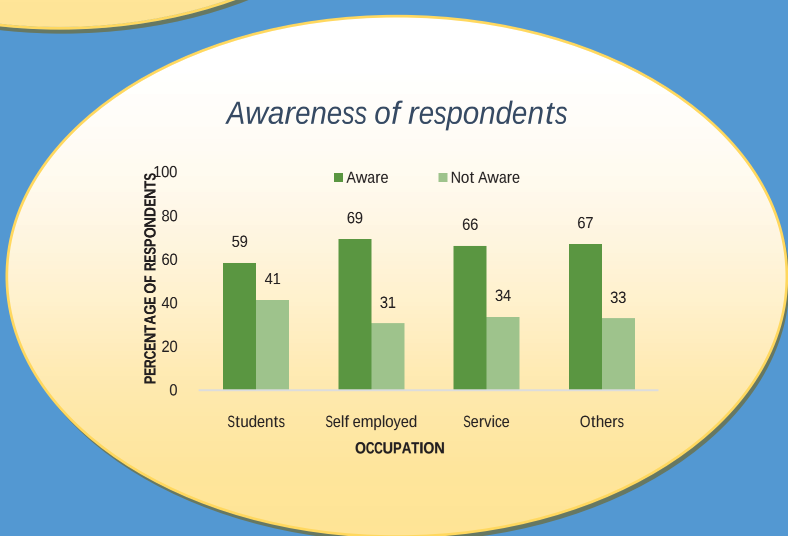
CSIR: 75 YEARS OF TOUCHING LIVES

A SURVEY OF PEOPLE'S PERCEPTION



Report of analysis based on Survey conducted during CSIR Platinum Jubilee Technofest 2016 at IITF, Pragati Maidan

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CSIR technofest attracts crowd

ARCHANA JYOTI ■ NEW DELHI

From healthy goodies — banana toffee, chocolates, plant nutrients-based carbonated fruit juices and Omega 3 enriched ice creams — to low cost housing technologies and 3D printed prototypes used for the design and validation of various aerospace components in the high-tech sector: These and many other technical research and innovation that has made the life of the common man easy are being showcased at the mega expo Technofest 2016 here. The mega show has been organized by the Council of Scientific and Industrial Research (CSIR) which is celebrating its Platinum Jubilee this year.

Union Science and Technology Minister Harshvardhan, who inaugurated the Technofest 2016 at Hall No 12 A at Pragati Maidan on Monday, said that it is a golden opportunity for the students, researchers, scientists, business man and a common man to witness science innovation and researches being conducted by the 38 laboratories of the CSIR located across the country under one roof here. "The entire history and contribution of the scientists from the CSIR since its inception 75 years ago can be seen through this window created in the IITF, 2016," added CSIR DG Girish Sahini adding that all the labs in one or another way has taken efforts to make the life of the common man easy.

Apart from 14 theme-based information panels highlighting the science and the technology components of major CSIR contributions, informative exhibits including demonstrable models are the highlights at the Technofest 2016.

For science enthusiast kids, their are science quiz and demonstrations, while the pavallion has a lot to offer for the startups as well the industry. If carbonated beverages based on grape, sugarcane, pomegranate and sweet lime and anti-obesity oils and quinoa based chocolates have been developed by the Mysuru-based Central Food Technological Research Institute (CFTRI), the Lucknow based National Botanical Research Institute (NBRI) has exhibited anti-diabetic products and other health related innovations. A brand of tea, Tea wine, which has a 7-12 per cent alcohol content by volume, which has been exhibited by the Himachal Pradesh-based Institute of Himalayan Bioresource Technology (IHBT) has been a centre of query among many of its other herbal products catering pharmaceutical, cosmetic, food, and plant industries. CFTRI senior scientist Dr Malathi, who has worked on a project to develop an indigenous variety of two highly nutritious (grain crops Chia(rich in omega-3 fatty acid and alpha linolenic acid) and quinoa (high protein content) said that the seeds can be highly beneficial supplements in a country like India that has a large number of malnutrion kids. "We are looking for more tie-ups," she added.

Message from the Hon'ble Minister

(Place Holder)

"This TechnoFest is an opportunity for the young students, scientists and the common people to come under one roof and witness the knowledge base of achievements and researches by CSIR"

Dr. Harsh Vardhan, Hon'ble Minister of Science & Technology and Earth Sciences .
Source: http://www.csir.res.in/webpages/ dailybulletin/Nov16/daily_bul_13_181116.pdf

http://www.dailypioneer.com/ vivacity/csirs-techno-fest-kicks-off-at-iitf.html

http://timesofindia.indiatimes.com/good-governance/centre/CSIR-showcasing-Platinum-Jubilee-Techno-Festival-at-IITF/articleshow/55432567.cms


वैज्ञानिक तथा औद्योगिक अनुसंधान
Council of Scientific & Industrial Re
LOUNGE

Foreword from DG, CSIR

(Place Holder)


Generics &
Healthcare

1. SUMMARY

With its entry into the 75^{th} year of touching lives in India, CSIR planned an event to assess its presence and performance through the eyes of its extreme end clients- the people. CSIR planned this event strategically alongside the 36^{th} India International Trade Fair (IITF) at PragatiMaidan, New Delhi from 14^{th} November to 27^{th} November, 2016 organized by the Indian Trade Bereau, an event that attracted a broad spectrum of visitors. The event was inaugurated by the H'ble Minister of Science and Technology and Earth Sciences, Dr Harsh Vardhan.

During the 12 days of the event, people from all walks of life were invited and received at the CSIR Pavilion. The visitors were exposed to a wide spectrum of CSIR technologies and products that have touched lives of India in the past seventy five years. Selected contributions from the CSIR labs were organized under life-touching themes like water, food and environment; dedicated scientists interacted with the visitorsthroughtout the event, aided by carefully prepared audio-visuals and working models of technology products.

Simultaneously a survey based on a carefully prepared questionnaire was conducted to record, assess and analyse visitors' feedback on the performance of CSIR through direct questions like "Are you aware of CSIR"and "Is CSIR useful to India". The responses were revealing; this Report records those responses and their implications. The visitors were also requested to provide general comments and recommendations. Overall the event was found to have very high impact.

In terms of people's perception, 97% of the respondents opined CSIR to be useful to India, with 2% of the opinion of somewhat usefulness. In terms of impact, the event was found to have significantly enhanced awareness of CSIR among all the categories of visitors.

The CSIR pavillion was awarded the Gold Medal by the India International Trade Association for quality.

CSIR can make true PM's dream of "Make in India"

The main exhibition was supplemented by various Business Sessions, Training Sessions and Interactive Sessions for students. Comments and suggetions were received both at survey points and also at the theme stalls.

A number of recommendations have been made based on the analyses; an important recommendation is that such events need to be organized more frequently for focused groups of audience and in different parts of the country.

2. INTRODUCTION

Science and Technology today play very critical roles in all fronts of national development. It is a tribute to the visionary leadership of India that a string of laboratories in various branches of science and engineering was established under the Council of Scientific and Industrial Research (CSIR). This year CSIR has entered the 75th year

of touching lives of India; over the past few decades CSIR developed and facilitated many new products that transformed the socio-economic landscape of India.

CSIR has significant presence essentially in all S&T sectors of societal, strategic and industrial importance. Public awareness of the resulting products and services is an important requirement for success and intensity of technology adoption. Keeping this in view,

CSIR decided to showcase its knowledge and technology spectrum that it has developed and delivered to the nation during its journey of 75 years, through the **Platinum Jubilee Technofest 2016**, as a part of the 36th India International Trade Fair at Pragati Maidan, New Delhi during 14th to 27th November, 2016. The purpose of the Technofest was to expose the students/public and prospective industrial partners about the CSIR initiatives in Science & Technology to improve the lives of people by technology interventions, skill development, employment generation avenues and explore potential collaborations with industry and academia. As a part of its organizational responsibility, the Technofest was an effort to learn directly from its extreme end users.

