES
SDGs	Sustainable Development Goals
SPMVV	Sri Padmavati Mahila Visvavidyalayam
TOCIC	TePP Outreach cum Cluster Innovation Centre
UoM	University of Madras

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Annexure

TEPP Outreach cum Cluster Innovation Centre (TOCIC)
SRI PADMAVATI MAHILA VISVAVIDYALAYAM
(WOMEN'S UNIVERSITY)
TIRUPATI

Questionnaire for Coordinators of TOCIC

Primary Objective of the study:

To measure the impact of PRISM scheme on inclusive growth, techno-commercial or socio-economic value addition at National, regional and local level and challenges faced by TOCIC and innovators

A. Details of Centre

1. **Name of TOCIC**
2. **Name of the host Institute :**
3. **Year of establishment of TOCIC :**
4. **Name of the Coordinator along with associated period**
5. **Name of the Co-Coordinator along with associated period**
6. **Address (with PINCODE)**
   TOCIC Telephone number
   Mobile Number of Coordinator(s)/ Co-Coordinator
   E-mail ID of Coordinator(s)/ Co-Coordinator
   Web Address:

B. Detailed information

Objective-1 (Q7-Q17)

- **To assess the extent the PRISM scheme dissemination from National to sub-National, regional and local level.**

7. **How many Workshops/outreach camps/Hackathons were conducted in the region :**

Please attach some photographs or media clippings (Annexure if required).

Year (Financial year April-March)	Number of Workshops	Number of outreach activities	Place of Event organized / Organization associated (Name them)	Target group (PG Students/UG Students/ NGO etc,.)	No of delegates participated	Any follow up activity with organisation, etc. Describe briefly	Remarks if any
2015-16							
2016-17							
2017-18							
2018-19							
2019-20							

8. Has your TOCIC developed technology solutions aimed at helping MSME clusters? Yes / No

9. If yes, has your TOCIC connected with MSME Clusters

Yes / No

(if you have answered to the above question, please provide supporting documents)

10. Please indicate the number of Innovators mentored from 2015 to 2020

Year (Financial year Apr-March)	2015-16	2016-17	2017-18	2018-19	2019-2020
Phase-I Category -I					
Phase-I Category -II					
Pe-II					

11. What kind of innovative ideas and mechanisms did you adopt to promote the outreach of TOCIC? Please describe briefly.

12. Details of proposals received

Year (Financial year April-March)	2015-16	2016-17	2017-18	2018-19	2019-2020
Number					
No of Men Innovators					
No of Women Innovators					

13. Details of proposals submitted to DSIR

Year (Financial year April-March)	2015-16	2016-17	2017-18	2018-19	2019-2020
Number Men women					

14. Details of proposals funded by DSIR

Year (Financial year Apr- March)	2015-16	2016-17	2017-18	2018-19	2019-2020
Number					
No of men who received funding					
No of women who received funding					

15. Quantum of project funds disbursed from DSIR to innovators

Year	2015-16	2016-17	2017-18	2018-19	2019-2020

Number					
Total amount sanctioned					
Total amount disbursed to innovators					

13. How many projects were completed during the assessment period (Apr 2015- March 2020)(Give Details)

14. Number of ongoing projects (Give Details)

Objective-2: (Q18-Q20)

To document the impact of PRISM scheme in terms of innovations in science & technology and startup ecosystem

19. What are the major areas of Innovations at your TOCIC. Also indicate the number of innovations generated?

Area	Number of Innovations
Green Technology	
Clean Energy, Industrially Utilizable Smart Materials	
Waste to Wealth	
Affordable Healthcare	
Water & Sewage Management	
Any other technology or knowledge intensive area	

19. Indicate the scale-up of innovations at the centre at regional, national and international level during the assessment period (2015-2020)

Level	Regional (Within the state	National (Outside the state	International (Outside the	Any other

	where you are located)	where you are located but within the country)	country)	
Number				

20. Please indicate the total output of the PRISM scheme during the study period (2015-20) :

Primary Beneficiaries (Innovators)	
Secondary Beneficiaries /Potential users/major organizations that adopted the technology	
End Users	
No of patents generated	
Number of Start-ups initiated	
Any other aspect you wish to state	

Objective-3 : (Q21-Q30)

To capture socio-economic, technological aspects of innovations and entrepreneurial impact of PRISM

20. Explain the extent of entrepreneurship leveraged: (Provide the details in 200 words)

21. Outcome of the innovations mentored by TOCIC (Yes/No)

Area of Innovation	Employment generated	Trainings conducted	Contribution to the local solution	Contribution to the local government

23. Map the innovation with sustainable development goals (SDG) / National mission wherever applicable

24. Listed below is a group of stakeholders (such as students, etc.). Please indicate to which of the three class they belong (whether innovators, incubates and entrepreneurs)

Group	Innovator	Incubates	Entrepreneurs
Student			
Academician			
Illiterates			
Unemployed youth			
Scientists			
Engineers			
Any other (Pl. write)			

25. How many innovators established network with incubation centres (if Applicable):

26. Whether your TOCIC has been successful in developing any prototype(s)? Yes/No

If yes, have you adopted any strategies to demonstrate the successful prototype(s): (If yes, what are these? Briefly describe them).

