1. Science and Technology Division (S&T Division)

The Science and Technology Division was established in 1964. The Division was administratively responsible for National Science Council, the Council of Scientific and Industrial Research, the Atomic Energy Commission and the Space and Upper Atmospheric Research Committee.

The Ministry of Science and Technology (MoST) has been functioning since 1972. It is the national focal point for planning, coordinating and directing efforts; to initiate and launch scientific and technological programs and projects as per national agenda for sound and sustainable S&T base for the socio-economic development.

The Day-to-day business assigned to this Division under Schedule-II of the Rules of Business 1973 is undertaken by four technical Wings each headed by BS-20 level officers, while the Administration and Finance & Accounts Wings are being headed respectively by the Joint Secretary (Admn) and Chief Finance & Accounts Officer (CFAO). The Planning and Development Cell and Commercialization Cell are also operating in the Ministry with specific objectives and functions.

The operational business shall be distributed as specified herein below: -

Additional Secretary

Responsible for monitoring of all wings of MoST and submission of Policy matters to Secretary, MoST for approval. While adhering to this distribution of Business, further distribution amongst various Sections of the Administration and Finance & Accounts Wings would be as under:-

Joint Secretary (Admn):

The Administration Wing is headed by Joint Secretary (Admn) who is assisted by two (02) Deputy Secretaries and eight (08) Section Officers. This Wing provides support services to operational wings of MoST and is primarily responsible for personnel management and general administration of the Ministry as well as of its S&T organizations. The Administration Wing also handles work relating to the National Assembly and Senate business.

Deputy Secretary (Admn):

- Administrative and Personal Management.
- HRD, Training issues and cases.
- Maintenance / Security.
- Work Pertaining to Year Book of the Ministry.
- Foreign trainings/ conferences/ visits etc.

- Miscellaneous work.

(a) Section Officer (Estt:):

- Recruitment, Promotions, Transfer/Postings and Pension cases of officers/officials of the Ministry of Science & Technology.
- Provision of miscellaneous information to President/Prime Minister's Office, National Assembly/Senate Secretariat and Ministries/ Divisions about the Ministry of Science and Technology.
- Training of officers/officials of the Ministry inland and overseas.
- National Internship Programme.
- Rules of Business, Secretariat Instructions, etc.
- Foreign trainings/ conferences/ visits etc.

(b) Section Officer (General):

- Maintenance of office building(s).
- Maintenance of vehicles, office equipment and machinery (including telephone, fax computer and photo-stat machines etc.).
- Purchase of Stationery etc.
- Security measures.
- Hiring of accommodation for officers/official of the Ministry.
- Record room and connected matters.
- Receipt & Issue (R&I) matters.
- Miscellaneous assignments not assigned elsewhere.

(c) Section Officer (Council)

- National Assembly and Senate Secretariat Business.
- Administrative and personnel matters relating to Pakistan Council of Research in Water Resources (PCRWR).
- MoST Library.
- Miscellaneous matters.

(d) Section Officer (Coord.):

Administrative and personnel matters relating to:

- National University of Sciences & Technology (NUST).
- Pakistan National Accreditation Council (PNAC).
- Pakistan Engineering Council (PEC).
- Coordination between Ministry and its organizations.

Deputy Secretary (Organizations):

Administrative matters of S&T Organizations.

(a) Section Officer (Tech.):

Administrative and personnel matters relating to:-

- Council for Works and Housing Research (CWHR).
- Pakistan Council for Science & Technology (PCST).
- Pakistan Council of Scientific & Industrial Research (PCSIR) including National Physical & Standards Laboratory (NPSL).
- Scientific & Technological Development Corporation (STEDEC).

(b) Section Officer (Elect.):

Administrative and Personnel matters relating to:

- National Institute of Electronic (NIE).
- Pakistan Council of Renewable Energy Technologies (PCRET).
- Pakistan Science Foundation (PSF) including
- Pakistan Scientific & Technological Information Centre (PASTIC)
- Pakistan Museum of Natural History (PMNH)

(c) Section Officer (I.L.):

Administrative, Financial and Personnel matters relating to:

- National Institute of Oceanography (NIO).
- Pakistan Standards & Quality Control Authority (PSQCA).
- The COMSATS Institute of Information Technology (CIIT).

Chief Finance & Accounts Officer (CF&AO):

- Maintenance and Reconciliation of Accounts.
- Coordination and Scrutiny of Budget: Expenditure and Receipts.
- Consolidation of Public Sector Development Programme (PSDP).
- Advice in Delegated Field.
- Processing of Cases in Non-Delegated Field.
- Public Accounts Committee (PAC) and Department Accounts Committee (DAC).
- Compliance with Rules, Regulations and Orders.
- Internal Control / Internal Audit

(a) Section Officer (F&A):

- Budget preparation and coordination with other Wings, S&T organizations and the Finance Division etc.
- Re-conciliation of accounts and expenditure of the Ministry and its S&T organizations.
- Liaison with DAC/PAC including appropriation of accounts, and related audit matters of the Ministry & its organizations.

(b) Accounts Officer (Development Budget):

- Preparation of NIS of all development projects.
- Release of funds to all development projects.
- The AGPR matters including timely release of funds.
- Monthly PSDP expenditure statements for FA's organization.
- Maintenance of Assignment Account of different projects.
- External audit/Public Accounts Committee/Departmental Accounts Committee matters.
- Administrative/financial matters of employees of Project Staff including arrangements for logistic support i.e. Telephone, Stationery and CNG/POL, repair of Government Vehicles of Development Projects etc.

(c) Incharge P&D Cell

- Processing of PSDP Projects through DDWP/CDWP/ECNEC.
- Processing of release of funds of Development Budget.
- Preparation of Development Budget.
- Monitoring of Development Budget.

Technical Wings

1. Technology Wing:

- Promotion and development of industrial technology.
- Monitoring and evaluation of research and development works.
- Pakistan Council of Scientific & Industrial Research (PCSIR).
- Council for Works & Housing Research (CWHR).
- Pakistan Standards & Quality Control Authority (PSQCA).
- Scientific & Technological Development Corporation of Pakistan (STEDEC).
- Pakistan National Accreditation Council (PNAC).
- Pakistan Engineering Council (PEC).

Only technical matters relating to these organizations.

2. Electronics Wing:

- Establishment of Science cities.
- Monitoring and evaluation of research and development works.
- National Institute of Electronics (NIE).
- Pakistan Council of Renewable Energy Technologies (PCRET).

Only technical matters relating to these organizations.

3. Policy & Coordination (P&C) Wing:

- Establishment of institutes and laboratories for research and development in the scientific and technological fields.
- Monitoring and evaluation of research and development works.
- Support to NGOs concerned with development of science and technology.
- Pakistan Council of Research in Water Resources (PCRWR).
- Pakistan Council for Science & Technology (PCST) / National Commission for Science & Technology (NCST)

Only technical matters relating to these organizations.

4. International Liaison (IL) Wing:

- Bilateral Cooperation in S&T through Agreements / MoUs with friendly countries including Pak US Cooperation.
- Liaison with International Organizations
- Monitoring and evaluation of research and development works, including scrutiny of development projects.
- Establishment of science universities as specifically assigned by the Federal Government. (NUST & CIIT)
- National Institute of Oceanography (NIO).
- Pakistan Science Foundation (PSF).
- OIC Standing Committee on Scientific & Technological Cooperation (COMSTECH).
- Commission on Science & Technology for Sustainable Development in the South (COMSATS).

Only technical matters relating to these organizations.

Federal Ministers / Ministers of State & Advisers to Prime Minister / President,
Ministry of Science & Technology

S.No.	Name	From	To
1.	Mr. Habibur Rahman, Federal Minister for Education, Re-designated as Minister of Education & Scientific Research	17.02.1960	17.04.1961
2.	Mr. Akhtar Husain, Federal Minister for Education & Scientific Research	17.04.1961	01.03.1962
3.	Lt. Gen.W.A. Burki, Federal Minister for Education & Scientific Research	02.03.1962	08.06.1962
4.	Mr. Ghulam Faruque, Federal Minister for Scientific and Technological Research	01.01.1966	15.07.1967
5.	Vice Admiral S.M. Ahsan, Deputy Chief Martial Law Administrator, Incharge M/o. Scientific & Technological Research	05.04.1969	06.05.1969
6.	Air Marshal M. Nur Khan, Deputy Chief Martial Law Administrator, Incharge Scientific & Technological Research	07.05.1969	03.08.1969
7.	Mr. Muhammad Shamsul Huq, Federal Minister for Education and Scientific Research	04.08.1969	22.02.1971
8.	Mr. Khurshid Hasan Meer, Minister without portfolio (looked after work of the Ministry)	17.08.1973	22.10.1974
9.	Mr. Abdul Hafiz Pirzada, Federal Minister for Education, Science and Technology and Provincial Coordination	22.10.1974	05.02.1976
10.	Mr. Hafeezullah Cheema, Minister of State	22.10.1974	09.01.1975
11.	Shahzada Saeed-ur-Rashid Abbasi, Minister of State	10.01.1975	05.02.1976
12.	Malik Muhammad Jaffer, Minister of State	05.02.1976	24.01.1977
		26.01.1977	28.03.1977
13.	Mr. Niaz Muhammad Wassan, Federal Minister	30.03.1977	05.07.1977
14.	Mr. Mohammamd Arshad Chaudhri, Federal Minister	27.08.1978	21.04.1979
15.	Mr. Hamid Nasir Chatta, Federal Minister	28.01.1986	31.05.1986
16.	Mir Haji Tareen, Federal Minister	28.09.1986	20.12.1986
17.	Malik Muhammad Naeem Khan, Federal Minister	15.05.1988	29.05.1988
18.	Chaudhry Nisar Ali Khan, Federal Minister	09.06.1988	01.12.1988
19.	Mr. Jahangir Badr, Federal Minister	04.12.1988	20.09.1989
20.	Mr. Javed Jabbar, Federal Minister	20.09.1989	06.08.1990
21.	Mir Hazar Khan Bijarani, Federal Minister	13.08.1990	06.11.1990
22.	Choudhri Hamid Nasir Chatta, Federal Minister	09.11.1990	10.09.1991
23.	Mian Muhammad Zaman, Minister of State	09.06.1991	18.07.1993

24.	Mr. Illahi Bukhsh Soomro, Federal Minister	10.09.1991	09.06.1993
25.	Lt. Gen. (R) Muhammad Shafiq, Federal Minister	23.07.1993	19.10.1993
26.	Haji Muhammad Nawaz Khokhar, Federal Minister	31.07.1996	05.11.1996
27.	Syeda Abida Hussain, Federal Minister	05.11.1996	15.12.1996
		10.09.1997	10.04.1999
28.	Prof. Atta-ur-Rahman, Federal Minister	14.03.2000	23.11.2002
29.	Prof. Atta-ur-Rahman, Adviser to the Prime Minisiter	24.11.2002	25.08.2004
30.	Ch. Nouraiz Shakoor Khan, Federal Minister	03.09.2004	15.11.2007
31.	Dr. Shams Kassim Lakha., H.I., S.I., Federal Minister	16.11.2007	25.03.2008
32.	Ms. Tehmina Daultana, Federal Minister	31.03.2008	12.05.2008
33.	Mr. Mohammad Azam Khan Swati, Federal Minister	29.01.2009	14.12.2010
34.	Pir Aftab Hussain Shah Jilani, Federal Minister	14.12.2010	12.02.2011
35.	Mir Changez Khan Jamali, Federal Minister	12.02.2011	16.03.2013
36.	Ms. Rahela Baloch, Minister of State	18.04.2012	16.03.2013
37.	Dr. Sania Nishtar, S.I., Federal Minister	03.04.2013	05.06.2013
38.	Engr. Khurram Dastgir, Minister of State	07.06.2013	22.06.2013
39.	Mr. Zahid Hamid, Federal Minister	22.06.2013	21.11.2014
40.	Rana Tanveer Hussain, Federal Minister	17.12.2014	To date

Federal Secretaries Scientific & Technological research division

S.No.	Name	From	To
1.	Dr. I. H. Usmani	Feb.1972	30.08.1972
2.	Mr. Manzoor Ahmed	31.08.1972	22.08.1973
3.	Dr. A. Q. K. Afghan	23.08.1973	30.03.1976
4.	Sheikh Manzoor Ahmed	31.03.1976	28.02.1978
5.	Prof. Dr. Nisar Ahmad	01.03.1978	30.07.1979
6.	Maj. Gen. Shafiq Ahmed	30.07.1979	21.02.1980
7.	Sheikh Manzoor Ahmed	22.02.1980	18.08.1982
8.	Mr. M. Masihuddin	19.08.1982	18.01.1989
9.	Mr. Tariq Mustafa	18.01.1989	18.12.1990
10.	Mr. Pervez Ahmed Butt	27.02.1991	27.11.1994
11.	Dr. S.M. Qureshi	27.11.1994	02.05.1996
12.	Lt. Gen. (R) Javed Ashraf	05.05.1995	04.05.1998
13.	Mr. Javed Masud	05.05.1998	30.04.2001
14.	Mr. Ashfaq Mahmood, *(Secretary, I T& Telecom Division (Additional Charge of Secretary (MoST)*	30.04.2001	09.09.2001
15.	Mr. Shahzad Hassan Pervez	10.09.2001	26.05.2004
16.	Kh. Zaheer Ahmed	01.07.2004	26.11.2005
17.	Mr. Farrukh Qayyum *(Secretary, IT & Telecom Division (Additional Charge of Secretary (MoST)*	27.11.2005	05.04.2006
18.	Mr. Parvez Butt	06.04.2006	05.04.2008
19.	Mr. Sharif Ahmed	07.04.2008	11.10.2008
20.	Mr. Saifullah Khan Sherwanee Additional Secretary Incharge	13.10.2008	17.01.2009
21.	Mr. Muhammad Kashif Murtaza	17.01.2009	10.12.2009
22.	Mr. K. B. Rind	11.12.2009	04.10.2010
23.	Mr. Irfan Nadeem	04.10.2010	14.07.2011
24.	Mr. Akhlaq Ahmad Tarar	16.07.2011	26.08.2013
25.	Mr. Kamran Ali Qureshi	26.08.2013	08.07.2015
26.	Mr. Fazal Abbas Maken	09.07.2015	To date

Strength of Ministry of Science & Technology

As on 01.07.2016

Nomenclature of the Post	BS	Sanctioned posts
Secretary	22	1
Additional Secretary	21	1
Joint Secretary	20	1
Joint Technological Adviser	20	1
Joint Electronics Adviser	20	1
Joint Scientific Adviser	20	2
Chief Finance & Accounts Officer	20	1
Deputy Technological Adviser	19	1
Deputy Electronics Adviser	19	3
Deputy Scientific Adviser	19	3
Deputy Secretary	19	2
Science Counsellor, Beijing	19	1
Assistant Technological Adviser	18	2
Assistant Scientific Adviser	18	4
Assistant Electronics Adviser	18	3
Accounts Officer	18	1
Section Officer	17/18	8
Private / Sr. Private Secretary	18/19	4
Assistant Accounts Officer	17	2
Scientific Officer	17	1
Admin. Officer (Legal)	16	1
Superintendent	16	2
Assistant Private Secretary	16	24
	Total:-	**70**

Sub-Librarian	15	1
Assistant	14	26
Stenotypist	14	19
Upper Division Clerk	9	2
Lower Division Clerk	7	9
Technician	6	1
Staff Car Driver	4	13
Dispatch Rider	4	2
Daftary	2	2
Qasid	2	2
Naib Qasid	1	45
Electrician-cum- Plumber	1	1
Chowkidar	1	5
Frash	1	2
Sweeper	1	4
1.1	**Total:**	**134**
1.2	**Grand Total:**	**204**

International Liaison (IL) Wing

International Cooperation in Science & Technology constitutes an integral function of the Ministry of Science and Technology providing openings and opportunities for the scientists and engineers to interact with the outside world to enhance their capacities of the Institutions and individuals through interaction with their counterparts on the principles of equality and mutual benefits. The International Liaison Wing in the Ministry is responsible for enabling S&T organizations in Pakistan to develop linkages in pursuing cooperation with friendly countries as well as at international forums dealing with Science and Technology.

The main functions of the International Liaison Wing are*:*

- To deal with matters pertaining to bilateral cooperation in Scientific and Technological fields under the umbrella of bilateral agreements/MoUs, Joint Economic Commissions, Joint Ministerial Commission; and Working Groups on Science and Technology;

- To deal with work pertaining to negotiations and subsequent signing of Bilateral Agreements/MoU, Programs of Cooperation and Protocols for Scientific and Technical Cooperation with friendly countries, through coordination and consultations with the relevant Ministries and Organizations;

- Seeking approvals of the competent authorities e.g. Cabinet/Prime Minister for initiation and signing of the S&T Cooperation Agreements/MoUs etc.

- Providing briefs/input on bilateral/multilateral cooperation in Science and Technology to EAD, MoFA and other Ministries / departments.

- To interact with friendly countries at various forums through EAD and MoFA for implementation of the agreements/MoUs/Programs of Cooperation/Protocols/Executive Programs through diplomatic channels.

- To interact with the intergovernmental organizations such as UN Agencies, ECO, SAARC, NAM S&T Centre, APCTT, IDB, OIC, TWAS, AS-ICTP etc. to channelize participations from Pakistan in Projects/ Programs on Science and Technology and to benefit from their assistance to meet requirements of the S&T Organizations through specific Programs/Projects.

- Processing of Government approvals for participation of scientists and technologists in the meetings/workshops/Seminars abroad.

- Preparation of Reports/ Briefs for high level Pakistan delegations and Pakistan Embassies/Missions to facilitate their purposeful participation in International Meetings, Conferences, etc. on Scientific & Technological Research matters.

- Dealing with Technical/ Semi Technical matters pertaining to NIO, NUST, CIIT, PSF, COMSTECH and COMSATS, ECO-SF.

During the year 2015-16, International Liaison Wing has been undertaking coordination of the following activities within the frameworks of bilateral agreements with friendly countries, and through liaison with international and regional organizations dealing with Science and Technology:-

Pakistan and Belarus:

Under the framework of the Agreement on Scientific and Technological Cooperation singed in Islamabad in May 2015, a Joint Commission on Science and Technology (JCST) between Pakistan and Belarus was constituted; the first meeting of the Commission was held in August, 2015 at Minsk, Belarus during the visit of the Prime Minister of Pakistan. Implementation of the Agreement was pursued as;

a) Rules of Procedures for functioning of the JCST were agreed/signed by the First JCST;
b) Both the focal agencies in Pakistan and Belarus shared their web sites and notified respective focal points for direct interactions and exchange of information between scientific communities of the two sides;
c) A joint call for Joint Research proposals was launched by the two sides during 2015-16. While submitting these joint projects the scientific communities of the two sides had extensive interactions through the focal point in the Ministry. A total of 12 Joint R&D projects received were peer reviewed, as a result of which three Projects were finally prioritized and selected for implementation;
d) The two sides conceived a Pakistani Belarusian Joint Center on S&T Cooperation to be established at PCSIR, Islamabad; the draft of the Statute of the Centre was exchanged and agreed by the two sides. Pakistan delegation during the First JCST also visited a number of Belarusian R&D institutions and Universities in Minsk in August 2015;

e) The following instruments of cooperation in Science and Technology were also signed/exchanged on 10th August, 2015 at Minsk;

    i) MoU on Cooperation on Standardization and Information Support;

ii) MoU between COMSATS Institute of Information Technology (CIIT) Pakistan and Belarus National Academy of Science;

iii) MoU between State University Belarus and COMSATS Institute of Information Technology (CIIT) Pakistan; and

iv) MoU between COMSATS Institute of Information Technology (CIIT) Pakistan and Belarusian State University of Informatics and Radio-electronics (BSUIR).

Pakistan and Russia

A MoU on S&T Cooperation between Pakistan and Russian Federation was signed during the 4th session of the Pakistan Russia Inter-governmental Commission (IGC) held in November 2015 at Islamabad. The Russian Deputy Minister of Education & Science Mr. V.S.Kaganov also had a meeting with the Secretary MoST at the sidelines of the 4th session of the IGC. A Joint Working Group (JWG) on Science Technology and Education between Pakistan and Russia was conceived by the two sides. The first meeting of the JWG was proposed to be held in the December 2016 in Moscow. The two sides also decided to:

i) Consider an increase in the number of scholarships for Pakistani students for studying in Russia at Graduate and Post-Graduate levels up to 100 students over a span of 3 years, and
ii) A group of Pakistani scientists to visit the National Research Centre "Kurchatov Institute in Russia".

As a follow up of the decisions:

- Pakistan extended an invitation to the Heads of Russian academic and R&D institutes to visit their Pakistani counterparts during 2016-17.

- Pakistan side sent the proposals of R&D organizations submitted in Pakistan for joint projects to the Russian side for their input.

- PSF through Ministry of Science and Technology invited representatives of the Russian Science Foundation's working in the field of science and technology to formulate modalities of future cooperation.

Response of the Russian Side to the above proposals was being awaited.

Pakistan and Sri Lanka

Scientific and Technological cooperation between Pakistan and Sri Lanka was pursued through the following MoUs signed at Colombo during the visit of the Prime Minister of Pakistan to Sri Lanka from 4-6 January, 2016:

i) MoU on Science and Technology and Innovation cooperation between the Ministry of Science and Technology (MoST) Pakistan and the Ministry of Science Technology and Research (MoSTR) of Sri Lanka **,** and
ii) MoU on S&T Cooperation between Pakistan Science Foundation (PSF) and National Science Foundation (NSF) of Sri Lanka

Signing of the above MoUs was approved by the Prime Minister and later by the Federal Cabinet. Implementation of the MoUs was pursued by establishing Joint Committees to identify specific projects in the priority areas of mutual interests and to monitor progress on regular basis. Meeting of the First Joint Committee was planned to be held in Colombo during 2016.

Pak-USA S&T Cooperation:

Agreement on Science and Technology Cooperation-2003 between Pakistan and USA was renewed for the second time till October, 2018 during the visit of Prime Minister of Pakistan to USA in September 2013. In pursuance of the agreement, six phases of collaborative programmes have so far been undertaken, while the phase-VII was planned during year 2015-16. The main issue for implementing the programme by Pakistan side especially for MoST has been lack of matching funds available for Pakistani PIs of the Joint Projects. The Ministry has therefore supported Higher Education Commission of Pakistan to take lead in launching Phase-VII of the Programme in 2016; HEC will therefore be providing matching funds to Pakistani PIs for implementation of Joint Projects conceived by the PI's of two sides. HEC signed an MoU with USAID in this respect in February 2016. This was planned to be implemented through a bilateral Committee as conceived under the MoU.

In the meanwhile the two sides decided that bilateral consultations in S&T needed to continue on regular basis for achieving the desired objectives, therefore under the Pak-US framework of Strategic dialogue a separate Joint Working Group on Education, Science and Technology (ESTWG) was established; Secretary MoST is a member of this JWG, Ministry of Planning, Development and Reforms is leading the JWG. MoST has regularly been participating in all the preparatory meetings and providing necessary input for the ESTWG.

The 2nd Meeting of US-Pakistan Education, Science and Technology Working Group was held on February, 29, 2016 at the Department of State, Washington DC, USA. It has been led from Pakistan Side by the Minister for Planning, Development and Reforms. The Ministry of Science and Technology was represented in the JWG by Secretary, MoST as member of the Pakistan delegation. The main decisions and outcome of the 2nd ESTWG were:

- An MoU was signed regarding additional mutual support by both countries to enable 250 Pakistani scholars to pursue Doctoral Studies at US universities over the next five years under the Fulbright program coordinated by HEC. The meeting highlighted the key developments since the first meeting of ESTWG held in Islamabad June, 2015. It was considered a momentous year in which MoU for phase-VII of the Agreement on Science and Technology was signed and continued exchanges of scholars through Fulbright program had expanded with increased in opportunities for women in higher education through merit and need-based scholarships.

- The meeting was further informed that with the emerging stability and growth of Pakistan's economy, additional funds were being provided to education sector through a variety of new initiatives. Prime Minister's scheme for providing tuition waivers and laptops to meritorious/needy students, Technology Innovation Fund, interest free microfinance opportunities and National Education Science and Technology Fund are some examples of funding innovative programs of education and science to reach the goal of increasing enrolment in our universities to 5 million students during the next five years.

- There was discussion on expanding the USAID funded Centers for Advanced Studies Program to include the study of Global Climate Change and its impact on Pakistan's agriculture, ecology, water resources and energy needs. Given the limited availability of funds and the global importance of the subject it was suggested that creative ways will have to be found to include the topic of climate change in the existing four centers of advanced studies at Pakistani universities rather than including new cooperative agreements for an additional set up.

- It was noted that new MoU of Cooperation in Science and Technology Research had been already signed between HEC and USAID. The MoU calls for US government to provide 4.4 million dollars and HEC to invest 3.9 million dollars to undertake cooperative research projects in Science and Technology including health through collaboration between Pakistan Science Foundation and US National Science Foundation. The Pakistan's delegation pointed out that under the National Science Linkage Program (NPSL) an endowment fund was established to finance research in "natural sciences as applicable to agriculture". It was proposed to expand the scope of this fund to include areas like Alternate Energy, Biotechnology, Material Sciences and Nanotechnology. It was proposed that Pakistani researchers and entrepreneurs be given access to the Innovation Corps Team Program of US National Science Foundation.

- It was noted that University Linkages program has been implemented by fostering partnership among 35 Pakistani universities and their US partners. HEC's ambitious goal

of preparing ten thousand Ph.D. Scholars over the next ten years through the US-Pakistan Knowledge Corridor is the new dimension of leveraging this partnership to assist in achieving this goal. Pakistan expressed its interest to expand and sustain these partnerships with additional US universities offering post graduate programs to achieve this goal. HEC is developing a list of US research universities offering innovative doctoral program that can accommodate Pakistani scholars with tuition waivers while Government of Pakistan will support travel and living expenses and provide opportunities for collaborative and mutually beneficial research.

Pakistan-China S&T Cooperation

The Scientific and Technological (S&T) Cooperation between Pakistan and China is being pursued under the framework of Agreement on Scientific and Technical Cooperation-1976, through which mutual benefits have been accrued satisfactorily as more than 350 Items of cooperation comprising Study Visits, Training Programs and Joint Research Projects launched through a total of Seventeen Protocols; the 17th proposal signed in November 2011 at Beijing was for the period 2012-2016. Joint Research Projects and activities have been undertaken under this Protocol. The importance of Cooperation in S&T was re-affirmed during various to and fro high-level visits from both countries, and with the signing of a number of MoUs for cooperation in specific fields of Science & Technology. Implementation of these MoUs was being pursued at the institutional levels. MoST has also been maintaining and funding an office of the Counselor (Technical affairs) at PAREP Beijing for pursuing cooperation with China in the fields of S&T. As a follow-up and implementation of the 17th Protocol, the scientific communities of the two sides kept on interacting extensively to pursue further cooperation;

Pak-China Business Forum:

- The COMSATS Institute of Information Technology (CIIT) in collaboration with Xuzhou Normal University of China is regularly holding the Pak-China Business Forums in Pakistan since 2012 with specific themes, with participation of Chinese firms and Pakistani business houses/SMEs, Universities and R&D Organizations. The format of Forums include Exhibitions Seminars, workshops and Road shows. The last one was held from 19-21 March, 2016 at Lahore. The forums have provided opportunities to study academia – driven model of business cooperation.

The Young Scientists Program (TYSP)

- Ministry of Science and Technology being the focal point for the TYSP is actively facilitating Pakistani young scientists for participation in the capacity building programs of 6 months to one year duration at the Institutions in China being offered by the Chinese Government through TYSP. About 20 cases of availing the opportunities by young

scientists from Pakistan under this Program were processed for approval during the year under report.

China-South Asian Countries Science and Technology Partnership Programme

- This was launched by Government of China in 2014 with the intention of strengthening cooperation among South Asian countries through Technology Transfer as China intends to invest heavily in implementing this programme for dissemination of Chinese technology. This is however a good opportunity for Pakistan to engage positively and more actively with China and with other South Asian countries in Science and Technology and exploring ways and means for technology transfer and dissemination on the basis of mutual benefit. With this objective, a high level S&T delegation led by Minister for Science and Technology participated in the 2nd China-South Asia Technology Transfer and Collaborative Innovation Forum held from 12-14 June, 2016 at Kunming, Yunnan China. IL Wing coordinated participation of Pakistan delegation in the Forum.

Pak-Iran S&T Cooperation:

Cooperation between Pakistan and Iran in the fields of Science and Technology has been pursued under the framework of MoU on S&T Cooperation signed in 2002. In pursuance of this MoU a Joint Expert Committee on Science Technology and Education Cooperation was constituted and the 1st meeting of the Committee was held in May 2015 at Islamabad. The two sides through mutual consultations agreed on developing various PoCs during the years 2016-2018 in the fields of Biotechnology, Mineral Resources, and Application of Bio-Saline Agriculture for desertification Control, Oceanography, Renewable Energy Technologies, Technology Parks, Exchange of Experts and Researchers and other areas of mutual interests. Implementation of these PoCs were being pursued through the designated focal points.

Pak- Azerbaijan S&T Cooperation:

S&T Cooperation with Azerbaijan was pursued at the 6th Session of Pakistan-Azerbaijan Inter-Governmental Commission (IGC) held on 26-27 April 2016 at Islamabad. The two sides noted the expiry of the Agreement on S&T Cooperation between Pakistan and Azerbaijan and expressed their intent to renew the same through exchange of diplomatic notes and followed by completion of requisite codal formalities.

Pak-European Union S&T Cooperation:

Awareness seminars/workshops on the EU Horizon-2020 program were arranged in collaboration with NUST's and PSF's urging Pakistani scientists to avail funding opportunities by submitting projects under Horizon-2020.

Pak –Thailand S&T Cooperation:

An MoU on S&T Cooperation between Pakistan and Thailand was signed on 29th April, 2004. The two sides have constituted Pak-Thai Joint Committee on S&T and its second meeting was scheduled in April 2015 for which Pakistan sides shared Joint Research Projects with Thai side. An MoU between PSQCA and TISI has been initiated after completing codal formalities.

Pak- Jordan S&T Cooperation:

MoU between PSQCA and JSMO was signed during the 9th Session of Pak-Jordan JMC held in 2015 at Amman, Jordan. Earlier, codal formalities for signing the MoU were followed by MoST.

Pak-Saudi Arabia S&T Cooperation:

Codal formalities for initiation of negotiation on the draft MoU between PSQCA and SASO were completed by MoST.

Pak –Mauritius S&T Cooperation:

Signing of MoU of Science and Technology Cooperation between Pakistan and Mauritius was pursued.

Preparation of Draft Agreement between Pakistan Standards & Quality Control Authority (PSQCA) and Mauritius Standards Bureau (MSB) for Recognition of Certification on Export of Basmati Rice to Mauritius, provided by PSQCA, forwarded to Mauritius counterpart for their inputs.

Pak- Afghanistan S&T Cooperation:

Input for S&T cooperation with Afghanistan was provided for the 10th Session of Pak-Afghan Joint Economic Commission held on 23 November, 2015 at Islamabad. Input was also provided for the Regional Economic Cooperation Conference on Afghanistan (RECCA-IV)-August, 2015.

Pak-UAE S&T Cooperation:

Meeting of Pak-UAE JMC held in Islamabad was serviced by an input/proposal provided by the Ministry on the Draft MoU between PSQCA and its UAE counterpart;

Pak- Switzerland S&T Cooperation:

A draft MoU on S&T cooperation between Pakistan and Switzerland was provided to the Swiss side for their input. Ministry of S&T facilitated PAEC/NCP regarding Pakistan Associate membership at CERN and also this Ministry participated in the meeting of the steering committee at PAEC for cooperation with CERN.

New Initiatives:

i) Codal formalities for initiation of negotiations on the draft MoU on S&T Cooperation between Pakistan and Republic of Chili were completed. Response from the chili was being awaited and the same was pursued through diplomatic channels.

ii) Codal formalities for signing an Agreement on S&T cooperation between Pakistan and Republic of Ethiopia were completed.

iii) Codal formalities for initiation of negotiations on Draft MoU between PSQCA and DGMO were completed.

iv) Processed for codal formalities the draft MoU on S&T cooperation between Pakistan and Iraq

v) Initiated a Draft MOU on S&T Cooperation between Pakistan and Nigeria

vi) Initiated a draft MoU on S&T cooperation between Pakistan and Ukraine

vii) IL Wing participated and provided brief for the Inter-ministerial meeting on 5th Session of Pakistan-Austria Joint Working Group (JWG) on Trade and Economic Cooperation December 2015 Islamabad. Also the contact details of the Focal Point from Pakistan side were shared with Austria through diplomatic channels.

viii) IL Wing pursed the implementation status of the decisions taken during 8th session of Pak-Bangladesh Joint Economic Commission (JEC) held at Dhaka in September, 2015, and accordingly proposals were provided to the Pakistani Counterpart through Diplomatic Channels.

ix) Completion of codal formalities for MoU Pakistan Standards & Quality Control Authority (PSQCA) between SIRIM QAS International Sdn. Bhd, Malaysia for cooperation in Standardization and Quality Control. All codal formalities in respect of the MoU was completed and the MoU is ready for singing.

x) Completion of codal formalities in respect of draft Agreement on Science, Technology and Innovation (STI) Cooperation between Pakistan and New Zealand was forwarded the New Zealand through diplomatic channel.

xi) Coordinated with UAE through diplomatic channels for finalization of the MoU between PSQCA Emirates Authority on cooperation on Standardization.

Pak- Bulgaria S&T Cooperation:

IL Wing provided proposals for S&T Cooperation between Pakistan and Bulgaria for the Inaugural Session of Pak-Bulgaria Inter-Governmental Commission (IGC) on Economic Cooperation held in Sofia in July 2015. The two sides have agreed on Accreditation Services. The Executive Agency "Bulgarian Accreditation Service" expressed its interest in establishing contacts with the Pakistan National Accreditation Council with the purpose of exchanging expertise and putting into practice the requirements of ISO/IEC 17025 in the field of Testing and Calibration.

Pak- Cambodia S&T Cooperation:

Ministry of Science and Technology provided its input for the draft Agreement for the Establishment of Joint Ministerial Commission on Economic Cooperation between Pakistan and Cambodia. Areas of S&T were proposed for inclusion in the draft agreement.

Pak- Czech S&T Cooperation:

This Ministry has consistently pursued the proposal of visit by Pakistan side to Czech Republic. Also the draft Agreement between the Government of the Islamic Republic of Pakistan and the Government of the Czech Republic on Science and Technology Cooperation has been pursued.

Pak- Gambia S&T Cooperation:

The IL Wing facilitated and coordinated the sideline meeting between Minister for Science and Technology of Gambia with the Federal Secretary, MoST during the 15th Session of COMSTECH General Assembly held on 30th May -1st June 2016 at Islamabad. In pursuance of this meeting this Ministry shared a draft MoU for STI Cooperation between the two countries.

Pak-Kirgizstan S&T Cooperation:

Pakistan Standard Quality Control Authority (PSQCA) under the administrative control of this Ministry has proposed Draft MoU in the field of Standardization, Metrology, Conformity Assessment and Management Systems between the Center for Standardization and Metrology under the Ministry of Economy of the Kyrgyz Republic and the Pakistan Standards and Quality Control Authority. Views of the Kyrgyz side on the proposed MoU were being awaited.

Pak-Kenya S&T Cooperation:

The IL Wing pursued the S&T cooperation between Pakistan and Kenya during the 4th session of Pakistan –Kenya JMC. The MoU on cooperation in the fields of Standardization and Conformity Assessment between Kenya Bureau of Standards (KBS) and Pakistan Standards and Quality Control Authority (PSQCA) was placed on the agenda of the JMC.

Pak-Kuwait S&T Cooperation:

This Ministry provided input /proposals from Pakistan National Accreditation Council (PNAC) and Pakistan Standard Quality Control Authority (PSQCA) have provided proposal(s) for cooperation with their Kuwaiti counterparts in the fields of Accreditation, Quality Control, Testing, Conformity Assessment and Standardization for the 4THSession of Pak-Kuwait JMC.

Pak- Nigeria S&T Cooperation:

In pursuance of the Nigeria-Pakistan Joint Ministerial Commission held on April, 7-8 2014 in Abuja Nigeria, a meeting between the Nigerian Minister for Science and Technology and the Minister for Science and Technology Pakistan on 1st June, 2016 at the sidelines of the 15th Session of COMSTECH General Assembly in Islamabad. A draft Agreement on S&T Cooperation between Pakistan and Nigeria was forwarded to the Nigerian side for their consideration.

Pak- Qatar S&T Cooperation:

In pursuance of the decisions of the 3rd Session of the Pak-Qatar Joint Ministerial Commission (JMC), the project proposals provided by the R&D Organizations were forwarded to the Qatar side through diplomatic channels for their consideration.

Pak- Romania S&T Cooperation:

In pursuance of an Agreement on Cooperation in S&T between Pakistan and Romania in July 1995, this ministry provided input/materials for the Pakistan-Romania annual bilateral consultations

Pak- Sudan S&T Cooperation:

Prof. Azhari Omer Abdel Bagi under Secretary of Ministry of Education Sudan and the Secretary Ministry of Science and Technology Pakistan held a meeting at the sidelines of 15th COMSTECH General Assembly on 2nd June, 2016 at MoST. The two sides discussed in detail the S&T Cooperation coordinated in the past. The Sudan side highly appreciated the facilities extended in the past by the S&T Organization for training and capacity building of the Sudan's Researchers

and Scientists. The two sides stressed upon active cooperation in the field of S&T through a formal framework in future.

Pak- Tajikistan S&T Cooperation:

Following documents were signed during the visit of the President of Tajikistan to Pakistan on November 2015.

- PoC between Academy of Sciences of Tajikistan and Pakistan Council of Scientific and Industrial Research (PCSIR) on Exploitation of Indigenous and Exotic Medical Plants for Herbal Drugs

- PoC between Pakistan Museum of Natural History and Institute of Geology, Earthquake Engineering and Seismology, Academy of Science of the Republic of Tajikistan

Pak- Turkmenistan S&T Cooperation:

1st meeting of the Pakistan-Turkmenistan Joint Working Group on Education, Science and Technology was held on 24-26 November, 2015 in Islamabad.

Pak- Tunisia S&T Cooperation:

An MoU between PSQCA and Tunisia was signed. Extension of Executive Programme of Cooperation in the field of Science and Technology between Pakistan & Tunisia for the period 2016-2018 was also agreed by the two sides.

Pak- Vietnam S&T Cooperation:

The two sides exchanged the contact details of the Focal persons on S&T Cooperation. Ministry of Science and Technology Pakistan forwarded a list of proposals to the Ministry of Science and Technology Vietnam for their consideration to hold the 1st meeting of Pak-Vietnam Sub-Committee on S&T Cooperation in Pakistan.

Participation in the Inter Ministerial Meetings by IL Wing for preparation of Pakistan Bilateral cooperation including S&T at EAD, MOFA, M/o Commerce etc.

Officers of IL Wing participated in the Preparatory Inter-Ministerial meetings held at EAD/MoFA, M/o Commerce for the Bilateral including S&T cooperation between Pakistan with Kenya, Kuwait, Kyrgyzstan, Maladies, Morocco, Philippine, Qatar, Ghana, Germany, Canada, Brazil, Bangladesh, Bahrain, Azerbaijan, Austria, SAARC, Algeria, Zimbabwe, Yemen, Vietnam, Uzbekistan, UN, UK, Uganda, Turkmenistan, Tanzania, Tajikistan, Syria, Sweden, Norway,

Denmark, Sudan, Spain, South Africa, Singapore, Romania, Poland, Nepal, Namibia, Myanmar, Mozambique, USA.

Pakistan Extended Continental Shelf Programme–*Milestones*:

Pakistan's Claim with UN Commission on Limits of the Continental Shelf (CLCS) for extension of the outer limits of its Continental Shelf from 200 to 350 nautical miles was finally notified by the Commission in March 2015. This was a result of excellent coordination mechanism followed by IL wing in MoST with different stakeholders at home and abroad that culminated with successful winning of the claim for extended continental Shelf. Follow-up actions were coordinated through the Inter-ministerial Technical Committee for submission of coordinates of the extended continental shelf to the United Nations and International Seabed Authority.

Multilateral Cooperation in Science and Technology

COMSATS

The 3rd General Meeting of the Commission on Science and Technology for Sustainable Development in the South (COMSATS) held at Accra Ghana from 27-28 October, 2016 was coordinated by IL-Wing MoST. It was preceded by meeting of the COMSATS Consultative meeting held under the Chairmanship of the Secretary Ministry of Science and Technology. Both these meetings were hosted by Ministry of Environment, Science, Technology and Innovation (MESTI) Republic of Ghana. Earlier the Secretary Ministry of Science and Technology, Government of Pakistan in his capacity as of Chairman COMSATS Consultative meeting extended invitations to member states for participation in the COMSATS meeting. Ministry of Science and Technology also facilitated the COMSATS HQs and CIIT for holding the 19th Meeting of COMSATS Coordinating Council on 17-18 May, 2016 in Islamabad.

UN-CSTD

Pakistan is an elected member of the UN commission on Science & Technology Development based in Geneva Switzerland. During 2015-16, participation by Pakistan at export leave was coordinated by the IL-Wing in the Inter-session panel of the Commission held in Hungary on 11-13 January 2016 and the 15th Annual Session at General Switzerland and on 9-13 May 2016 respectively be Chairman PCST and Secretary MoST.

Ministerial Standing Committee on Scientific and Technological Cooperation (COMSTECH)

The 15th General Assembly of the Ministerial Standing Committee on Scientific and Technological Cooperation, COMSTECH was convened by President of Pakistan/Chairman COMSTECH in Islamabad on 31st May to 1st of June 2016. It was preceded by meeting of the 30th Executive Committee of COMSTECH on 30th May 2016. More than 350 delegates led by Ministers In-charge of S&T in the OIC member states, observer states, OIC affiliated S&T

organizations and UN Organizations working for S&T participated in the proceedings of the General Assembly. It was an expression collective political will of the OIC member states towards promotion of S&T for development and socio-economic uplift of the Muslim Ummah in general and specifically in the respective member states. The General Assembly endorsed the draft of the Document **"**Science and Technology in the OIC Countries: Goals, Priorities, and Actions for consideration of the OIC Summit on Science and Technology in Kazakhstan in September 2017. The Ministry of Science and Technology coordinated for holding the meeting of the 15th COMSTECH General Assembly.

Earlier, the efforts made by the Ministry of Science & Technology to hold the 1st special OIC Summit on Science & Technology in Islamabad in 2015, prior to the COMSTECH 15th General Assembly meeting could not get materialized due to administrative reasons.

ECO-RISCAM

The Regional Institute on Standards Conformity Assessment and Metrology- RISCAM is being established under the Economic Cooperation Organization (ECO). In order to establish RISCAM and make it functional, the Government of Pakistan with approval of the Federal Cabinet has approved Pakistan's Signing and Ratification of the Statute of RISCAM. Pakistan has also agreed to host one of the Technical Management Board on Metrology at National Physical and Standards Laboratory (NPSL) Islamabad. Establishment of RISCAM will facilitate intra-regional trade among the ECO member states addressing technical barriers on trade under the WTO regimes.

ECO-SF

The 2nd meeting of the Board of Trustees (BoT) of Economic Cooperation Science Foundation was held in Islamabad on 11th of August 2015. The Secretary Ministry of Science and Technology on behalf of Minister for Science and Technology/Chairman BoT chaired the meeting. It was participated by delegation/expert from ECO member states; the BoT was preceded by senior official/Expert Group meeting on 10th of August 2015.

AS-ICPT

The Ministry of Science and Technology successfully processed and followed the request from the Abdu Salam- International Centre for Theoretical Physics (AS-ICPT) for Pakistan's side contribution amounting to US$ 100,000/- annually. The Prime Minster of Pakistan approved the Summary for payment of the contribution in 2016-17 while designating MoST as focal point for the AS-ICTP.

Technical Matters of the R&D/S&T Organizations under IL Wing-Most

Miscellaneous Technical and administrative matters were handled, in respect of the organizations like PSF, NIO, CIIT, NUST, COMSTECH, COMSATS Headquarters, and ECO Science Foundation, attached with the IL Wing as and when referred to during the year under report:-

i) Draft Bill on Establishment/up-gradation of COMSATS University.
ii) Natural Science Linkages Programme at PSF
iii) Draft ECO-SF Host-Country Agreement
iv) Meetings of the BoGs of NIO, NUST, and CIIT
v) Responses to National Assembly/Senate Questions etc.
vi) Participations in the meetings of the Standing Committee on S&T of the National Assembly and Senate.

Technology Wing

Introduction

Technology Wing has been entrusted to initiate and monitor various programs for technology development and industrialization in the country. This wing also acts as liaison between various ministries, national and international bodies for the development of technology based projects. The wing is headed by a Joint Technological Adviser, assisted by one Deputy Technological Adviser and two Assistant Technological Advisers.

Objectives & Functions

- Promotion and development of industrial technology
- Promotion of Metrology, Standards, Testing and Quality Assurance System.
- Establishment of accreditation system in the country.
- Focal point for WTO affairs relating to science and technology.
- Establishment of Common Facility Centers to provide SMEs Training, Product Development, Consultancy and Quality improvement.
- Technical matters of PCSIR, PNAC, PSQCA and PEC.

Accomplishments/Achievements:

During the year 2015-2016, the following activities were undertaken by Technology Wing:

Strengthening of Metrology Standards Testing & Quality (MSTQ) Infrastructure

With the establishment of WTO and its policies of trade liberalization, export is increasingly dependent on the supply of quality goods and services in the international market. Market access in the developed countries, which are the major trading partners of Pakistan, now require compliance to international standards and providing evidence of such compliance through internationally recognized Conformity Assessment Systems. Under WTO regime, the global trend is towards a free market with no economic trade barriers, allowing for free movement of goods and interchange of services. This requires the elimination of Technical Barriers to Trade (TBT) and sanitary and Phyto-Sanitary measures (SPS). The TBT & SPS agreements of WTO specifically emphasize the need for harmonizing the national quality infrastructure including technical regulations, accreditation and standardization etc. to reduce Technical Barriers to Trade and ensure the supply of safe and quality products & services to export as well as in the local market.

Infrastructure of accreditation, certification, standardization and calibration is essential to facilitate export, leading to maximize foreign exchange earnings by the sale of quality products/services in international market, assist regulators in controlling the sale of sub-standards products and services in the local market.

Technology wing has been assigned to deal with the technical matters of following organizations:

(a) Pakistan Council of Scientific & Industrial Research (PCSIR)

PCSIR was established in 1953 as an autonomous body under the administrative control of this Ministry and mandated to build a strong scientific and technological base for the economic progress of the country.

The mandate of the PCSIR is to undertake, promote and guide scientific and technological research in respect of problems connected with the establishment and development of industries under conditions prevailing in Pakistan, and to encourage the extension of the results of research to various sectors of the economic development of the country in the best possible manner. It started with manpower of about 20 scientists and technicians in borrowed naval barracks in Karachi. By the Grace of Allah, it has established, over the years, a network of four multi-discipline laboratories at Karachi, Quetta, Lahore and Peshawar, four mono-discipline centers like the Fuel Research, Leather Research, both at Karachi, Hyderabad Laboratories and National Physical and Standards Laboratory, Islamabad and 07 technical training centers at Karachi, Quetta, Lahore, Peshawar, Daska and Sakardu.

PCSIR, since its inception, has contributed immensely not only in terms of production activity and technological processes to boost the national industry, but also in term of human resource development to meet the requirements of academic and R&D institutions of the country.

(b) National Physical and Standards Laboratory (NPSL)

NPSL is a unit of PCSIR, working under Ministry of Science & technology. It is an apex body in the field of metrology and is the sole custodian of National Standards of Measurement in the country.

Objective & Functions

- To establish, maintain and disseminate coherent National Measurement Standards / System of base and derived SI units for Physical and Chemical Metrology in the country.
- To improve and develop measurement techniques in the field of Physical and Chemical Metrology.
- To produce secondary and working standards/equipment for supporting the Scientific and Legal Metrology.
- To acquire/develop SRMs for specific chemical and industrial applications.
- To help establish Lab. Quality Management / Assurance System through consultancy / advisory to R&D organizations, industries & academic institutions and other customers.
- To impart training in the field of metrology and Lab Quality Management System to industry, academic institutions, R&D organization and other stake holders.
- To maintain linkages for cooperation with regional / international Metrology Bodies like APMP/BIPM, APLAC/ILAC and National Metrology Institutes of other countries.

(c) Pakistan Standards & Quality Control Authority (PSQCA)

Pakistan Standards and Quality Control Authority (PSQCA), established through an Act of Parliament (Act-VI of 1996) is providing one window services for standardization and quality control. This authority works through three integrated components namely: Standards Development Centre (SDC), Quality Control Centre (QCC) and Technical Services Centre (TSC).

Main functions of PSQCA

1. Development of National Standards;
2. Enforcement of marks scheme National Standards under compulsory /voluntary certification marks scheme;
3. Research and development work on standardization, Analytical / testing techniques in chemical, metallurgical and other fields;
4. Setting up, assisting in, establishing and authorizing various inspection and testing centers and agencies at important industrial sites and towns;
5. Inspection and testing of products and services for their quality specifications and characteristics during use and import and export purposes;
6. Examination of manufacturing plants for the designated products or processes for approval of marks of the Authority;
7. Grant, renewal, suspension, cancellation or withdraw of a license or certificate in relation to use of any of the Authority Marks;
8. Collection, circulation of statistic and other information relating to standardization, quality control, metrology, applied research etc; and.
9. Testing and inspection of products and services for quality.
10. Registration of inspection agencies.

(d) Pakistan National Accreditation Council (PNAC)

Pakistan National Accreditation Council (PNAC) is an apex body working under the administrative control of Ministry of Science & Technology, established on 7th January, 1998 with a mandate to accredit Conformity Assessment Bodies (CABs) including laboratories (testing / calibration / medical), inspection bodies and certification bodies etc. to improve the quality of products and services for enhancement of export.

Objective & Functions

The main functions of the Council are stated below:

- Functioning of the Council in accordance with ISO/IEC 17011 (General requirements for accreditation bodies accrediting conformity assessment bodies)
- Accreditation of certification bodies in accordance with ISO/IEC 17021.

- Accreditation of testing and calibration laboratories in accordance with ISO/IEC 17025. Accreditation of medical laboratories according to ISO 15189.
- Accreditation of inspection agencies in accordance with ISO/IEC 17020.
- Accreditation of Halal certification bodies in accordance with PS 4992.
- Conduct courses/workshops/seminars on conformity assessment standards like ISO/IEC 17021, 17025 and ISO 15189.
- Act as a focal point for coordination with relevant international and national organizations.

(e) Pakistan Engineering Council (PEC)

Pakistan Engineering Council (PEC), a statutory/autonomous body, was constituted through an Act of Parliament in 1976 to regulate the Engineering Profession and Engineering Education in the country. Presently, PEC maintains its secretariat at Islamabad with branch offices at all the provincial capitals including Gilgit-Baltistan and liaison offices at Sukkur, Multan, Hyderabad and Muzaffarabad.

Major Functions / Objectives

Maintenance of a Register of persons qualified to work as registered engineers, professional engineers, consulting engineers, constructors and operators.

- Accreditation of engineering qualifications for the purpose of registration of registered engineers, professional engineers, consulting engineers.
- Promotion of engineering education and review of course of studies in consultation with the Universities.
- Ensuring and managing of continued professional development.
- Establishing standards for engineering contracts, cost and services.
- Assistance to the Federal Government as a Think Tank.
- Providing forum for arbitrations, pertaining to dispute in construction and consultancy contracts.
- Facilitating engineering sector industries.
- To recommend the bills for legislation pertaining to engineering profession, engineering education and engineering works.
- Promotion of engineering profession in totality.

Establishment of Pakistan Halal Authority (PHA)

With efforts of Technology Wing, MoST, Pakistan Halal Authority has been established in March, 2016. Finance Division has been requested for the sanctioning of posts. Draft recruitment rules of PHA are forwarded to Establishment Division for approval / vetting.

National Quality Policy (NQP)

MoST in collaboration with UNIDO TRTA-II programme took the initiative to develop Pakistan National Quality Policy 2014 to improve the quality infrastructure in Pakistan. NQP has the following primary objectives:

- Ensure that goods and services emanating from or traded in Pakistan are designed, manufactured and supplied in a manner that match the needs, expectations and requirements of the purchasers and consumers as well as those of the regulatory authorities in the local as well as in the export markets, and
- To contribute safety around homes, public places and work places and help protect the environment within Pakistan.

In this regard different working groups had been constituted to share the information and discuss the NQP in the specific areas of Standards, Metrology, Accreditation and Conformity Assessment to shape the final draft. The final draft of the NQP has been submitted to the Cabinet Division for its approval.

Policy and Coordination (P&C) Wing

Policy & Coordination Wing is headed by a Joint Scientific Adviser (JSA), assisted by an Assistant Scientific Adviser (ASA) thereby, responsible for dealing with matters related to National Science, Technology and Innovation Policy initiatives and identifies areas for S&T research to respond national requirements in emerging technologies.

Objectives & Functions:

- Establishment of S&T/R&D institutes and laboratories for research and development in the scientific and technological fields.
- Monitoring and evaluation of research and development work.
- Dealing with technical matters of the Pakistan Council of Research in Water Resources (PCRWR), Pakistan Council for Science and Technology (PCST), Pakistan Science Foundation (PSF) and National University of Sciences and Technology (NUST).
- Coordination with Federal & Provincial S&T Councils/Departments/Organizations and NGOs dealing with S&T.
- Civil Awards for Scientists and Technologists.
- President's Medal for Technology.
- Research Productivity Award for scientists.
- Preparation/construction and fielding of the S&T float for Pakistan Day Parade on the 23rd of March every year.
- Miscellaneous matters.

Regular Activities:

Regular activities of P&C Wing include:

- Civil Awards for Scientists and Technologists.
- President's Medal for Technology for Scientists/Technologists.
- Technical matters of PCRWR, PCST, PSF and NUST.
- Matters relating to Environmental Pollution/Bio-safety and Bio-security in coordination with M/o Climate Change and Ministry of Foreign Affairs.
- Scientific NGOs.

Activities Performed During the Year under Report

- **President's Medal for Technology**

  19 nominations were received from universities and R&D organizations of the country for consideration of the President's Medal for Technology 2016 which are under process for scrutiny by Preliminary Sub-Committee and recommendation by the Final Selection Committee. The recommendation would be forwarded to the President of Islamic Republic of Pakistan for approval.

- **National Science, Technology and Innovation Strategy and action plan.**

  It was observed by the Secretary, MoST during Performance Review meeting at MoST that there is a gap between policy aspirations set by the government for S&T development and its implementation. He emphasized the need to device a coherent and practicable implementation strategy by adapting actual implementation tools in consultation with all relevant stakeholders. In this regard, series of meetings were held with PCST and other stakeholders under the Chairmanship of Secretary, MoST to devise a new implementation strategy of prioritized action plans given in National Science, Technology and Innovation Policy-2012. Draft STI strategy has been finalized and stakeholders conference would be held on 18th October, 2016 to discuss STI strategy. The draft STI strategy would then be presented before NCST headed by Prime Minister of Pakistan for approval.

- **Agenda for National Commission for Science & Technology (NCST)**

  Agenda for National Commission for Science & Technology (NCST) has been approved by ECNCST in its meeting held on 9th March, 2016. Agenda includes following programme of S&T for consideration of NCST headed by Prime Minister of Pakistan for approval.

  1. Enhancing National R&D spending upto 1% of GDP by the year 2018 and upto 2% by 2023.
  2. Promoting R&D in industry and engaging industry & civil society in patronage of R&D activities.
  3. Uniform salary structure for scientists, engineers and technicians of R&D organizations.
  4. Devising a communication strategy for creating an enabling environment for promoting scientific mindset and culture in the society.
  5. Approval of National Research Agenda.

     - Agriculture & Food Security.
     - Automobiles.
     - Biotechnology.
     - Climate Change & Environment.
     - Electronics.
     - Energy &Fuel Cell Technology.
     - Health & Pharmaceuticals.
     - Housing.
     - Information & Communication Technologies (ICTs).
     - Marine Resources.
     - Mineral Resources.
     - Nanotechnology.
     - Space Technology.
     - Water.

- **Civil Awards for Scientists & Technologists – 2016**

35 nominations were received from the R&D organizations and Pakistan Academy of Sciences for consideration of Civil Awards– 2016. Policy & Coordination Wing examined credentials of the nominees and recommended eight nominees for different categories of Civil Awards, out of which following scientists have been conferred with Civil Award – 2016 in the category of Science & Technology. The investiture ceremony would be held on Pakistan Day 23rd March, 2017.

S.No.	Name	Award
1	Prof. Dr. Muhammad Ashraf, Chairman, Pakistan Science Foundation, Islamabad	Hilal-i-Imtiaz
2	Dr. Wasim Ahmad, Tenured Professor & Dean Faculty of Biological Sciences, Quaid-i-Azam University, Islamabad	Hilal-i-Imtiaz
3	Dr. Muhammad Iqbal, Director General, National Physical and Standards Laboratory, Islamabad	Sitara-i-Imtiaz
4	Dr. Muhammad Aslam Noor, Eminent Professor of Mathematics, COMSATS Institute of Information Technology, Islamabad	Sitara-i-Imtiaz

- **Coordination with MoST's organizations.**

  - Coordination regarding BOGs/BODs/BOTs of PCRWR, PCST, PSF & NUST on various technical matters.

- **Coordination with other Ministries/Participation of P&C officers.**

  - Participation in Inter-ministerial Coordination Committee of PARC, regarding agriculture research, food security and mutual sharing of research findings and initiatives by S&T organizations.

  - Attended meeting on the Underground Shelters Committee on Defence Planning which was held in the Ministry of Housing & Works, Islamabad.

  - Attended the meeting of Re-composition and Redefined Mandate of all Camouflage and Concealment Committee on Defence Planning was held at Engineer-in-Chief's Branch, General Headquarters, Rawalpindi.

  - Meeting with Korean International Cooperation Agency (KOICA) Pakistan office along with Ministry of Foreign Affairs, Economic Affairs Division and Ministry of Law and Justice to resolve litigation issues of Project "Establishment of National Capacity Building Institute for Water Quality Management" at PCRWR with Korean grant in aid of Rs.258.0 million.

  - National Assembly Standing Committee on Science and Technology meeting was held at PCST on 27th May, 2016.

- Meeting of the Senate Standing Committee on Science and Technology held on 18th August, 2015 in Committee Room No.4, Parliament House, Islamabad.

- Meeting to Review Current and Future Initiatives/Projects of PCRWR was held on 20th June, 2016 at Ministry of Science and Technology.

- **Workshops**

Officers of P&C Wing attended following workshops:

- National Workshop on 'Organic Food and Health: Avenues of Innovation and Entrepreneurship' at auditorium of Pakistan Academy of Sciences, Islamabad.

- Enquiry based education system held at Pakistan Science Foundation (PSF).

- Launching Ceremony of "ILM PAKISTAN" was held under patronage of Prof. Ahsan Iqbal, Federal Minister for Planning, Development & Reforms with assistance of Higher Education Commission.

- National Consultative Workshop on Developing Water Research Agenda in Pakistan held at Higher Education Commission.

- National Consultation Workshop on SERVIR Hindu Kush Himalaya needs assessment Workshop at PCRWR Headquarter, Islamabad.

Finance and Accounts (F&A) Wing

Functions

This Wing is headed by Chief Finance & Accounts Officer (CF&AO) assisted by an Accounts Officer (Development Budget), Section Officer (F&A) and Assistant Accounts Officer (F&A).

According to System of Financial Control and Budgeting as notified by the Finance Division's O.M. No.F.3 (2) Exp.III/2006 dated 13th September, 2006 in each Ministry/Division, there shall be a Chief Finance and Accounts Officer (CFAO) equivalent to Joint Secretary under the Principal Accounting Officer who shall assist him and report to him as part of his team.

The CFAO works directly under the Principal Accounting Officer and assists the Principal Accounting Officer in matters relating to reconciliation of accounts, internal control/audit, monitoring and coordination with DAC, PAC and financial proprieties of expenditure and receipts, risk management, and asset protection. He/she shall coordinate his/her work with the Financial Adviser's Organization.

Duties and Responsibilities:

The duties and responsibilities of the Chief Finance and Accounts Officer are as under: -

(i) Maintenance and Reconciliation of Accounts:

The CFAO shall systematize proper maintenance of accounts and their timely reconciliation with the CGA/AGPR and maintenance of 'Liability Register' in the Ministry/Division, its Attached Departments and Subordinate Offices.

He shall monitor the progress of the expenditure and receipts and furnish, with the approval of the Principal Accounting Officer, a monthly statement of departmental expenditure and receipts to Financial Adviser's Organization and the Finance Division (Budget Wing) by the 10th and the reconciled statement of expenditure and receipts by the 25th of the month following the month to which it relates.

(ii) Coordination and Scrutiny of Budget: Expenditure and Receipts:

He shall undertake coordination and internal scrutiny of budget estimates of expenditure as well as receipts of Ministry/Division, its Attached Departments and Subordinate Offices, including Budget Order (BO) and New-Items Statement (NIS) in accordance with the Budget Call Circular issued by the Finance Division and proposals for additional funds to be met out of Supplementary Grant.

(iii) Consolidation of Public Sector Development Programme (PSDP):

He shall be responsible for consolidation of PSDP so that the development schemes of the Ministry are prepared in accordance with the prescribed procedure and instructions under the supervision and with approval of the Principal Accounting Officer.

(iv) Advice in Delegated Field:

He shall tender advice to the Principal Accounting Officer in the delegated field, where called upon, in all matters of payment and matters affecting the accounts or any other matter concerning propriety and regularity of transactions.

(v) Cases in Non-Delegated Field:

He shall process, in accordance with the prescribed rules and procedure, cases relating to the non-delegated field, and matters relating to foreign exchange, and demands for Supplementary Grant, which are required to be referred to the main Finance Division through the Financial Adviser.

(vi) Public Accounts Committee (PAC) and Department Accounts Committee (DAC):

He shall be responsible for the work relating to PAC, DAC and audit observations on Appropriation Accounts and Audit Reports, ensuring compliance with the PAC observations and recommendations. He shall assist the Principal Accounting Officer, prepare necessary Briefs for PAC/DAC and attend the meetings of the PAC and DAC along with the Principal Accounting Officer in the case of PAC and Additional Secretary/equivalent officer in the case of DAC.

(vii) Compliance with Rules, Regulations and Orders:

He shall tender advice to the Principal Accounting Officer for compliance of rules, such as General Financial Rules (GFR), Fundamental Rules (FR), Supplementary Rules (SR), Federal Treasury Rules (FTR) and other regulations, instructions and orders issued by the Finance Division from time to time.

(viii) Internal Control:

He shall be responsible for observance of Internal Control prescribed by the CGA in the Ministry/Division, Attached Departments and Subordinate Offices. He shall assist and advise the Principal Accounting Officer for preventing irregularities, waste and fraud and shall exercise internal checks as provided in Para 13 of GFRs Volume-I, which reads that:

(a) Rules on handling and custody of cash are properly understood and applied;

(b) An effective system of internal check exists for securing regularity and propriety in the various transactions including receipt and issue of stores etc., if any, and

(c) A satisfactory arrangement exists for a systematic and proper maintenance of Account Books and other ancillary records concerned with the Initial Accounts.

(ix) Internal Audit:

He shall conduct the Internal Audit of the Ministry/Division/Attached Departments and Subordinate Offices and incorporate the results of these inspections in the form of an inspection report and furnish the Internal Audit Report to the Principal Accounting Officer. The Principal Accounting Officer shall, after scrutiny of the report, communicate to Audit, copies of the report along with remarks and orders/action(s) taken thereon.

Principal Accounting Officer in the Ministries/Divisions and Departments are delegated powers and may exercise these powers without consulting the Financial Adviser. The Chief Finance and Accounts Officers may, however be consulted. His advice can however, be over-ruled by the Principal Accounting Officer who may record reasons for overruling the advice.

(x) Reference to Financial Adviser/ Finance Division:

In cases where a reference to the Financial Adviser/Finance Division is necessary, the

Chief Finance and Accounts Officer shall ensure that:-

(a) The case is properly examined in accordance with the relevant rules and orders;

(b) The facts of the case and the point of reference are clearly stated in a self-contained note or office memorandum which shall be submitted in duplicate; and

(c) Such further data and information is furnished as may be asked for by the Financial Adviser/Deputy Financial Adviser/Finance Division for the proper disposal of the issues referred to him.

The following two Department Accounts Committee meetings were held during financial year 2015-2016:-

DATE	SUBJECT
25-8-2015	DAC meeting was held to discuss the Special Audit & Inspection report on Funds released by Election Commission of Pakistan to PCSIR (Labs), Karachi for Supply of Ink of Electrion Commission of Pakistan for use in General Election - 2013.
21-12-2015	DAC meeting was held to discuss the Draft Paras proposed for inclusion in

	Audit Report Public Sector Enterprises (Federal) for the year 2015-16 on the accounts of Pakistan Science Foundation, Islamabad.

Government of Pakistan

Ministry of Science and Technology

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Non-Development Allocation 2015-2016

S.No.	Name of Organization	Final Grant 2015-2016
1	Ministry of Science & Technology including Science Counsellor Office at Beijing (China)	423.287
2	Pakistan Technology Board	0.692
3	Pakistan Council for Science & Technology	80.308
4	Pakistan Science Foundation	181.002
5	Pakistan Museum of Natural History	115.001
6	Pakistan Scientific and Technological Information Centre	129.001
7	National Institute of Electronics	126.789
8	National University of Sciences & Technology.	2,146.000
9	Pakistan National Accreditation Council.	32.100
10	Pakistan Council of Renewable Energy Technologies	98.500
11	COMSATS Institute of Information Technology (C.I.I.T)	250.000
12	Pakistan Council of Research in Water Resources	228.206
13	National Physical Standard Laboratory	170.000
14	Pakistan Council of Scientific and Industrial Research	1,849.001
15	National Institute of Oceanography	108.410
16	Council for Works and Housing Research	75.000
	Grand Total:-	**6,013.297**

Commercialization Cell

Ministry of Science & Technology (MoST) established the Commercialization Cell, at MoST in March 2012 with an aim to promote demand driven research, innovation and commercialization of intellectual property of R&D organizations of MoST, enabling them to play vital role in socioeconomic/ industrial development of the country.

Objectives and Functions:

The Commercialization Cell, MoST has been given the mandate to guide, support and facilitate R&D organizations working under aegis of MoST for optimum utilization of their human and capital resources for:-

- Developing linkages with industry & academia
- Undertaking demand driven research and technology development
- Development of import substitutes
- Value addition in products/technologies, especially for exports
- Entrepreneurship development
- Transfer of technology to the local industry
- Effective Publicity

Activities and Progress:

The Commercialization Cell established / strengthened linkages of R&D organizations of MoST with industry & academia for undertaking demand driven R&D, value addition especially for exports, development of import substitutes, entrepreneurship development and transfer of technology to the local industry. Commercialization Cell convened a number of Focus Group Meetings with different industrial sectors, arranged follow-up meetings/ visits, enhanced interaction of industries with R&D organizations and identified projects/ assignments as per industrial needs. Major activities undertaken during 2015-16 are briefly mentioned below:

i) Focal Group meeting with Food sector of KPK at KPCCI Peshawar

The Commercialization Cell MoST and PCSIR Peshawar organized a Focus Group Meeting with representatives of Food Industries of Peshawar, Mardan & Nowshera in collaboration with Khyber Pakhtunkhwa Chamber of Commerce & Industries (KPCCI) on September 15, 2015 at KPCCI, Peshawar. The main purpose was to enhance linkage of the R&D Organizations with the local industry and academic institutions for undertaking demand driven R&D, resolve industrial problems and indigenize the technologies/ products/ processes developed by the public sector.

ii) **Establishment and Inauguration of Display Corner at KPCCI**

As a result of joint efforts of the Commercialization Cell, MoST and PCSIR Labs Complex Peshawar, the Khyber Pakhtunkhwa Chamber of Commerce & Industries (KPCCI) provided a space, free of cost, at the premises of KPCCI Peshawar to display products and technologies developed by PCSIR Labs Complex Peshawar. Subsequently, PCSIR, Peshawar established a Display Corner in the KPCCI building, which was inaugurated by President KPCCI, Mr. Fuad Ishaq on September 29, 2015.

iii) **Commercialization Cell MoST jointly organized 5th Invention to Innovation Summit and a Consultative Workshop at University of Haripur, KPK**

The Commercialization Cell MoST, Institute of Research Promotion (IRP) and University of Haripur jointly organized 5th Invention to Innovation Summit at University of Haripur, KPK. Secretary MoST was the chief guest at the inaugural function of the Summit. A Consultative Workshop on "Commercialization of Technologies: Challenges & Way Forward" was also organized during the Summit. A large number of Directors of Office of Research Innovation and Commercialization (ORIC) of private and public sector Universities of KPK, representatives of industries of KPK and officers of R&D organizations actively participated in the workshop. The Vice Chancellor, University of Haripur, Dr. Naseer Ali Khan distributed the certificates among the participants of the Workshop.

iv) **Commercialization Cell MoST jointly organized 5th Invention to Innovation Summit at Lahore and a Focus Group Meeting with Food Industry of Punjab**

The Commercialization Cell MoST, Institute of Research Promotion (IRP) and University of the Punjab jointly organized another event of 5th Invention to Innovation Summit at University of the Punjab, Lahore where about 150 researchers from different universities and R&D organizations showcased their developed products.

At the eve of the Summit, Commercialization Cell, MoST and PCSIR, Lahore jointly organized a Focus Group meeting with Food and Food Products Industry of Punjab. The participants of the meeting represented national and international industrial enterprises, academic institutes and scientists / technical experts from PCSIR Lahore. The industry representatives were from Nestle Pakistan Ltd, Mitchells Fruit Farms Ltd, Shezan International Ltd, Engro Foods, Asian Food Industry (Mayfair), The Hospitality Experts, Sabirs Group of Companies, Ajmair Foods (Cakes and Bakes) and Metro Cash & Carry.

The industry representatives raised a number of quarries and the relevant experts responded accordingly. The participants also mentioned of various issues/problems of their industries and sought technical advice from the PCSIR's technologists.

v) **National IP Awareness Seminars and Training Workshops**

To promote Intellectual Property awareness and strengthen the Patent regime in the country, IPO-Pakistan in collaboration with Higher Education Commission, Commercialization Cell MoST, National Textile University, COMSAT and United Nations Industrial Development Organization (UNIDO), under TRTA-II program sponsored by European Union, held a series of a weeklong Seminars / Workshops on "Patent Drafting, Licensing and Valuation" one each at Islamabad, Faisalabad and Karachi. These were attended by hundreds of stakeholders from public and private sector. The senior-most officials of the collaborating organizations including Chairman & DG IPO-Pakistan, Chairman HEC, representatives of EU and UNIDO and Chairman PCSIR participated and shared their views on the significance of the event and the Intellectual Property Rights.

vi) **Technical cooperation between MoST and SEC**

A Memorandum of Understanding (MoU) was signed between MoST and State Engineering Cooperation (SEC) to collaborate in the field of Science and Technology. Under this MoU, the R&D organizations of MoST will provide technical assistance to organizations of SEC in modernization of their installations/ facilities and up-gradation/ improvement of their capabilities so as to manufacture new products on large scale conforming to market demand. Commercialization Cell, MoST is the Focal Point for coordination between organizations of MoST and SEC. The collaborating organizations have initiated preparing a number of joint R&D projects.

vii) **Signing of Framework of Collaboration between MoST and MoDP**

On the directions of Federal Minister for S&T/ MoDP and Secretary MoST, the Commercialization Cell made efforts to enhance strong relationship & technical cooperation between organizations of MoST and Ministry of Defence Production. The objective was to identify areas of mutual interest and develop demand driven / research based innovative technologies/ products/ prototypes sharing their capital and human resources. The Framework of Collaboration was signed by the Secretaries of both the Ministries on June 09, 2016. A number of joint R&D activities have been initiated by the organizations/establishments of the Ministry of Science and Technology and Ministry of Defence Production. ED Commercialization Cell is the Focal Person of MoST to facilitate interaction between the collaborating partners.

viii) **Publicity activities**

Quarterly Newsletter "S & T Biz": The Commercialization Cell published its quarterly newsletters "S&T Biz" during the report period, which are aimed to project various activities of S&T organizations of MoST among the stakeholders.

b) Most of the programmes / activities and targets set out by the Commercialization Cell during the preceding financial year were accomplished which included strengthening of linkage of R&D organizations of MoST with industry & academia for undertaking demand driven R&D and solving industrial problems, establishment of technical cooperation of R&D organizations of MoST with the Establishments of State Engineering Corporation and Ministry of Defence Production for undertaking joint research projects, creation of awareness on Intellectual Property and capacity building of researchers through trainings on Patent Drafting, Licensing and Valuation at National level and publication of quarterly newsletter, S&T Biz".

c) Not applicable

Focal Group meeting with Food sector of KPK at KPCCI Peshawar

The Vice Chancellor, University of Haripur, Dr. Naseer Ali Khan distributing certificates among the participants of the Consultative Workshop organized by Commercialization Cell, MoST

Focus Group Meeting with Food and Food Product Industry of Punjab at Lahore

Secretary, Ministry of Science & Technology and Secretary, Ministry of Defence Production signing a Framework of Collaboration between MoST and MoDP

Electronic Wing

Functions

Electronic Wing is providing supervision, guidance and evaluation of research and development works and scrutiny / monitoring of development projects in the fields of electronics and renewable energy technologies. The wing also coordinates development programs in the fields of electronics and renewable energies. The technical matters / affairs of National Institute of Electronics (NIE) and Pakistan Council of Renewable Energy Technologies (PCRET), are dealt by this wing.
Electronic wing has been assigned the task for the preparation and processing of the draft Bills, for providing legal cover to the organizations under MoST, which were created through Resolutions / Executive Orders etc. and other legislative matters/issues related to the S&T Sector.
Processing, coordination, implementation and trainings related to the IT and E-Government in the S&T Division.
Electronic Wing also provides necessary technical opinion on standardization of electronic components, devices, processes and attended the meetings, organized by Pakistan Standard and Quality Control Authority (PSQCA). Joint Electronics Adviser, MoST is the Chairman of the Technical Committee on Biorisk Management and member of the National Standard Committee on Health Care.

Activities of Electronic Wing:

Electronic Wing carried out monitoring and evaluation of the NIE project titled "Balancing, Modernization and Rehabilitation (BMR) of NIE".

* Dealt with the technical affairs of National Institute of Electronics (NIE) and Pakistan Council for Renewable Energy Technologies (PCRET). In particular provided necessary guidance for the completion of extension plans of NIE and PCRET, which have been planned to enhance their technical activities.
* Drafted and processed Bills for the enactment of organizations under MoST, created through resolutions / executive orders etc.; which have no legal status and other related legislation.
* Implementation of E-Government initiatives and IT security instructions in the S&T Division as directed by the Cabinet Division.
* Pursued the decisions taken in the meetings of the Standing Committees of National Assembly and Senate on S&T and actions taken for their implementation, related to PCRET and NIE.
* Dealt with the matters of National Electric Power Regulatory Authority (NEPRA) and necessary technical opinion / views were conveyed to NEPRA, for awarding Power Generation Licenses to different organizations.
* Participated in the meetings of the National Computing Education Accreditation Council (NCEAC), Higher Education Commission (HEC) for awarding accreditation certificates to

different educational institutes, for offering degree courses in Computing education i.e. Software Engineering, Computer Science, Information Technology etc.

* Participated in the BoG meetings of the Alternative Energy Development Board (AEDB), Bahria University, Air University and Pakistan Institute of Emerging and Applied Sciences (PIEAS).

Details of Activities:

A. Evaluation and Monitoring of NIE and PCRET:-

Monthly performance/progress reports of National Institute of Electronics (NIE) and Pakistan Council of Renewable Energy Technologies (PCRET) were expedited, evaluated and necessary guidance provided to the Institutes.

The bottlenecks pointed out by NIE and PCRET regarding implementation of projects and administrative matters were taken up with the concerned Ministries / departments for providing consultancy.

B. Legislation:

In pursuance to the instructions of the Establishment Division, the draft Bills of the organizations under MoST have been processed. Details of the organizations are as under:-

Draft Bills of the Organizations under process at MoST:-

* Pakistan Council of Renewable Energy Technologies (PCRET) Bill, 2016

The Cabinet Division, vide Cabinet Decision case No. CCLC-31/02/16, dated 11-02-2016 accorded approval to introduce the Bill in the Parliament. The same was forwarded to the Parliamentary Affairs Division through Law, Justice and Human Rights Division for its introduction in the Parliament.

* Pakistan Council of Science & Technology (PCST) Bill, 2016

The Cabinet Division, vide Cabinet Decision Case No. CCLC-30/02/2016, dated 11-02-2016 accorded approval to introduce the PCST Bill, 2016 in the Parliament. PCST Bill was introduced in the National Assembly on 18-03-2016 and referred to the Standing Committee.

* Pakistan National Accreditation Council (PNAC) Bill, 2016

The Cabinet Division vide Cabinet Decision case No. CCLC-33/02/2016, dated 10-02-2016, accorded approval to introduce the PNAC, Bill 2016 in the Parliament. The same was forwarded to the Parliamentary Affairs Division through Law, Justice and Human Rights Division for its introduction in the Parliament. PNAC Bill was introduced in the National Assembly on 14-06-2016 and forwarded to the Standing Committee.

* Pakistan Engineering Council (Amendment) Bill, 2016

PEC amendment Bill was introduced in the National Assembly on 14-03-2016 and report of the Standing Committee was presented in the National Assembly on 14-06-2016.

* National Metrology Institute of Pakistan Bill, presently working as National Physical and Standards Laboratory (NPSL)

In the light of Cabinet decision vide case No. 31/02/1998, dated 07-01-1998; establishing a proper infrastructure of physical and chemical metrology, M/o Science and Technology likes to establish National Metrology Institute of Pakistan to separate it from PCSIR and its reconstitution as an autonomous body under the administrative control of Ministry of Science and Technology, through an Act of Parliament.

After accorded approval in principle by the Cabinet, National Metrology Institute of Pakistan (NMIP) Bill, presently working as NPSL was forwarded to the Law, Justice and Human Rights Division for vetting. As per the advice of the Law, Justice and Human Rights Division the same was forwarded to the Council of Common Interest (CCI) for their consideration / approval.

* National University of Technology (NUTECH) Bill, 2016

National University of Technology Bill, 2016 is under consideration at MoST. Summary for the Cabinet is yet to be finalized.

* National University of Science and Technology (NUST) (Amendment) Bill, 2016

NUST amendment Bill, 2016 has been passed by the National Assembly & Senate and Notified.

C. Meetings on Standardization

Meetings on the standardization of electronic components and devices / processes were attended and technical opinions were provided for the finalization of standards.

E-Government

Electronic Filing system has been introduced in the Secretariat of the Ministry in coordination with Ministry of Information Technology and Telecommunication (MoIT&T) to establish paperless environment in the Ministry. It has not only improved the archaic system of filing but also speeded up disposal of official business.

E-Office is a software application developed to automate functions common to all the Federal Ministries/Divisions in order to enhance efficiency and delivery of the Government services in a transparent and efficient manner. E-office application consists of following six modules which include:

i) Internal Communications and Movement of Files
ii) Project Management
iii) Human resource Management
iv) Inventory and Procurement Management
v) Budget and Accounts Management; and
vi) Dynamic Portal

MoST has procured computers, Printers, Scanners and installed Network infrastructure and Optical Fiber Connectivity as per organizational structure and reporting hierarchy for starting e-filling system. Computers and allied equipment have been installed in all offices at MoST.

Training on e-Office system has been provided to all officers/officials of Ministry of Science and Technology at National Information Technology Board (NITB), Ministry of Information Technology and Telecommunication (MoIT&T). E-Filing System has been initiated and will be started completely in November, 2016 at MoST.

Alternative Energy Development Board (AEDB)

Joint Electronics Adviser, Ministry of Science and Technology participated in the BoG meetings of the Alternative Energy Development Board (AEDB), an autonomous body, established under act No.XIV of 2010, for the purpose of implementing various policies, programmes, and projects in the field of alternative / renewable energy technologies.

Parliamentary Business

Drafted replies for National Assembly and Senate questions related to National Institute of Electronics (NIE) and Pakistan Council of Renewable Energy Technologies (PCRET). This wing is also pursuing aggressively for the implementation of the decisions made by the Standing Committees related to NIE and PCRET.

Planning and Development (P&D) Cell

Functions

The Ministry of Science and Technology (MoST) is the national focal point and enabling arm of Government of Pakistan for planning, coordinating and directing efforts to initiate and launch scientific and technological programs and projects as per national needs necessary for rapid socio-economic development of the country, with the following mandate as spelled out in the Rules of Business.

Keeping in view the Vision 2025, R&D organizations of MoST have diverted their efforts and resources towards demand driven R&D and implementation of projects having significant economic impact. These organizations are being encouraged and supported to transfer technology to the local industry and commercialize their products and processes to become sustainable over a period of time with the goal to achieve Knowledge Based Economic Development. The MoST programmes are mainly implemented by the following 15 institutions/ organization working under its administrative control.

Organizations of Ministry of Science & Technology:

1	Pakistan Council of Scientific and Industrial Research (PCSIR)
2	Pakistan Council of Research in Water Resources (PCRWR)
3	Pakistan Science Foundation (PSF)
4	Pakistan Council for Science and Technology (PCST)
5	Council for Works and Housing Research (CWHR)
6	Pakistan Council for Renewable Energy Technologies (PCRET)
7	National Institute of Electronics (NIE)
8	National Institute of Oceanography (NIO)
9	Pakistan Standards and Quality Control Authority (PSQCA)
10	Pakistan National Accreditation Council (PNAC)
11	Pakistan Engineering Council (PEC)
13	National University of Sciences and Technology (NUST)
14	COMSATS Institute of Information Technology (CIIT)
15	Science and Technological Development Corporation (STEDEC)

In the fiscal year 2015-16, Ministry of Science & Technology (MoST) emphasized on promotion of demand driven research, innovation and commercialization of intellectual output of R&D organizations of MoST with the goal to enable them to play an effective role in socioeconomic/ industrial development of Pakistan.

Achievements in 2015-16

- MoST is **guiding and supporting Small & Medium Enterprises (SMEs) for exploring and adopting new trends** and requirements of intentional competitiveness, improved industrial productivity and quality according to the requirements of internationally recognized standards and guidelines. SMEs would give incentives in developing a certification framework for meaningful participating in global supply chains, enhancing export trade and to improve business practices.

- **Private Sector through its Public-Private partnership programs** for viable R&D, in order to meet the future challenges of WTO. Universities and private Sector are being persuaded to establish R&D facility leading to a well concise innovation culture in the country. MoUs with leading academic institutions and chambers signed for collaborative efforts.

- **For Capacity Building and HRD in S&T Sector Science Talent Farming Scheme (STFS)** is being implemented under the Vision 2025 to groom the selected youth and support them all the way to highest degree by progressively exposing them to advanced topics in science with application of inquiry based approach to learning. The science talent would be encouraged through scholarships and other additional interventions under this initiative.

- **International Cooperation in the fields of Science & Technology** is being pursued both at policy and working levels with the main objectives of: (i) enabling Pakistani researchers to get access to technologies developed elsewhere in the world, (ii) mobilizing S&T capacity of national institutions and development of human resource for mutual benefit, and (iii) sharing of resources in areas of science and technology having excellence at home and abroad. The MoST has adopted two pronged strategy of developing linkages i.e. through bilateral agreements/MoUs with friendly countries and coordination with Intergovernmental, International and Regional Organizations dealing with Science & Technology. To achieve optimal results, the provision of consistent funding is however a major limitation in this regard on the part of MoST.

- **Up-gradation of Overall R&D infrastructure of the Labs and Facilities** of MoST Organizations was continued to be upgraded to enhance the internal research capability of these organizations. The internal capacity of National Physical Standards Laboratory (NPSL) enhanced to achieve the highest level of accuracy and traceability of its measurement system to the international system of measurement. This will support public/ private and industrial sector enabling us to export quality products fulfilling WTO requirement and earning of foreign exchange.

- **Industry Focused R&D** is the prime impetus at Pakistan Council of Scientific and Industrial Research (PCSIR). Presently, PCSIR is promoting lab scale development to Pilot scale level in areas of Pharmaceutical and Chemicals, Food, Herbal, Minerals and Cosmetics etc. PCSIR has developed processes and leased out to different industries, patents registered and provided consultancy services to various industry clients.

- In an effort to **reduce the water borne diseases by creating awareness in people** as well as ensuring safe drinking water practices, PCRWR completed recently a national level project "Provision of Safe Drinking Water". Under this project, a network of 23 water quality laboratories has been established at district level in all provinces and completed a nation-wide assessment survey of over 10,000 water supply schemes (1808 urban and 8320 rural) as well as capacity building of 3000 professionals associated with water supply agencies. These efforts are facilitating the provincial and local governments in ensuring safe drinking water supplies.

- For **Energy Conservation,** Electrical Test Centre for Household Electrical Appliances & Lighting Products at Lahore is being upgraded. The center will create awareness and provide services to industry to benchmark and help increase the energy efficiency of household electrical appliances, lighting products and accessories.

- **Trade Related Interventions** by MoST are being undertaken through Pakistan Standards and Quality Control Authority (PSQCA), Pakistan National Accreditation Council (PNAC) and National Physical and Standards Laboratory (NPSL). These organizations are actively involved in export enhancement, trade increasing and improving health and safety of consumers through mandatory and voluntary standards. PSQCA formulate and promulgate standards. PNAC assists in expansion of trade through accreditation of laboratories and certification bodies, whereas NPSL is responsible for traceability of metrology standards.

Budgetary Overview of Development Activities

During the fiscal year 2015-16, an amount of Rs. 1510.427 Million was allocated against 25 development projects. Out of this, Rs. 1389.427 Million released to the projects up till June 2016.

Government is steadily increasing the budgetary provision for MoST that is in line with the National Science & Technology Innovation Policy 2012, wherein, it is recommended to enhance R&D expenditure to 1% of GDP till 2015 and 2% by year 2020. Ironically, at present, R&D sector is allocated not more than 0.29% share of GDP.

Monitoring of Development Project

Monitoring and Evaluation of PSDP project were carried out during the period under report. The overall progress/ assessment regarding monitored projects is partially satisfactory due to less release of funds. The system of internal monitoring and audit within executing agencies has also been initiated to overcome all retardants affecting progress and implementation of development projects. This is in line with the endeavor of MoST for effective and efficient utilization of development funds.

Pakistan Council of Research in Water Resources (PCRWR)

Introduction

Pakistan Council of Research in Water Resources (PCRWR), working under the Ministry of Science and Technology, has been playing its role as a national research organization by undertaking and promoting research in various disciplines of water sector, more specifically; irrigation, drainage, surface and groundwater management, groundwater recharge, watershed management, rainwater harvesting, desertification control, water quality assessment and monitoring, water conservation and development.

Major Activities

- Conducting research on all aspects of water resources and designing/ implementation of R&D projects in water sector.
- Monitoring water quality in urban and rural areas of Pakistan, to develop technologies for providing safe drinking water to the public.
- Keeping liaison with national and international research and development organizations, and non-government organizations working in water sector.
- Dissemination of research outcome to farmer's community and Government departments/agencies by holding seminars, symposiums and training programs.
- Providing services to public on drinking as well as irrigation/ground water investigation.
- Publication of research reports, booklets and provision of reprographic services to researchers.

Achievements

* Investigated and mapped groundwater zones by carrying out 3700 investigative tests in 17 districts of the lower Indus Basin (Bahawalnagar, Bahawalpur, Rahim Yar Khan, D.G. Khan, D.I Khan, Ghotki, Sukkar, Khairpur, Jacobabad, KashmoreKandkot, Larkana, Shikarpur, Kambar-Shahdadkot, Dadu, Jamshoro, Thatta and Nausheroferoze). This would facilitate farmers for proper installation of tube wells for pumping good quality water.

* Introduced low cost innovative recharge techniques i.e. leaky dams (5), check structures (13), inverted wells (4) in Pishin districts (Bagh, Bargai and Nasarud din, Cheena) of Balochistan which are economical and efficient to recharge groundwater as compared to delay action dams. The interventions resulted in water table rise and rejuvenation of adjacent karezes and wells.

* Conducted experiments for growing rice and wheat on beds in rice-wheat zone of Punjab province for water saving. The water use efficiency under bed and furrow method was 40-50% higher than conventional method. By adopting only bed and furrow method for rice cultivated area of the country, about 8 MAF of water can be saved. Necessary guidelines for the farmers in the form of booklet have also been developed in order to promote the technology at the large scale.

* Introduced solar powered high efficiency drip irrigation system in Pothwar and Cholistan desert for cultivation of high value fruit plants like olive, fig, grapes etc. Moreover, a design manual for solar tube wells (English & Urdu) has been developed and provided policy guidelines to the Federal Government for subsidized installation of 30,000 solar tube wells in the country.

* Determined crop water requirements of maize in Punjab and papaya in Sindh provinces through lysimeteric studies for rationalized irrigation scheduling for more crop production with less irrigation water.

* Demonstrated high efficiency irrigation systems viz. beds, sprinkler, bubbler and drip among 350 professionals and 700 farmers in different areas of Pakistan.

* Developed rainwater harvesting ponds (4 new and 6 rehabilitated) at UC Musa ZaiShareef, district D.I. Khan.

* Established two solar powered drip irrigation systems for irrigating 1100 orchard plants at Passu and 2700 at Morkhoon in Gilgit-Biltistan. The operational responsibility of the systems was formally handed over to local Community Based Organization (CBO).

* Made operational twenty four (24) water quality testing laboratories with the state of the art equipment.

* Conducted monitoring of water quality of river Ravi and Sutlej at 6 strategic locations, 9 associated drains and 18 groundwater sources (shallow and deep). This information would help to understand the health of the rivers and suggest management measures accordingly.

* Completed monitoring of water quality of 23 major cities of the country (Rawalpindi, Islamabad, Karachi, Peshawar, Quetta, Hyderabad, Multan, D.G. Khan, Lahore, Faisalabad, Sialkot, Swat, Rahimyar Khan, D.I. Khan, Nawabshah, Loralai, Gujranwala, Gilgit, etc.).

* Undertook regular monitoring of available bottled water brands on quarterly basis and shared the results with the public, the provincial Chief Secretaries and the related stakeholders for taking action against those selling contaminated water.

* Developed technical capabilities for production of low cost water quality testing kits for main drinking water quality parameters and water treatment technologies for the removal of arsenic, turbidity and microbiological contamination.

* Generated revenue of Rs.14.224 million from water quality testing, groundwater investigation, laser land leveling, research farms produce and sale of PCRWR products.

* Developed eight PC-Is for funding from Government of Pakistan and thirteen project proposals for international donors on emerging water related issues in less developed areas of Punjab (Thal), Sindh (Thar), Balochistan, KP (D.I. Khan), irrigated agriculture, low lying areas of Sindh and eastern border of Punjab, Pakistan.

* Developed "National Water Resources Research Agenda: 2015-25" in consultation with stakeholders like federal and provincial departments, academia and international NGOs working in the water sector.

* Developed liaison with national and international organizations (PARC, BARI, ICIMOD, WWF, CSIRO, UNESCO, WHO, ICARDA etc.) to conduct and disseminate research on emerging water-related issues.

Progress of on-going Projects/Studies

❖ Integrated Water Resources Management in the Highly Depleted Pishin-Lora Basin of Balochistan: Pishin-Lora basin is one of the highly depleted groundwater areas of Balochistan. This project has been initiated in July 2014 and would be completed in June 2018. Three leaky dams and 4 inverted wells have been constructed at Cheena Dam, Pani Dam; Tangi Dam in Pishin district; and village Aid Dam in Quetta district for groundwater recharge of depleted aquifer. Constructed 11 check structures to control soil erosion in the watersheds of the leaky dams; and conducted resistivity survey on 10% area of Pishin-Lora Basin to assess the existing groundwater resources.

❖ Demarcation of Groundwater Quality Zones in the Indus Plain and Marginal Areas for Sustainable Development and Management of Groundwater (Lower Indus Plain): PCRWR investigated and mapped the groundwater of Upper Indus Plain in the 4 Doabs (Thal, Bari, Rechna and Chaj). The investigations for Lower Indus Plain are being carried out using geophysical methods such as resistivity survey, well drilling, isotopes hydrology, water quality evaluation and computer modeling. For this purpose, conducted 3580 shallow and 121 deep probes and collected 16 soil samples from the test bores for aquifer studies.

❖ Establishment of National Capacity Building Institute for Water Quality Management: To provide safe drinking water to the community, capacity building and regular training of the professionals involved in drinking water supply is essential. PCRWR with the financial assistance of Korea International Cooperation Agency (KOICA) is establishing a permanent national level setup. Seventy percent civil work has been completed (after which the work was stopped due to litigation initiated by a local contractor against Korean contractor and resultant stay order); and developed curriculum for short course and procured books, journals and e-material for the Institute.

❖ Study on Evaluation of Crop Water Requirement of the Hybrid Maize: The planting of hybrid maize is increasing in Pakistan. However, due to lack of information regarding its water requirements, farmers keep on applying tremendous amount of water to maize crop resulting into depletion of groundwater resources particularly in Sahiwal and Okara districts. This study is being conducted at Lysimeter Station, Lahore to determine water requirement of hybrid maize. By sowing hybrid maize on raised bed will save water from 20-30% without compromising the yield.

- Study on Prospects of Growing Fruit Trees in Desert Environment: Desert's lands can be made more productive by introducing drought tolerant plants, crops and grasses. Many countries in the world have converted their desert lands into productive lands using high value, low delta crops. These provide livelihood to the local community besides controlling desertification. PCRWR has planted over 6000 plants: olive (5000); fig (150); cactus (300); zyziphus (400); grapes (600); atriplex (20); neem (200); canocorpus (200) and parkinsonia (100) at its Field Research Station Dingarh, Cholistan. Supplemental irrigation is being provided through drip irrigation system coupled with low-cost solar pumping from the harvested rainwater.

- Study on Determination of Consumptive Use of Water for Cotton under Different Water Table Depths: Cotton is one of the major cash crops of the country and very sensitive to high water table conditions. The experiment to determine its optimum water requirements has been started from April 2016 at lysimetric station, Tandojamat three water table depths (1.5, 2.25 and 2.75 m). Data on soil, water, crop and climate have been collected regularly to determine the crop water requirements under different water-table depths.

- Study on Growing of Banana on Raised Beds: Banana is one of the most water consuming crops and is grown on about 32000 hectares in Sindh. The study has been started from April 2015 to assess water saving and soil salinity for banana under raised bed irrigation system over conventional irrigation method. The treatments T1, T2, T3 pertain to banana cultivated on raised beds (2.5 acres) whereby the irrigation is applied on 50, 40 and 30% depletion of available moisture. T4 is the banana cultivated under conventional method (2.5 acres) having random irrigation as per the farmers' practice.

- Study on Growing of Cotton under Different Irrigation Methods: Farmers of Sindh province mostly cultivate cotton crop on flat beds/ridges applying 50% more water than the actual water requirements. Thus, this study has been started in May 2015 to assess water saving and soil salinity for cotton under raised beds, ridges and conventional irrigation methods. Sowing of cotton seeds was completed in May 2016 under raised beds and ridges by dibbling method.

- Study on Water Saving and Yield Assessment for Sesame under Sprinkler and Conventional Irrigation Methods: Sesame is one of the major oilseeds crops of Sindh province and is cultivated on 7700 hectares. It is low delta crops and is tolerant to soil salinity. Therefore, this study has been started in May 2016 to determine the yield and water use efficiency as well as soil salinity for sesame under sprinkler and conventional irrigation methods. Soil, water, crop data have been collected for both sprinkler and conventional irrigation methods.

- Study on Strategic Strengthening of Flood Warning and Management Capacity of Pakistan (UNESCO sponsored): Pakistan Meteorological Department (PMD) and UNESCO are developing a flood forecasting model to be used in Pakistan. PCRWR is determining soil physical and hydraulic properties to be used as inputs for the model.

PCRWR has also established a state of the art Soil Physics Laboratory to determine soil physical and hydraulic properties; surveyed 97 sites in Pothwar region and in the four Doabs for carrying out double ring infiltration tests, resistivity survey; collected soil samples for texture analysis and laboratory based determination of soil moisture characteristics curve; generated moisture retention data from analyzing the collected soil samples; and developed lithology of soil upto 50 m depth.

- Study on Strategic Basin Assessment, Indus (CISRO funded): The study has been undertaken to monitor the water quality of the eastern rivers Ravi and Sutlej at the strategic locations to understand the health of the rivers and to suggest management measures. Six strategic locations have been selected at the rivers, 9 associated drains and 18 groundwater sources; collected/analyzed 396 water samples for physico-chemical, microbiological, trace elements and persistent organic pollutants (POPs).

- Study on Assessment of Environmental Degradation of Manchar Lake (financial assistance of US–Pakistan Centre of Advance Studies in Water, Jamshoro): The environmental degradation of Manchar Lake has imposed adverse impacts on economic activities and livelihood of the local people. This study will help assess the health of the lake and to devise strategies for its improvement. Sixty water and soil samples have been collected from the body of the lake, surrounding area, inlets and outlets of Manchar Lake to evaluate the causes of degradation.

National Institute of Electronics (NIE)

Introduction

National Institute of Electronics (NIE) is an autonomous R&D organization under the Ministry of Science & Technology, Government of Pakistan. It was established through Presidential Ordinance No. III of 1979. The aim of the Institute is to undertake design & development work in the emerging areas of electronics and to acquire advanced level know-how in major disciplines of electronics.

The general administration of the affairs of the Institute and the formulation of its policies vests in the Governing Body which is headed by the Director General of the Institute. Whereas, the Executive Committee is responsible for the day to day functioning of the Institute.

1. Functions

- To carry out design and development work in vital areas of electronics.
- To develop know-how in advanced electronic techniques and exchange of knowledge/impart advanced training in electronics.
- To establish close liaison with other organizations engaged in R&D academic and production activities.
- Undertake design and development projects on contract with user organizations.
- To establish small scale production line of specialized electronic equipment.
- To arrange seminars & conferences.

2. Key Expertise

- Design Research & Development.
- Small Scale Production.
- Consultancy/Services.
- Human Resource Development.

3. Research & Development Labs

The Institute has well-equipped labs/facilities in the following disciplines:

- Communication Engineering.
- Automation & Control Engineering.
- Integrated Circuits (IC) Design.
- Centre for Software Development & Training in Advance Database.
- Power Electronics.
- Testing & Certification of Electronic Products.

- Printed Circuit Boards (PCB).
- SMT Pilot Production Line (Automatic).
- General Purpose Electronics.
- Consumer Electronics.
- Automotive Electronics.

a. Details of Activities, Achievement & Progress on Design & Development of Products

- Design & Development of Electronic Voting Machine (prototype)
  NIE has designed and developed electronic voting machine (EVM). The main objective of the EVM is to assist in conducting transparent and fare election and to avoid rigging.

- ECG Machine (Prototype)
  In accordance to medical equipment, prototype developed of 12 channel Net Enabled ECG machine. The NECA 1100 is the product of a safety conscious engineering process and satisfies international medical standards amply in this regard. Safety and Quality Testing has also been done by NIE.

- Dental Capsule Filling Machine (Prototype).
- Granular Scale Powder Filling Machine.
- Granular Scale Liquid Filling Machine.

  A semi-automatic machines is designed to fill milli Scale Powder into the capsules/bottles. The machine is capable of filling up to accuracy of 10mg. Multi-head customized solution is also under process.

- Automated Screw-Downing System designed for Pakistan Steel Mill
  Modernize / Rehabilitation the screw-downing mechanism of Hot Steel Rolling Mill by replacing electronics of 1970's unit, the latest digital technologies & intelligent gadgets by targeting increased productivity and quality to last for decades.

- Vehicle Tracking System
  GPS tracking device is capable of providing information about altitude, location and speed in real time, with update rate of 04-05 readings per minute. It is universally integrable with any system. It finds its applications in military and automobile industry.

- Antenna Design and Testing (Micro strip Patch Antenna of Various frequencies, Yagi, Ground Plane Antenna)

It is a rectangular patch, low cost, low profile of light weight microwave antenna designed at a frequency of 3.24 GHZ having a gain of 6dB of neglible reflection. It can be used for communication in military, medical and radar fields.

- Designed and developed CMOS based multiplier ASIC for implementation in electronic circuitry
  Multiplier is based on Gilbert cell which is an expounded cascade circuit used as an analog multiplier and frequency mixer. The output current is a quadrant multiplication of the differential base voltage of the inputs. The Gilbert cell can be used as a small signal precise four quadrant multiplier, a large signal phase detection, a modulator in a communication application and other purposes.

- Research work in design and implementation of asynchronous clockless digital circuits for low power devices.
  The urge to minimize power consumption is today's requirement. Many low power design techniques have been proposed in the past for clocked designs. But the clock itself is a major source which consumes power and produces heat. The latest trend in low power design approach is to eliminate the clock source from the architecture as it consumes most of the power. This approach is known as asynchronous design approach. The prime focus of research is to utilize existing ASIC design tools, for design & analysis of asynchronous circuits. Mentor Graphics Model Sim for behavioral implementation/simulation is used. Leonardo Spectrum for synthesis and Pyxis Schematic is used for transistor level circuit implementation. ELDO/Ez-wave is used for transistor level simulation analysis.

- Assembled 1200 PCBs, consisting of LEDs for different light fixtures.
  NIE has developed a flexible LED PCB circuit, which can be assembled/prepared for different types of LED products such as 2'X2' ceiling panels, street lights of different wattages, flood lights, soft light (decorative) etc.

- Production of 2x2ft LED false ceiling fixtures.
  These LED based false ceiling fixtures are energy & environment efficient. Consuming only 36 watts while conventional tube lights consume 96 watts. Their UV index is also safe for human eye because of special diffuser sheets.

b. Achievements

In addition to above projects following are submitted.

- AR Amplifiers a well-known company for the development of High Power RF amplifiers, communications Engineering lab, repaired 50W and 100W amplifiers.

- Atomic Absorption System and George, CNC Core Cutting Plant etc.
  Atomic absorption System at PCRWR is used for performing water purification test. It is also used for spectroscopy which is the quantitative determination of chemical elements. George CNC core cutting plant of HEC Hattar, is used to cut silicon cores for transformer manufacturing.

- Energy Audit & Management of different organizations
  Energy Management is the judicious and effective use of energy to maximize profits (minimize costs) and enhance competitive positions. An energy audit is an inspection, survey and analysis of energy flows energy conservation in a building, process or system to reduce the amount of energy input into the system, without negatively affecting the output(s). In commercial and industrial real estates, an energy audit is the first step in identifying opportunities to reduce energy expenses.

- PCB Design/Fabrication facilities are provided to various public/private sector organizations.
  NIE has facilities of the Printed Circuit Board (PCB) design and fabrication, single, double, multilayer and flexible PCB's.

- Establishment of Computerized Automobile Tuning (CAT):
- Design and Development of Pakistan's First Indigenous Electronic Control Unit for Automobile tuning.
- Tuning & removing faults of vehicles as a result fuel consumption of these vehicles has been reduced. The facility is open for private and public organizations and individuals.

c. Relevant Statistics/Out Come

MoU's	02	Signed with Universities/Public & Private Sectors
Training/Internship Program - Two Months Course - 6 Months Diploma - Advanced Industrial Training on PLC, HMI & SCADA - 6-8 Weeks internship	 400 Students 126 05 100	 Students of universities/ institutions in the field of Electronics/IT
Designed & Developed of Products	08	For various Public & Private Sectors
Consultancy/Engineering Services	25	Universities/Institution & Public & Private sector

ECG Machine Design & Developed by NIE

SMT Production Line

Center for Quality Testing and Certification of Electronic Products

Pakistan National Accreditation Council (PNAC)

Pakistan National Accreditation Council (PNAC) was established in 1998 under the administrative control of Ministry of Science & Technology with a mandate to accredit laboratories (testing/calibration/medical), Inspection Bodies (IBs), Certification Bodies (CBs) and Halal Certification Bodies (HCBs) etc. PNAC has established, maintained and implemented quality management system based on **ISO/IEC 17011** - *General requirements for accreditation bodies accrediting conformity assessment bodies (CABs).*

1. Functions of PNAC:

1.1 Accreditation of;

Current:

- Testing & Calibration Laboratories (ISO/IEC 17025)
- Certification Bodies (ISO/IEC 17021)
- Inspection Bodies (ISO/IEC 17020)
- Medical Laboratories (ISO 15189)
- Halal Certification bodies (PS 4992:2010)
- Proficiency Testing Scheme (ISO/IEC 17043)
- Product Certification bodies (ISO/IEC 17065)
- Personnel certification bodies (ISO/IEC 17024)

1.2 Trainings

- PNAC is also providing trainings to conformity assessment bodies on international standards.

2. World Acceptance of Certificates/ Testing Reports:

PNAC has achieved Mutual Recognition Arrangement (MRA) with International Laboratory Accreditation Cooperation (ILAC) and Asia Pacific Laboratory Accreditation Cooperation (APLAC) for testing and calibration laboratories since May 2009. PNAC has also achieved Multilateral Recognition Arrangements (MLA) with International Accreditation Forum (IAF) and Pacific Accreditation Cooperation (PAC) for QMS & EMS since May 2013. Now Pakistan is included in the list of countries having harmonized and equivalence status for accreditation of Conformity Assessment Bodies (CABs).

3. Contribution to Economic Growth:

PNAC contributes in the economic growth through accreditation. The certificates / tests reports issued by the accredited organizations are acceptable all over the world. Accreditation builds confidence of the exporter that whatever they export conforms to the international requirements. Consumer Product Safety Commission of USA registers only those textile laboratories of Pakistan which are accredited by PNAC.

Achievements and Targets (Statistics tabulated)

Activities	Actual Achieved		Original Target	Plan Target		
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Testing and Calibration	60	80	15 (80 + 15)	10 (95+10)	10 (105+10)	10 (115+10)
Inspection Bodies	06	06	01 (06 + 01)	01 (07+ 01)	01 (08+ 01)	01 (09+01)
Certification Bodies	04	04	01 (04 + 01)	01 (05 + 01)	01 (06 + 01)	01 (07+01)
Medical Laboratories	03	05	02 (05+02)	01 (07+01)	01 (08+01)	01 (09+01)
Halal Certification Bodies	00	03	01 (03+01)	01 (04+01)	01 (05+01)	01 (06+01)
Proficiency Testing (**New Scheme**)	00	00	01	02 (01+02)	01 (03+01)	01 (04+01)
Product Certification (**New Scheme**)	00	00	01	01 (01+01)	01 (02+01)	01 (03+01)
Certification of Persons (**New Scheme**)	00	00	00	01	01 (01+01)	01 (02+01)
Trainings/Courses/Seminars / workshops	12	12	12 annually	12 annually	12 annually	12 annually

STEDEC Technology Commercialization Corporation of Pakistan (Private) Limited

Introduction

STEDEC Technology Commercialization of Pakistan (Private) Limited was established in 1987 under the Companies Ordinance 1984. The primary objective was to commercialize PCSIR's products, processes and technologies. Subsequently, the scope was broadened to assist all Public Sector R&D Institutions in their commercialization efforts. The Board of Directors comprises of nominees by the Ministry of Science and Technology with Secretary MoST as the Chairman of the Board. STEDEC generates revenues through its commercial activities and no development or non-development budgetary allocations are made to STEDEC in the Federal Government budget.

1. Objective and Functions:

- To function as a National Technology Commercialization Organization
- To assist public sector R&D organizations towards commercialization of their indigenously researched products, processes and technologies
- To assist public sector R&D organizations in developing market-driven research programs
- To assist public sector R&D organizations for a greater commercialization efforts through market studies, investment in pilot plants, management of pilot plants, and marketing of such products
- To assist the Ministry of Science and Technology in the management of projects related to indigenously researched products, processes and technologies
- To reduce dependence on foreign technologies, enhance import substitution
- To adapt and adopt foreign technologies for enhancing industrial development
- To establish and manage a technology resource database, for effective transfer of technologies, especially oriented towards the small and medium enterprise sector

2. Corporate Structure:

The business of the Company is managed by a Board of Directors, who is appointed by Ministry of Science & Technology, subject to provisions of the Companies Ordinance 1984. The present Directors are as follows:

a) Non-Executive Directors

Secretary MoST, Islamabad	Chairman
Chairman PCSIR, Islamabad	Member
DG PCSIR, Lahore	Member
CEO, Punjab Industrial Estate	Member

CEO, SMEDA	Member

b) Independent Directors

President LCCI, Lahore	Member
Mian Muhammad Adress CEO, Sitara Chemicals	Member
Mr. Ali Asrar Aga Managing Partner, Ward Howell Int.	Member
Mr. Mujeeb Rashid Ex-CEO, Mitchells Fruit Farms Ltd	Member

c) Executive Directors

Managing Director, STEDEC Lahore	Member/Company Secretary

The Board of Directors is supported in the discharge of its functions by four Committees, namely Nomination Committee, Audit Committee, Human Resource Committee, and Procurement Committee.

During FY 2015-16, four meetings of the Board of Directors were held as follows:

- 49th BoD Meeting 06-08-2015
- 50th BoD Meeting 19-10-2015
- 51st BoD Meeting 04-01-2016
- 52nd BoD Meeting 08-04-2016

As required under Corporate Governance Rules enacted by SECP, a number of policies enacted by the Company to regulate its workings, namely Human Resource Policy, Employees Code of Conduct Policy, Communication Policy, Conflict of Interest Policy, Anti-Corruption Policy, Environment, Health and Safety Policy, Sale Policy and Procurement Policy

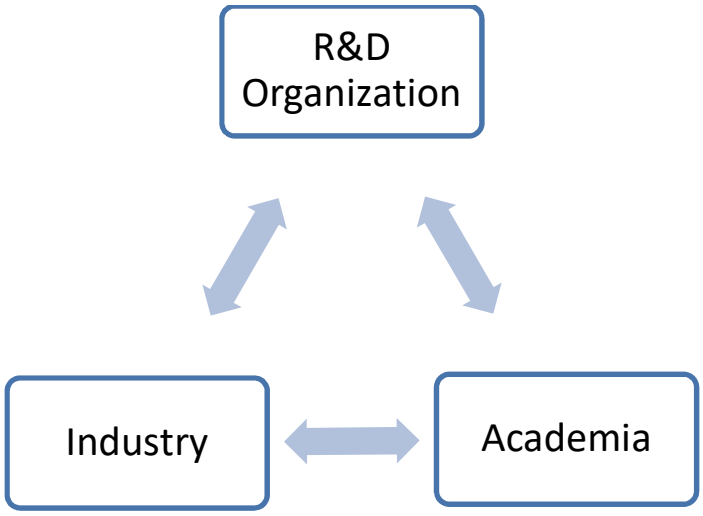
3. Activities

a) Commercial Activities:

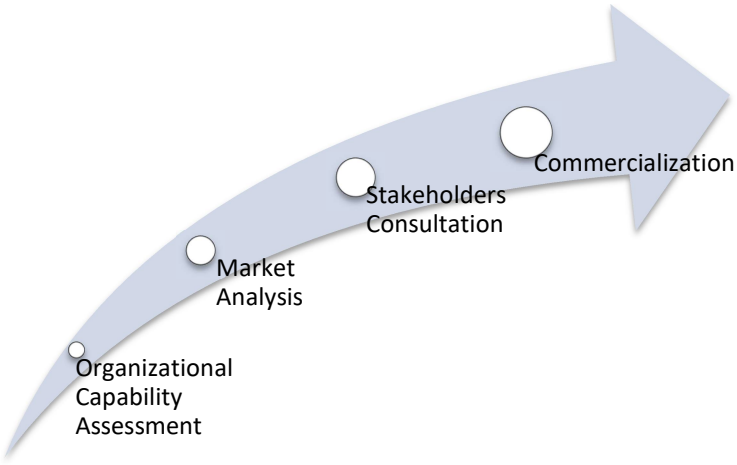
STEDEC is a commercial marketing organization, with its major activity to commercialize indigenous products, processes and technologies. The Company manufactures, promotes and markets indigenous as well as imported agro-chemical based pesticides as well as domestic insecticide and termiticide products at economical price for the support and development of the agriculture sector of the country, in addition to serving domestic consumers in household pest management. During the current year, the Company generated net profits after tax of Rs. 5.4 million on sales of Rs. 166 million, which was the highest recorded profit in the last ten years. It is pertinent to note that the commercial activities of the Company to generate the revenue and profits, which finance the Company's commercialization activities, as no funding is provided to STEDEC by the Government.

b) Commercialization Activities

The commercialization activities of STEDEC are aimed towards creating a research, innovations and commercialization eco-system in which three important stakeholders of this eco-system, namely R&D Institutions, Academia and Industry are being linked together. STEDEC plays a role of bridge and coordinator between these stakeholders with the purpose of overcoming barriers, facilitating communications, and ultimately resulting in a self-sustained eco-system where needs of industry will translate into ideas, technologies and products being created within R&D institutions supported by academia.



With this concept in mind, the new management of STEDEC initiated work on commercialization of MoST R&D organizations in 2015-16. In the first phase three industry sectors; namely, Water, Renewable Energy, and Agriculture have been taken up, coverage to which is provided by three R&D organizations; PCRWR, PCRET and NIE. A step-wise approach has been taken to ultimately lead towards commercialization of products, technologies and services of R&D organizations. The model is depicted below:



During the course of the year, the following activities were carried out towards achievements of the goals outlined above:

- A dialogue process was initiated during the year with Sheikhupura and Faisalabad Chambers of Commerce & Industry to discuss cooperation between MoST R&D organizations and industrial sectors located within these regions. In the first instance, STEDEC management team visited these Chambers and outlined mutual areas of interest. Subsequently relevant R&D Organizations working under MoST would be visiting these Chambers to meet with member companies and identify need based R&D initiatives that could benefit the local industry.
- Agriculture sector is a major focus area of STEDEC for technology commercialization activities. The initiative in this area was kick-started with a stakeholder consultation session between MoST R&D organizations working in this area, namely PCRET and PCRWR, renowned academic / research institutes and Agriculture Department Punjab to explore way forward for commercialization of R&D products, processes and technologies and how MoST R&D organizations can continually contribute towards the sector and related organizations. It was decided that all stakeholders would coordinate their R&D activities so that limited resources could be optimally utilized for the benefit of this key sector of the country.
- Another key sector which has been identified for commercialization activities by STEDEC is Renewable Energy. A stakeholder consultation was coordinated on renewable energy sector with REAP (Renewable and Alternative Energy Association of Pakistan), in which MoST R&D organizations, PCRET, NIE, and PCRWR participated. Way forward was discussed regarding commercialization

of products, technologies and processes of MoST R&D organizations and their support to the renewable energy sector and organizations involved on sustained basis.

- Furthermore STEDEC initiated work on commercialization of specific products from PCRWR, an R&D organization under MoST, specifically their solutions related to drinking water purification and irrigation water management. It is expected that some of these products would be effectively commercialized as a result during the next financial year.
- In line with its role as a public sector entity, a major focus area for STEDEC is to create awareness and training through its dealer's network to the farmers on regular basis to create awareness regarding proper/safe use of pesticides, increase the yield at minimum cost, thus contributing to economic development.

Pakistan Standards and Quality Control Authority (PSQCA)

Introduction

The Pakistan Standards and Quality Control Authority, under the Ministry of Science and Technology, is the national standardization body. In performing its duties and functions, PSQCA is governed by the PSQCA Act No. VI of 1996. PSQCA came into operation since 1st December 2000, as self-finance organization, been given the task of not only formulation of Pakistan Standards, but is also responsible for promulgation thereof. PSQCA has also been established to advise the Government on standardization policies, programmes and activities to promote industrial efficiency and development, as well as for consumer protection.

Budget Estimates 2015-2016 in Respect of PSQCA

- Budget allocation 568.000 M
- Strength of Establishment **Sanction Strength** 627 **In Position** 489

Pakistan Standard & Quality Control Authority (PSQCA)

Conformity Assessment (South& North)

S. No.	Parameter	Progress (2015-2016)
01	Application received	1209
02	Inspection Conducted for Quality Assurance	2153
03	Sample Collected	16853
04	Licenses Issued	818
05	Notices Issued	1215
06	Cases Filed against defaulters	61 cases filed in the court
07	Revenue Generated C.A South/North	Rs.269.41 millions

Standard Development Centre, Directorate of Standardization

No. of Technical Committee (TC) Meetings Held	No. of Draft Standards Finalized(New/Rev/Direct Adopted)	No. of National Standards Committee (NSC) Meetings Held	No. of Draft Standards Approved by NSC as Pakistan Standards
132	327	11	412

Quality Control Centre (South & North)

Year	Samples Tested	Revenue Generated
2015 – 2016	23,046	125.80 Million

Technical Services Centre (TSC), PSQCA

Achievements and Progress during Financial Year 2015-16

During the period under report, the Centre has following achievement

- Got accreditation in metallurgical testing parameters from PNAC.
- Completed **3975 Testing Jobs** having an increase of 49% from the previous year.
- Generated 11.269 million rupees as revenue having an increase of 30% from the previous year.

WTO-TBT National Enquiry Point-PSQCA

S #	Activities	Achievements 2015-16
1.	TBT Notification issued by Pakistan (PSQCA) to WTO-Secretariat, Geneva	25
2.	Collection of TBT Notification issued by WTO members countries	1231
3.	Dissemination of TBT Notification issued by WTO member countries, amongst the stakeholders (more than 1,200) in the country	1231
4.	Intra-department Training. One Day Training Session -1 on WTO TBT & SPS Agreements Session-2 on ISO/IEC Guide 21-1	 01 01
5.	Handle enquiries (foreign/local)	49
6.	MoU's Signed with Academia	10
7.	Enhancement of "P" member status in ISO	22
8.	Acquiring of "P" member status in OIML	04
9.	Enhancement of "P" member status of IEC	02

International Affairs & Training (PSQCA)

- Training Workshop on Creating Awareness to Environmental Management ISO 14001:2015 on February 25, 2016 at Karachi – Pakistan.
- Training Workshop on Energy Management Systems ISO-50001 on April 5th, 2016 at Karachi – Pakistan.
- Training Workshop on Food Safety Management Systems ISO-22000:2005 June 2nd, 2016 at Karachi – Pakistan
- International Workshop with SARSO/SAARC on Awareness / Understanding on the Importance of Regional Standardization Activities and their Implementation in Enhancing Regional Trade on March 1, 2016 at Karachi – Pakistan.

Pakistan Standards & Quality Control Authority

List of Mandatory items Notified by the Government
Under Section 14 of PSQCA Act VI of 1996.
2015-2016

S. No.	Name of Items	Relevant PS No.
1.	Steel Wire Rod	16124
2.	White Portland Cement	1630
3.	Masonry Cement	5314
4.	Internal Combustion Engine Lubricating Oil	343
5.	Flexible Polyurethane foam for Domestic Mattresses.	3087
6.	Stainless Steel for general purpose Part-I Corrosion-resistant flat products.	16143 Part 1, 2 & 3
7.	Motorcycle Tyres and Rims (code designated	PS-ISO:4249-1
8.	Enamel Paint interior (finishing colour)	617
9.	Enamel Paint iexterior (finishing colour)	616
10.	Paints for vehicles.	396
11.	Bio Orgno Phosphate (BOP)	5295
12.	Tooth Paste.	1721
13.	Toilet Soap.	13
14.	Shampoo.	3509
15.	Synthetic Detergent Powder for General Purpose.	4986
16.	Powder Hair Dyes.	4079
17.	Oxidation Hair dye Liquid.	5250
18.	Structural Steel.	4798
19.	Tin Plate.	4773
20.	Urea (Prilled and Granular)	217
21.	Di-Ammonium Phosphate (DAP)	3517
22.	Single Super Phosphate.	67
23.	Triple Super Phosphate.	216
24.	Poly Propylene Woven Sacks for Packing (Sugar)	3128
25.	Iodized Salt	1669
26.	House Hold Refrigeration Appliances-Characteristics and Test Method.	62552
27.	Polyproplyene Woven Laminated Hermetically sealed block bottom valve sacks for packing cement.	4877
28.	Read Mixed Paint Brushing Finishing, Semi-glose for general purpose.	402
29.	Truck and Bus Tyres and Rims (Metric Series) Part-1 Tyres.	4209-1
30.	Packaged Liquid Milk.	5344 Under Process

The 11th Board of Directors meeting of PSQCA Chaired by Rana Tanveer Hussain, Federal Minister for Science and Technology" Dated: 25th July 2016.

PSQCA Participated in SAARC-SARSO, Sectoral Technical Committee on BUILDING MATERIALS, 4th meeting, at, Colombo, SRI LANKA. Dated: 12-13 May 2016.

Islamabad, Federal Minister for Science and Technology, Rana Tanveer Hussain Chairing a Meeting with PSQCA and Punjab Food Authority Dated: 28th July 2015.

Awareness Workshop on the Importance of Regional Standardization Activities and their Implementation in Enhancing Regional Trade

The Director General, PSQCA Chaired the 8th Directors Conference which was at PSQCA-Head Office, Karachi.

PSQCA Participated in "Regional Tanning on Sectoral Technical Committee Chairs and Secretaries at Dhaka, Bangladesh.Hosted by the South Asian Regional Standards Organization (SARSO), with the finicial and techinal assistance of PTB-Germany.

PSQCA Participated in workshop on ISO 14001:2015 and Life Cycle Assessment (LCA) under the SESA

Programme at, Colombo, Srilanka.

Group Photo of Participant of PSQCA Organized “One Day Workshop on Food Management Systems ISO 22000:2005.

One Day Awareness Training Workshop on Energy Management Systems ISO-50001. at PSQCA Head Office

Council for Works and Housing Research (CWHR)

Introduction

Council for Works and Housing Research (CWHR) was established through a Resolution in 1964, as an autonomous organization under the aegis of the Ministry of Rehabilitation and Works, Government of Pakistan. In June 1971, CWHR was transferred to the Ministry of Science and Technology.

CWHR was established to form and strengthen the requisite infrastructure, so that the research and development (R&D) activities in the field of housing and works could be fostered.

Presently, CWHR is the only organization at National level that is involved in quality testing of construction materials and carries out Research & Development (R&D) activities, including contract research for the construction sector.

1. Major Functions and Objectives of CWHR:-

i. To conduct/sponsor/organize, co-ordinate and promote Research and Development, in all fields of Civil Engineering Works, including construction of model structures and demonstration units, and to collaborate with regional, National and International Institutes/Organizations.

ii. To arrange Seminars, Symposia, Open Houses, Exhibitions, Trainings and other extension activities to promote technology, relevant to Housing and Works.

iii. To undertake commercialization of R&D activities, including transfer of technology.

2. Activities of CWHR (2015-2016)

2.1 PSDP Project: Exploration and Exploitation of Lightweight Aggregate along the Coast of Baluchistan.

a. Objectives

i. To conduct field surveys in the Coastal Areas of Baluchistan and Sindh for identification of suitable raw materials such as clay shale, slate, industrial wastes, etc.

ii. To install a pilot plant for commercial production of lightweight aggregate for evaluating its potential use in lightweight concrete in future, mega construction projects along with saving in cost.

b. Achievements

i. Installation of Machinery:

An Industrial crusher plant has been integrated using size jaw crusher, impact crusher with vibratory screen etc. and to be finally installed at demarcated location as per the requirement of pilot plant premises, meanwhile an industrial large size Rotary Kiln has

been installed with blower and gas line to run kiln for production of lightweight aggregate, using raw materials of coastal line of Baluchistan. In additional to this, Grinding Mill has been cleaned and some of its parts have been installed for making pulverized fine and ground powder using hard silty shale stones and Pellet Mill is already installed as a separate pelletization method. The pilot plant has a capacity to produce 10 tons/day of light weight aggregate. Commercial production will be started in fiscal year 2016-17 to meet an order of M/s. ENVICRETE, for providing 10 tons lightweight aggregate on commercial basis.

ii. Benefits

Lightweight aggregate concrete can be used in projects along the coast of Baluchistan viz. construction of bridges, coastal highways, sea ports and harbors. Use of lightweight aggregate concrete will significantly reduce deadweight of structures and have coast saving effects.

2.2 PSDP Project: Accreditation of CWHR Laboratories in accordance with ISO 17025:2005

a. Objectives

i. To acquire the status of Quality Control Testing Laboratories at National level for the construction Industry.

ii. To provide Accredited Testing Facilities for construction related inspection bodies, which are operating in Pakistan, under PNAC and accrediated to ISO 17025.

iii. To strengthen quality Assurance Programme within CWHR laboratories by adoption of International Quality management System.

b. Achievements

Skill Development Training programme (SDTP) was initiated by the Project Director, for the CWHR officials, so that parameters and mechanism required for accreditation labs could be established. Standard operating procedures have been prepared for testing of cement concrete etc. as per the requirements of ISO/IEC 17025:2005.

2.3 Quality Control and Quality Assurance.

Quality control tests for cement, sand, aggregate, concrete, cubes, blocks, steel rebars and etc. were carried out for a number of clients and testing fees amounting to Rs.0.6 million was generated. The major clients are as under:

(i) M/s. Pakistan Atomic Energy.
(ii) M/s. Usamani & Company.
(iii) M/s. National Construction Company Ltd. (NCL).
(iv) M/s. Engineers Association.

2.4 Consultancy Works and Advisory Services.

An amount of Rs.1.2556 million was generated through Non-Destructive Testing and Research Consultancy Works by providing services to the following organizations:

(i) Non-Destructive Testing Services for Reservoir Tank, Defence Housing Authority, Phase-VIII, at Khayyaban-e-Iqbal, Karachi.

(ii) Corrosion Analysis Test of Concrete Cylinder Specimens (22 Nos.) for Quaid-e-Awam University.

(iii) Non-Destructive Testing Services for RCC Column of Shell Pump Station, DHA Phase-VIII at Khayyaban-e-Beharia, Karachi.

(iv) Non-Destructive Testing Services for Bridge # 11, Karachi to Hyderabad Motorway.

(v) Non-Destructive Testing Services for Culvert # 02 at DHA City.

2.5 Low cost Ferrocement Manhole Covers Developed by CWHR, supplied to public departments.

The Public Departments of Punjab were ordered for the fabrication and supply of low cost ferrocement manhole covers and a revenue amounting to Rs.7.0 million was received for the supply orders. Details are as under:

Sr. No.	Name of Public Departments	Total Number of Ferrocement Manhole Covers Fabricated and Supplied
I	Water & Sanitation Agency, Faisalabad Development Authority	1010 Ferro Cement Manhole Covers
ii	Water & Sanitation Agency, Tehsil Municipal Administration, Sialkot	2600 Ferro Cement Manhole Covers

2.6 Business Plan of CWHR

The business plan of CWHR was prepared with consultation of NED University of Engineering & Technology, Karachi to enhance the commercial activities of CWHR.

2.7 Meetings, Visits, conferences, Seminars, Symposia, Workshop, Exhibitions and etc.

2.7.1 CWHR officials attended workshops on "Policies for Research Commercialization" held on 21.12.2015, at NED University of Engineering and Technology, Karachi.

2.7.2 CWHR officials attended 01 day workshop on "Project Management" held on 30th January 2016, at PC Hotel Karachi, organized by Institute of Tender Management.

2.7.3 CWHR Officials attended one day Seminar on "Emerging Importance of Intellectual Property Rights in Knowledge Society" held on 09.03.2016, at Agha Khan University Karachi, organized by Pakistan Scientific and Technological Information Centre (PASTIC).

3.0 Outcomes:

3.1 3,610 Ferro-cement manhole covers were fabricated and supplied to Public Departments of Punjab. An amount of Rs.7.0 Million was generated for the work.

3.2 A Pilot plant for the production of lightweight aggregate at CWHR premises, by using suitable raw materials available along the coast of Baluchistan.

3.3 Facilitated the Civil Engineering students of Mehran University of Engineering and Technology (MUET) for the internship training at CWHR.

3.4 Non-Destructive Testing (NDT) Consultancy Services was provided to various clients amounting to Rs.1.2556 million.

3.5 Quality control testing of cement, sand, aggregate, concrete and steel rebars was undertaken and testing fees of Rs. 0.6 million was obtained from various clients.

3.6 Business Plan of CWHR was prepared.

3.7 CWHR officials attended/received trainings from public and private organizations.

National University of Science and Technology (NUST)

Introduction

National University of Sciences and Technology (NUST) is a premier national institution with international standing. In a relatively short span of time since it was granted the Charter in 1993, it has earned a reputation for quality education, innovation and excellence in research and learning. As a comprehensive university, NUST comprises of 17 schools/colleges/institutes (12 at Sector H-12 Campus, Islamabad, 02 at Rawalpindi, 02 at Risalpur and 01 Campus at Karachi) offering 27 undergraduate, 51 MS/MPhil and 37 PhD academic programmes including Engineering, IT, Biotechnology, Biosciences, Art & Design, Management and Social Sciences. As of today the University has faculty strength of 895 with more than 419 PhDs and student strength of 14579. The University has awarded 19446 Undergraduate, 4798 MS/MPhil and 137 PhD degrees. It is ranked 340th in the field of Engineering & Technology in the whole world and 119th in Asia. NUST has also been rated among the top 100 world universities under the age of 50. University is ranked No. 1 in Engineering & Technology in Pakistan. The university through forward planning and consistent efforts has earned a name for itself at both the national and international levels. The University is based on a multi-disciplinary concept and its colleges and institutes are located in seven campuses across the country, with its Central Campus in Islamabad.

Objectives & Functions

- **Mission**

To develop National University of Sciences and Technology (NUST) as a comprehensive, research-led university with a focus on Technology, Innovation, Entrepreneurships and Community Service.

- **Vision**

The National University of Sciences and Technology (NUST) aims to emerge as a leading research intensive university of Pakistan, comparable to the top universities of the world within the next 10 years. It will be a comprehensive, residential university, responsive to technological change, dedicated to excellence and committed to international educational perspective. The University will fulfill its responsibility of graduating culturally enlightened, technologically knowledgeable, and academically competent and research-oriented productive citizens who are prepared to lead, to inspire, and to serve humanity. The University commits itself and all its resources to this trust and responsibility.

- **Strategic Thrust**

The strategic goals of NUST are:

a. Excellence in Teaching & Learning
b. Focus on Research

c. Spirit of Enterprise
d. Internationalization & Global Perspective
e. Discernible Social Impact

International/National Rankings of NUST 2015-16

a. "QS" World University Ranking

Year	By Subject	Ranking
2015-16	Electrical & Electronic Engineering	215
	Computer Science & Information System	272
	Engineering & Technology	340

b. "QS" Asian University Ranking

Year	Overall Ranking
2015-16	119

c. "THE" World University Ranking

Year	BRICS	150 Under 50 Years
2015-16	132 out of 200	126

d. "HEC" Rankings of NUST

Year	Category	Ranking
2015-16	Engineering & Technology	1

* Students Strength (2015-16)

Degree		Strength
UG	-	9496
MS/MPhil	-	4607
PhD	-	476
Total	-	**14579**

* Students Graduation (2015-16)

Degree		Graduated
UG	-	2088
MS/MPhil	-	700
PhD	-	37
Total	-	**2825**

* **Programmes added (2015-16)**

		Total	Added
• Undergraduate Programmes	:	27	-
• MS/MPhil Programmes	:	51	4
• PhD Programmes	:	37	-
Total	**:**	**115**	**4**

Regular Activities

- **Training Courses/Diploma/Certificate Programmes (2015-16)**

			Nos.	Participants
a.	Short Courses	/Trainings :	36	750
b.	Diploma Courses	:	6	77
c.	National Expo	:	1	76
	Total	**:**	**43**	**903**

- **Research Outcome – Patents – Commercialization (2015-16)**

a. R&D Projects Completed from July 2015 to June 2016 - 40

b. Patents Filed / approved upto to June 2016:

- Filed - 107
- Approved - 27

- **Conferences, Symposiums, Seminars, Workshops, Presentations/Lectures (2015-16)**

- MoUs Universities/Organizations - 21
- International Conference/Workshops - 8

- **Research Papers (2015-16)**

• Research Papers presented in Conferences	-	464
• Research Papers Publications	-	1147
Total	**-**	**1611**

Technology Incubation Centre (TIC)

➢ Incubatees

The Technology Incubation Centre (TIC) is an initiative of the National University of Sciences and Technology (NUST) to provide a nurturing environment to technology based business ideas, to prosper and become viable contributors to our community and economy. This is also an attempt to bring academia and industry closer to each other by providing NUST students and faculty a platform to commercialize their research, final year projects and other technology based business ideas. Business Incubators are nonprofit entities that provide a range of business services in a nurturing and supportive environment. Business incubators differ from other commercial property and serviced offices by providing business support and advisory services specifically targeting start-ups and emerging businesses and play an important role in the development and growth phase of a client's business life cycle and by requiring clients to "GRADUATE" from the incubator when they reach a point in their business development where they will be viable outside the incubator (on average after 3 years). TIC is the first Technology Incubator of Pakistan established in academia in 2005 by Pakistan's premier university NUST as a means to replicate the concept of incubators in Pakistan. TIC is part of university's drive to prove itself as a world class learning center and is amongst many advanced institutions set-up at its over 700 acres state-of-the-art campus. Statistics are appended below:-

- Start Ups (Current Incubatees) : 32
- Graduated : 20
- No. of Jobs Created : 250+
- Revenue Generated : US$ 4.0 M

➢ Innovative Ideas

a. Discover

Discover is NUST's premier national Business Plan Competition, held for the first time in 2011. The first Discover was endorsed by the Prime Minister of Pakistan and called the Prime Minister's Entrepreneurial Challenge. Over the years, Discover has grown in scale and impact, getting more and more support from the public as well as private sectors with every passing year. The top 5 teams receive seed funding in the form of cash prizes and are offered free incubation services at TIC for 6 months. The statistics are given below:-

Year 2015-16

- Participant Universities : 75+
- Participant Students : 1800+
- Business Ideas : 400+

b. Finding Innovative & Creative Solutions for Society (FICS) - A NUST Initiative

In line with NUST's mission to promote innovation, entrepreneurship and commercialization, FICS was launched in the year 2013 at NUST to encourage students to get actively involved in social problem identification and think innovatively to devise technology-based solutions. The aim of this initiative is to instill a spirit of social entrepreneurship amongst its students, encouraging them to convert their creative ideas into value-adding solutions, thereby promoting commercialization of new technologies with the objective to also benefit the society.

FICS has been aligned with the Sustainable Development Goals (SDGs), proposed by the Sustainable Development Solutions Network (SDSN) that works closely with United Nations agencies, multilateral funding institutions, the private sector, and the civil society. The proposed SDGs included the following:

- Ending Poverty and Hunger
- Reducing Inequality
- Ensuring Quality Education
- Promoting Gender Equality
- Sustainable use of Water and Sanitation
- Ensuring Sustainable Energy
- Inclusive and Sustainable Economic Growth
- Productive Employment and Decent Work for all
- Sustainability of Environment
- Strengthening Infrastructure and faster innovation
- Improving Governance

FICS 2015		**FICS 2016**	
Stage 1 – Idea / Synopsis Submission			
Projects Synopses submitted	179	Projects Synopses submitted	263
Projects shortlisted for Stage 2	103	Projects shortlisted for Stage 2	183
Stage 2 – Standee, Presentation & Video			
Projects Displayed	79	Projects Displayed	93
Projects Shortlisted for Stage 3	57	Projects Shortlisted for Stage 3	61
Stage 3 – Prototype Display			
Projects Presented	54	Projects Presented	57
Winners	5	Winners	5
Sponsorship Raised			
Rs. 1,100,000		**Rs. 2,575,000**	

c. The Organization of Pakistani Entrepreneurs (OPEN)

The Organization of Pakistani Entrepreneurs (OPEN) Global is the world's premier entrepreneur network. Founded in 1998 in Boston, OPEN has grown to eleven chapters in some of the world's most dynamic hubs of entrepreneurship in the U.S, U.K. and Pakistan. OPEN's membership boasts leading entrepreneurs, business leaders and corporate professionals. OPEN chapters host dozens of networking, knowledge sharing and mentoring events every month. OPEN Global ensures coordination across chapters and drives global initiatives and growth through the launch of new chapters. The non-profit organization is registered in Massachusetts, and is governed by an independent Board of Directors and an elected President. NUST is the member of this premier network and hosted many sessions of OPEN events in its Islamabad chapter.

d. Automotive Research Centre (THE ARC)

NUST is one of the leading universities in Pakistan focusing on engine tribology, powertrain systems, IC engines, sensor technology, data acquisition and instrumentation. Apart from supporting automotive industries we are providing cost effective and robust solutions to a wide range of mechanical related industries. We have successfully worked with reputed National and International companies and are well aware of customer needs.

(1) Research Projects (Completed)

- Engine Blow-by monitoring system for off-road vehicles. Client: Millat Tractors
- Instrumentation and testing of Audi TDI engine for valve train performance. Client: British Petroleum UK
- Engine health monitoring system for engines up to 150kw. Client: United Traders
- Customized engine blow-by measuring system for power units. Client: Power Vision
- Engine Test Cell for green Engines. Client: Millat Tractors

(2) Research Projects (in Progress)

- Engine valve train friction for fuel economy. (PSF)
- Mercedes Benz OM464 engine valve train performance (Lubrizol USA)
- Development of complete engine test cell for OEM. (Millat Tractors)
- Instantaneous oil consumption measurement system. (Millat Tractors)
- Multi-purpose powertrain test rig.
- Wear and lubrication maps.
- Calculation of film thicknesses in elasto-hydrodynamic lubrication.
- Development of new techniques for engine component performance.
- Design and development of special sensors for automotive industries.
- Lubricant-Engine compatibility studies.

➢ Conclusion

NUST's flexible approach to Hi-Tech education and R&D is an essential element of its educational philosophy. The University, as one of Pakistan's fastest growing institutions of higher education, is energized by a vision that will distinguish it among its peers. NUST strives to become a symbol of pride and honor for the nation. If pursued with the clear understanding of the international academic landscape and the internal dynamics of Pakistan, we may initiate a revolution in academia, industry, policy, interaction and contribute significantly to our economic recovery.

COMSATS Institute of Information Technology (CIIT)

Introduction

COMSATS Institute of Information Technology (CIIT), was established in 1998 as a Centre of Excellence of the Commission on Science and Technology for Sustainable Development in the South (COMSATS), which is an inter-governmental organization with 24 member states. CIIT established its first campus in 1998 at Islamabad and was chartered as a Degree Awarding Institute by the Government of Pakistan in August 2000. Currently, it has campuses in Lahore, Abbottabad, Wah, Attock, Sahiwal, Vehari and a Virtual campus as well. This expansion continues as more campuses are planned in the future.

CIIT's three pronged mission is: Research and Discovery; Teaching and Learning; and Outreach and Public Service. CIIT aspires to be both one of the top research institutions and one of the best higher education providers in the country. The vision being pursued by the CIIT is to become one of the top 100 universities in the developing world. The CIIT further resolves to earn a place among the top 500 universities of the world by the year 2020.

The CIIT currently comprises of six faculties, 18 departments and 10 research centers. Presently 97 degree programs are on offer in which more than 35,000 students are enrolled. There are 3,159 faculty members working in CIIT with more than 1,087 faculty members and academic managers have PhD qualification. 575 faculty and staff members are undergoing advanced education leading to MS and PhD degrees. Till now 90 convocations have been organized in which degrees were conferred on 37,114 graduates including 151 PhDs.

Faculty Designation	**Strength**
Professors	55
Academic Advisors	55
Associate Professors	99
Assistant Professors	1,219
Lecturers	1,278
Research Associates	453
Total	**3,159**

CIIT Rankings:

During 2015 and 2016, CIIT was ranked among top 250 universities of Asia by QS Asian University Rankings. Higher Education Commission, in its Quality and Research based Rankings of Pakistani Higher Education Institutes ranked CIIT at number 03 in the General Category and at number 06 among overall universities in 2016, besides being ranked at number 02 in research publications in 2015. In 2015, CIIT was at number 301 in 301-400 QS World University Rankings by Subject Mathematics and among 401-450 in the field of Computer Science and Information Systems during 2016. Besides, CIIT is also ranked at number 2 in Information Technology University's Quality Research Ranking 2016 of over 200 universities. It is also ranked at number 2 in university ranking in Pakistan and No. 967 in World University Ranking 2015/16 by Middle East Technical University Turkey in University Ranking Academic Performance. CIIT is the only University in Pakistan to be ranked in Information and Computing

Systems at 577 in the world. CIIT is also ranked at number 1 among top 10 Pakistani universities according to nature index in 2016.

Conferences / Workshops Held:

During the reporting period, CIIT organized different conferences / trainings and workshops. Some of the important ones are listed below:

- The Symposium on "The Vulnerability of Pakistan's Water Sector to the Impacts of Climate Change - Identification of Gaps and Recommendations for Actions" was organized by Center for Climate Research and Development on May 31, 2016.
- The workshop on "Food Safety and Hygiene" was organized by the Department of Biosciences, CIIT Sahiwal on May 18, 2016.
- CIIT Abbottabad organized its high-tech national level event consisting of seminars, symposia and exhibitions under the umbrella of Technomoot 2016 from May 09-10, 2016. Technomoot 2016 comprised the following activities EMCOT (Electrical Engineering), Computational Complexities, Innovations, and Solutions (CCIS, Mathematics), Conference of Software Enterprise (CSE), Vision ICT (Computer Science), Miles (Management Sciences), Height (Humanities) and Sustainable Infrastructure Development.
- The department of Environmental Sciences organized "6th International Conference ESDev-2016" from April 25-27, 2016. Inaugural session emphasized on the environmental scientists to solve the different environment issues faced by Pakistan. More than 250 national and international participants registered in the Conference.
- The lecture on "Coal and Thermal Power Plants" by Department of Electrical Engineering, CIIT Wah was held on April 26, 2016. Mr. Asif Khan, Manager Technical, Saba Power Plant Shakhupura shared technicalities of Coal and Thermal Power Plants.
- CIIT organized the 5th Pak-China Business Forum from March 19-22, 2016 to promote university-industry collaborations in business and economic sectors for the mutual benefit of both countries. Punjab Chief Minister inaugurated the Forum at Expo Center Lahore. The Forum was the biggest Pak-China business forum to date with participation of over 700 delegates from 400 Chinese and 300 Pakistani companies. The forum consisted of stalls of Chinese companies in various sectors. It offered an opportunity for Pakistani businessmen to meet their Chinese counterparts. Punjab Board of Investment and Trade (PBIT) also actively participated in the forum by setting up a stall where the Board's experts briefed the visiting Chinese investors about investment opportunities in Punjab.
- Center of Islamic Finance, CIIT Lahore organized the 4th GFIF from March 08-09, 2016 under the theme of "Value Creation and Impact". It was a bigger event in number of sessions and speakers. It benefited the audience through 15 parallel sessions in which around 40 notable national and international speakers contributed their work on the latest advances in the field of Islamic finance.
- 13th International Conference on Frontiers of Information Technology (FIT) was held from December 14-16, 2015. This year, the conference theme was "Smart University: Myths and Realities". It was technically sponsored by IEEE Islamabad Chapter, IEEE Computer Society and IEEE Industrial Electronics Society. A total of 31 invited talks were delivered on the latest trends in the areas of computing and electrical engineering.

- Department of Computer Science, CIIT Wah organized 13th episode of national level mega IT event of Visio Spark 2015 held on November 07, 2015. The objective of the event was to provide future IT professionals, an opportunity to exhibit their skills and get them familiarized with latest trends of the fast-developing IT sector. Students from around 30 universities and educational institutions participated in the event.
- Symposium on Medical Imaging Processing: A symposium showcasing research on medical imaging technology, conducted by students and faculty members of Department of Electrical Engineering, CIIT Islamabad was held on October 27, 2015. The cutting-edge research focused on finding mechanisms to reduce the time required for a typical Magnetic Resonance Imaging (MRI) scan from 45 min to five or six minutes, without loss in quality.
- First International Conference on Energy Systems and Sustainable Development was International Symposium on Light and Life was organized from October 14-16, 2015. A part of UN's year-long celebration of the International Year of Light and Light-based Technologies, the event highlighted the latest research at various universities across the country, including CIIT.
- The Department of Management Sciences successfully conducted the 7th SAICON meeting on August 19, 2015. The theme of the conference was 'Meeting the Challenge: Navigating the Future'. It was a blend of the different events comprising of Keynote addresses, Oral presentations, Invited Talks and special interactive sessions. CIIT and CIMA Business Case Awards night was another highlight of SAICON this year. The Award is a step to bridge gap between industry and academia.
- The 1st Harappa International Conference on Environment, Archaeology, Conservation and Legacy was organized by Department of Architecture in collaboration with Centre for Heritage Studies, Sahiwal and CIIT Lahore from August 15-17, 2015.

Besides Faculty Development Academy also conducted one session of 04 weeks pre-service training from July 27-August 28, 2016 for the newly faculty members joining CIIT in which 44 faculty members participated. Under in-service category, different training programs were also conducted e.g.:

1. 03 Days Workshop on Psychometric Testing and Application for HR Professionals was arranged from May 10-12, 2016.
2. 04 Days Workshop on Capacity Building was organized for female officers of universities/HEIs from April 21-24, 2016 at CIIT Lahore.
3. Training for Primary Teachers of Pak-Turk Schools and Colleges was organized from March 29-30, 2016.
4. 3rd Strategic Development Workshop for HoDs was organized from January 19-21, 2016.
5. A series of 07 Indigenous on Campus Trainings (IoT) under Modern University Governance Program was organized from October 06-December 03, 2015.
6. 02 Weeks Professional Development Workshop was organized for the faculty members of Baluchistan Universities in collaboration with Inter University Consortium for the Promotion of Social Sciences and Government of Baluchistan from August 24 - September 04, 2015.

7. 04 Weeks Graduate Record Examination (GRE) Preparatory Workshop was arranged from July 27-August 21, 2015.

Research and Commercialization:

Faculty members at CIIT are actively engaged in research in their respective fields. The total number of research articles published in international and national journals during January to December 2015 was 1,247, reaching the total of 5,659. While the compilation of research papers for the year 2016 is in process. Further 16 patents were also filed.

During the reporting period, the Office of Research, Innovation and Commercialization (ORIC) Professional Development conducted a series of various seminars and workshops to ensure research learning is maximized.

Visits:

Exchange of faculty and officials between CIIT and foreign universities adds to the rich international and academic experience of the participating institutions. To fulfill this particular role, CIIT encouraged more than 114 foreign delegates from different international organizations to visit CIIT during the reporting period. Similarly, it also facilitated 172 CIIT delegates to visit abroad to explore possible avenues of research collaborations and opportunities for international linkages. During the reporting period, 28 International and 11 National MoUs were also signed with different leading universities/ research institutes around the world making the total of 310 MoUs.

Development Activities:

CIIT has so far completed 48 development projects at a total cost of Rs.8770.474 Million; while for the financial year 2015-16, the Government of Pakistan allocated Rs. 165.0Million for two development projects of CIIT. During said period, Rs. 125.0Million have been released.

Further, CIIT meets its operational expenses mainly from student fees (73%) and partly from government grants (27%). All development expenses are met solely from Government grants.

CIIT Islamabad has also launched a GO Green Program which focuses towards energy conservation and recycling of natural resources, so that the coming generations would benefit from decisions made today.

Human Resource Development:

During the preceding years, the CIIT has invested generously in human resource development through awarding scholarships to its meritorious faculty/staff. Till June 30, 2016, over three hundred and sixty scholarships have been awarded by CIIT to allow faculty/staff to pursue their higher studies at some of the best universities in the world. Till date, 150 MS and 103 PhD scholars have successfully completed studies, returned back and are serving CIIT. Currently, 88 scholars are pursuing studies on CIIT funding.

National Institute of Oceanography (NIO)

Introduction

NIO is the pivotal research organization in Pakistan for multidisciplinary oceanographic research with experienced and well qualified team of scientists, technicians and supporting staff; more than 30% scientists hold Ph.D's from national and international universities. Almost 95% of the scientific team has received specialized training from well reputed international institutions. Since the establishment of NIO, the efforts are being made to enhance the R&D capabilities in the field of oceanography and a number of projects of national and international level have been undertaken. In this regard laboratories were equipped with the state-of-the-art instruments/equipment and softwares. NIO has grown up at international level for pursuing oceanographic research and surveys. The R&D activities being undertaken by NIO to meet the objectives of the Institute include Marine Geological & Geophysical surveys and studies in the deltaic, coastal and deep sea; Bathymetric Surveys and Mapping of the sea floor, Water Mass studies; Evaluation of living and non-living resources; Biogeochemical studies in the Arabian Sea, impact of global warming and Sea Level Rise; Impact assessment of El-Nino and Upwelling phenomena in the open sea; and Acoustic characterization of water column and subsurface strata.

Objectives & Functions of the Institute

- To undertake mission oriented multi-disciplinary research in Physical, Chemical, Biological and Geological Oceanography in Pakistan's maritime zones;
- To undertake oceanographic surveys at the national, international regional and sub-regional levels;
- To undertake training programmes in various fields of oceanography for the development of indigenous manpower and expertise;
- To establish a National Oceanographic Data Centre (NODC), to serve as a national repository for all oceanographic data/information. concerning Pakistan's maritime areas;
- To provide necessary advice to and collaborate with Government and other national agencies engaged in maritime activities;
- To coordinate and maintain liaison with international organizations/ institutes for arranging training/experts services; procurement of specialized instruments and equipment; transfer of marine technology: and development of cooperative research programmes;
- To hold Seminars/Workshops/Symposia at national, international, regional and sub-regional levels.

Research Activities of NIO during Financial Year 2015-16

Workshop on Seawater Intrusion

NIO organized an International workshop on “Seawater Intrusion Affecting Coast, Ecosystem and Livelihoods” on 20 October 2015 at Karachi. The objective of the workshop was to address the issues related to seawater intrusion in the coastal areas and to explore possible measures to reduce or lessen its impacts through mutual sharing of experiences and information within scientific community, policy makers and management responsible.

Delegates from Second Institute of Oceanography, Hangzhou and the State Key Laboratory for Estuarine and Coastal Research, Shanghai, China and local experts including Dr. M. Ashraf Chairman (PCRWR), Prof. Dr. Shahid Amjad (IoBM), Prof. Dr. Sarfraz H. Solangi (Sindh University), Dr. Haider (NED), Mr. Saeed Ahmed Bablani (Sindh University), Ms. Mehwish Shafi Khan, Mr. Mudassir (SUPARCO), Ms. Shela Bano (PCRWR), and NIO scientists presented their findings on the subject. The workshop was widely attended by relevant stakeholders and interested members of the civil society.

Sea water Intrusion in the Coastal areas of Sindh & Baluchistan

Following the directive of the Federal Minister for Science & Technology, a Cell at the National Institute of Oceanography has been established for studies on seawater intrusion and land subsidence. NIO has equipped the dedicated laboratory for the working of the Cell with Workstations, Arc GIS, ERDAS and other software.

As per the recommendations of the 1st Inter-Ministerial meeting held at Islamabad on 17 September 2015, a follow-up meeting of the Working Group "On the issue of sea water intrusion in the coastal areas of Sindh and Balochistan was convened on 12 November 2015 at National Institute of Oceanography Karachi. NIO shared the data available in the National Oceanographic Data Centre at NIO.

Collaboration between National Institute of Oceanography (NIO), Pakistan and State Key Laboratory of Estuarine and Coastal Research (SKLEC), East China Normal, University (ECNU), Shanghai, China

Prof. Jing Zhang, State Key Laboratory of Estuarine and Coastal Research (SKLEC), East China Normal University (ECNU), visited National Institute of Oceanography in December 2015. Prof. Jing Zhang and three NIO scientists carried out the first joint field observation from December 7 - 13, 2015 to derive maximum coverage of the study site and for field observations for a full cycle year with possibility of extension. During this observation of physical, chemical and ecological parameters were collected from the Indus delta creeks. Prof. Zhang also spent time at the NIO for post field data and sample processing, which was part of the capacity building initiative. On December 21, 2015 a SKYPE meeting was arranged at NIO to discuss research follow-up with colleagues at SKLEC, Shanghai and NIO.

Following this a field survey was carried out by NIO researchers in February-March 2016 and a SV Behr Paima cruise was also carried out with the assistance of the Hydrography Department of Pakistan Navy (HDPN).

5th Meeting of the Board of Governors (BoG)

The 5th Meeting of Board of Governors of the National Institute of Oceanography (NIO) held on 16 October 2015 at 1100 hrs in the Conference Room at NIO Headquarters, Karachi was presided over by Rana Tanveer Hussain, Federal Minister for Science & Technology in his capacity as President of the BoG.

Federal Minister & Secretary MoST with CSE technical team.

DG NIO appraised the BoG that NIO was committed to conduct world class oceanographic research for uplifting the national image and economy. To achieve the goals and self-sufficiency, NIO has its Vision 2025 that is aligned to the themes of Pakistan Vision 2025 provided by the

Planning Commission of Pakistan. The salient features and components of the NIO Vision-2025 were briefed to the BoG

The BoG was informed that progression of NIO's research capabilities required a floating platform for coastal and deep sea studies/surveys besides using the latest technological facilities in the onshore/offshore laboratories. It was noted that NIO's capabilities can be gauged from the successful approval of Pakistan's claim on extended continental shelf by UN. Therefore, for the next phase of mapping the resources, a research vessel is essential. The BoG supported the acquisition of research vessel and a Boat for NIO; a joint proposal by NIO and Hydrographic Department of Pakistan Navy is under preparation in this regard.

The BoG was informed that after the extension of the continental shelf it was very important to explore its resources.

Senate Sub-Committee of the Standing Committee on Planning, Development and Reforms Meeting at National Institute of Oceanography, Deliberations on Steps/ Possible Solutions/ Recommendations to Secure Coastal Areas of Balochistan & Sindh from Sea Intrusion in light of VISION 2025

Senate's Standing Committee on Planning, Development and Reforms, held a detailed briefing at NIO on 28 March 2016 for deliberations on steps/possible solutions and recommendations to secure Coastal Areas of Balochistan & Sindh from Sea Intrusion in light of Vision 2025. Several Senators and Public Representatives from the National and Provincial Governments of Sindh & Balochistan attended this briefing. Dr. Asif Inam made an aerial visit to the coast of Balochistan on 29 March 2016. A briefing was carried out at Gwadar.

A Sub Committee of the Senate Standing Committee had an aerial visit to the Sindh coast on 30th March, 2016. They flew over different locations on the way to Shah Bundar, where a briefing was

arranged to discuss the issue of SWI in Sindh, Sajawal, Thatta, Badin districts. NIO and SUPARCO officials arrived at Shah Bundar by road to attend the briefing.

Fourth Meeting of the Technical Advisory Committee (TAC) held at National Institute of Oceanography, Karachi

The 4th Meeting of Technical Advisory Committee of the National Institute of Oceanography (NIO) held on 8 March 2016 at NIO, Karachi. Specific programme /projects of the NIO proposed to be implemented over next five years were presented to the members. The members appreciated NIO's overall progress and current research activities.

Meeting of the Technical Committee (TEC) on Continental Shelf Extension Programme of Pakistan

A meeting of the Inter-Ministerial Technical Evaluation Committee (TEC) responsible to oversee implementation of Pakistan Continental Shelf Extension Programme was held on 25 April 2016 at National Institute of Oceanography. The members proposed that a presentation on Pakistan Continental Shelf Programme be given to the PM to appraise him on this unprecedented achievement and its prospects. This presentation would not only give due recognition of the great success but would also provide a roadmap in the pursuit of planning and implementing the 2nd phase of the Programme on exploration and exploitation of available marine resources, so that the benefits of this could ultimately reach to the people of Pakistan.

Meeting of the Consultative Group of Experts for the Reactivation of Pakistan's Antarctic Programme

A meeting of veterans of Pakistan's two expeditions to Antarctica along with leading marine scientists and academicians was held at NIO on 3 March 2016. It was a brain storming session for re-activation of Pakistan's Antarctic Programme. Dr. M. M. Rabbani, Ex-DG, NIO and Chief Scientist of the two Pakistan's Expedition to Antarctica and who had also participated in the German and Chinese Scientific Expeditions to Antarctica said that Antarctica is the fifth largest continent and undertaking research in Antarctica has multiple significance including Strategic, Economic, Scientific and Geopolitical aspects. Pakistan became an Associate Member of the SCAR only by sending two expeditions to Antarctica. Since Pakistan has acceded to the Antarctic Treaty in 2011 it was therefore important for Pakistan to re-activate her National Antarctic Programme. It was in Pakistan’s interest that she becomes a Consultative Partner of Antarctic Treaty System (ATS) as well as Full-member of SCAR.

The participants of the meeting were unanimous on the reactivation of Antarctic Program of Pakistan for the country's strategic as well as economic and scientific positioning.

R & D Work at Gwadar, Balochistan

Oceanographic Survey was carried out in Gwadar East and West bay using Vale Port CTD during the month of February 2016. Five stations were taken in the Gwadar East Bay whereas the data from seven stations were collected in the West Bay. The wind was calm or less than 4 m/s during the survey. The CTD data was processed and profiles of temperature, salinity, density and sound velocity with depth were plotted to describe spatial and vertical variability of these parameters.

NIO has an oceanographic substation at Gwadar and maintains local staff at the facility, during the survey one of the objectives was to provide on the job, hands on training to the NIO Gwadar staff in the field and laboratory. The Gwadar staff was involved with the Karachi based NIO team to operate all the instruments and gear on the offshore sampling. Rapid Ecological Survey techniques were explained to the staff and data recording was demonstrated.

Evaluate the Impact of Flood on the Coastal Community and Ecosystem

Teams of NIO scientists are regularly visiting the coastal area of Sindh to monitor the downstream flood flow of the River Indus. The main objective of the survey is to collect the data/information to evaluate the impact of flood on the coastal community and ecosystem particularly Indus Deltaic System. Two surveys were carried out on the 25th July and 12th August 2015 to assess the flood conditions at various fixed stations (Kharo Chann, Jangesir, Dandhari, Keti Bundar, Sajawal Bridge) established for monitoring.

NIO and SUPARCO Teams Collaboration in Studies for Flood and Environment Assessment in Coastal Sindh

SUPARCO and NIO are collaborating to monitor the coastal areas of Sindh and in this connection; SUPARCO established a weather station and an air sampler at the Ghorabari station of NIO. The objective is to collect observations for a full year with regular intervals of 6- 8 weeks.

Oceanographic Studies for Selection of Suitable Site for Desalination Plant at Gwadar, Balochistan

To meet the acute shortage of fresh water for domestic use, Public Health Engineering (PHE), Gwadar, has planned to install three desalination plant in Gwadar. PHE has requested NIO to identify suitable site for water intake prior the installation of desalination plants. In this respect NIO has initially conducted a survey of bathymetry, current metry, CTD (for physical parameters). ADCP was also moored for 25 Hours in the identified location for the plant. The Hydrographic and oceanographic survey was conducted in Gwadar area during 17 – 21 May 2016 under NIO's regular R&D monitoring program along the coast and in shallow waters.

R & D Work for DHA Cogen Plant, Karachi

Defense Housing Authority, Karachi is planning to reactivate its Deslination Plant. Due to the previous technical issues, they have realized the importance of oceanographic studies and have requested NIO to conduct some water quality assessment surveys in the area of "Intake DHA Cogen Plant". Seawater and sediment samples were collected from middle depth (i.e., < 3 m above sea bottom) at location 24 44 54.4 N & 067 05 05.7 E. Sampling done during peak flooding and in ebb tides. Niskin bottles and Grab were used for sampling.

Route Survey Operations at Clifton (Opposite Sea View Club)

NIO scientist participated in Cable route survey under **Asia-Africa-Europe-1 Project.** Which (AAE-1) is an undersea telecommunications cable system linking the countries of France, Greece, Italy, Egypt, Kingdom of Saudi Arabia, Djibouti, Yemen, Qatar, United Arab Emirates, Oman, Pakistan, India, Myanmar, Thailand, Malaysia, Vietnam and Hong Kong. AAE-1 is a trunk and branch configured undersea telecommunications cable system spanning a distance of approximately 20,000 km in total length.

PSDP Funded Projects underway during the Year 2015-2016:

Establishment of National Central Marine Research Laboratory at National Institute of Oceanography phase-I, Chemical Oceanographic Analytical Facilities

Main objective of the proposed project is to establish a National Central Marine Research Laboratory at NIO with state-of- the-art equipment to fulfill the laboratory needs of various disciplines of Oceanography to meet the future challenges of R&D in the field of marine science to contribute in the economic development of the country. NIO Chemical Laboratories were well equipped with state-of-the art analytical facilities during the financial year 2015-2016.

1. Visit of SIO-SOA Delegation to NIO

The delegations of scientists from the Second Institute of Oceanography (SIO), State Oceanic Administration (SOA) and State Key Laboratory for Estuarine and Coastal Research (SKLEC), East China Normal University (ECNU) China visited National Institute of Oceanography (NIO), Karachi. The Chinese side was led by Prof. Dr. Huang Daji Deputy Director General, SIO-SOA and the Pakistan side was led by Dr. Asif Inam Director General, NIO. Both sides were assisted by the presence of researchers from the two institutes. The Pakistan side also had the Ministry of Science and Technology representative Mr. Khan Muhammad Wazir Assistant Scientific Advisor (IL Wing).

As a follow-up of this MoU, the two sides agreed to establish a China Pakistan Joint Marine Research Centre (CPJMRC) with an integrated Observation Station at NIO, Karachi with Chinese assistance and support. While SOA/SIO would provide CNY 500,000/year for the running of CPJMRC. This fiscal grant could also be used for the NIO scientists to carry out research work in China and covers the accommodation, allowance and transportation.

