

Chapter 25 | SCIENCE AND TECHNOLOGY

The progress in science and technology have altered the way people live, connect, communicate and transact. However, the major impact of Science & Technology during last few decades has been on economic development. This becomes more important for developing countries as they seek rapid economic growth in short span of time. The practical approach to adopt this strategy would be acquiring advancement in latest technologies, producing talented scientists, engineers and technicians in key areas, nurturing entrepreneurial culture, focus on innovation, and realizing collaboration among industry, R&D Institutions and academia. The extent to which developing economies like Pakistan emerge as economic powerhouses depends on their ability to grasp and apply insights from science and technology and use them creatively.

6th pillar of Vision 2025 describes concept of “Developing a Competitive Knowledge Economy through Value Addition”. Higher Education and Science & Technology are main contributors for Knowledge based economic development. The vision document emphasizes on competitiveness, innovation and sophistication. The competitiveness can be driven by leveraging knowledge to increase efficiency. Another important step suggested in vision is a cluster based development approach and improved academia, R&D & Industry linkage. Establishing Science & Technology Parks and Incubation Centres as well as increasing productivity in every walk of life are some other important factors responsible for knowledge based economic development. 11th Five Year Plan emphasizes on transition from an input-driven to a productivity-driven growth strategy. The role of institutions of the higher learning will be creating leadership through the production of skilled, innovative and enterprising knowledge workers while R&D organizations will undertake solution based and innovative research in collaboration with the industry and academia for fruitful results.

Performance review 2016-17

Physical

- Pakistan Council of Scientific & Industrial Research (PCSIR), provided 12728 nos. of technical services (Tests)/ calibrations to local industry/ enterprises whereas, 58 nos. of feasibility / technical reports/ consultancy services provided to businesses/ clients. 19 nos. of patent obtained while 43 processes developed, 9 of which leased out to the interested parties. A total number of 45 trainings/ seminars / workshops were conducted in the industrial hubs across the country to popularize the R&D culture. A total number of 86 research papers were published in notable international journals. During 2016-17, PCSIR would be completing 5 development projects in 2016-17 having main focus on strengthening the lab infrastructure to better serve the growing clientele.
- PCSIR has also developed and fabricated 35-40 analytical and clinical equipment for measurement in clinical, industrial and laboratories of universities. Agricultural

products developed are bio-fertilizers, pesticides and insecticides like phytofix, sarsabz, sulfokil, tenekil, neem fertilizer, phenyl, etc. having wide agricultural applications. Technical training centers of PCSIR at Karachi, Lahore, Peshawar, Quetta and Daska are providing 3-4 years diploma certificates in Cast Metal & Foundry Technology, Dye & Moulds and Precision Systems Mechanics and Bachelor degree in Industrial Electronics Engineering. More than 300 students are awarded diplomas/ degrees annually with high rate of probability of landing suitable jobs as per the qualification.

- Pakistan Science Foundation (PSF) under Science Talent Farming Scheme paid monetary benefits to 289 students out of selected 300 students in 1st batch. The goal of the programme is to harvest young talent from across the country to support and groom them all the way to the highest degrees. The programme will progressively expose them to advancements in the S&T by providing opportunities to the toppers to visit international S&T institutes and universities. Selection of 300 students for 2nd batch has been finalized, as per criteria laid down in the PC-I.
- Certification Incentive Programme (CIP) for Small & Medium Enterprises (SMEs) under PQI initiative was conceived by Ministry of Planning, Development & Reform and approved. Ministry of Science & Technology is implementing the project. The programme will guide and support SMEs to adopt new trends of international competitiveness by improving industrial productivity and quality. During the CFY 2016-17, CIP awareness seminars were held at Karachi Peshawar and Quetta. In addition to this, numerous interactive seminars, workshops, consultative meetings, lectures disseminated awareness/ enhance competitiveness of SMEs. These activities were held at industrial hubs/ cities across country in collaboration with relevant Trade associations, Chambers of commerce & Industry, SMEs Academicians and other stakeholders. So far, 92 applications from Punjab, Sindh and Khyber Pakhtunkhwa have been received from various SMEs for the award of Incentive Grant for various Certification schemes.
- Another project to create awareness is Halal Accreditation among Pakistani manufacturers, exporters and traders has been launched. Pakistan National Accreditation Council (PNAC) remained involved in awareness programmes and is establishing Halal Authentication Laboratories in provincial capitals for promotion of Halal Standards and build international credibility.
- Pakistan Council for Research in Water Resources (PCRWR) is undertaking the development and implementation plan for sustainable management of groundwater resources through artificial groundwater recharge techniques and rainwater harvesting. One of the important activity in this regard was focusing on Water Resources Management in the Highly Depleted Pishin-Lora Basin” for which an awareness Programme was launched by PCRWR to create awareness of locals by demonstrations of disseminating the efficient recharge techniques for wide scale adaption to manage groundwater resources in water scarce area.
- PCRWR has also constructed 6 leaky dams, 19 check structures and 6 inverted wells for rainwater harvesting and groundwater recharge, whereas, 70 per cent resistivity survey has been completed in Pishin-Lora Basin area to assess the existing water resources.
- National University of Science & Technology (NUST) is establishing the Facility for the Indigenous Development of Percutaneous Transluminal Coronary Angioplasty

(PTCA) Baloon Catheters. Facility envisages to produce 2000 Baloon Catheters per year at much lower cost as compared to imported.

- HEJ Research Institute of Chemistry was provided funds for research activities under project “Discovery of new potent natural antiglycation agent for the management of late diabetic complication, HEJ”. The project focuses on identification of lead molecules that can minimize the complications of diabetic patients. 40 compounds have been shortlisted on the basis of good antiglycation activity in BSA-methyglyoxal and human serum albumin. The same would be sent to Argentinean counterpart for the selection of compounds for *in vivo* studies.

Financial

During the fiscal year 2016-17, an allocation of Rs1,776.87 Million was made to Ministry of Science & Technology against 21 on-going projects. Out of this, Rs1,577.38 Million have been released. The utilization by the same date is Rs903.67 million. It is expected that 10 projects will be completed by June 2017.

Outlook 2017-18

Physical

The main focus in science and technology sector will remain on futuristic technologies like Nanotechnology, Biotechnology, Hydrogen Fuel Cell, Advanced Materials, Polymers etc. In addition to this, efforts will be made to improve industry and R&D institutions collaboration and create awareness about productivity, quality and innovation. Ministry of Planning, Development and Reform will play a key role to implement the Pakistan Productivity, Quality and Innovative Initiative (PPQI).

Pakistan Council for Renewable Energy Technologies (PCRET) is conducting R&D on renewable technologies, during the next year, the focus will remain on developing high-tech, low cost and sustainable energy solutions with renewable resources so as to help overcoming energy crisis in the country and minimizing the energy divide between the developed and less developed rural parts of the country.

Pakistan Standards and Quality Control Authority (PSQCA), Pakistan National Accreditation Council (PNAC) and National Physical and Standards Laboratory (NPSL) will undertake various trade related interventions. These organizations are actively involved in export enhancement, trade increasing and improving health and safety of consumers through mandatory and voluntary standards. PSQCA will continue formulating and promulgating necessary standards. PNAC will assist in expansion of trade through accreditation of laboratories and certification bodies, whereas NPSL is responsible for traceability of metrology standards.

Ministry of Science & Technology will focus on indigenization of biomedical equipment like stents and other small digital equipment. NUST has already demonstrated indigenous production of stents in 2016-17. The same will continue in next year.

PCRWR has been involved in scientific research about water resources of the country. In 2017-18, it will work for improved land and water conservation practices to enhance waste land productivity in water logged / water deprived areas.

In line with Vision 2025 and 11th Five Year Plan, some initiatives will be started for establishment of technology park and incubation centres in the country. This is one of the main steps to bring R&D institutions and industry closer and focus on solution based and commercializable research

Programmes

Ministry of Science & Technology will be provided Rs1,900 million in 2017-18. Following are main programmes to be executed by Ministry of Science & Technology during 2017-18:

- A project “Establishment of PSTC for Precision Mechanics and Instrument Technology at Gawadar PCSIR” will be executed and it will contribute towards creating scientific manpower for CPEC. The programme will offer 3 year diploma, and certificate programmes in Precision Mechanics & Instrument technology for youth.
- A project for 100 Micro Hydro Power Plants in PPP mode i.e. Public-Private Partnership will be executed by PCRET and would emphasize on minimizing the energy divide between the developed and less developed rural parts of the country.
- PCSIR will undertake testing activities in Electrical Test Centre for Household Electrical Appliances & Lighting Products at Lahore. The centre will create awareness and provide services to industry to benchmark and help increase the energy efficiency of household electrical appliances, lighting products and accessories.
- PNAC will undertake “Halal Accreditation” project to identify investment opportunities in Pakistani Halal sector and disseminate this information in more accessible manner to international Halal players, ultimately bringing Foreign Direct Investment in Pakistan. Project would also create awareness in Pakistani manufacturers, exporters and traders regarding the “Halal Accreditation” through workshops & training sessions.
- Pakistan Productivity Quality Innovative (PPQI) Initiative will be implemented in 2017-18. Ministry of Science & Technology is main stakeholder and PPQI initiative will be implemented by Ministry of Planning, Development & Reform, The ministry will undertake some of its own initiatives relevant to PQI that will focus on i) Awareness and Training on Pakistan National Hospital and Health Care Accreditation (PNHHA) ii) First Industrial National Innovation Survey, and iii) Need Assessment of S&T Human Resources for Deriving Innovation.
- NUST has already implemented a project for production of Balloon Catheters. In next phase, Ministry of Science & Technology will fund a project with the objective to acquire the technology and manufacturing the Balloon Catheters within the country. Initially NUST would start supplying both Cardiac Stents and Angioplasty Balloon Catheters to selected hospitals/ institutes by the end of this year. It is envisaged that the balloon catheter project will be completed by first quarter of 2016-17. Ministry of Science & Technology is planning to set up a facility at NUST for indigenous production of other health related organs / products and explore the possibility of its commercialization.
- PCRWR will continue implementing its projects in areas like Thal Desert and control of waterlogging in low lying areas of Sindh. Tile drainage units at 2 sites of 100 acres, each under different soil conditions would be developed for research and

demonstration purposes, with farmer's participation, to reclaim saline and saline-sodic soils.

During 2016-17 feasibility study is being undertaken for development of Technology Park. This technology park will be established in Islamabad during next two years. Basic aim of the park is to establish an innovation based encouraging business environment for budding as well as veteran entrepreneurs. This would act as catalyst for commercialization of indigenous research and would be beacon to attract renowned international market players. The technology park will act as beacon to support University-Industry and R&D collaboration with the intent of creating high technology economic development and advancing of knowledge.