27. **What kind of activities were planned by the TOCIC to connect the – Innovators with domain knowledge experts (PI describe in about 100 words)**

28. **What type of innovations were developed by the innovators at your Centre (In number):**
    a) **Techno-entrepreneur / Commercial**
    b) **Socio-economic**

29. **Please provide concrete/actionable recommendations to improve the role and performance of TOCIC coordinator**

30. **Any other observations would you like to make?**

TEPP Outreach cum Cluster Innovation Centre (TOCIC)
SRI PADMAVATI MAHILA VISVAVIDYALAYAM
(WOMEN'S UNIVERSITY)
TIRUPATI

Questionnaire for PRISM Innovators

Primary Objective of the study:

To measure the Impact of PRISM scheme on inclusive growth, techno-commercial or socio-economic value addition at National, regional and local level and challenges faced by TOCIC and innovators

15. Name of the innovator :
16. Address ----------
    Telephone number ----------
    Mobile number ----------
    E-mail ----------
17. Name of the TOCIC :
18. How did you know about the PRISM scheme:
19. Title of the project proposal
20. Category of proposal
    a. Phase - I Category I/II : ----------
    b. Phase-II : ----------
21. Year of sanction of the proposal(DD MM YY)_____
22. Amount sanctioned for proposed innovation from PRISM :
23. Duration of the project start date ---------- end date ----------
24. Status of the project : 1) Completed 2) On-going

25. Specify the area/s of your innovation

Area	
Green Technology	
Clean Energy, Industrially Utilizable Smart Materials	
Waste to Wealth	
Affordable Healthcare	
Water & Sewage Management	
Any other technology or knowledge intensive area	

26. What is the nature of the Innovation :

a. Techno-entrepreneur /Commercial b) Socio-economic

27. What are the supports have you received from TOCIC Centre

a. Funds received Yes No

b. Technical Yes No

c. Mentorship Yes No

d. Coordination Yes No

e. Any other (please mention)

28. Technological challenges faced by you during proposed period (100 words).

29. Any other challenges faced during proposed period (100 words).

30. Types of strategies adopted to demonstrate your successful Innovation :

31. What is the End product / Process / Output resulted from the proposed innovation (One page Write-up not less than 500 words. Please attach a Photograph of the Innovation & Design/ Flowchart explaining the model/innovation).

32. Indicate the outcome of the Innovation (Yes/NO) :

Primary Beneficiaries	
Secondary Beneficiaries / Potential users/major organizations that adopted the technology	
End Users	
Patent generated (Filed/Published)	

33. Qualitative impact of your innovation (Contribution &usefulness to the society/significance of the innovation) (100 words)

34. Outcome of the innovations mentored by TOCIC (Yes/No)

35. Have you established network with any Incubation centre/ Industry Yes

No

36. Have you completed the process of commercialization

1) Yes 2) No 3) In the Process

37. If yes, Please provide the details of

1. Company ----------

2. Start-up ----------

3. Source of funding ----------

4. Incubation centre ----------

38. Have You received funding from any other agencies for the commercialisation of prototype (National/International)

Yes No

39. If yes, please name the organisation and its location

a. Name of the organisation

b. Loaction (full address)

40. Explain the nature of marketing of your Innovation.

1) Regional 2) National 3) International

41. **Mention the average time taken/expected time in terms of months from idea to its profitability in the market (If Applicable).**

42. **Please explain wide range of activities of your innovation in terms of deployment of novel solutions indicated below (200 words each)**

    A. **Economic,**
    B. **Social Relevance**
    C. **Environmental Impact,**
    D. **Regional Impact**
    E. **Manpower trained/employed**
    F. **Utilization of local knowledge**

43. **Map the innovation with sustainable development goals (SDG)/ National mission wherever applicable**

- **Good Health and Well-being** **[ ]**
- **Clean Water and Sanitation**
- **Affordable and Clean Energy,**
- **Decent Work and Economic Growth,**
- **Industry, Innovation and Infrastructure,**
- **Sustainable Cities and Communities,**
- **Life Below Water,**
- **Life On Land**

44. **Explain future plan of action of your innovation**

45. **Any other information (Please specify).**

****

PRISM – Glimpses of Activities

दैनिक भास्कर उदयपुर 30-03-2023

नया आविष्कार : चार साल का प्रोजेक्ट पूरा, अब लॉन्चिंग के लिए सरकार से लाइसेंस का इंतजार