3. ABOUT THE EVENT

The Hon'ble Union Minister of Science & Technology and Earth Sciences, Dr. Harsh

Vardhan, inaugurated the event and addressed the press. The CSIR pavilion was divided into 14 thematic zones which comprised of components of major CSIR contributions, informative exhibits, including demonstr able models from various CSIR laboratories. The Directors of the CSIR labs in each theme area along with specialized team were present in their respective pavilions, ensuring effective interaction and explanation.

Themes were classified under the following broad categories (Annexure A)

(i) Aerospace &Strategic Sector
(ii) Engineering & Infrastructure
(iii)Agriculture& Floriculture
(iv)Petrochemicals& Chemicals
(v) Ecology & Environment
(vi)Food & Nutrition
(vii) Generics &Healthcare
(viii) Leather
(ix)Energy
(x) Water
(xi)Materials, Metals, Minerals & Manufacturing
(xii) CSIR for Societal Interventions
(xiii) CSIR 800 and IP& Entrepreneurship
(xiv) Nurturing Human resource

Alongwith the general exhibition, each day was dedicated to one theme; Coordinators responsible for the respective theme made presentations in the conference hall, highlighting the key technologies on display; activities were planned accordingly during the theme day. Intensive discussions with industrial partners were also part of the event for exchange of views as per the requirements of the industry and what CSIR can offer. The activities also included signing of MoU, technology transfers, etc.

“Bilingual texts should have been displayed”

Technical sessions were held for entrepreneurs, including presentations on recent success stories by the industrial partners of CSIR, in most cases over a live demonstration of the technology. Presentations were also made on promising technologies of CSIR of interest to potential partners.

A major emphasis was on the student visitors, the future leaders and partners of CSIR. Several activities were organized for the students to participate in the specific science related activities like quiz and competitions.

4. THE SURVEY: SCOPE AND METHODOLOGY

In the ninth meeting of the CSIR Platinum Jubilee Celebrations Advisory Committee held on 29 September 2016 under the Chairmanship of DG, CSIR, the members recommended a systematic survey to obtain feedback from the wide spectrum of visitors expected in the event. CSIR-NISTADS with its expertise and experience was entrusted with arranging the survey and analysing the feedbacks.

The objective of the feedback survey was to gather public opinion on the CSIR based on various aspects ranging from ambience to the quality of their exhibits. The expected outcome was to suggest improvements based on public perception and understand expectations of the common man from CSIR.

A CSIR-NISTADS team involving scientists, technical officers, administrative staff, project fellows, PhD students and other support staff (as in Annexure) carried out the survey based on questionnaire/feedback form developed and designed in-house at CSIR-NISTADS. The questionnaires are given in Annexure H.

A survey team was constituted on a daily basis

(as in Annexure I) which made great effort in collecting feedback from the visitors (hereafter mentioned as respondents) who came to visit the CSIR pavilion. Responses from more than 6000 respondents were collected during the 14 days. The data in the questionnaires were then codified, compiled and archived.

5. THE RESPONDENTS

I. **Gender-wise distribution of respondents:** On an average, the number of male (75%) respondents of CSIR pavilion were more than the female (25%) respondents (Figure 1).

"It was a great experience to visit the CSIR pavilion. It was very knowledgeable"

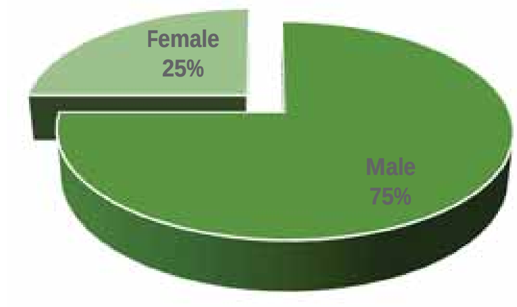


Figure 1: Percentage ratio of Male & Female respondents in the total sample

Initially on the very first business day the overall number of respondents was small. During 2nd, 3rd and 4th day, the number of respondents increased with same ratio between male and female. The number of respondents was exceptionally high on the first public day (Figure 2) as expected.

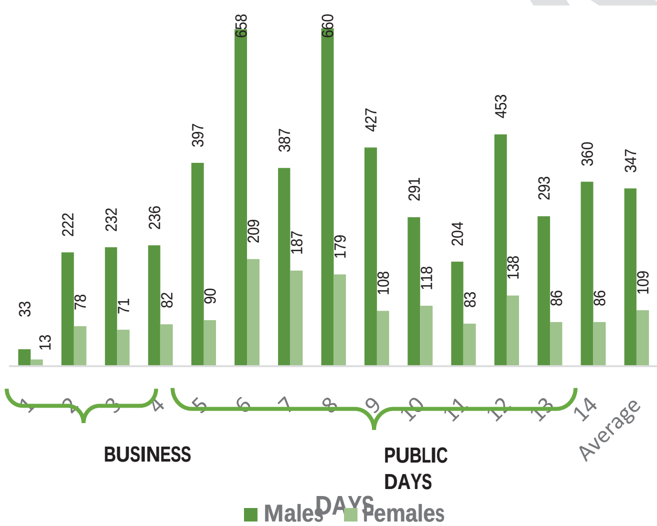


Figure2: Day-wise gender distribution of respondents

II. **Occupation-wise distribution of respondents:** Analysing the respondents based on their occupation revealed that the CSIR pavilion was visited mainly by students, including both school and college level students. 51% respondents were students (Figure 3).

"All Health technology developed and transferred by CSIR to a private company should boldly display a logo of CSIR, - All Govt. hospitals shouldmandatorily use these medicine, especially in NationalHealth Mission"

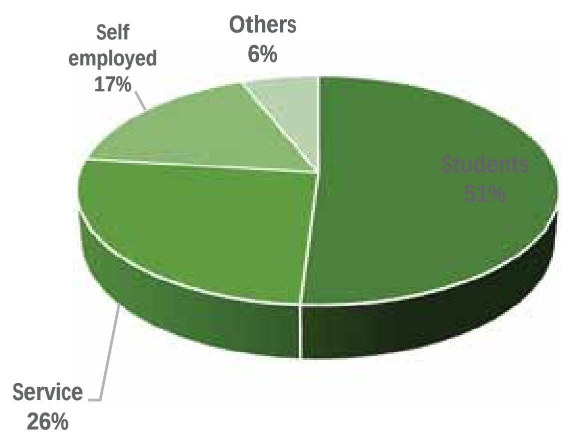


Figure 3: Occupation-wise distribution of respondents

6. IMPACT ANALYSIS

Methodology: To measure the impact of the event the impact indices were calculated as follows.

1. Overall Impact Index = $(N_N/ N_T)100$
2. Qualification-wise Impact Index = $(N_{NQ}/ N_T)100$
3. Occupation-wise Impact Index = $(N_{NO}/ N_T)100$

N_N: Number of respondents not aware of CSIR

N_T: Total number of respondents

N_{NQ}: Number of respondents (for a particular qualification) not aware of CSIR

N_{NP}: Number of respondents (for a particular occupation)not aware of CSIR

7. ASSESSMENT RESULTS

The overall day-wise impact index is 40% (Figure 4).

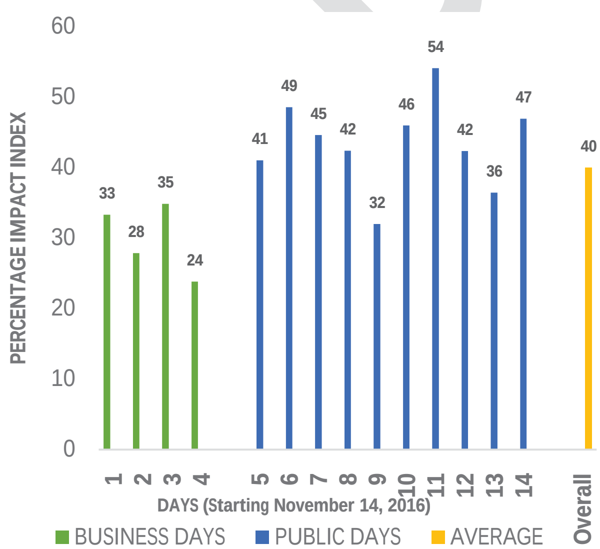


Figure 4: Day-Wise Impact Index

I. **Qualification-wise Impact:** The qualification-wise impact index was calculated using the formula previously cited. The impact index was found to be the highest amongst the

undergraduates visitors (Figure 5).

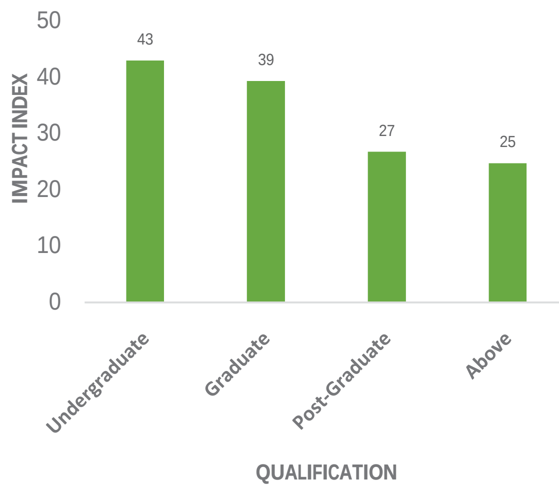


Figure 5: Qualification-wise Impact Index

II. **Occupation-wise Impact:** The occupation-wise impact index (Figure 6) was calculated using the formula previously cited. The highest impact was amongst the students followed by visitors who were in the service

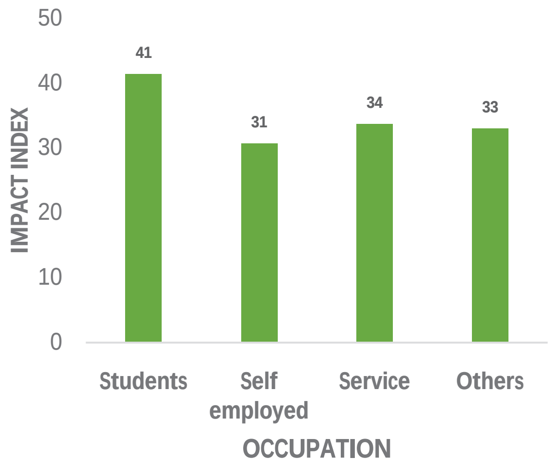


Figure 6: Occupation-wise Impact Index

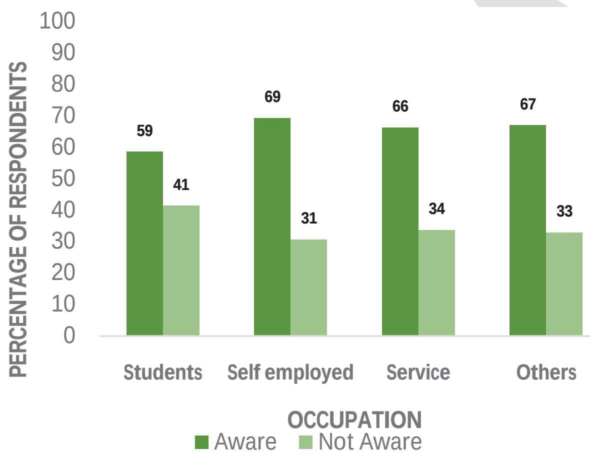


Figure 7: Awareness of respondents about CSIR vis-a-vis occupation

8. DISCUSSIONS

Highlights of the trends emerging are shown as below:

I. Awareness about CSIR: The survey showed that58% respondents were aware of CSIR and 42% were not (Figure 8). In terms of occupation, self-employed were found to be most familiar with the CSIR (Figure 7). Also, as per the qualification of respondents, highly qualified/educated were found to be mostly aware of CSIR (Figure 9).

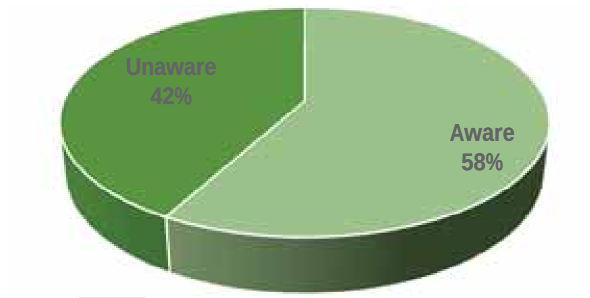


Figure 8: Percentage ratio of respondents' awareness about CSIR

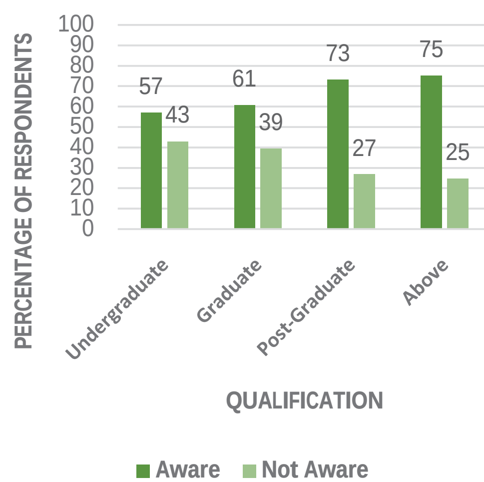


Figure 9: Awareness of respondents about CSIR as per their qualification

II. **CSIR for India**: Overall 93% respondents found CSIR useful to India (Figure 10). Also, respondents who were not aware of CSIR (Figure 8) before visiting the pavilion showed confidence in CSIR after visiting it. More than 90% respondents who were not aware of CSIR found CSIR useful for India (Figure 11). Only 2% respondents think CSIR is not useful to India.

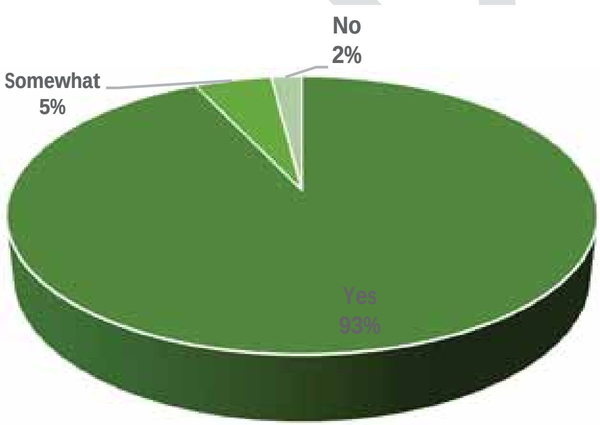


Figure 10: Is CSIR useful to India?

"Awareness program on generic drugs is desired"

Also, in terms of qualification of respondents whether undergraduate or graduate or so and so

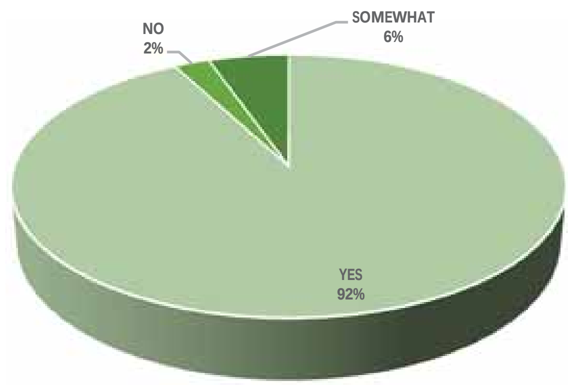


Figure 11: People who were not aware of CSIR, showed confidence in CSIR after visiting pavilion

all found CSIR useful to India in high percentages (Figure 12).

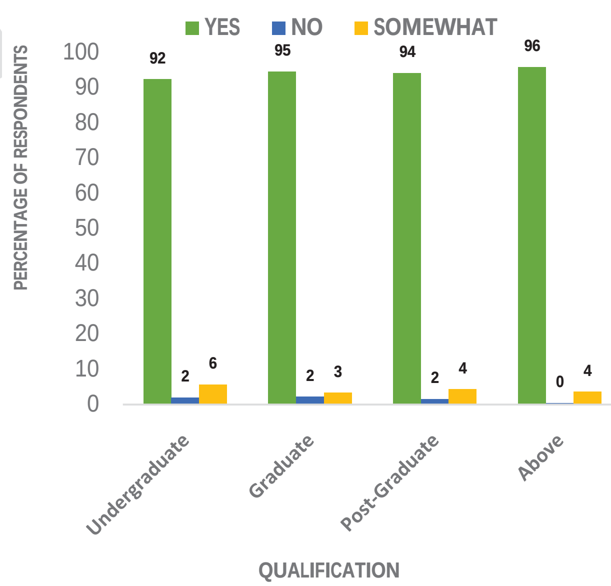


Figure 12: Respondents' opinion about usefulness of CSIR to India as per their qualification

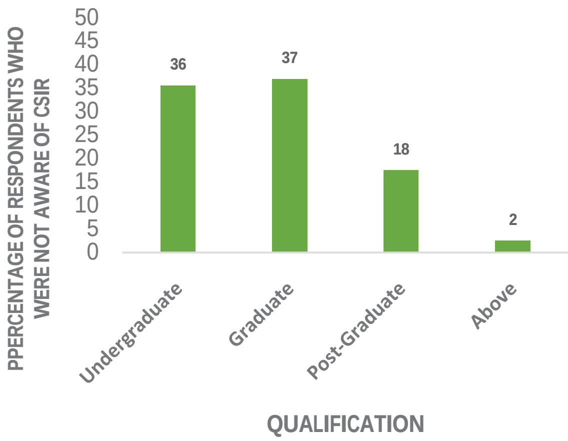


Figure 13: Respondents' (who were not aware of CSIR) opinion about usefulness of CSIR to India as per their qualification

"Rural incubation centres needed"

Rating of CSIR Pavilion: Rating for the contents, ambience, clarity of display, clarity of explanation and information content/novelty of display of CSIR pavilion were marked in terms of ranking from 0 to 4. Overall all the factors turned out to be excellent. Clarity of display factor has managed to grab highest ranking out of all (Figure 14).

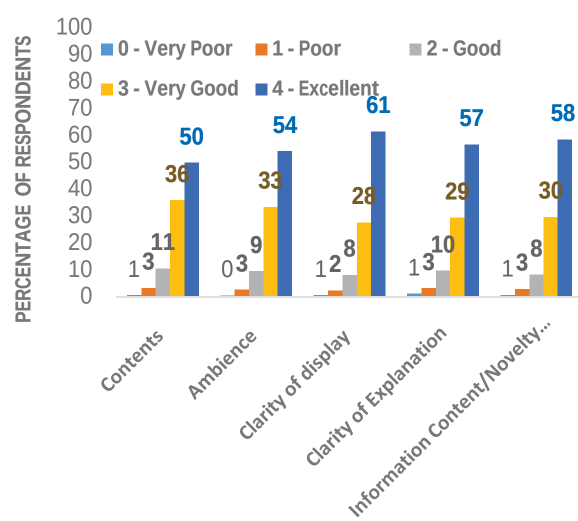


Figure 14: Rating of CSIR Pavilion in terms of expectation

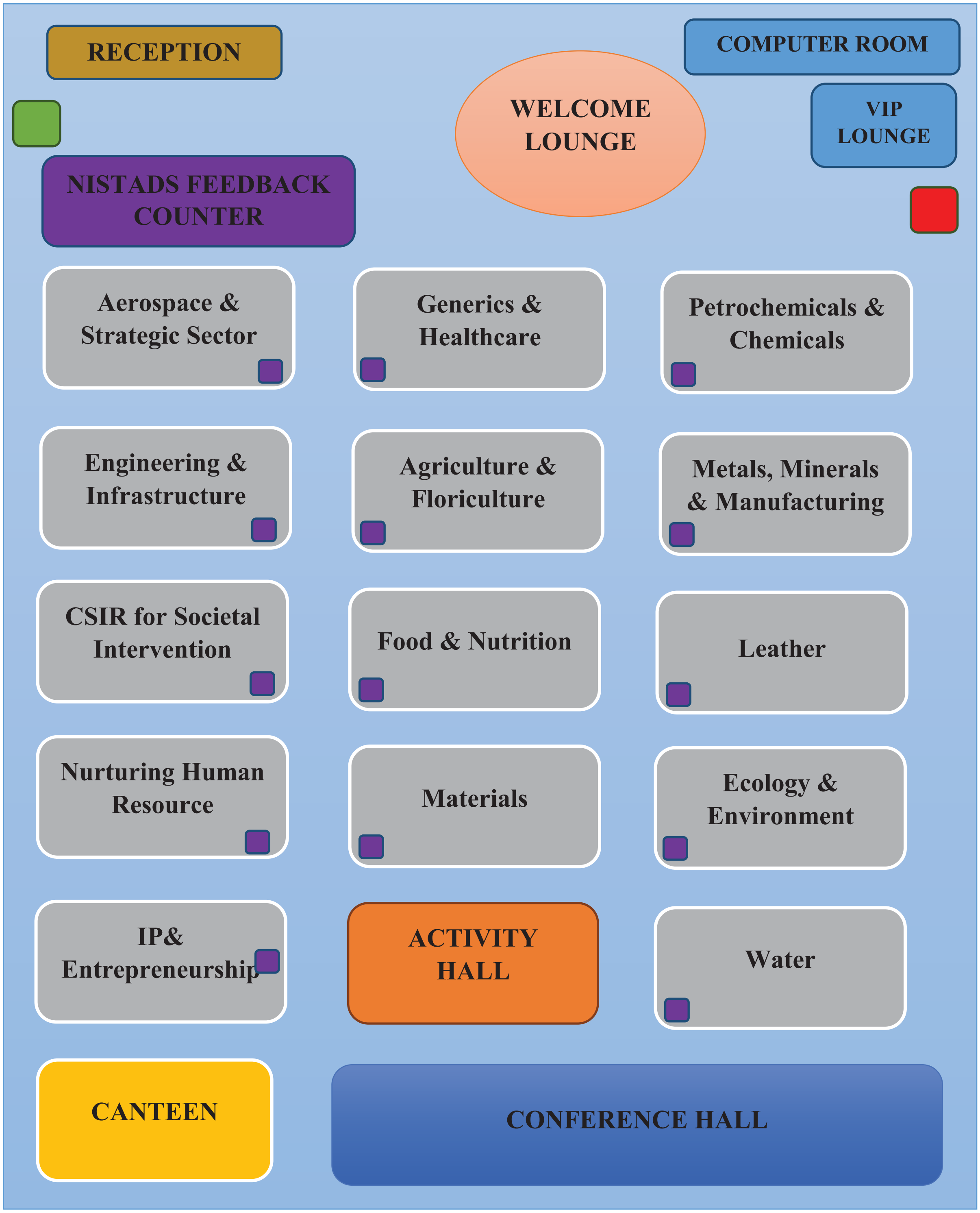


Figure: Schematic Diagram of CSIR Pavilion

Recommendations: TheFeedback Survey analysis revealed that the CSIR-Technofest, 2016 gave a huge impetus to young population, specially students who were previously not aware of CSIR. They were greatly impressed by the CSIR technologies and its knowlegebase. Someof the comments and suggestions from the visitors which are spread all over the report (also in pg no 15) also indicate that the vistorshad taken keen interest and looked into the details of each technology and made valuable recommendations. However, some key recommendations based on the the results of the feedback survey as well as their comments are highlighted in the box below.

KEY RECOMMENDATIONS

- Similar events with focused target audience (Students, entrepreneurs etc) could be more impactful
- The display/information should be bilingual
- Improvement required in one to one communication with the visitors
- More information on commercialization/marketing potential
- Regional events should be organized

"More detailed information on technology transfer mechanisms should be available for common man to follow-up"

Annexure-B

Sample of Comments from Visitors

- Communication / explanation require improvement, more interactive people should be there in the stalls
- Awesome work!
- More digitized display should be there
- Content of display should be more public-friendly, at places too much technical
- Display of future projects would be interesting!
- More detailed information on technology transfer mechanisms should be available for common man to follow-up
- Awareness program on generic drugs is desired
- CSIR should take the challenge of ensuring safe drinking water from any tap in India
- Display of more working models would make the exhibitions more interesting, if possible some hand-on –experience.
- It was a great experience to visit the CSIR pavilion. It was very knowledgeable.
- Very impressive work from CSIR
- CSIR can make PM's dream of "Make in India" true
- New govt policies should come up to ensure that the excellent work done by CSIR reaches common man.
- Rural incubation centres needed
- Good innovations from CSIR but needs to be implemented all over India by cutting costs; stop importing

Annexure-C

Some of the MoUs Proposed/envisaged during IITF

Name of the Lab	Technology	Details of MoU
CSIR-800	Crispy fruit production	M/S Roots & Flowers, Palampur Metahelix: Tata group of Campus Bengaluru
CSIR-CBRI	MoU signed for Architectural and Structure validation of rural housing designs developed by UNDP	MoU with UNDP, New Delhi on Rural Housing/"PradhanMantriAwasYojna" ,
	Geopolymer Concrete Technology	Agreement on Geopolymer Concrete Technology with M/s Kiran Global Geocements, Chennai
CSIR-CDRI	Bone Health/Fracture healing	Enem Nostrum Remedies Pvt. Ltd., Mumbai
CSIR-CGCRI	RSW	Incubation at CGCRI Pilot plant to manufacture RSW
CSIR-CLRI		NSFDC signed on 21 Nov. 16 Punjab Leather Signed on 26 Nov.16
CSIR-CLRI		MoU with NSCFDC for 2350(2016-17)
CSIR-CMERI	Edlyviayfloride detection Development of Digger teeth	tM/s Joint Enterprise Durgapur. M/s MisdapEngg. Ltd. Kolkata.
CSIR-CRRI	Hard grade bitumen for the formation of bituminous surfacing for roads and airfields pavements Design and Development of Car Driving Simulator Modification of bitumen and use in road construction	M/s. Juno Bitumix Pvt. Ltd., Noida, M/s. AR Thermosets Pvt. Ltd., Kanpur M/s. Tikki Tar Industries, Vadodara. MOU signed with M/s Faros Simulations Reliance Industries for a 3 phase project.

CSIR-IIP	Waste plastic to diesel	MOU's for technology transfer to qualified MSME's that can adopt the technology locally would be signed once the completed 1 ton unit is standardized.
CSIR-NAL	Composites Technology Wind Solar Hybrid System for domestic application	Aditya Birla Group, Mumbai - Technical Advisor Consultancy for establishing a composite manufacturing unit for manufacturing of LCA composite parts Enzen Global Solutions Private Limited, Bangalore
CSIR-NEERI	Pprovision of safe water in rural areas in Maharashtra. Water and wastewater management Develop a systematic framework for Integrated Green Corridor Development along National Highways, build resilient ecosystem in the form of 'Green Corridors' along National Highways for combating global warming and climate change effects	MoU with Water Supply and Sanitation Department (WSSD), Govt. of Maharashtra and Drinking Water & Sanitation Department (DWSD), Govt. of Jharkhand MoU with Trident Ltd. And Speciality Silica Pvt. Ltd. for research and development to provide viable solutions MoU between National Green Highway Mission (NGHM)-National Highways Authority of India (NHAI), Ministry of Road Transport & Highways, Govt. of India to extend cooperation and institutional collaboration in research, development and implementation of green highways initiative.
CSIR-NIEST	Herbal Anti-Arthritis Formulation	Tripartite Agreement signed between M/S Multani Pharma Ltd, New Delhi, NRDC and CSIR-NEIST on 25Nov2016 for technology transfer. Tripartite Agreement signed between M/S Altis Life Sciences, Himachal Pradesh, NRDC and CSIR-NEIST, on 25Nov2016 for technology transfer.

Annexure-D

Some of the Technologies in Demand at Technofest, 2016 from Enterprises/Industry

Name of the Lab	Technology
CSIR-800	Stevia cultivation & processing Phytopharma botanical raw material Food based product Kansradham AGR Technology Bio-gas polymer company Ginger,turmeric,chilli (post provessinh) water and tectectot technology Tea wine “Gur Bhatti” improved Seed Technology
CSIR-CBRI	Liquid fire extinguisher Flyash brick Cement & Flyash moulding machine technology Rice Husk Plastic Composite (Wood without tree) Interlocking bricks/ Flyash bricks Building Products using Kota Stone Cutting and Slurry Waste Geoploymer brick technology EPS Panels Mass housing – Precast construction techniques
CSIR-CDRI	Centchroman Bone Health Saheli Keenmind Artnether-fansidar combination formulation New Chemical Entity (NCEs)
CSIR-CGCRI	Waste utilization Pairing blocks Corrosion protection coatings Steel protection RSW Better silicon nitride powder for brake paddle Ceramic coatings for hot parts of automobile engine Boron carbide for armous application
CSIR- CLRI	Waste to health Chamois leather Safety leather products DPR for leather products Bio-glue & other health care products “Diastep”-Footwear for diabetic patients Leather processing set up Waterless Tanning Technology Products from Chicken feet leather

CSIR- CMERI	Krishishakti Tractor Solar Tree Multi-fab
CSIR-IIIM	Herbal Ayurvedic Cream for Permanent Hair Removal Organic Fertlilizer and Pesticides Ayurvedic Herbal Health Product
CSIR-IIP	Plastic waste to diesel
CSIR –NAL	UAV from CRPF Dhvani Drishti Wind Solar Hybrid System
CSIR-NCL	Catalysts polymers& water purification unit Hollow fibre membrane water purification unit
CSIR-NML	Gold from electronic scrap Production of pigment grade Fe_2O_3 Rust blocker for brass and steel Fly ash utilization
CSIR-SERC	Seismic base isolators for structures Mass housing using pre-engineered EPS panels Laced steel-concrete composite system for blast resistant structures

Annexure-E

REACHING OUT TO YOUNG MINDS

The CSIR Pavilion had kept special provisions to attract young minds, students in particular. A special program named "Scientist Kid" was conducted which encouraged participation of school children from different schools in Delhi and NCR region. Popular science lectures by renowned scientists and hands-on-experience on conducting scientitific experiments like DNA isolation, brick making, how to measure impacts of earthquake etc were a part of the program which intended to inculcate scientific temper amongst kids.

Table: Schedule of children activities during 14 – 27 Nov, 2016

16 November	VikasBharti Public School, Rohini Sector 24	CSIR- IICT
17 November	Gujrati School, Civil Lines	CSIR- CBRI
18 November	KendriyaVidyalaya, Rohini Sector 3	CSIR- NCL
19 November	The Heritage School, Rohini Sector 23	CSIR- CECRI
20 November	KendriyaVidyalaya, Ghaziabad	CSIR- IGIB
21 November	KendriyaVidyalaya, Rohini Sector 22	CSIR- CDRI
22 November	DPS, VasantKunj	CSIR- CCMB, CSIR- IGIB
23 November	KendriyaVidyalaya, Rohini Sector 3	CSIR- IHBT
24 November	KendriyaVidyalaya, Ghaziabad	CSIR- CFTRI
26 November	SantNirankari Public School, Tilak Nagar	

Annexure-F

Thematic Days: Each day of the CSIR Technofest, 2016 focussed on a dedicated theme, based on the themes the CSIR pavilion was planned. The schedule of the respective thematic daysalongwith the participating laboratories are in the table below. Scientific lectures by renowned scientists, roundtable discussion with industry partners and one to one interaction with industry and respective scientist to exchange ideas based on demand were the key features of the program.

Schedule of dedicated thematic day

15 November	Aerospace & Strategic Sector	CSIR-NAL/CSIR-CGCRI
16 November	Engineering & Infrastructure	CSIR-CBRI, CSIR-SERC, CSIR-CMERI
17 November	Mining, Minerals & Materials	CSIR-NML
18 November	Chemicals & Petrochemicals	CSIR-NCL & CSIR-IIP
19 November	Energy	CSIR-CECRI
20 November	Ecology & Environment	CSIR-NEERI
21 November	Leather	CSIR-CLRI
22 November	Water	CSIR-CSMCRI
23 November	Agriculture & Floriculture	CSIR-CIMAP/CSIR-NBRI
24 November	Food & Nutrition	CSIR-CFTRI
25 November	Healthcare & Generic Drugs	CSIR-CDRI & CSIR-IICT
26 November	CSIR for Societal Interventions	CSIR 800

Annexure-G

HIGHLIGHTS OF SOME OF THE CSIR EXHIBITS AT IITF 2016

A very impressive and diverse array of technologies from different CSIR labs in the fourteen thematic areas were displayed during CSIR Technofest. Here are glimpses of a few.

Drishti is an innovative, cost effective, indigenous visibility measuring system, first of its kind, designed and developed by CSIR-NAL to cover the wide span of lowest to highest visibility (< 25 to > 2000 meters) aiding pilots for safe landing and take-off.CSIR-NAL has signed Partnership agreement with IMD for installation of 70 systems at all Civilian Airports of the country. MoA with Tata Power SED Company Ltd. has been signed for supply of 54 nos. of DRISHTI systems for 18 airbases under modernization of IAF airfields.

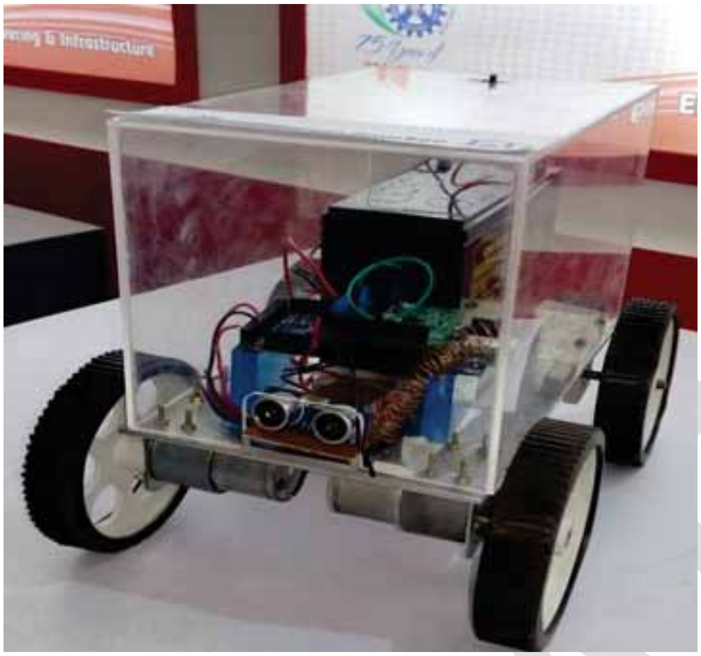
The **Desktop Flight Simulator** is designed as cost effective, rapid prototyping and real time simulation-based analysis of aerodynamics and flight control laws. Low cost visualization platform for pilot visual cues and pilot inputs can enhance rapid prototyping flight simulation systems in a cost effective manner. The System consists of high end computer graphics and Simulink rapid-prototyping. Simulated flight operations are effected using conventional twin throttles, force operated side stick, and rudder pedals,flap, landing gear.

Hansa-3 is an all composite light aircraft ideal for ab-initio training, sports and hobby flying with lightening protection and features for day/night flying. It is certified by DGCA under FAR 23 via JAR-VLA category. One prototype and fourteen production standard aircraft have been built and flown. The aircraft have cumulatively logged over 4000 hours.

SARAS, a 14-seat multi-role light transport aircraft is the first civilian aircraft designed and developed in India by CSIR-NAL for certification under FAR 23.

CNM-5, the five seat general aviation aircraft is being developed by CSIR-NAL in collaboration with M/s Mahindra Aerospace Pvt. Ltd. (MAPL2). CNM-5 had its first test flight on the 1st of

September 2011 in Australia. It is an ideal aircraft for air taxi, air ambulance, training, tourism and cargo applications, and is proposed to be certified first under FAR 23.



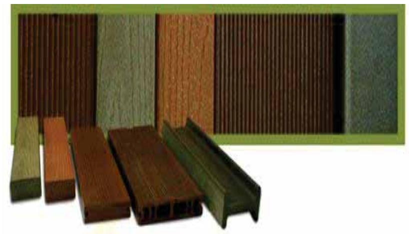
- **Autonomous cleaning robot** has been designed to perform automatic cleaning of floor when deployed.
- Autonomous robot has obstacle avoidance capability by using ultrasound based distance measuring sensor to detect any obstacle in the robot's path.
- By attaching a suitable cleaning mechanism which is under development, the robot will perform cleaning without any manual intervention.
- The autonomous robot for efficient coverage is to be tested for various planned paths such as spiral pattern, Line-sweep, their combination and spatial cell diffusion**.**

A fire door with a specific fire-resistance rating is used as part of a passive fire protection system to reduce the spread of fire from one compartment to other and to enable safe egress from an occupancy

- Meets all the three criteria i.e. stability, integrity and thermal insulation of fire resistance rating as per BS 476 Pt. 20 & 22, IS 3614 Pt 2
- Low thickness
- Material used is indigenously available.
- Mainly used in all types of occupancies for the confinement of fire.

Liquid Extinguishant Fire Extinguisher based on the working principles of oxygen depletion, flame-reaction chain inhibition as well as temperature reduction in the combustion zone of fire. The developed extinguisher suppresses the fire within 8-10 seconds with an application rate of 3-5 gm/sec on 100 cm^2 size Class A & B fires It is functionally superior to the existing water based extinguishers. The process includes: i) formulation of extinguishing composition, ii) design of spray system and iii) application methodology. The developed system is suitable to combat "Class A" combustible material Fires such as paper, wood, cloth, etc; "Class B flammable liquid fires" such as petrol, diesel, kerosene; "Class K kitchen fires for women's safety" and the "Electrical fires".

A manufacturing know-how has been developed for making solid and hollow profiles (Patent no: 275932). The process includes production of moulding grade flour, compounding for pallet production and profile extrusion. The production capacity for pallets is 100 kg/hr and extruded profile for 10 meter/hrs. The salient features of profiles are**:** wood like surface appearance, carpenter friendly, biologically durable and recyclable and also meet the requirements of National Building Code, 2005 when tested as per IS: 1708. The main applications include: door / window frames, sheets, decking, fencing, furniture, lumber and other molded items. *The products are now commercially available with a brand name of* ***"Wood without Trees".***



Cement Grouted Bituminous Mix for urban roads.
Cold Mix Technology for constuction & maintenance of Bituminous roads.
Car Driving Simulator device

Novel membranes made from polyamide, polyvinyl alcohol and polyethersulfone polymers to provide cost effective and flexible solutions compared to energy intensive conventional methods employed in water purification. The group has designed highly compact low cost **nanofiltration system** of 100-200 Lit/h capacity for providing safe drinking water and generates purified water without any loss of essential minerals at an operating cost of only 4 Paise per Liter. The unit is especially designed for small habitats of 10 to 20 hamlets such as schools,

colleges and hospitals. The plant costs only Rs. 30,000/- to Rs 40,000/- and is efficient in removing all contaminants including fluoride, heavy metal ions, turbidity, hardness and pathogens from polluted drinking water. The other innovation is the design and development of a double stage **cascaded compact ROmembrane** system of 40-60 L/h capacity for production of ultrapure water containing 0 to 2 ppm total dissolved solids (TDS) for Bioprocess applications at a low capital investment of Rs. 35000/- only. The system is equipped with prefiltration units, indigenous low cost Novel polyether urea spiral wound RO membrane module assembly followed by UV system for providing ultrapure water at an operating cost of 5 Paise per Liter only. The process is much more economical and effective compared to similar but highly expensive membrane units supplied by multinational companies such as MilliQ by Millipore or Sartorius.

*Gur*and*Khandsari*are among the major agro processing industries found in rural sector of our country. Nearly 50% of total sugarcane produced in the country is used for manufacture of about 8 million tonnes*gur* which is known as the most nutritious agent among all sweetners. ***Gurbhattis*** are underground furnace fabricated by local artisans over which sugarcane juice is boiled off in large boiling pans. Since the furnace / chimney are not properly designed, a lot of heat is wasted and dense smoke is generally seen coming out of the chimney, as a result bagasse consumption as fuel is very high. The improved *bhatti* focused mainly towards the better design of furnace and chimney which would improve the combustion performance of bagasse, resulting in about 15% reduction in bagasse consumption and lesser smoke through chimney. By using fire bricks in the improved design, the life of furnace increased considerably. In addition to it, about 25% increase in daily *gur* production capacity was also observed.

Extraneous addition of any artificial colour in any edible oil is not permitted under The Prevention of Food Adulteration Act, 1954 and rules thereunder. However, deliberate coloring of comparatively cheaper edible oils with artificial fat soluble yellow color i.e. Butter Yellow is sometimes adopted to make these oils look and sell as mustard oil. A handy, quick, easy and affordable spot adulteration test paper strip (**MO Check**) coated with chemicals has been developed to monitor the adulteration of mustard oil with Butter Yellow with detection limit of 0.001% (10 ppm). A drop of the test oil is placed on the strip and the resultant color compared with a color comparator chart to know the extent of adulteration, if any.

Consumption of mustard oil adulterated with Argemone Mexicana oil is known to cause a disease popularly referred to as Dropsy. A simple and quick field kit has been developed to detect Argemone oil adulteration in mustard oil. The test is easy to perform with a minimum detection limit of 0.01% (100 ppm) and takes about 20 minutes (Patent No. 189711). A portion of the oil is shaken with a clean-up reagent and the two layers are allowed to be separated. A drop from the lower layer is applied on a paper strip and viewed under a Fluorescent Detection Device d. An orange to purple fluorescent spot indicates the presence of Argemone oil.

A simple electronic device **(O Neer)** has been developed to disinfect the drinking water from pathogenic microorganisms like *E. coli* and to provide safe drinking water to house holds as per National and International standards. The device works on the principle of anodic oxidation and has a high disinfection efficiency . No exogenous chemicals added during decontamination process. This device is maintenance-free and can also be operated on a solar powered battery.

Technology for conversion of waste plastic bags and know-how for 'Recycling of plastic waste bags into tiles for designing structures for societal usage' was demonstrated. It serves the mission of Govt. of India under "**Swachh Bharat**" and "**Make in India**". A model made using tiles made from waste plastic bags was displayed under the Engineering & Infrastructure Section theme of CSIR at Pragati Maidan.

Carbon nanotube based flexible anode materials; size 35 cm x 35 cm, which has been used in making of indigenously developed lithium ion battery was demonstrated at IITF.

Light weight lead acid batteries by replacing the existing heavy weight lead plate by lead coated polypropylene grids.

Rubber-based Seismic Base Isolators for Structures:. Layered Rubber Bearings (LRB) were developed using indigenous knowhow for structural seismic protection. This technology can be applied to construct safer structures and buildings to make India a 'safe habitat' against natural forces under

‘innovate in India’ and ‘make in India’ schemes. Also this technology is ideal for ‘lifeline structures’ whose functionality is essential during and after an earthquake. CPWD, city development authorities and construction industry are the potential beneficiaries of this technology for developing ‘Smart Cities’.

Pre-engineered Precast Lightweight Large Wall and Roof Panels for Mass Housing

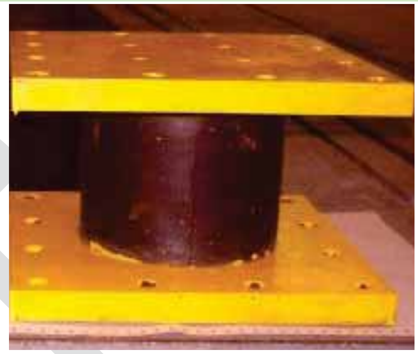
Two-third weight reduction compared to the conventional ones

Low thermal conductivity, moderate compressive strength and excellent shock absorption ability

Faster casting and better quality control.

Amenability for prefabrication

Use of industrial wastes in huge quantities resulting in sustainability of construction materials



Nanofiltration, hollow fibre based water purification and ultrapure water unit

Several cost effective technologies, specifically relevant to the rural India and related to water clarification and purification in the theme pavilion ‘Water’ were exhibited in CSIR, Technofest . The pavilion housed the technology for removing bacteria by submerged microfilters attached to hand pump consuming no electrical energy. This technology wass developed by CSIR-IICT Hyderabad. Another attraction of the pavilion was gravity assisted hollow fiber membrane basedwater clarification and disinfection unit developed by CSIR-CSMCRI, Bhavnagar. Solar energy operated online water treatment for pathogen removal developed by CSIR-IITR, Lucknow attracted the attention of the viewers. Such systems are very useful for treating surface water, flood water particularly when no electricity is available. The working models for the removal of iron (developed by CSIR-CGCRI-Kolkata) and arsenic (developed by CSIR-CSMCRI, Bhavnagar) from water drew huge attention of the visitors. The other attractions of the pavilion were CSIR-CSMCRI developed reverse osmosis membranes, modules and plants and Nanofiltration unit developed by CSIR-IICT. Ion exchange membranes and electrodialysis unit developed by CSIR-CSMCRI for the preparation of ultrapure and deionized water were also exhibited in the pavilion which created interest in the crowd. Posters from CSIR-CIMFR related to the treatment of mine water was displayed. The vibrant performance by all the participants and displays earned Silver award for the Water pavilion.

Reverse osmosis based water desalination unit

CSIR, being a premier scientific and industrial research organization of the country has made very impactful contributions to the advancement of agriculture through research and technology development for economically important aromatic, medicinal, nutritional and ornamental plants besides its significant contributions in the area of post-harvest technologies, agrochemicals, wasteland utilization etc. CSIR has also contributed to the development of agrotechnologies and post-harvest processing of certain super food crops and health supplement to mitigate the malnutrition.

Solar power based water

In the area of agriculture and floriculture, CSIR has focussed on the development of technologies for enhancing income and livelihood opportunities of the farmers. CSIR laboratories have made sustained efforts to provide remunerative options for the diversification of agriculture in sub-optimally utilized or degraded wastelands for generating additional job opportunities and income to the growers and entrepreneurs. CSIR has also developed agrichemicals including biofertilizers and biopesticides contributing significantly to crop protection in a safe and natural way. The theme document embodies scientific activities and achievements accomplished by CSIR laboratories including CSIR-CCMB, CFTRI, CIMAP, CSMCRI, IHBT, IICT, IIIM, NBRI and NCL in different areas of agriculture. During the IITF, large number of Scientific and technical peoples, farmers, entrepreneurs, industrialists visited the Agriculture and floriculture pavilion.

Tech-Jal: Water Purification Unit: The water filtration unit is based on new generation hollow fiber membrane technology developed by CSIR-NCL, Pune. Hollow fiber membrane is produced from the specialty polymer. It removes dirt, dust and turbidity from raw water. It removes odor, bad taste , chlorine, pesticides and volatile organic compounds from raw water. It removes all viruses and bacteria as per WHO norms causing diseases like Jaundice, Polio, Diarrhoea, Cholera, Typhoid and Dysentery. It can operate without electricity. The water filtration units are available with capacities of 500-2000 liter per hour. It is easy to operate and maintain. The life of the membrane is up to 3 years (depending on water source). There is no wastage of water. It retains the essential minerals in drinking water.

Oxygen Enrichment Unit: The Oxygen Enrichment Unit can be used for oxygen therapy in medical and other suitable applications. Oxygen Enrichment Unit is based on Hollow Fiber Membranes. The technology is durable alternative for existing methods of oxygen therapy. It enhances oxygen concentration up to 35 %. It is available in capacity of 3 to 10 lpm. The operational pressure is 5 bar. The Size of the unit is 60 cm x 27cm x 21cm. The weight of the unit is 10 kg approximately.

Demo Units for Process Development: Acrylamido tertiary-butyl sulfonic acid (ATBS): The ATBS technology was developed by CSIR-NCL and was successfully commercialized by Vinati Organics Limited (VOL), Mumbai. The commercial ATBS plant installed by VOL is the world's largest manufacturing plant. The present installed capacity is 18000 TPA. This technology has created major impact of Economic and Strategic nature on company as well as country's specialty monomer business. The demo units were also displayed showcasing process development for the low cost route for Silicon Tetrachloride and scale up, and Vinyl Benzoate and Vinyl-2-Ethyl Hexanoate.

Membrane based Fuel Cell demonstration Unit: 1 kW Proton Exchange Membrane based Fuel Cell demonstration unit was exhibited. The PEMFC demo unit consisted of a completely indigenous fuel cell stack. It is comprised of indigenous Membrane Electrode Assembly and Bipolar Plates along-with other peripheral components of the stack.

Display of Reactors:AmAR2 reactor: This is a unique flow reactor that offers excellent mixing, mass transfer and heat transfer for carrying out homogeneous as well as two-phase reactions. The reactor design has been licensed to Amar Equipment Pvt. Ltd. (Mumbai) and is being used in many industries for lab scale flow synthesis.

AmAR3 reactor: The 3D flow reactor named as AmAR3 is the only 3D flow reactor available in the market. This reactor is one of the most selling reactors and is available in SS316, hastelloy and also in PTFE. The reactor design has been licensed to Amar Equipment Pvt. Ltd. (Mumbai) and is being used in many industries for bench scale flow synthesis that gives a few kg/hr of production of the desired product. This reactor offers excellent mixing, mass transfer, heat transfer and scalability for carrying out homogeneous as well as two-phase reactions. The performance of this reactor stands at par with its international competitors.

e-Nose developed by CSIR-NEERI and C-DAC can help sniff out a variety of volatile organic compounds (VOCs) and odorants at a pulp and paper mill industry with a prime objective to protect the health of thousands of workers working in this industry. This portable device developed measures odour concentration and odour intensity. The Electronic Nose uses an array of sensors that function on the principle similar to that of human olfaction.

SAMPLE SURVEY FORMS IN HINDI AND ENGLISH

Annexure-H

सीएसआईआर प्लेटिनम जयंती समारोह- सीएसआईआर मेगा एक्सपो आईआईटीएफ- 2016
का फीडबैक सर्वे प्रगति मैदान, नई दिल्ली

नवंबर 2016

1. नाम:	2. पुरुष/महिला	3. उम्र

4. शैक्षिक योग्यता: स्नातक-पूर्व/ स्नातक/ स्नातकोत्तर तथा अधिक

5. व्यवसाय: स्वरोजगार/ सेवा/ विद्यार्थी/अन्य

6. हॉल 12A में आपने कितने स्टाल का निरीक्षण किया?

7. सीएसआईआर पवेलियन की रेटिंग की संभावना [0: सबसे कम :: 4 सबसे अधिक]

विषय-वस्तु	0	1	2	3	4
वातावरण	0	1	2	3	4
प्रदर्शन में स्पष्टता	0	1	2	3	4
व्याख्या करने में स्पष्टता	0	1	2	Engineering & Infrastructure	
सूचना की विषय-वस्तु/ प्रदर्शन में अनोखापन	0	1	2	1 | 2 | 3 | 4	

8. क्या आपको इस प्रदर्शनी से पहले सीएसआईआर के बारे में जानकारी थी? हां नहीं

9. क्या सीएसआईआर से भारत को कोई लाभ मिलेगा? हां कुछ नहीं

इंजीनियरिंग और इंफ्रास्ट्रक्चर
1 | 2 | 3 | 4

10. विशिष्ट विषय की रेटिंग *[1: सबसे कम :: 4: सबसे अधिक]* (यदि निरीक्षण न किया हो तो बॉक्स खाली छोड़ दें)		एयरोस्पेस 1 | 2 | 3 | 4	कृषि 1 | 2 | 3 | 4	पुष्पकृषि 1 | 2 | 3 | 4
रसायन 1 | 2 | 3 | 4	इकोलॉजी तथा पर्यावरण 1 | 2 | 3 | 4	खाद्य तथा पोषण 1 | 2 | 3 | 4	स्वास्थ्य उपचार 1 | 2 | 3 | 4	जेनरिक औषधि 1 | 2 | 3 | 4
पेट्रोकैमिकल । 1 | 2 | 3 | 4	चमड़ा 1 | 2 | 3 | 4	ऊर्जा 1 | 2 | 3 | 4	जल 1 | 2 | 3 | 4	पदार्थ 1 | 2 | 3 | 4
धातु, खनिज तथा निर्माण 1 | 2 | 3 | 4	स्ट्रेटैजिक क्षेत्र 1 | 2 | 3 | 4	सीएसआईआर 800 1 | 2 | 3 | 4	बौद्धिक संपदा तथा उद्यमता 1 | 2 | 3 | 4	मानव संसाधन विकास 1 | 2 | 3 | 4

11. सीएसआईआर पवेलियन में सर्वाधिक प्रभावशाली प्रौद्योगिकी

12. सुधार के लिए कोई सुझाव:

हस्ताक्षर

सीएसआईआर-पीजेसी कमेटी तथा सीएसआईआर-निस्टेड्स, नई दिल्ली 'सीएसआईआर प्लेटिनम जयंती समारोह' के अवसर पर इस वैज्ञानिक प्रयास में आपकी बहुमूल्य फीडबैक एवं सहयोग के लिए आपको धन्यवाद देता है ।

THE CSIR NISTADS SURVEY TEAM

Annexure-I

Coordinators (Scientists)	**Members (Scientists & Technical Officers)**	**Administrative &Technical**
Dr. Tabassum Jamal	Dr. Y. Madhavi	Mr. J. S. Narula
Dr. Sujit Bhattacharya	Dr. L.Pulamte	Mr. BrijBihari
Dr. Mohammad Rais	Mr. Vipan Kumar	Mr. Pukhraj
Dr. Naresh Kumar	Mrs. SandhyaWakdikar	Mr. Anil Kumar Yadav
Dr. Yogesh Suman	Dr. MadhulikaBhati	Mr. Pretesh Kumar
	Mr. Avinash Prasad Kshitij	Mr. Manish Mehta
	Dr. Kasturi Mandal	
	Dr. Suman Ray	
	Mr. RammiKapoor	
	Mr. Anil Kumar Sharma	
	Mr. A. K. Bhardwaj	
	Mr. Kashmiri Lal	
	Dr. Praveen Sharma	
	Dr. Suresh Kumar	
	Mrs. RenuJethi	

PROJECT FELLOWS			**Ph.D. STUDENTS**	
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Megha Garg	RekhaParashar	Jyoti Sharma	Umang Gupta	Dhruv Mishra
Chandrashekhar Sharma	Rehan Ahmad	PrincyVerma	AnuragKanaujia	SadhnaSahu
SherinKuruvilla	Jyoti Sharma	Preeti	NareshBabu	Praveen Rawat
Chandra Shekhar	HammadurRahman	ArushiKaushik	DebanjanaDey	ManjariManisha
Nitesh K. Yadav		Sudhakar	Shilpa	Priti

Logistics

Mr. J. S. Narula (Posters/Banners/Printing)

Mr. R. K. Nagarwal (Transport)

Mrs. Indira Jain (Stationary)

Data entry team (alphabetic order)

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Mr. Mohan Lal
Mr. N. A. Khan
Mr. Narender Singh
Mr. NareshParashar
Mr. Pukhraj
Mr. R. K.Nagarwal
Mr. VedPrakash
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Mrs. Indira Jain
Mrs. SunitaArora
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