Discussing NIO's future plans, it was conveyed that NIO was re-initiating the Pakistan Antarctic Research Programme and the Chinese delegation was requested for possibilities of inclusion of NIO scientists in Chinese Antarctic Expeditions. Prof. Huang Daji assured that they would take this into consideration and try their best to make this possible. With reference to Geo Resource Mapping, it was discussed that till the Chinese Research Vessel becomes available for joint oceanographic research, a project on onshore investigations can be initiated along Makran coast with reference to the geo-resource mapping. The possibility of other collaborators in this initiative was also discussed.

SOA/SIO and NIO has already mutually agreed who would be members of this joint committee. Joint research projects would be submitted to the JC, which will then vet the scientific proposals, following which a maximum of 5 projects of RMB 100,000 each will be approved each year.

2. Visit of Executive Director, Inter-Islamic Network on Oceanography (INOC)

Professor Dr. Mustafa Ergun, Executive Director, Inter-Islamic Network on Oceanography (INOC), Turkey visited National Institute of Oceanography (NIO) Karachi on 18-20 November, 2015 for meeting with NIO scientists for Pakistan-Turkish joint cooperation in the Marine Sciences and Pakistan's cooperation in the Inter-Islamic Network of Oceanography. A joint and collaborative project between Iran, Pakistan and Turkey for mapping of living and non-living resources was also discussed. Prof. Ergun also delivered a talk in the Dr G. S. Qureshi Memorial Lecture series at NIO.

3. Visit of Azerbaijan hydrographic delegation to NIO-Karachi

A 3 member Hydrographic delegation from Azerbaijan visited NIO on 19-1-2016. The Delegation comprising of Mr. Daoud Bagirli, Vasif Cumayev, Ramil Safarou and Mr. Manzoor Ahmed from Hydrography, Pakistan Navy. The delegates were briefed about the NIO’s R & D activities and its

national and international collaboration in scientific research. They also visited NIO laboratories and showed their interest in collaborative programs with NIO in future.

4. Visit of Geological Survey of China Delegation to NIO, Karachi

Delegation of Chinese Geological Survey along with Director General, Geological Survey Pakistan visited NIO on 23 January 2016. The DG Geological Survey of Pakistan explained the MoU signed between their respective organizations and the Chinese in the field of GIS and Remote Sensing and the possibility of conducting research in marine areas for metallic and non-metallic minerals. The representatives of the Geological Survey of China, Professor Li, showed their interest and willingness for collaboration with NIO in the field Marine Geology. The Head of the delegation appraised the meeting with their expertise and discussed areas of mutual interests between the GSC and NIO Pakistan.

5. Visit of Armament Research & Development Establishment (ARDE), Rawalpindi, Pakistan, Ministry Of Defence

A two member delegation under Col. Mazhar Hussain, DG ARDE Laboratory of Defence visited NIO on 26-4-2016. They were briefed about NIO's research and development activities. They also visited NIO laboratories and interact with NIO scientists on areas of mutual interest.

Formulation of Deep Sea Fishing Policy

Deep Sea fishing in Pakistan's maritime area is serious issue because it can result in over exploitation of marine resources, environmental degradation, and significant loss of export potential. To safeguard the interest of the local fishing communities to earn their livelihoods, the Prime Minister has constituted a committee to prepare and submit a draft fishing policy for his consideration. DG, NIO is a member of the Committee. The Committee has drafted a Deep Sea Fishing Policy. The Policy is presently being reviewed by different stake holders.

NIO participation in National Curriculum Revision Committee (NCRC) Preliminary Meeting in Marine Science

NIO participated in the National Curriculum Revision Committee (NCRC) preliminary meeting in Marine Sciences held from 29 February to 2 March 2016. The Committee discussed various issues, including Admission Criteria, Compulsory courses, Nomenclature of Degrees. Being a

maritime country the BS Programme added many specialized courses among the elective module in the 7th and 8th semester. The course contents and related items should be completed before the next meeting.

Joint Proposal Submitted Under the PSF-NSFC Call for Proposals

NIO submitted three joint proposals under the scheme for Call for Proposals PSF NSFC. Simultaneous submission was required by Pakistani scientists to PSF and Chinese scientists to NSFC.

i. Influence of physical, biogeochemical and ecological variability on the River Indus delta mangrove ecosystem dynamics and its link to coastal and fishery productivity (NIO & SKLEC)

ii. Mechanism and Impact Factors of Seawater Intrusion in the Indus River Estuary (NIO & SIO)

iii. Sources, transportation, and ecological risk assessment of the petroleum hydrocarbons in harbor sediment base on the new fingerprint identification technology (NIO & Xiamen University, China)

Research Publications:

NIO scientist published 5 scientific papers/reports in International journals, and two in the National journals during 2015-2016.

Pakistan Council for Science and Technology (PCST)

Introduction

Pakistan Council for Science and Technology (PCST) is one of the oldest organizations of the Ministry of Science & Technology (MoST) established in 1961 to provide advice to the government on science and technology policy issues. For performance of its duties, the Council collects national S&T data through surveys and maintains various databases. PCST is also the designated Secretariat of the National Commission for Science and Technology (NCST) the highest S&T Policy forum headed by the Prime Minister. PCST prepares agenda for the meetings of NCST and its Executive Committee (ECNCST), in consultation with federal ministries, provincial departments and all other major stakeholders of S&T.

PCST also oversees the overall development of S&T in the country; to achieve this objective it evaluates research output of scientists, conduct scientrometric studies, carries out analytical studies on important S&T issues and publishes the results in the form of S&T Indicators, reports and articles. Besides this, for seeking expert opinion and advice regarding development and application of science and technology in different areas, the Council constitutes "Think Tanks" and "Expert Committees" as and when needed.

Objectives

- To advise the Government on issues related to S&T development in the country.
- To evaluate regularly scientific research output of scientists / researchers through bibliometric & peer review techniques.
- Scientometric and futuristic studies.
- Secretariat of NCST and its executive body.

Salient Achievements of PCST during F.Y. 2015-16

6th Meeting of the Executive Committee of National Commission for Science and Technology (ECNCST)

The 6th meeting of the Executive Committee of the National Commission for Science and Technology (ECNCST) was convened to discuss & approve the agenda for the meeting of National Commission for Science and Technology (NCST), headed by the Prime Minister of Pakistan. The meeting was held on 9th March, 2016 at PCST. The meeting was chaired by Rana Tanveer Hussain, Federal Minister for Science and Technology whereas, Prof. Ahsan Iqbal, Federal Minister for Planning, Development & Reform / Deputy Chairman, Planning Commission was the Vice-chair of the meeting. The said meeting of ECNCST had been convened after a long gap of 14 years, in which the agenda for next NCST meeting was approved, which include:

- ✓ Proposal to increase, steps by setup R&D budget up to 1% by 2018 and 2% of the GDP by 2023.
- ✓ Promoting R&D in industry and engaging industry & civil society in patronage of R&D activities.
- ✓ Uniform salary and service structure for scientists, engineers and technicians of R&D organizations.

- ✓ Devising communication strategy for enabling environment for promoting scientific mindset and culture in the society.
- ✓ National Research Agenda.

National Research Agenda

Pakistan Vision 2025 envisions making Pakistan the next Asian Tiger and the Vision envisages that Pakistan could become one of the top 25 economies of the world by 2025. To realize the target and goals of the Vision, PCST prepared the National Research Agenda with the aim to align the national R&D and innovation activities with the Vision 2025 and to provide a direction to the national R&D efforts so that they could adequately support achievement of the goals set in the Vision 2025. In the Research Agenda, following thirteen priority areas have been identified which are presumed to be important for national growth and development over the next decade or so.

i. Agriculture & Food Security
ii. Biotechnology
iii. Climate Change & Environment
iv. Electronic
v. Energy
vi. Full Cell Technology
vii. Health & Pharmaceuticals
viii. Information & Communication Technologies (ICTs)
ix. Marine Resources
x. Nanotechnology
xi. Space Technology
xii. Water
xiii. Mineral Resources.

Formulation of Science, Technology & Innovation (STI) Strategy and Action Plan

STI strategy has been re-visited by the PCST under the guidance of MoST. In the revised STI strategy, policy actions have been divided into short, medium and long-term actions. For each policy action, implementing agency, major stakeholders, estimated cost & duration, milestones and key outcomes have been given. To finalize the Strategy and Action Plan, a series of meetings were held under the chairmanship of the Secretary, MoST at the floor of the Ministry. The Strategy and Action Plan is being amended in light of decisions of the meetings.

Establishment of Science, Technology and Innovation Policy Forum

A proposal for establishment of the Science, Technology and Innovation Policy Forum of the OIC countries was prepared and submitted to MoST with the aim to provide a platform to share their experiences and learn from each other's best practices related to STI Policy formulation, implementation and Research at the national and at OIC countries level.

Concept Paper: Encouraging and Engaging Industry & Civil Society in Patronage of R&D Activities

PCST prepared and submitted to MoST a concept paper with the mechanism and approaches for encouraging and engaging industry and civil society in patronage of R&D activities in the country. The concept paper consists of Endowment Professorships, Donations/grants for Establishing/upgrading Institutes, Collaborative Research, Sponsored Research/ Contract Research, Matching Grants, R&D Tax Credit Incentive, Fellowships & Scholarships awards etc.

Position Paper: R&D Funding in Pakistan

A position paper titled "R&D Funding in Pakistan" was prepared and forwarded to MoST. The paper presented the brief review of the trend of R&D expenditure of Pakistan, during the last 25years i.e. from 1988-89 to 2012-13.

38th Session of the General Conference at UNESCO Headquarter, Paris, France

PCST prepared a document with the information of provision of data on S&T Statistics to UNESCO Institute of Statistics, and for UNESCO Science Report 2015-draft Chapter on Pakistan complied & provided to UNESCO office in Pakistan.

Input on the Theme Study for 72nd Session of the UN Economic and Social Commission for Asia and the pacific (UNESCAP)

A comprehensive report and input for the theme study by UNESCAP was provided to MoST, which include STI for Sustainable Development, Approaches for STI Development in Pakistan, Funding Model, Institutional Support for STI in Pakistan and Bottlenecks and Possible Remedies.

Year 2016-branded as the Year of Quality, Productivity & Innovation

The Planning Commission has branded Year 2016 as the "Year of Quality, Productivity and Innovation". In view of PCST mandate and to harness culture of innovation in the country, following three projects of PCST have been approved by MoST, in principal.

- National Innovation Award
- First Industrial National Innovation Survey
- Need Assessment of S&T Human Resources for Deriving Innovation & Achieving Vision 2025.

Meeting of National Assembly Standing Committee on Science and Technology

A meeting of the National Assembly Standing Committee on Science and Technology (S&T) was held in the Committee Room of PCST, on May 27, 2016, under the Chairmanship of Ch. Tariq Bashir Cheema, MNA. Besides other members of the Standing Committee, the meeting was also attended by Rana Tanveer Hussain, Federal Minister for Science and Technology, Prof. Dr. Anwar-ul-Hassan Gilani, Chairman, PCST, Mr. Muhammad Ashraf, Additional Secretary, MoST and officers of MoST & PCST.

STI Indicators Data 2014-15 to UNESCO

For preparation of STI Indicators, letters along-with proforma for collecting information required for formulation of STI indicators were sent to 113 R&D organizations, 75 public and 62 private sectors Degree Awarding Institutes (DAIs) all over the Pakistan. The information of 106 R&D organizations, 73 public and 42 private sectors DAIs has been received so far.

Technology Foresight Studies

The final version of Technology Foresight Report on "Marine Resources" was sent for printing while the report on "Public Health and Sanitation" is ready for printing. The constitution of Expert Panels in the field of Automotive, Mineral Resources & Housing is in process.

Research Productive Award (RPA)

The process of RPA for the current year was completed on the basis of revised criteria focusing on applied research. A total of 310 scientists qualified and were awarded RPA under four different categories i.e. A to D based on their cumulative score. The total financial implications for the award of RPA were about Rs.63 million. However, due to shortage of funds awardees were made payments in proportion to actual availability of funds. Rs. 17.98 million in the form of Research Productivity Award (RPA) was distributed by PCST amongst the successful applicants.

Productive Scientists of Pakistan (PSP)

Applications have been called through print media for Directory of PSP, as well as through e-mails and PCST website. More than 2300 applications have been received for PSP. Evaluation and processing of these applications on the basis of the recently approved revised criteria is in process.

Conferences / Seminars / Workshops

During the period under report, PCST organized thirteen (13) conferences / workshops / seminars, in collaboration with different national & international organizations.

Science Technology and Development (STD) Journal & STI Voice

- The STD Journal Volumes 34(1), 34 (2), 34 (3) & 34 (4) were made online.
- Editorial board of the journal revised with addition of international experts.
- Two issues of PCST's Newsletter "STI Voice" published, while two issues are at composing phase.

Policy Research Studies

- Four research studies / articles have been published by PCST in different impact factor journals.

Preparation of Development Projects

Following PC-Is prepared and submitted to MoST for approval

i. First National Industrial Innovation Survey

ii. National Innovation Award

iii. Need Assessment of S&T Human Resources for Deriving Innovation and Achieving Vision 2025

iv. Strengthening of IT Infrastructure at Pakistan Council for Science & Technology (PCST)

Development of Research Proposals for S&T Cooperation with different Countries

Following three research proposals for S&T cooperation with different countries were prepared by PCST and submitted to MoST. Study of S&T policy formulation, monitoring & implementation system in Pakistan & Mauritius, Turkmenistan & Sri Lanka.

Glimpses of PCST's Events

1st Regional Workshop on *Harnessing Science, Technology and Innovation for Sustainable Development,* United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), Asian Pacific Center for Transfer of Technology (APCTT), United Nations Conference Center, Bangkok (August 6, 2015).

2nd ACSE 2015 Annual Meeting on *Trends in Academic and Scholarly Publishing in Asia*, Dubai, UAE (August 13-15, 2015).

National Workshop on *Textile Industry: Challenges and Opportunities towards Value Addition* at National Textile University, Faisalabad (October 5, 2015).

DICE-2015 Mega Innovation and Entrepreneurship Event at University of Agriculture, Faisalabad (November 24-25, 2015).

DICE Energy-2015 at NED University of Engineering and Technology, Karachi (December 22-23, 2015).

ACSE Workshop on *Research Integrity and Peer Review* organized by Asian Council for Science Editors, Islamabad (February 18, 2016).

6th Meeting of the Executive Committee of the National Commission for Science and Technology (ECNCST) was chaired by Rana Tanveer Hussain, Federal Minister for S&T and co-chaired by Prof. Ahsan Iqbal, Federal Minister for Planning, Development and Reform at Committee Room of PCST, Islamabad (March 9, 2016).

One day *Consultative Workshop on Policies for Research Commercialization* at 1st Invention to Innovation Summit-2016 at University of Baluchistan, Quetta (May 4-5, 2016).


Meeting of the National Assembly Standing Committee on Science and Technology held in the Committee Room of PCST, Islamabad (May 27, 2016).

National Workshop on *Functional Food and Health: Avenues of Innovation and Entrepreneurship* organized by PCST at Islamabad (June 2, 2016).

Pakistan Council of Renewable Energy Technologies (PCRET)

Introduction

Over the last thirty years, Asia has become a major player on the global scene. Many economies have become tigers while China and India are developing more rapidly than anyone had expected. Because of these developments, electricity demand is expected to increase 10% every year until 2017. As the world wakes up to the reality of climate change, electricity will increasingly have to come from renewable sources such as wind and solar. Pakistan is in a good position to exploit these because it has abundant wind and sun.

Pakistan Council of Renewable Energy Technologies (PCRET), since its very inception has been acquiring and updating knowhow imperative for the promotion and mass propagation of Renewable Energy Technologies, especially in the field of development and promotion of Biogas, Micro hydro, Solar Thermal , Solar PV and Wind Energy Technologies. The Biogas technology being promoted developed and disseminated by the Council is not only technically time tested but is highly affordable. In fact all the projects undertaken by the Council intend to promote and supplement Government policies in mitigating the sorrows of the deprived by satisfying their basic needs through a participating process. Pakistan has tremendous renewable energy potential which if tapped properly is capable of meeting the energy needs of all its population several times.

1. Establishment

Pakistan Council of Renewable Energy Technologies (PCRET) has been committed to the establishment of facilities and expertise for the development of suitable technologies in the field of Renewable Energy. PCRET has over the time, successfully developed various know how and processing techniques for promotion of the renewable energy sources. The total approved manpower strength of the council has been stagnated at merely 208 since it's from very inception. Out of which 70% posts of officers/ staff are lying vacant for last more than five years.

The manpower at present lacks appropriate scientific back ground, whereas Renewable Energy Technology calls for specific academic knowledge experience and expertise. At the time of establishment of the Council, the sanctioned posts of the two Councils were cut down the below required level, affecting smooth functioning of the council already facing shortage of scientific manpower.

2. Regular Activities:-

PCRET regular activities mainly pertain to following areas:

a. Fabrication of solar cells PV panels of mono-crystalline structure.

b. PV system designing and installation of demonstration units for the promotion of solar energy technologies.

c. Micro hydro power plant designing after potential assessment of the site, their installation and electrification of remote area houses / cottage industries.

d. Domestic and commercial scale biogas plants designing and installation for meeting fuel energy demands and power generation for water pumping to irrigate agri-land.

e. Wind energy system installation for electrification of remote and coastal area of the country.

f. Solar water heater for water and space heating,

g. Solar dryers for drying of fruits and vegetables.

h. Solar Water Purifier Systems designing and installation for clean water in remote areas.

i. Provision of consultancy and testing services to private and public sector organizations.

3. Research and Development Activities:

1. Demonstration unit of Hybrid micro hydro power plants (Hydro + Solar + Wind) installed in collaboration with Pak-China joint cooperation.
2. Fabrication and testing of Liner Fresnel Collector Based Solar Thermal Power Plants are in progress.
3. Fabricated and tested new types of Solar Cookers.
4. Testing, lamination and cutting of solar cells carried out for SUPARCO and Pakistan Army**.**
5. Fabricated 50 SOLAR MOBILE chargers.
6. Signed MoU with COMSATS Energy Center Lahore for carrying out advanced research in the field of Renewable Energy Technologies.
7. Signed MoU with University of Punjab for collaboration in the field of Biogas Technology. PCRET Lahore office will be Center of Excellence in Biogas Technology.
8. PCRET Peshawar office is being developed as Center of Excellence for development and testing of Micro hydro power plants.
9. 10-Ph.D/M. Phil students are doing research work in PCRET Laboratories in advance organic solar cells.

4. Foreign Aid Project Submitted:

S. No.	Title of the projects with Description
1	**Adaptation of PV Biogas Technologies and Establishment of Renewable Energy Lab in Pakistan for Climate Change Mitigation funded by GCF, total cost US $ 40**

	million Description 1. PCRET plans to install highly successful and cost effective Photovoltaic (3400 systems, 5 kW system each with grid-tie inverter) for urban population, 150 W off-grid PV system (3400 systems) for rural population and 850 Biogas plants (100 m^3 capacity attached to small scale local industry) across the country. 2. Model plants of both technologies will be installed, 100% subsidized, in each division of Pakistan (total 34 divisions). Another 100 PV grid-tie, off-grid and 25 biogas plants will be installed in each division with 70% subsidy (90% subsidy for off grid, 150 W systems) to popularize these three renewable energy solutions.
2	**Establishments of photovoltaic, Micro Hydropower, Biogas and Wind Energy Research Labs funded by KOICA, total cost US $ 3.00 million (revised 6.50 million US $ in progress)** Description 1. To enhance research capabilities of PCRET in the field of Photovoltaic (PV), Micro Hydropower (MHP), Biogas and Wind Energy Technologies. 2. To study problems of applied nature in these fields and to work out the most viable solutions based on these Renewable Energy Technologies. 3. To move a step further in the quest to maximize the share of Renewable Energy in energy mix of the country, to overcome the severe energy shortage problem and to reduce CO_2 emission. 4. Promotion of Clean and Renewable Solar Energy through PV, MHP, Biogas and Wind Energy Technologies. 5. Installation/commission of model renewable energy solutions at Capital and at all four provincial headquarters of Pakistan.

New PSDP Projects Submitted for Year 2015-16

S. No.	Name of the Projects with Description	Rupees (Million)
1.	**Public Training Program and Promotion of PCRET Products / Services for Accelerating the Penetration of Renewable Energy Technologies in Pakistan** Description: • To train master trainers of Renewable Energy sector in the major cities of the country, after getting training they will train the general public in the remote areas. • To promote Renewable Energy technologies for a better tomorrow. • To enhance utilization of Renewable Energy in the country.	31.05
2.	**Installation of New Biogas Plants in Pakistan for Providing Natural Gas and Bio-Fertilizer to Rural and Sub-Urban Communities**. Description: The project's main objective is the construction of 4000 biogas plants, that will: • Provide biogas as fuel through recycling of animal dung. • Lower dependency on fire-wood, LPG or kerosene oil. • Provide alternate and clean source of energy at cheaper rate. • Improve living conditions of natural masses; reduce in-house pollution	354.00

	and lower drudgery and women/children for collecting fire-wood. • Enhance the use of enriched organic manure and reduce dependency on chemical fertilizer.	
3.	**Installation of 100 Micro Hydro Power Plants In Public–Private Partnership** Description: • To develop and install 100 Micro Hydro Power Plants for generation of electricity. • To electrify homes and local cottage industries of the remote and rural areas where grid power is not available. • To promote technology of indigenous turbines.	334.00
4.	**Enhancement of Lab Facilities to Produce High Efficiency Silicon Solar Cells and PV Modules** Description: • To enhance the efficiency of Solar Cells and PV modules indigenously developed at PCRET. • Automation of the Lab Equipment to enhance PV module production capacity. • Purchase of remaining lab equipment to complete the solar cell and PV module fabrication chain. • To move a step further in the quest to overcome energy crises in the country. • Promotion of clean and renewable solar energy through photovoltaic process.	58.1864
5.	**Establishment of Testing lab for Solar PV equipment / product as per Quality / Safety Standards at PCRET** Description: • To provide a facility to local producers of the Solar PV Modules & Solar Inverters for the testing and maintenance of International Quality Standards. • Installation/Commissioning of Testing Machines at PCRET to test Solar PV Modules & Solar Inverters according to International Quality/ Safety Standards. • To provide awareness of "Quality/ Safety Standards" in clean renewable energy technologies/ products among the masses; through media campaigns, Seminars/ Workshops.	795.352
6.	**Installation of Solar Photovoltaic System at PCRET Islamabad**. Description: Installation of 200 KW Solar Photovoltaic System at PCRET, Islamabad. • To reduce the load on main grid of electricity. • To provide awareness of clean renewable energy application to masses; through demonstration of real application of Photovoltaic Technology.	59.49
	Total	**1632.0784**

Pakistan Science Foundation (PSF)

Introduction

Pakistan Science Foundation was established in 1973 through an Act of Parliament to promote and finance scientific research activities having a bearing on the socio-economic needs of the country. It is an autonomous organization under the umbrella of the Ministry of Science and Technology. Budgetary allocation of PSF for year 2015-16 was Rs.181 million for Non-Development side whereas, it was Rs.70.45 million for the Development projects. The expenditure on Administrative side was Rs.137.64 million which is 77% of the total Non-development budget of PSF. Rs.39.41 million were spent on Statutory Functions which is equivalent to 22% of the total budget. Despite the rise in the salaries of employees by the Government, the ratio of Administrative versus Statutory Functions was maintained at 77:22. Development funds amounting to Rs.70.45 million were received for two development projects, which were utilized accordingly.

1. Objectives and Functions

Pakistan Science Foundation is the apex body for promotion and funding of scientific and technological activities in the country. The Foundation functions as an agency for:

- The promotion of basic and fundamental research in the universities and other institutions on scientific problems relevant to the socio-economic development of the country.
- The establishment of comprehensive scientific and technological information and dissemination centres.
- The utilization of results of scientific and technological research including pilot plant studies to assess the technical and economic feasibility of processes found to be promising on a laboratory scale.
- Popularization of Science in Pakistan.
- Establishment of science centers, clubs, museums, herbaria and planetaria.
- Promotion of scientific societies, associations and academies engaged in spreading the cause of scientific knowledge in general or in the pursuit of a specific scientific discipline or technology in particular in country.
- The organization of science conferences, symposia and seminars, periodically.
- Exchange of visits of scientists and technologists with other countries.
- The grant of awards, prizes and fellowships to individuals engaged in developing processes, products and inventions of consequence to the economy of the country.
- Special scientific surveys, not undertaken by any other organization, and collection of scientific statistics related to the scientific efforts in the country.

- Establishment of Museum of Science and Technology at National Level of International stature.
- Extensive international cooperation and interaction with counterpart organizations in foreign countries.
- The Foundation has also started assistance in applications for Patents under PSF funded projects.

The activities of the Foundation revolve around above objectives, some of which are performed by the Science Wing of PSF, while others are undertaken through Pakistan Museum of Natural History (PMNH) and Pakistan Scientific and Technological Information Center (PASTIC), the two subsidiary organizations of PSF, as reflected in the following pages.

2. Regular Activities

A. Promotion of S&T Research

i. Research Support Programme: Research support is the principal programme of the Foundation, which provides funding for research projects in natural and physical sciences. Project proposals submitted to the Foundation are evaluated initially by subject experts in relevant fields and then by Technical Committees on the basis of technical merit and relevance to the socio-economic needs of the country. The progress of research is monitored through evaluation of semi-annual and annual progress reports. Multi-disciplinary research projects in areas of economic significance to Pakistan are accorded special priority for award of financial support.
During 2015-16, a total of 291 research projects in 10 scientific fields namely Agricultural Sciences, Biological Sciences, Biotechnology & Genetic Engineering, Chemistry, Computer Sciences/Maths, Earth Sciences, Engineering Sciences, Medical Sciences, Environmental Sciences and Physics remained under active consideration. Among these, 44 were under process, of which, 14 projects costing Rs.31.29 million were approved and an amount of Rs.9.37 million was released to 11 new projects on account of 1st installments, whereas, Rs.4.87 million are still due on account of 1st installments of 03 already approved new projects. Total 115 projects were on-going and an amount of Rs.6.13 million was released on account of due installments and evaluation fee of these projects.

One of the main achievements and usefulness of any research is the publication of its results in scientific journals. Based upon the results of 31 completed projects, 78 research papers were published in national/international journals. In addition, 22 Ph.D. and 39 M.Phil. /M. Sc. (Hons) students secured their respective degrees while working as Research Associates in these completed projects.

ii. Conferences/Seminars/Symposia/Workshops: Another function of the Foundation is to provide funding for holding conferences/seminars/ symposia/workshops etc. During the year

2015-16, organization of 17 conferences, seminars and workshops on important scientific topics were financially supported at different universities and R&D organizations across the country.

iii. Financial Support for Scientific Societies and Journals: The Foundation provides funds to Scientific Societies for holding their regular conferences, meetings and publications of scientific journals in various disciplines. During the period, 09 societies and journals were funded for their regular activities and printing of journals.

iv. R&D-Industry Programme: Focusing on collaborative research and strong industrial linkages, R&D-Industry Programme is bringing together researchers, end-users and the funding institutions at one platform to create an environment of a unified approach to identify and solve industrial problems through applied research and technology transfer mechanism.

During the year 2015-16, a total of 18 research projects in R&D-Industry Programme remained under active consideration. Among these, 04 were under process, of which, 05 projects costing Rs.13.4 million were sanctioned and an amount of Rs. 6.8 million was released to new projects on account of 1st Installment. Two research projects are still in pipeline. During the year, 07 projects were on-going and an amount of Rs. 0.9 million was released on account of due installments and evaluation fees to referees for the evaluation of progress reports of these projects. Based upon the results of 01 completed project, 02 PhDs were produced, 02 research papers were published 05 new species of nematodes were reported.

v. Invention to Innovation Summit: Pakistan Science Foundation (PSF) organized Invention to Innovation Summits at BUTIUMS, Balochistan and University of Punjab, Lahore wherein, hundreds of indigenous technologies, varieties, products, processes, posters presentations and documentaries etc were presented. This event is a regular activity of the joint collaboration of R&D-Industry Programme of Pakistan Science Foundation (PSF) and Pakistan Scientific & Technological Information Center (PASTIC), University of the Punjab and Institute of Research Promotion (IRP).

Several different workshop sessions of industry, academia & R&D experts were also arranged in these summits from different technology sectors. The industrial issues identified during these summits are being taken up jointly by Pakistan Science Foundation, Academia and the Industry. The most innovative technologies, finalized by the panel of judges, were awarded with the Innovation Award.

Funding of Projects under PAK-US Natural Sciences Linkage Programme (NSLP) Endowment Fund:

The Natural Sciences Linkages Programme (NSLP) was agreed upon between Ministry of Science and Technology and United State Department of Agriculture (USDA) under the MoU signed in November 2002 on the "Joint Operating Arrangement for Cooperation in the Field of Natural Sciences". However, the funds were released in 2005-06 and the activity began in 2007. The NSLP Endowment is an important component of Pakistan Science Foundation. It is being managed by the Foundation through the Board of Governors (BoG) and Fund Management

Committee (FMC). The Chairman, PSF is the Chief Executive of the Programme/Fund. Main objective of this fund is to enhance the agricultural production through effective research carried out by Pakistani scientists.

During the report period, 204 concept papers were received, 36 projects remained under process, of these, 03 were recommended by the technical committee. A total of 55 projects were on-going and an amount of Rs. 32.104 million was released on account of due installments. A total of 18 projects were completed during the period. The title and cost of each newly recommended project is given below:

	Title of Project	Total Cost
i)	DNA Based Identification of Halal and Non Halal Meat and its Products.	Rs.2.44 m
ii)	Development of simple photo-Bioreactor for quality algal biomass and oil production.	Rs.4.31 m
iii)	Follow-up of established mushroom farms and popularization of oyster and milky mushrooms as cottage industry for economic uplift of landless communities of KPK and Punjab.	Rs.4.16 m

Project Formulation Workshops:

During the year 2015-16, four Project Formulation Workshops were organized to enhance the capacity of the researchers for writing project proposals. The workshops were organized at University of Poonch, Rawlakot on September 2-3, 2015, Govt. College Woman University Faisalabad on January 20-21, 2016, Govt. College University, Lahore on March 30-31, 2016 and University of Agriculture, Peshawar on April 27-28, 2016. A total of 220 researchers from different R&D organizations and Universities benefitted from these workshops. Scientists were trained on different aspects of writing a good quality research proposal by renowned agricultural researchers.

Monitoring and Evaluation of Projects:

Pakistan Science Foundation is playing a key role in establishing research culture in the country through funding of research projects in Universities and R&D organizations. Technical progress of the projects is monitored through the semi-annual and annual reports. Monitoring and Evaluation Wing (M&E Wing) has been established by the PSF Board of Trustees (BoT) in its 45th meeting held on 10.09.2015 for on-site monitoring of PSF funded projects.

The team of PSF M&E Wing accompanied by relevant subject experts monitored 30 PSF funded projects being executed in different institutes of Lahore, Faisalabad and Sargodha. During monitoring, the Principal Investigators were also guided on specific project issues to ensure smooth execution and successful completion of the projects.

International Liaison Activities

During the year 2015-2016, the international linkages activities of the Foundation were expanded to a great extent. More effective linkages were developed with international counter-parts to benefit the Pakistani scientific community. The detail is given below:

- Call for the joint proposals with National Science Foundation of (NSFC) China was launched on 28.12.2015 and as a result, more than 200 proposals were received. The proposals went through review process for selection

- Under an MoU signed between Scientific and Research Council of Turkey (TUBITAK) and PSF, a joint call of proposals with TUBITAK was launched and more than 100 proposals were received. The proposals went through the PSF scrutiny process for finalization. In this connection, the meeting of "PSF Adhoc Committee for Screening of Research Proposals received under PSF-TUBITAK Joint Initiative" was held on 06.01.2016 to examine the technical merit of the project proposals submitted for financial support under PSF-TUBITAK Joint Initiative

- One day "Awareness Seminar on EU Horizon-2020 Program" was organized in collaboration with European Union Delegation to Pakistan and University of Karachi at University of Karachi on August 19th, 2015 for scientists and researchers of Sindh Province to take maximum benefits from this vital funding opportunity

B. Popularization of Science

Popularization of science, increasing science awareness and development of scientific culture in the society are major functions entrusted to Pakistan Science Foundation. Under the action plans of various S&T Policies, the task of popularization of science at grass roots level in the country has also been assigned to PSF. Popularization of science plays a central role in the socioeconomic, cultural, and environmental development of any country. During 2015-16, a number of programs were carried out and their brief is given below;

3. Regular Activities

i. Science Caravan is a Mobile Science Exhibition which has been designed to increase public awareness about science and to motivate the younger generation of the country towards study of science. Science Caravan consists of three major components, firstly the Panel Exhibits & Display items, secondly film/multimedia projectors for screening of science films/documentaries and lastly the Starlab Planetarium system. Microscopes, computers, laser holograms and working models reflecting various phenomena of physics, chemistry, mathematics and biology are included in Caravan Exhibitions. At present, 09 Science Caravan units are in operation, 02 for each of the four provinces and one for federal and adjoining areas. During the year 2015-16, a total 102,273 students from 506 schools visited Science Caravan Exhibitions as detailed below;

- Federal Unit:- 21,375 students from 111 schools
- Sindh Unit:- 25,874 students from 136 schools
- Punjab Unit:- 15,101students from 34 schools
- Khyber Pakhtunkhwa Unit:- 26,327 students from 141 schools
- Baluchistan Unit:- 13,596 students from 84 schools

ii. 25th Annual Intra and Inter Board Science Essay and Poster Competitions were organized between the students of all Boards of Intermediate and Secondary Education (BISE) of the country. Students from all over the country took part in the competitions. Winners were also awarded cash prizes. Essay Competition was on theme "Is renewable energy an economically viable option for Pakistan?" and for Science Poster Competition the theme was "Importance of light for life". Thousands of students from all over the country participated in these competitions and 117 winner students were awarded cash prizes.

iii. Donation of Popular Science Magazines and Scientific Books is one of the regular and important activities for science popularization. Popular Science magazine "Monthly Global Science" and Quarterly "Urdu Science Magazine" were distributed to 500 schools during the report period. Bimonthly Scientific Journal "The Fountain" published by The Light Publishing Turkey was also provided to Caravan offices, PASTIC offices and PMNH. A book titled; "Transgenic Plant" was also distributed among universities and college.

iv. Establishment of Science Clubs in schools and Support for Science Popularization Activities: PSF supports S&T organizations in organizing their science popularization activities. During the report period, an amount of Rs.140,000/-was sanctioned to 02 schools and S&T organizations for strengthening of their labs and arranging their science popularization activities.

v. World Science Day for Peace and Development: PSF in collaboration with other organizations like UNESCO, Intel, and Federal Directorate of Education organized various activities for students and scientists to commemorate the World Science Day-2015 like Convention of Scientists, Science Caravan Exhibitions, Panel Discussions on TV and Prize Distribution to the winners of PSF Annual Inter Board Science Essay and Poster Competitions. The theme selected by UNESCO for this year was "*Science for a Sustainable Future*". The Federal Secretary, Ministry of Science & Technology Mr. Fazal Abbas Maken and Ms. Beverly Jones, Representative UNESCO shared their views. Students from different schools of Islamabad also displayed their projects. Medals, cash prizes and certificates were also distributed among the winners of PSF's 24th Science Essay & Poster Competitions.

vi. Popular Science Lectures:

Pakistan Science Foundation arranges series of lectures where eminent scientists and educationists express themselves for the benefit of the audience comprising scientists, scholars, students and the

general public as one of its mandatory functions. During the current year, 05 Popular Science Lectures were organized on different scientific themes which were attended by hundreds of students, scientists and general public.

vii. Inquiry Based Science Education Programme in Pakistan:

PSF has initiated Inquiry Based Science Education Program in collaboration with Academy of Sciences France, Embassy of France in Pakistan, and Federal Directorate of Education. In this regard, number of training workshops and review meetings were organized time to time. PSF in collaboration with ECOSF conducted the training sessions at PAEC Education Centre, Chashma and also signed MoU with DoST (Directorate of Science & Technology, KP) for mutual cooperation for developing science culture in the society. Under this MoU, PSF organized 04 teacher training sessions on Inquiry Based Science Education in different districts of KP. In addition, training sessions were also conducted during Science Caravan Exhibitions.

viii. Participation of Pakistani Students in International Forums:

PSF, being a focal organization for ASC, coordinated with the organizers for participation of Pakistani students in ASC-15. This year Asian Science Camp was organized at Pathumthani, Thailand. More than, 270 students from 29 Asian countries participated in ASC-2015.The Pakistani delegation comprising 07 students along with the Team Leader from PSF participated in the event and won 06 awards. The detail is given below;

- Ms. Maryam Khan won the Best Question Award and Honorable Poster Mention
- Danial Amin got Best Question Award and Bronze Poster Award
- Muhammad Shoaib Butt and Aamir Zaryab won Bronze Poster Award

ix. Need Assessment Survey of Science Labs across the Country:

PSF has the mandate to popularize and promote science at grassroots level in every corner of the country. For the purpose, PSF is undertaking various science popularization activities to supports High Schools for strengthening of their science labs. In connection with strengthening and up-gradation of Govt. High Schools labs, PSF conducted need assessment survey of Govt. High Schools 04 districts (02 advance and 02 backward) from each of the provinces and 02 from AJK and GB. Data of status of the labs of government sector High Schools will be used in preparation of a PSDP project for strengthening of science labs in the schools. PSF Science Caravan and PASTIC staff conducted the survey.

x. Establishment of Science Caravan Office at BZU, Multan:

In connection with enhancing the performance of Science Caravans, PSF new Science Caravan office was established in the campus of Bahauddin Zakariya University, which was inaugurated by Prof. Dr. Muhammad Ashraf (*S.I*) Chairman, Pakistan Science Foundation. Prof. Dr. Tahir Amin, Vice Chancellor BZU, Multan was the Guest of Honor. All the Deans, Directors from the BZU also participated. The Vice Chancellor congratulated PSF management for establishing resource

centres for the S&T awareness for Southern Punjab, which will be a source of inspiration for students and teachers.

xi. Science Talent Farming Scheme (STFS) for 1800 Young Students

The STFS project was conceived by the Pakistan Science Foundation under the Science Talent Farming Scheme as part of "Pakistan Vision 2025" Program of Government of Pakistan and was approved in June 2015. Main goals of STFS are;

i. Attracting youth towards science in early years of education.
ii. Developing a competitive knowledge economy through value addition.
iii. Improving the quality of science and technology education particularly in the Natural and Physical Sciences.

In this connection, 300 matric pass students will be selected each year from all provinces of the country. Each selected student will be granted scholarship worth Rs.10,000/- per month along with tuition fee Rs.8,000/- and hostel charges Rs.8,000/- per year. The selection of students is made through evaluation in three phases i.e., Specialized written/screening test, Computer Based IQ Test and Presentation on innovative ideas/Interview.

For these students, a "National Science School" will be established at an appropriate location within the country, which will be able to accommodate 1500 students from Grade-8 up to Intermediate level.

In this scheme, the toppers from the selected students will be given opportunities for visit to the world leading science and technology institutions and universities and also participate in training sessions for students /teachers on Inquiry Based Science Education (IBSE).

xii. Participation in Pakistan Governance Forum/Expo 2015:

The event "2nd Pakistan Governance Forum/Expo 2015" was organized by Ministry of Planning, Development and Reform on 31st Dec, 2015 at International Islamic University, Islamabad. PSF being a Focal organization for the event displayed stall on behalf Ministry of Science and Technology. The stall showed achievements in provision of good governance services and reforms during the past two and half year of this present government. The forum/expo aimed to provide a roundup of government achievements in various areas of governance; chalking out a plan of action for high priority reform initiatives for 2016; provide opportunities to ministries/federal agencies to showcase their achievements/services being provided and providing a platform for various stakeholders to come together and share their experiences for mutual collaboration. The stall was visited by a large number of students, researchers, politicians, government officers and general public.

Glimpses of Science Promotion Activities

Pakistani Students with eminent Scientist during Asian Science Camp-2015at Thailand

Hands on activities performed by students under Inquiry Based Science Education

Prof. Dr. Muhammad Ashraf, Chairman, PSF & Prof. Dr. Tahir Amin Vice Chancellor BZU, Multan Inaugurating Science Caravan Multan Unit at BZU

Mr. Fazal Abbas Maken, Federal Secretary MoST and Dr. Muhammad Ashraf, Chairman PSF distributing medals and certificates among winners of PSF Competitions on World Science Day., Ms. Vibeke Jensen, Representative/Director UNESCO is also present

Pakistan Museum of Natural History (PMNH)

Pakistan Museum of Natural History the only natural history museum of Pakistan was established in 1979 under Pakistan Science Foundation, Ministry of Science & Technology, (Government of Pakistan). Pakistan Museum of Natural History (PMNH) has four principal divisions namely Earth Sciences Division, Botanical Sciences Division, Zoological Sciences Division and Public Services Division. First three scientific divisions are engaged in the collection, identification and research activities pertaining to plants, animals, fossils and mineral resources of Pakistan, while the fourth one is responsible for mass education and popularization of natural history through various displays, exhibits and dioramas.

Researchers of PMNH carried out extensive field work from the Coast of Arabian Sea to the Alpine regions, roamed through barren areas for the collection of flora and fauna, rocks, fossils and minerals not only for research work but also for the purpose of education because education is one of the main objectives of PMNH. Research outcome of this field work is published in the form research papers in reputed national and international journals. At present, PMNH has more than one million natural history specimens in its repositories.

PMNH regularly organizes trainings, workshops, seminars, symposia and other educational interactive activities related to natural history, environment and biodiversity of Pakistan. International days are also observed by the PMNH. Many national and international liaisons have also been established by the PMNH. The scientists of PMNH are not only conducting research on the natural resources of Pakistan but also educating the students and common people with the help of informative, interactive, educative 3-dimentional dioramas and exhibits. Students of schools, colleges and universities from all over the Pakistan visit PMNH as a part of their educational tours. PMNH scientists also facilitate the students and researchers from the other universities and institutes by providing them information, technical assistance and specimens.

Objectives and Functions:

- To collect, identify and catalogue the natural history specimens through field studies for developing a national repository of plants, animals, rocks, minerals and fossils for further scientific studies
- To carry out research on biological and geological resources of Pakistan
- To establish liaison with similar institutions both within and outside Pakistan for sharing of knowledge and expertise
- To provide research facilities and incentives to scientists from within and outside the country to work at the Museum
- To document and display specimens in the form of attractive exhibits/films/documentaries to educate the masses about the natural wealth of Pakistan

- To interpret our natural resources and environment in light of the past and plan for future course of action
- To advice the government on all issues related to biodiversity, conservation, environment, wildlife and ecology
- To publish natural history books, research articles, field guides, monographs, popular literature, technical reports, bulletins, brochures, pamphlets etc. for the promotion scientific research and public awareness
- To provide training facilities in natural history research, education, conservation, collection, preservation, identification, curation and exhibit designing including taxidermy, modeling and casting to interested individuals and groups
- To arrange expeditions for the study and collection of natural history specimens

During 2015-16, following Activities were carried out:

Training Courses held:

- PMNH organized two workshops on "Mushroom handling, cultivation and cooking" and "Gemology & Modern Techniques of Lapidary".
- Research Outcomes- Patents-Commercialization, etc
- A total 6000 natural history specimens from different areas of the country were collected and preserved in the repositories as reference material, and 7,640 specimens were identified, catalogued, curated, digitized and preserved in the repositories for further scientific research.
- Ten research articles on botany, geology, paleontology and zoology were published in national and international journals by PMNH scientists, and 02 popular articles on mushrooms and rocks were also published.

Seminars/Symposia/Presentations

- PMNH celebrated International Day for Biodiversity from 21 May to 2 June 2016, and "World Earth Day" on 21 April 2016.

Visits

- Federal Secretary MoST, Senate Standing Committee on S&T, Mr. Michel Nheme, French Consul, Embassy of France, Islamabad, Prof. Xianglga Li, Zanzhou University, China, Dr. David Sarmiento-Castillo, MAFBI-French Archaeological Mission in The Indus Basin, Pakistan and University Paris, Mary E. Barkworth an American scientist,

Ambassador of Portugal H.E. Joao Sabido Costa and Federal Minister for Higher Education and Research, Togo, Mr. Broom visited PMNH display galleries.

- During the year a total of 140,248 persons visited the PMNH Display Centre which included 100,000 students, 40000 general public and 248 foreigners.

Miscellaneous

- Educational stalls were displayed in various events for science awareness.
- Various brochures, banners, pamphlets were designed and prepared.
- Senior management participated in various meetings and conferences and also examined M.Phil and Ph.D theses as examiners.

Glimpses of PMNH Visits

Pakistan Scientific and Technological Information Centre (PASTIC)

Pakistan Scientific and Technological Information Centre (PASTIC), an affiliate of Pakistan Science Foundation is a national S&T information dissemination agency serving as a gateway for access to and delivery of S&T information and catering to the information needs of the scientists & engineers, researchers, academicians, entrepreneurs and the industry. PASTIC National Center is housed in its own building at Quaid-i-Azam University Campus, Islamabad with a comprehensive collection of information resources in science and technology. PASTIC has sub-centers in Karachi, Lahore, Peshawar, Quetta, Faisalabad and Muzaffarabad.

1. Objectives & Functions

- To acquire, process and disseminate scientific and technological information to the researchers and facilitate scientific, technological, agricultural and industrial development by providing timely access to relevant information
- To develop human resource in contemporary techniques of information handling and management
- To compile and publish Reference Information publications for ready reference of R&D community
- To develop inter-library cooperation and resource sharing at national level
- To promote technologies, products & processes of local industry/SMEs
- To develop collaborations with national & international information networks/ organizations

2. Regular Activities

Document Supply Service: Under the Document Supply Service, reprints of research articles, conference papers and reports, etc. (full text) are supplied on demand, which are procured either from local sources or from abroad. During 2015-16, a total 66758 S&T documents were procured and supplied to 6461 R&D workers.

Bibliographic Information / Literature Search Service: The facility of free literature search is provided and abstracts are supplied to students, scientists, researchers, etc., according to their research topics, on request through online national and International electronic databases. During the year 2015-16, a total of 742653 abstracts on various S&T topics were supplied to 5578 researchers of different organizations.

National Science Reference Library Service: During the period 2015-16, PASTIC library received 387 issues of National and International Journals along with 39 miscellaneous documents, which were processed and shelved for use. Total 8778 users visited PASTIC Library for reference purpose, reading & photocopying services and internet browsing. 12 issues of fresh arrivals of PASTIC Library were brought out.

Technology Information Service:

Three Exhibitions (Invention to Innovation Summit) and 3 Symposia were organized at Lahore, Haripur and Quetta under the University Industry Partnership (UIP) Programme for building effective linkages between Universities/R&D institutions and the Industrial sector for enhancing innovations and competitiveness. Six issues of Trade & Technology news bulletin entitled "*Technology Roundup*" were published online.

Reprographic Service: PASTIC has a Reprographic Section (Printing Unit) at its National Centre in Islamabad which is meant for printing requirements of PASTIC, but it also facilitates other R&D organizations for their printing requirement. During the 2015-16, the press disposed off 154 printing jobs.

Publicity Activities and Collaboration Development

PASTIC organized 50 Services Stalls on different occasions and locations at Islamabad, Karachi, Lahore, Peshawar, Quetta, Faisalabad and Azad Jammu & Kashmir to enhance public-private partnership and provide mobile Information Services. Besides, PASTIC also organized 19 Services Awareness Seminars at different cities. An initiative was also taken to invite nominations of Focal persons from R&D organizations & Universities to develop collaboration with academia.

International Liaison:

Revisions were made in already submitted project "Networking and Capacity Building of Women Entrepreneurs (SMEs) of SAARC Countries" which was approved by SAARC Development Fund (SDF). Three officers from PASTIC were sent for training offered by SAARC Documentation Centre.

Publications

Pakistan Science Abstracts:

PASTIC publishes an abstracting journal entitled "Pakistan Science Abstracts" (PSA) in 10 different scientific disciplines as secondary source of information on regular basis. During this period, digitization of old records of Pakistan Science Abstracts (PSAs) was carried out. The number of abstracts processed for import during this period was 7194 and the number of abstracts converted into text format was 4875.

Seminars/Symposiums/Workshops/Trainings Organized:

PASTIC organized 4 seminars and 22 workshops on various themes such as PASTIC Information Services, Resource Sharing, Intellectual Property Rights, Research Tools and Techniques, etc

Other Activities

- A total 2364 new members were added to PASTIC Services Users Membership Database
- Students from Sindh Agriculture University, Tandojam and Islamia University, Bahawalpur visited PASTIC

- Data collection of R&D projects and Scientists, Engineers & Doctors for development of databases was initiated, and publication of "Pakistan Journal of Computer Sciences & Information Systems" was also launched
- PASTIC coordinated in bringing out PSF monthly Newsletter.

Glimpses of PASTIC Activities

Student group visiting PASTIC

PASTIC Services Stall arranged by PASTIC Center, Peshawar

PASTIC Services stall arranged by PASTIC Center, Lahore

PASTIC Services stall arranged by PASTIC Centre, Karachi

Pakistan Council of Scientific & Industrial Research (PCSIR)

Introduction

Pakistan Council of Scientific and Industrial Research (PCSIR) is a government-owned science and industrialization research organization which mainly focuses on Research and Development (R&D) activities. Initially established as Pakistan Department of Research in 1951, it was reformulated in its current state in 1953. Since 1973, it has functioned under the Act of Parliament. The organization was under control of Pakistan's Ministry of Science and Technology, and was given autonomous control in 1984. The organization was founded under the Societies Act to promote the cause of Science and Technology in the country.

The mandate of PCSIR is to undertake, promote and guide scientific and technological research in respect of problems connected with the establishment and development of industries under conditions prevailing in Pakistan and to encourage the extension of results of research to various sectors of the economy of the country in the best possible manner. PCSIR over the years has established a network of four multi-discipline laboratories at Karachi, Lahore, Peshawar and Quetta and four mono-discipline centres i.e .National Physical and Standards Laboratories Islamabad, Fuel Research Centre, Leather Research Centre both at Karachi and Hyderabad Laboratories. The brief introduction of these laboratories is given below

PCSIR Laboratories Complex, Karachi

PCSIR Laboratories Complex, Karachi is a multidisciplinary research complex having expertise in the disciplines of Marine & Food Sciences, Environment, Bio-Sciences, Pharmaceuticals, Applied Chemistry & Physics, Instrumentation, Material Science and Computers. Besides carrying out R&D work in these disciplines, it also provides analytical and technical services as well as academic supervisory services. In the present scenario of ISO and WTO, KLC is contributing by providing quality testing services accredited under ISO / IEC-17025, to the Pakistani manufacturers, exporters and importers.

PCSIR Laboratories Complex, Lahore

Pakistan Council of Scientific & Industrial Research (PCSIR) Laboratories Complex, Lahore (LLC) comprises of 10 research centres. These centres are rendering services to local industry and other organizations in diversified fields. The centres are Applied Chemistry Research Centre (ACRC), Applied Physics Computers & Instrumentation Centre(APCIC), Centre for Development of Laboratory Equipment (CDLE), Centre for Environmental Protection Studies (CEPS), Electrical Measurement and Test Laboratory (EMTL), Engineering Services Centre (ESC), Food & Biotechnology Research Centre (FBRC), Glass & Ceramics Research Centre (GCRC), Minerals Processing Research Centre (MPRC), Pakistan Institute of Technology for Minerals & Advanced Engineering Materials (PITMAEM). These centres are not only engaged in indigenous technology

development, provision of Testing and Quality Assurance Services but also effectively contributing to the Human Resource Development (HRD) by providing research guidance to the B.S / M.Sc., M.S / M.Phil. and Ph.D. students from the Academic Institutions.

PCSIR Laboratories Complex, Peshawar

PCSIR Laboratories Complex Peshawar comprises of following seven main Centres:

- Medicinal Botanic Centre
- Materials Science Centre
- Food Technology Centre
- Dimension Stones Centre
- Engineering Services Centre
- Calibration Centre
- Demonstration-cum-Training Centre, Skardu

These Centres are providing services to local industry, Government and Non-government Organizations in diversified fields besides carrying out research for development of economical and effective indigenous raw material based technologies. These Centres are also engaged in providing research supervision / guidance to Ph.D, M. Phil, B.Sc (Hons), M.Sc/B.Sc Engineering students to government universities of KPK in various fields of science and technology. Moreover, the Dimension Stones Centre is effectively contributing to the Human Resource Development through training programmes for the youth of FATA.

PCSIR Laboratories Complex, Quetta

PCSIR Laboratories-Quetta was established in 2004 and consists of Food Technology, Mineral Technology, Chemical Engineering & Pilot Plant Centre including Administration block and Library.

PCSIR Laboratories, Quetta is engaged in R&D activities along with testing/analytical and advisory services to clients from public and private sectors. Quetta Laboratories also provide research facilities to M.Sc., M. Phil and Ph.D students. By utilizing the latest research and development facilities, scientists of these laboratories have developed a number of bench scale processes. The establishment of pilot plant facilities for commercialization is under progress.

Major activities of the laboratories are:

- Collection and dissemination of information related to research and development being undertaken on indigenous fruits, vegetables and minerals.
- Evaluation, characterization and processing of the indigenous resources.
- Enhancement of export potential through value addition to indigenous raw materials.
- Extension of technical and scientific assistance, advisory services to local entrepreneurs and industries.

- Training of scientific/technical manpower.

National Physical and Standards Laboratory (NPSL)

National Physical and Standards Laboratory (NPSL) was established in 1974 under a development project of Pakistan Council of Scientific and Industrial Research (PCSIR) and started functioning practically at its present premises at Islamabad in 1983, as a unit of PCSIR.

Since establishment, NPSL has been operating as the apex body in the field of "Metrology" and is the sole custodian of National Standards of Measurement in the country. It is the first accredited laboratory in the country against ISO 17025 International Standard and is equipped with state-of-the-art equipment for measurement, calibration, testing and analysis. Being the National Metrology Institute (NMI) of Pakistan, it has been mandated to acquire, realize, establish, maintain and disseminate coherent national measurement system of base and derived SI units for physical and chemical metrology.

Besides, providing test and calibration services in different fields of metrology, NPSL maintains linkages with International Bureau of Weights & Measures (BIPM), Asia Pacific Metrology Programme (APMP), Regional Metrology Organizations (RMOs) and National Metrology Institutes (NMIs) of the Asia Pacific region. To maintain International Traceability of its national measurement standards it regularly participates in inter laboratory comparisons (ILC) / proficiency testing (PT) programmes and bilateral arrangements with member countries of Asia Pacific Metrology Programme (APMP).

Fuel Research Centre, Karachi

Fuel Research Centre (FRC) of the Pakistan Council of Scientific and Industrial Research (PCSIR) is the research and development (R&D) centre having the capability to undertake comprehensive R&D, analyses and testing of not only solid fuels like coal and coke but also liquids like gasoline, diesel and petroleum products obtained from coal and petroleum refineries. Thus FRC has served a number of industries and stakeholders of Thar Coal and other coal exploring / mining agencies in evaluation of their coal and fossil fuels. FRC is also engaged to address the issues regarding coal characterization, combustion and utilization. FRC has recently become focal point for cement industries, coal miners and suppliers to assess the quality of coal for their utilization in industries. The centre also carry out research in beneficiation, desulphurization and up-gradation of indigenous coals.

Leather Research Centre, Karachi

In 1959 Leather Section was established in PCSIR Labs Complex, Karachi to serve the tanning industry. In 1981, this Leather Section was upgraded into Research Division. Later on, in 1984 Leather Research Division was upgraded into Leather Research Centre at SITE, Karachi. Leather Research Centre has established the basic facilities to strengthen the local tanneries and assist the exporters.

PCSIR Laboratories, Hyderabad

PCSIR Laboratories Hyderabad is located in the heart of three Industrial zones i.e. Nooriabad, Hyderabad and Kotri. It is playing a vital role in sustainable growth of the region by focusing on various dimensions of rural development technology like value addition in agro produces, solar oriented techniques for safe drinking water, drying & cooking of food stuff and technical support of regional cottage industries as well as actively providing its technical services for quality assurance & control in this region. Students of universities complete their Internship Training under the supervision of engineers and scientists of these laboratories.

Demonstration-cum-Trainig Centre, Skardu

PCSIR Laboratories Skardu "Demonstration cum Training Centre" was established to impart training to the local people in the field of processing and preservation of fruits and vegetables. Since its inception in 1997, the centre has undertaken valuable activities related to training, R&D work, product formation and participation in events for dissemination of information to the local people and contributing in socio- economic development of Gilgit-Baltistan. PCSIR Skardu is working under the supervision of Director General, PCSIR Labs. Complex Peshawar.

Scientific Information Centre, Karachi

A critical aspect of the Scientific Process is the reporting of new results to disseminate information to the large community of scientist and provide information that helps others to interpret their own experimental results. Globally, a Scientific Information Centre is an information and analytical body, which develops method and approaches of perspective development for the improvement of a scientific organization. The Centre collaborates with network of scientific and R & D organizations, for information exchange at National/International level.

In 1956, a publication branch was setup for sharing knowledge and transfer of technology of PCSIR scientists. It started functioning as 'Scientific Information Division (SID) in 1984. In 1989, SID was re-organized and upgraded with augmented activities at par with other independent Centres of the Council and was named "Scientific Information Center (SIC)".

SIC is actively engaged in the dissemination of scientific and technical information, research results of other indigenous local & foreign organizations and institutions through regular and occasional publications for the scientific community. One of the major activities of SIC is the Bi-monthly research journal, Pakistan Journal of Scientific & Industrial Research (PJSIR). Other publications of SIC are: PCSIR Bulletin, Annual Report and R&D Programme.

1.) Objectives & Functions

- Research in the field of Science and Technology for uplift of Scio-economic Development of the country.

- Optimum utilization of indigenous raw materials resources for development of value added products through scientific research.
- Development of technologies based on local resources, from bench scale to pilot plant stages and leasing them out for industrial exploitation leading to import substitution and export enhancement.
- Fostering linkage with private and public sector industries & academic institutions in order to solve problems through R&D programmes and organizing and conducting of symposia, workshop and conferences for exchange of innovative ideas in science and technology.
- To undertake cooperative research with local and foreign R&D organizations and industries on problems faced by them.
- Human resources/ skill development through organized training courses and diffusive on job grooming of manpower for industry and research centers to expand the science and technology base in the country.
- Development of Rural Technologies and Post-Harvest Technologies to improve rural prosperity.
- Establishment and promotion for the use of standards of measurement of physics quantities relating to Physical and Chemical Metrology.
- Establish maintain and disseminate consistent and coherent National Measurement System of basic and derived units.
- To help and guide the industries and other organization to meet the WTO/ ISO challenges/ obligations.
- To provide calibration and testing services for instrument and equipment in accordance with international standards ISO 17025.

2.) Science Wing

2a.) The Performance of PCSIR during the Period is given below:

S.No	Performance Indicator	No.
1	In-House R&D Projects	101
2	Need-Based R&D Projects	22
3	Industrial Processes / Technologies Developed	84

4	Industrial Processes / Technologies Commercialized/ Leased out	18
5	Patents Filed (National/International)	21
6	Patents Obtained (National/International)	01
7	Research Publications (National)	37
8	Research Publications (International)	115
9	Agreements/MoUs signed with Public/Private Sector Organizations and Educational Institutions	35
10	Technical Services Provided (Tests, Analysis & Calibration etc.)	32907
11	Tests Accredited 17025 in PCSIR Laboratories	334
12	Consultancies/Advisory Services Rendered	30
13	Student Supervised (Ph.D, MPhil, MSc, MSc Engineering)	220
14	Training Imparted	40
15	Feasibility Reports Prepared	21

Other Major contributions of PCSIR during the period include:

- Establishment of Common Facility Centre at SIMAP, Sialkot.
  Establishment of Common Facility Centre in Sialkot upon the request of Surgical Instruments Manufacturers Association of Pakistan (SIMAP). Centre will provide testing services to the surgical industry and also provide consultancy and technical expertise to resolve technical issues. Centre is expected to enhance export immensely.
- Need Based Projects (2015-16)

The following need based projects have been initiated and are funded through self-generated funds of PCSIR.

S. No	Project Title	Objectives
1.	Culture of microalgae, *Spirolina* for Nutraceutical and Aquaculture products End User: Vision Foundation, Karachi	• To culture both indigenous and exotic species of *Spirulina.* • To optimize culture media and physical parameters • To process of algae into a fine powder for making tablets and other products for its use as a food supplement in treatment of diseases caused by malnutrition and to enhance the immune system. • Studies on quality aspects of *Spirulina.*
2.	Dietary Supplements Rich In Branched Chain Amino Acid For The Patient Of Liver Cirrhosis. End User: Gold Pharma, Karachi	• To develop a diet formulation from food resources along with the free branched chain amino acids. • To overcome the nutritional deficiency especially the branched chain amino acid for chronic liver disease. • To support industries furnishing for the development of oral supplements for cirrhosis.
3.	Synthesis of triterpenes and other bioactive compounds by microbial biotransformation/chemical method End User: Atiken Stuart Pharma, Karachi	• The main objective of the proposed project is to do different biological activities of triterpenoid metabolites. Detailed biological and biochemical studies will be conducted on the bioactive triterpenoids. The antioxidant and anticancer activities of the isolated and derivatized compounds will be carried out. • Derivatiz • ation of existing drug triterpenes will be carried out. These new analogues of triterpenes will be evaluated to their relevant activities such as anti-oxidant, anti-cancer, anti-diabetic, antifungal, antibacterial. So anti-oxidant, anti-cancer, anti-diabetic, antifungal, antibacterial drugs will be produced. • This project will also help to develop International skills of pharmaceutics for drug production in our labs. • Compounds that act on the enzymes are receiving attention as potential therapeutic agents. Therefore new inhibitors of different diseases will be designed.

4.	Isolation, purification and characterization of Phytase from microbial sources and its potential application. End User: ISIS Pharma, Karachi	• Screening of microbial strain for phytase production. • Media optimization and effect of fermentation conditions for maximum production of phytase enzyme. • Purification and characterization of phytase enzyme. • Potential application of phytase in poultry feed.
5.	Preparation of protein hydrolysate to control fruit flies End User: Food & Biotechnology Industries	• To save cash crops by highly compatible pest management protein hydrolysate • To increase export by improving reducing use of pesticides • To save foreign exchange by developing protein hydrolysate
6.	Development of High Temperature Kiln Furniture/ Refractory End User: All Pakistan Pottery Manufacturers Association, Gujrat	• No any single unit in Pakistan is manufacturing high temperature kiln furniture. Industries are importing kiln furniture from China whose working temperature range is upto 1200^{o}C. But in GCRC we will develop kiln furniture whose working temperature range will be upto 1600^{o}C.
7.	Development of HA coating on Orthopedic Implants with Animal Trials End User: Surgical Instrument Manufacturing Industries, Sialkot	• Production hydroxyapatite (bone substitute) from egg shells • Characterization and Biocompatibility evaluation of powdered HA before coating. • Development of HA coating by plasma spraying and optimization of parameters. • Characterization and implantation testing of coating produced on orthopedic implants. • After successful trials, commercialization of product to support orthopedic industry.

8.	Development of Nano-coatings by Low Cost methods for Photovoltaic Applications End User: Solar Energy Sector	• The project is solely designed to develop a solar prototype which would be economical and energy efficient. The key objectives of the project are: • To develop a TCO layer on glass by Spray pyrolysis Technique, which would be transparent having short circuit resistance in the range of 10 ohm-meter. • To develop n-type CdS layer on glass by Spray pyrolysis Technique, which would be transparent and act as an optical window for device . • To develop p-type CdTe absorber coating on glass and CdS layer to complete p-n junction for photovoltaic action. • To develop a proper back contact for p-type conductivity, which would be more beneficial for the device for long term applications. • To develop various heat treatments to improve the efficiency of solar cell.
9.	Enhancement of Methane Gas Production by using different additives End User: Energy Sector	• To enhance methane gas production by using anaerobic digestion with different additives. • To minimize pollution • To explore new raw materials to produce methane gas.
10.	Synthesis of Zeolite based Nano-fertilizer for slow release of nutrients in soil End User: Agriculture, Food & Fertilizer Industries	• To develop slow release nano-fertlizers by increasing nutrient availability in the plant-soil system. • To help industry in implementation of industry-centric and application-driven projects based on nanotechnology • Self-sufficiency and self-reliability • Prepare value added products and materials • Technology transfer • Capacity building
11.	Development of Industrial Chemicals: • Utilization of Used PET	• Development of technology for the manufacturing of DOTP (from used PET materials) and Tri-Octyl Trimelitate (TOTM) • Self-sufficiency and self-reliability in the field of

	Materials (Off-Spec PTA) for the production of Low Cost Di-Octyl Terephthalate (DOTP)] • Developmen t of Trioctyl Trimelitate (TOTM) End User: Qaiser LG Petrochemicals (Pvt.) Ltd. Lahore	Plasticizers (Melitates & Terephthalates) • Capacity building & Self Reliance • Technology TransferImport Substitution
12.	1.3 Micro Feeder Controller End User: Food/ Wheat flour Industry	• The main objective of this project is to provide import substitute, to introduce technology and design, development and fabrication of scientific lab equipments in order to save the revenue.
13.	Preparation and utilization of Opuntia extracts in herbal products End User: Orient Enterprises, Peshawar	• Investigating different pharmacological activities. • Extraction and fractionation into constituents responsible for different bioactivities. • Preparation of standardized extracts and value added products/herbal drugs of Opuntia spp, based on the above studies.
14.	Preparation of herbal product from Saw palmetto for the treatment of Benign Prostatic Hyperplasia (BPH) and Urinary Tract Infection (UTI) End User: Dawn Pharmaceuticals,	• The project has high priority in view of the fact that traditional system of medicine will be established on the bases of modern technology and is estimated to cover the needs of large portion of the population of the country. • To save valuable foreign exchange spent on the import of drugs and also to earn Foreign exchange by export of Medicinal Plants extractives and its products

	Peshawar	
15.	Utilization of food industries processing waste (by-products) in the preparation of novel food (Nutraceutical) End User: Integrated solutions, Peshawar	• To create awareness about hazards of these toxins to livestock and human health • To study food processing waste (peel) of citrus, apple and potato scientifically for estimation and isolation of bioactive compounds such as antioxidants. • Evaluate different extraction techniques for maximum recovery of bioactive compounds for industrial application and feasibility. • Application of extracted antioxidant constituents in drinks /different food products, marked as natural antioxidant diet with reference to health benefits. • Replacement of synthetic/imported products with natural source.
16.	Synthesis of Polyacrylic Resin as Superabsorbent for Plastic Industry. End User: Institute of Research Promotion, Lahore	• To develop indigenous technology for the Preparation of Polyacrylic Resin as superabsorbent for import substitute
17.	Exploration of Future Fuel for the Boilers of Industries and Coal-based Power plants – Co-combustion studies of some novel renewable fuels/coal blends End User: Jamshoro Power Company Ltd., Jamshoro	• To explore the potential of some economical biomass sources as a fraction of future fuel for boilers of industries and coal-based power plants of the country. • To estimate the reactivity parameters of selected coal, biomass materials, and their blends upon combustion. • Kinetic studies of co-combustion reactions will be carried out to evaluate activation energy and to propose kinetic modeling. The comparison of the combustion characteristics in controlled laboratory settings will aid in the design and optimization of practical coal and biomass blend facilities under specified conditions. • To propose appropriate coal/biomass blends which meet the specification of proper fuels for power plant and boilers. • A reduction in emission pollutants during co-combustion

		of coal/biomass blends will be measured, controlled and compared with the individual fuels. • The fusibility of ash of co-combustion blends will also be evaluated to propose appropriate methods for ash removal from boilers of industries or power plants. • To estimate the cost of the energy produced per unit of fuel blend and its comparison with the energy produced by indigenous coal.
18.	Production of coal tar and Char from Pakistani lignite and its utilization in the industries of Pakistan. End User: Niaz Muhammad Khan & Brothers Engineers & Constructors, Karachi	• Utilization of Lakhra and Thar Pakistani lignite reservoirs for production of coal tar and char. • To explore appropriate methods for production of coal tar and char extracted from Pakistani lignite • Chemical treatment of coal on lab scale for extraction of coal tar and char from Pakistani lignite. • Characterization of coal tar and char. • Marketing of coal tar and char in different local industries of Pakistan. • To carry out the production of coal tar and char on pilot scale after increase the consumption in different local industries of Pakistan.
19.	Easy Maintainable Leather with Upgraded properties through advance Nano Material. End User: Leather Industry	• To prepare the nano/micro size materials have antimicrobial, Oleophobic hydrophobic and stainresisting properties. • To develop appropriate leather processing technology for the application of above smart materials in leather, making. • To achieve the very easily and cost effective maintainable leather for new generation leather goods, to be used in rains, seals, oil places etc.
20.	Investigation of causes of Spew problem being faced by Pakistan Leather Industry and the replacement of degreasing chemicals by appropriate	• To find out the main causes of spew problem being faced by Pakistan Tanning Industry. • To develop highly effectiveeco-friendly enzyme for leather processing to remove unwanted natural fat from skins.

	enzyme technology. End User: Leather Industry	
21.	Development of Zero Formaldehyde Syntan for Leather Industry End User: Leather Industry	• To prepare a synthetic tanning agent that does not produce toxic effects, i.e., it must be eco-friendly and safe for tanning industry, workers and consumers. • To replace the use of toxic chemicals by less or non-toxic and free from formaldehyde products or synthetic tanning agent. • The Synthetic resin will be applied on wet blue and would perform chemical and physical test. • Similar characteristics derivatives of syntan are planned to synthesize and application in Leather Processing.
22.	Design, Fabrication of Prototype Solar Oriented Dehydrator for Drying Dates & Chilies End User: Solar Energy Sector and Food Industry	• To develop a prototype natural convection dryer for carrying out experimental studies of drying characteristics of red chillies and dates (agriculture Crops) • To Design and fabricate a suitable prototype dryer for drying cash crops especially dates variety Aseel and Begum Jungi and Chilies

3.) Technology Wing

3a.) Development Activities

Ongoing Development Projects (PSDP) 2015-16

S. No.	Project Name
1.	Up-Gradation, Balancing, Modernization and Refurbishment (BMR) of National Physical and standards Laboratory (NPSL) Pakistan
2.	Up-Gradation & Modernization of Pilot Plants of PCSIR Laboratories Complex, Karachi
3.	Up-gradation and Modernization of Building of PCSIR labs Complex Karachi

S. No.	Project Name
4.	Balancing, Modernization & Refurbishment (BMR) of PCSIR Laboratories Complex, Lahore
5.	Up-gradation and Modernization of Herbal, Mineral & Food Pilot Plants at PCSIR Labs. Complex, Peshawar
6.	Modernization and Up gradation of Electrical Test Centre For Household Electrical appliances and Lighting Products
7.	Establishment of Proficiency Testing Provider Facility for Analytical Laboratories, NPSL, Islamabad.

Completed Development Projects (PSDP) 2015-16

Sr. No.	Project Title	Project Outcome
1	Up-gradation and Modernization of Mineral, Herbal and Food Pilot Plants of PCSIR Labs Complex, Peshawar.	• Herbal, Mineral and Food Pilot Plants facility have been established for the production of various products at PCSIR Labs Complex, Peshawar. • Transfer of developed technologies to entrepreneur, industrialist and stakeholders. • Facility will support research work as well development of new products. Up gradation of Pilot Plants at PCSIR Labs Complex, Peshawar will lead to the development of technologies for the production of value added products utilizing the indigenous recourses thus resulting in a cut in total import figures.
2.	Establishment of Proficiency Testing Provider Facility for Analytical Laboratories NPSL, PCSIR Islamabad.	• Established the Lab facility to improve the Quality Control / Quality Assurance system in Pakistan. • NPSL is able to provide the traceability of testing & Calibration facility in selected areas and to provide reports accepted internationally.

		• NPSL is able to validate methods and produce CRMs.

3b.) Human Resource Development/ Skill Development Programs Executed Through Following Institutions under PCSIR

- Institute of Industrial Electronics Engineering, Karachi.
- Pak-Swiss Training Centre, Karachi.
- Precession System Training Centre, Lahore.
- Precession System Training Centre, Peshawar.
- Precession System Training Centre, Quetta.
- Cast Metal & Foundry Technology Center (CM&FT), Daska.

Institute of Industrial Electronics Engineering

The Institute of Industrial Electronics Engineering (IIEE), Karachi was established in the year 1989 in collaboration with SWISSCONTACT (Swiss Foundation for Technical Cooperation) to provide technical and professional programmes in developing countries. The programme for Industrial electronics and engineering organized and implemented by IIEE is the only of its kind being extended in country.

The institute offers four years degree programme and is affiliated with the NED University of Engineering and Technology. It trains 46 students in an academic year wherein the students learn to operate and maintain electronic plants and equipments in the present industrial system. The Institute is equipped with state of the art equipment and machinery and arrayed with learned teachers. A library and an auditorium with latest audio visual equipment facilitates the learning process.

The Institute offers a four year course leading to degree of Bachelor of Engineering in the discipline of Industrial Electronics. The main objective of this course is to provide the student with a thorough grasp of the fundamentals on which the modern engineering science is based. Theoretical instruction is supplemented with relevant experimental work in the laboratories and workshops.

Pak- Swiss Training Centre, Karachi

Since its inception in 1965 PSTC, Karachi has progressed and introduced training programs in different disciplines. Firstly, it started a training programme 03 years Diploma of Precision Mechanics and Instrumentation Technology (PMIT). Due to its high standards and recognition, the trained manpower played their role in national development and capacity building of national industries. PSTC is also conducting a Degree Program B.Tech. in Mechanical Technology for the passed out DAE students with the affiliation of NED University of Engineering & Technology. A Batch of 30 students being admitted every year. Three Years Diploma Course of Associate

Engineer in Precision Mechanics and Instrument Technology for 48 students per year and 04 Years Specialized Diploma of Associate Engineer in Dies & Mould Technology for 18 students per year and in the Evening 66 students are trained according to the methods followed in Switzerland. The Course is affiliated with the Sind Board of Technical Education, Karachi. Three years Diploma Course of Associate Engineer in Instrumentation and Process Control Technology in the field of Process Control Instrumentation & Engineering also initiated in the year 2005 for a Batch of 30 students from all over Pakistan.

In addition to the regular Diploma courses PSTC is also organizing and conducting the evening short courses for in service engineers & technologists to upgrade their skills and knowledge in the field of CNC Programming and Operation (CAD/CAM), Process Control Technology, Dies & Mould Technology. About 300 in-service engineers & technologists are trained every year.

Precision Systems Training Centre, Lahore

Precision Systems Training Centre – Lahore (PSTC – Lahore) was established in 2007 considering the requirement of the local industry for introducing training programme in Mechanical and Instrument Technology .
Objectives are to provide the foundation for development and generation of technical know-how and to organize and conduct training in the following fields:

i. Precision Mechanical and Instruments Technology [Diploma of Associate Engineer (DAE), 03 years course]

ii. Dies and Moulds Technology with specialization in special purpose machines [Diploma of Associate Engineer (DAE), 04 years course]

iii. Short term courses of 06 to 24 weeks duration for Engineer and Technicians employed in the industries.

The centre also offers Chartered Engineering (Mechanical) Level courses though City & Guilds, U.K.

Precision Systems Training Centre, Peshawar

The main objectives of Precision System Training Centre (PSTC), Peshawar are:

i. Organizing and conducting three years Diploma course of Associate Engineer in Precision Mechanical & Instrument Technology and Four Years Diploma course of Associate Engineer in Dies & Mould Technology.

ii. Organizing & conducting short term courses of 4 to 24 weeks duration in the field of Machine Tool Operations, CAD/CAM, Process Control, Dies & Mould, Engineering Drawing and Design.

iii. Laying foundation for generation of technical know-how and manufacturing facilities for precision type of machine tools and its components, gauges, jigs & fixtures and dies & moulds, resulting in the saving of valuable foreign exchange.

Provision of much needed consultancy and production services to the industrial sector in order to relieve them off the additional burden of time as well as finance consuming practice of going to Lahore and Karachi for the purpose.

Precision Systems Training Centre, Quetta

Precision System Training Centre was established at Quetta in 1986. The Centre is involved in the development of specialized manpower and R&D activities. It is conducting 03 years course of Diploma of Associate Engineers in the field of *Mechanical Technology (with Specialization in Precision Machining and Instrument Technology)*.The centre is regularly providing Training Course of Three Years Diploma of Associate Engineer (DAE) in the field of Precision Mechanical and Instrument Technology. A total number of 296 students have been qualified for the award of DAE certificate. Main objectives of diploma are;

i. To lay the foundation for the development and generation of technical know-how in the field of instruments and precision Mechanical Engineering.

ii. To organize and conduct a three years diploma for 30 students annual basis.

iii. To organize short-term courses of 3 to 6 months duration for Engineers and technicians employed in local industry.

iv. Development of manufacturing facilities for precision type of machines and components, gauges, tools, jigs & fixtures which are in enormous demand in local industry resulting in the saving of valuable foreign exchange.

v. Development of technical know-how and facilities for the designing of machines, equipment and instruments.

Cast Metal & Foundry Technology Centre (CM&FT), Daska

The Cast Metals & Foundry Technology Centre, Daska was established at Punjab Small Industries Estate, Daska in the year 2005. The centre is providing multi-dimensional services to all engineering industries especially the Cast & Metal Industry.

Cast Metals & Foundry Technology Centre conducts and promotes industrial projects and help research scholars, institutes and industries.

Pakistan Engineering Council (PEC)

Introduction

Pakistan Engineering Council (PEC), a statutory body constituted under Act of Parliament in 1976. The prime function of PEC is to regulate the Engineering Profession and Engineering Education in the country. PEC has its Headquarter at Islamabad with Regional offices in provincial capitals and branch/ liaison offices in various cities. The Governing Body (GB) is vested with general directions and administration of the council and its affairs. GB is composed of sixty-five professional engineers registered with the Council and elected for term of three years as per details given under:

a)	Chairman	01	Elected
b)	Sr. Vice Chairman	01	Elected
c)	Vice-Chairmen	04	Elected one from each Province.
d)	Members	40	Elected
e)	Members	18	Nominated
f)	Registrar	01	Nominated
	Total	65	

1. Mission

PEC aims to elevate standard of engineering education and engineering practices in line with internationally recognized criteria. The mission of PEC is to provide cross boarder mobility, equivalence to internationally recognized accreditation process and regular review of engineering curriculum with continuing advancement of engineering education and engineering practices in the country.

2. Vision

PEC is financially a self-sustaining institution, meets its expenses from the accrual of registration fees from engineers, constructors, operator and consulting firms and having no dependency on government or any other outside agency.

3. Functions and Objectives

- Maintaining Register of persons qualified to work as Registered Engineers, Professional
- Engineers, Consulting Engineers, Constructors and Operators nationwide.
- Accreditation of engineering qualifications for the purpose of registration of Registered
- Engineers, Professional Engineers.
- Promotion of engineering education and review of course of studies in consultation with the Universities.
- Ensuring and managing of Continued Professional Development.
- Establishing standards for engineering contracts, cost and services.
- Assistance to the Federal Government as a Think Tank.

- To recommend the bills for legislation pertaining to engineering profession, engineering education and engineering works.

4. Achievements of Regulation of Engineering Education

Major achievements of PEC during 2015-2016 regarding benchmarking and International recognition of engineering qualifications offered in Pakistan.

1.	**Accreditation Recognition by Federation of Engineering Institutions of Asia and the Pacific (FEIAP)** The Federation of Engineering Institutions of Asia and the Pacific (FEIAP) is an international non-profit professional organization founded on 6 July 1978 under the umbrella of UNESCO for the purpose to recognize accreditation and registration processes within the region, granting substantial equivalence based on the laid down standards/benchmark. Pakistan has been declared as substantially equivalent economy for the purpose of accreditation and qualification standardization in 2016 by FEIAP, leading towards the mobility of engineers in Asia and Pacific region with the required competency. PEC was officially awarded certificate of recognition by FEIAP during its 24th General Assembly at Perth, Australia on July 6-9, 2016. PEC has also been appointed as "Mentor and Reviewer" for FEIAP member economies who will apply for acceptance under the accreditation system as per FEIAP guidelines. PEC has been nominated as focal organization for central Asian Republics to be invited to join FEIAP. Necessary mentoring will be provided by PEC and facilitated by Science Foundation, Islamabad in consultation with the Ambassador of Tajikistan in Islamabad. This will facilitate our registered engineer's mobility to Asia and Pacific region for the job market/work. UNESCO has also endorsed as the Director UNESCO (Asia & Pacific region) was present during this achievement; and attended official meeting on Dec 17, 2015 at PEC HQ to congratulate Chairman, PEC and to work further for strengthening international collaboration.
2.	**Provisional Signatory status of Washington Accord (WA)** Pakistan accepted as provisional signatory to WA in June 2010 during the International Engineering Alliance (lEA) meeting at Ottawa, Canada. During the progress towards full signatory status, PEC has gone through continuous mentoring by WA-Experts from the nominated WA signatories (Singapore and Malaysia). lEA has

	developed a comprehensive Accreditation Manual/Guidelines in-line with international practices/processes accepted by WA mentors during 2013-14 after going through an extensive exercise of consultation with stakeholders at national and international levels. Meanwhile extensive training workshops and international seminars were conducted throughout the country/region to create necessary awareness and to bring Engineering institutions with the required understanding and capacity to adopt newly introduced concept of Outcome-Based Education (OBE approach) and assessment system. Mentoring countries have recommended finally Pakistan in 2016 for the final Review visit by the Washington Accord Executives towards granting full signatory status to PEC/Pakistan. The final review visit by IEA lWA was delayed due to security situation in the country now trying utmost to provide security assurance to delegates at state level. In the light of IEAM-2016 decision the final review visit of Pakistan has been conducted in November, 2016. After achieving full signatory status of WA which is the apex body in engineering accreditation/recognition globally will be a milestone in the history of PEC towards substantial equivalence and international recognition of engineering qualifications and to facilitate mobility of engineers across the borders. This will result in further promoting job opportunities without requiring any additional assessments and passing exams etc. in other countries. This will also provide opportunities to engineering consultants and constructors to apply for international projects with internationally recognized local engineers. After obtaining full membership, Pakistani graduates will be entitled for entry to International Register of Professional Engineers which would result in increased mobility and enhanced job opportunities internationally.
3.	**UNESCO-FEIAP-PEC Dialogue/meetings on Engineering Qualification Standardization and Benchmarking** • PEC took initiative to hold this international 2-days workshop in Islamabad in collaboration with UNESCO and FEIAP on Jan 9-10, 2015 in Islamabad. • Warmly participated by National (VCs and Deans of local institutions and industry representatives) and international participants (Chairman ECOSF, Chairman ISTIC, President FEIAP), including UNESCO regional and country Directors. • Ambassadors from Central Asian Republics and Malaysia also joined • Six working groups with various assignments formulated • UNESCO agreed to help towards establishment of National Engineering Academy (NEA). The concept paper has been prepared and the PEC has already

	requested to the Federal Government and CDA to allocate required land. • The progress was presented by PEC focal person in the last FEIAP GA meeting at Taipe which was appreciated to continue such efforts.
4.	**Implementation of the Outcome Based Education and Assessment (OBE/OBA) System in the country-a paradigm shift:** Accreditation of Engineering Programs offered in the country has been carried out through a comprehensive procedure adopted as per the PEC Accreditation Manual-2007 and subsequent updated version 2014 (Outcome Based Education system). The Manual-2014 is in-line with the guidelines of Washington Accord (WA)/International Engineering Alliance (lEA). PEC has continuously been involved in capacity building of the concerned faculty, program evaluators and the quality directors of HEls through local and international workshops and training sessions throughout the country. The Higher Education Commission (HEC) Islamabad has also extended support and funding for conducting several workshops. This is a paradigm shift in engineering education and accreditation in the country to make the systems as per the international standards and best practices. The major HEls in the country have adopted this system. This has been confirmed through acceptance by the FEIAP accreditation systems at the Asia and Pacific level. The final verification visit for implementation of this system for full signatory status of Washington Accord has been conducted in November 2016.

5. Accreditation of Engineering Programs(Under Graduate Level)

Accreditation of Engineering Programs offered in the country has been carried out through a comprehensive procedure adopted as per the PEC Accreditation Manual-2007 and subsequent up dated version 2014 (Outcome Based Education system).

A. Summary of Accreditation Visits Conducted from Jan 2014 to June 2016

➢ Overall Accreditation Statistics up to June 2016:

i.	Accredited Engineering Programs till date	:	333
ii.	Under Process Engineering Programs	:	100+
iii.	Accredited Engineering Programs as per OBE Manual 2014	:	18
iv.	Engineering Universities/HEls	:	116
v.	Engineering Disciplines accredited so far	:	29

➢ International programs accredited/recognized

i.	Accredited Engineering Programs till date	:	302
ii.	Universities/HEls/Accrediting Bodies	:	201

B. Key Areas and Priorities for Reforms

PEC is in the process of taking various initiatives and further reforms in line with the vision of Chairman, PEC towards engineering education in order to regulate, maintain and enforce the relevant provisions given under the PEC Act &Bylaws. The focus is towards consolidation and strengthening of quality education through standardization of whole process.

C. Consultative Workshop on Reforms Pertaining to Engineering Education Regulations and Accreditation Process

PEC has arranged seven regional workshops by the head of institutions, experts from academia and industry in Public/Private Sector HEls across the country focusing core engineering education themes. Final recommendations of these consultative workshops/reforms were placed in 33rd Vice Chancellor Committee meeting held on May 3, 2016 at PEC HQ, Islamabad with representation of all regional Group Leaders. The recommendations were approved in 25thGoverning Body meeting held on May 31, 2016 at PEC Head Office, Islamabad.

6. Registration of Engineers, Consultants and Constructors

In order to get national and international recognition of engineering qualification and as abona-fide engineer, it is mandatory to obtain registration with Pakistan Engineering Council. The council is the official body having the sole right of providing registration in the country for practicing engineers. Such registration also provides brighter employment opportunities &service structures. PEC also registers consulting engineers, constructors and operators. Up to June 2016, the strength of registered engineers, professional engineers, consulting engineers, and constructors/ operators, is as stated below:

Description	Up to June 2016
No. of Registered Engineers (RE)	116828
No. of Professional Engineers (PE)	89996
Total:	206824
No. of Registered Consulting Engineers	1763
No. of Registered Constructors	76484
No. of Registered Operators	842

7. Continuing Professional Development (CPD) Department

The major activities of the CPD Department are categorized into three areas including: 1) organizing CPD activities (short courses, workshops, seminars, technical session) country wide based on approved CPD yearly calendar; 2) regulation of Professional Engineering Bodies (PEBs) registered with PEC to impart CPD activities to the engineers; and 3) performing all activities for holding Engineering Practice Exam (EPE) twice a year. In addition, CPD Department also involved in development and launching of different Codes during the year 2015-16.

Under the provisions of CPD Byelaws 2008, PEC has registered Engineering Universities, technical organizations and professional entities known as Professional Engineering Bodies (PEBs), to join hands with PEC for imparting CPD activities to the large community of engineers. This involves: registration of PEBs after due scrutiny and approval by EPOC; issuing of license and thereby renewal after three years, scrutiny and approval of their yearly CPD calendars by EPOC; maintenance of CPD record of their activities being received as CPD returns; related monetary affairs and regular correspondence for compliance. So far PEC has registered 124 PEBs.

CPD Activities (Short Courses / Workshops) conducted by PEC		
Province	**No. of Short Course**	**No. of Participants**
Federal	09	1331
Punjab	10	1201
Sindh	09	1025
KPK	06	874
Balochistan	02	272
AJK	03	280
GilgitBaltistan	01	63
Total	**40**	**5046**
CPD Activities (Short Courses / Workshops) Conducted by PEBs		
Province	**No. of Activities**	**No. of Participants**
Federal	13	268
Punjab	57	3074
Sindh	40	1376
KPK	21	513
Balochistan	2	268
AJK	11	115
GilgitBaltistan	0	0
Total	**144**	**5614**
Interactive Workshops on CPD Framework for Professional Development of Engineers From July 2015 to June 2016		
Province	**Institution/Organization**	**No. of Participants**
Punjab	04	271
Federal	01	70
Total	**05**	**341**

8. Think Tank Department of Pakistan Engineering Council

The prime function of Think Tank Department of Pakistan Engineering Council is to assist to Government of Pakistan on various sectors connected or involving engineering disciplines i.e. Water, Energy, Telecommunication, Building &Infrastructure etc. to assist the government in policy making for various quarters. The prime task of Think Tank is to identify gaps, challenges, and to formulate requisite polices based on strategies while prioritizing small and long term developmental plans. PEC has developed four national codes so far:

- **Building Code of Pakistan Seismic Provisions-2007**
  Funded by Ministry of Water and Power through NESPAK

- **Building Code of Pakistan Energy Provisions-2013**
  Funded by Ministry of Water and Power through ENERCON

- **Pakistan Electric and Telecommunication Safety Code-2014**
  Funded by Ministry of Water and Power through USAIO

- **Building Code of Pakistan Energy Provisions-20016**
  Funded by Ministry of Climate Change through NOMA

Pakistan Electric and Telecommunication Safety Code (PETSAC-2014)

PEC has also developed 'Pakistan Electric and Telecommunication Safety Code (PETSAC-2014)'notified for nationwide enforcement under S.R.O. 716 and 717 dated July 30, 2015 to ensure electric and telecommunication related safety qualifications required to be adopted for utilities' personnel and the general public. PETSAC-14 is based on C2-2012, National Electrical Safety Code and made under international license agreement by IEEE, SA, U.S.A. - Further PEC developed 'Alternate Energy Resource Portal' available on PEC website (http://energy.pec.org.pk), which is to provide consolidated and exclusive information related to national and international business community dealing in energy sector. The aim is to facilitate end users, manufacturers, suppliers, consultants and solution providers.

Building Code of Pakistan (Fire Safety Provisions-2016)

Every year a significant number of casualties and injuries occur as a result of fire incidents in the Country. Unfortunately about 70% deaths occur in existing buildings including housing and industrial units only due to non-provisions of fire protection systems. A large number of major fire incidents occurred in big cities during year 2014-15, wherein a significant number of people perished by fire with massive loss of material and property apart from creating environmental pollution. In this regard, the Government of Pakistan mandated the National Disaster Management Authority (NOMA) through Ministry of Climate Change to mitigate and minimize major fire incidents in the Country. For this purpose, PEC and NOMA entered into an **MoU for development of Building Code of Pakistan -Fire Safety Provisions (BCP-FSP-2016) on October 15, 2015.**

PEC in collaboration and financial assistance extended by NOMA initiated the development of Building Code of Pakistan - Fire Safety Provisions - 2016 (BCPFSP-2016), which is bench marked with National Fire Protection Association (NFPA), USA, NFPA 1 Fire Code 2015. These provisions provide a unified system of fire prevention, protection and life safety standards for safeguarding human lives and reducing material loss to residential and industrial building systems. The implementation and enforcement of these Provisions shall vest with following as Authority Having Jurisdiction (AHJ) within their respective jurisdictions/ circles:

1. Building Control, Housing and Development Authorities
2. District Administration
3. Tehsil/town Administration
4. Municipal Administration
5. Station Headquarters (Army, Air Force and Navy)
6. Cantonment Administration
7. Union Council Administration
8. Autonomous Bodies
9. Industrial Estates
10. Directorates of Civil Defense
11. Export Processing Zones
12. Other Federal/Provincial Authorities as and when notified

The Ministry of Science and Technology and Ministry of Law and Justice has approved the notification of the Building Code of Pakistan Fire Safety Provision-2016 after successful publishing in Gazette of Pakistan PEC and NOMA will launch the fire safety provisions-2016.

9. Implementation of Building Code, with Particular Reference to Provisions regarding Earthquake, for Suggesting Penal Provisions, Measures and Mechanism regarding Violation of the Code

On the directives of the Senate Sanding Committee on Law and Justice, PEC and NOMA constituted a Task Force for development of Penalty Provision and Implementation Mechanism of Building Code of Pakistan-Seismic Provisions (BCP-SP 2007) which successfully accomplished this national task and proposed amendments in PEC Act 1976 under Section 8A. As per directions of Senate Standing Committee on Law and Justice PEC has prepared the Bill and same will be forwarded to Ministry of Science and Technology to Table the same for legislation after abating approval by the Cabinet. For effective implementation of Building Code of Pakistan following are proposed institutions responsible for ensuring implementation of Building Code of Pakistan at various stages during building construction.

Sr. #	Stages/Duties	Responsible Institutions
1.	Testing the quality of construction material	PSQCA
2.	Geotechnical Engineer/Consultant	Duly registered with PEC
3.	Architect	Duly registered with PCATP
4.	Structural Design by the Engineer/Consultant	Duly registered with PEC
5.	Constructors	Duly registered with PEC
6.	Supervision by Building Control Authorities/Executing Agencies	Like CDA, Ministry of Housing, NOMA, Pak PWD, Commissioner/mayor etc

Pakistan Halal Authority (PHA)

Introduction

Pakistan Halal Authority (PHA) was established through an Act of the Parliament known as the Pakistan Halal Authority Act No. VIII of 2016.

The purpose of establishing PHA is to promote imports and exports, trade and commerce with foreign countries and inter-provincial trade and commerce in Halal articles and processes. The Provincial Governments and the respective governments of Gilgit Baltistan and Azad Jammu and Kashmir may also opt to adopt the provisions as envisaged in the Act.

There exists a huge international market of Halal business worth trillions of dollars, bulk of which is being taken away by non-Muslim countries. Countries mostly involved in the Halal products exports are Brazil, Australia, Malaysia, Indonesia, Thailand, China, Korea, South Africa, America etc. The scope of the Halal sector covers a wide range of items such as food, pharmaceuticals, health, food supplements and toiletries etc. 85% of the Halal Food imports by OIC Nations are from Non-Muslim Countries. Pakistan being a Muslim country is taking only a nominal share of this huge export potential, due to non-existence of a legal and recognized entity / authority at the national level dealing with the Halal sector.

Powers and functions of the Authority:

Powers and functions of the Authority shall be to:–

(a) Develop and implement strategies, plans and programmes for promotion of imports and exports, trade and commerce with foreign countries and inter-provincial trade and commerce in Halal articles and processes;

(b) Recommend the Halal Standards developed for articles and processes, to be notified in the official Gazette by the Federal Government for adoption and notification by the National Standards Body:

In this context, the Authority may consider the OIC Guidelines in schedule-I, relating to Halal food and other articles or processes, as modified by the Organization of the Islamic Cooperation from time to time, as a reference point;

(c) Recommend mechanism for the Accreditation of Halal Certification Bodies and adoption of Halal Certification systems;

(d) Gevelop policies, plans and programmes for ensuring compliance of Halal articles and processes with the Halal Standards;

(e) Develop and authorize use of Halal logo for Halal articles and processes;

(f) May operate as a certification body after obtaining due accreditation from the National Accreditation Body;

(g) Levy fees for issue or renewal of the Halal certificate and / or authorizing the use of Halal Logo;

(h) Maintain a register of all persons, firms and companies authorized to use the Halal logo;

(i) Inspect and test Halal products and processes for their quality, specification and characteristics with relation to the Halal Standards, for purposes of imports and exports, trade and commerce with foreign countries and inter-provincial trade and commerce;

(j) Prohibit production, storage and sale in the Islamabad Capital Territory of such Halal products as do not conform to the Halal Standards;

(k) Arrange and conduct public awareness campaigns in relation to the Halal sector in general and to Halal products and processes in particular;

(l) Secure international recognition of the Halal logo to build confidence in the Halal Certification system and Pakistani Halal products abroad;

(m) Co-ordinate with national and international organizations for strengthening the Halal sector;

(n) Promote and encourage establishment of libraries and laboratories for the purpose of developing the Halal sector;

(o) Collect and circulate statistical and other information relating to the Halal sector; and

(p) Any other function assigned by the Government for development of the Halal sector and promotion of Halal products and processes for purposes of the Act.

Activities:

The Ministry of Science & Technology and its various organizations i.e. Pakistan Standards and Quality Control Authority (PSQCA), Pakistan Council for Scientific & Industrial Research (PCSIR) and Pakistan National Accreditation (PNAC) has taken a number of initiatives for the promotion of Halal Sector over the past few years.

a. Pakistan Standards and Quality Control Authority (PSQCA) has formulated following standards on Halal:

   i. General Requirements for the Accreditation Body Accrediting Halal Certification Bodies (PS: 5241-2013).

   ii. Halal Food Management System requirements for any organization in the food chain (PS: 3733-2013).

   iii. General criteria for the operation of Halal certification bodies (PS: 4992-2010).

iv. General Guidelines for Halal Cosmetics and Personal Care Products (PS: 5319-2014).

b. Pakistan Council of Scientific and Industrial Research (PCSIR) has established Halal Authentication laboratory at PCSIR Labs Complex, Lahore and Peshawar to support local industries and regulatory authorizes for export and import of Halal items (especially food & cosmetic) according to Islamic Shariah.

c. Pakistan National Accreditation Council (PNAC) being National Accreditation Body has taken initiative by launching Halal Accreditation Scheme according to Pakistan Standard PS 4992-2010 in–line with the requirements of OIC/SMIIC Halal Guidelines for the recognition and acceptability of Halal Certification Bodies and the certificates issued by these accredited Halal Certification Bodies. PNAC has awarded accreditation certificate to 04 (Four) Halal Certification Bodies in the country.