इलेक्ट्रिक व्हीकल में नहीं लगेगी आग, एमपीयूएटी के रिसर्चर ने बनाई अनूठी बैटरी, सस्ती व हल्की भी

रवि धाकड़ | उदयपुर

तकनीक : टीसीएम का इस्तेमाल, ठोस अवस्था में रहेगा, आग लगने से रोकेगा

तकनीक देखते विशेषज्ञ

PRISM helps novel ideas converted into commercially viable products

HANS NEWS SERVICE
TIRUPATI

A workshop to unveil the report on 'Impact of PRISM scheme for five years' (2015 -2020) was organised at Sri Padmavati Mahila Visvavidyalayam (SPMVV) in hybrid mode. Dr Ramanuj Banerjee, member secretary, DSIR while explaining the objectives of PRISM, said it aims to reach out budding students, professionals, farmers, homemakers and any citizen who has novel ideas that can be converted into commercially viable products which have social relevance.

The scheme provides funds to individual innovators from Rs 2 lakh to Rs 50 lakh.

SPMVV V-C Prof K Raja Reddy, Registrar Prof N Rajini, Dr Ramanuj Banerjee, Dr PK Dutta and others releasing the workshop souvenir in Tirupati on Monday

He also stated that the impact study conducted by the SPMVV team provides deeper insights of PRISM to promote the scheme further. Dr PK Dutta, Head, PRISM, DSIR specified that PRISM was playing a crucial role in teaching the rural innovators. Padmabhushan awardee Dr T Ramasami, Prof Sachin Chaturvedi also spoke on the occasion.

The research team with Prof P Uma Maheshwari Devi, as Principal investigator, Prof P Vijaya Lakshmi and Prof P Jyothsna as co-investigators visited TOCICS located across the country and interacted with coordinators of centers and innovators to collect the data. DSIR has funded Rs 827 lakh to 132 innovators across the nation and 42 patents were sanctioned during the evaluation period.

Vice Chancellor Prof K Raja Reddy appreciated the team for conducting in-depth study on impact of PRISM scheme. Registrar Prof N Rajini stressed the need for continuation of the scheme because of its relevance to the society. Dr Lalitha Guruprasad, Prof Sunil Bhand and Dr Indranil Biswas, members of the advisory committee were also present. The successful innovators Vivek Pandey, Venu Polineni and others shared their experiences.

दैनिक भास्कर उदयपुर 13-03-2023

DSIR PRISM

उदयपुर फ्रंट पेज

दैनिक भास्कर सोमवार 13 मार्च, 2023

मंडे पॉजिटिव ■ एमपीयूएटी ने दिया 29 लाख का अनुदान, अब ऑटोमेटिक वर्जन बना रहे, इससे सीलबंद होकर मिलेगा ब्लड

एमबी में काम कर चुके लैब टेक्नीशियन ने 3.50 लाख में तैयार की ब्लड कंपोनेंट्स अलग करने की मशीन, अभी यूरोप से 25 लाख रुपए में मंगाते हैं

सिटी रिपोर्टर | उदयपुर

ओमप्रकाश 2011 से कर रहे रिसर्च, ब्लड से आरबीसी-डब्ल्यूबीसी-प्लेटलेट्स को करेगी अलग

ओमप्रकाश द्वारा तैयार मशीन

एमपीयूएटी की योजना

नई तकनीकें विकसित करने देते हैं 20-50 लाख रु. तक की सहायता

दैनिक भास्कर

आप पढ़ रहे हैं देश का सबसे विश्वसनीय और नंबर 1 अखबार

कुल पृष्ठ 18 राजस्थान मूल्य ₹ 4.50

उदयपुर मंगलवार, 22 सितंबर, 2020

देशभर में 12 सेंटर में से एक एमपीयूएटी : किसी ने 3-डी स्कैनर तो किसी ने वाटर प्यूरीफायर बनाया

प्रिज्म योजना : 12 साल में इनोवेटर्स ने बनाई 48 मशीनें, 15 का हो चुका पेटेंट, केंद्र से मिली अब तक 1.5 करोड़ रुपए की फंडिंग

इन मशीनों का हो चुका अब तक पेटेंट

ऑर्गेनिक खाद-बीज बुवाई मशीन।

स्वचालित पौध रोपाई यंत्र।

इस प्यूरीफायर से 85 प्रतिशत पानी शुद्ध मिलता है।

इनोवेशन से किसानों को मिलेगा फायदा


विज्ञान और
प्रौद्योगिकी मंत्रालय
MINISTRY OF SCIENCE
& TECHNOLOGY


वैज्ञानिक तथा औद्योगिक अनुसंधान विभाग
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH