Higher Education
VISION 2025

1. Technological Advancement
   Keeping pace with technological advancement

2. Higher Learning Institutions
   Transforming universities from teaching centres to centres of research & innovation

3. Quality Assurance
   Zero tolerance against plagiarism and violation of quality criteria

4. Critical & Innovative Thinking
   Encouraging critical & innovative thinking through new teaching methods

5. Linkages
   Establishing linkages between academia and industry

6. Leadership Skills
   Encouraging entrepreneurial spirit and responsible leadership skills

Higher Education Commission - Pakistan
www.hec.gov.pk
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FOREWORD

A new and ambitious journey to comprehensively reform higher education in Pakistan started with the establishment of Higher Education Commission in 2002, with the mission to “facilitate Institutions of Higher Learning to serve as Engine of Socio-Economic Development of Pakistan.” The Founding Fathers of HEC recognized that quality higher education provided to a growing number of talented youth was essential to prepare a critical mass of creative, constructive, competent and contributing human capital. During its first decade of growth and reforms, HEC guided numerical expansion of higher education institutions from 59 universities in 2002 to 178 in 2014-15, increased enrolment from 276274 in 2002 to 1.3 million in 2014-15, increased gender parity from 36.8% to 47.2% in the same period. Government of Pakistan significantly increased investment in human resource development to improve the quality of faculty and instructional facilities and laid the foundations of a vibrant research culture.

HEC used its institutional autonomy to bring about fundamental structural changes in academic programmes offered by our universities to comply with international standards of recognition and acceptance. The transition from 19th century version of higher education to 21st century has been challenging yet rewarding. It has emboldened HEC and its dedicated team of scholars and policy makers to become even more ambitious. HEC Vision 2025, is a well thought out aspirational document that has set even more demanding qualitative and quantitative goals.

HEC plans in the next decade not only to sustain what has been achieved but initiate further reforms that are in line with GOP Vision 2025 that aligns human resource development platform with the economic production platform to ensure that higher education sector plays a proactive and pivotal role in the socio-economic development of the country. HEC plans to implement a process of developing human capital that is not only professionally competent and outstanding but ethically committed to creating a just and democratic social order.

HEC plans to have an integrated three tiered model of tertiary education. In this structure 30 TIER 1 universities will be carefully nurtured and re-designed to serve as global centres of trans-disciplinary scholarship and collaborative discovery of basic and applied knowledge to discover innovative solutions to real life challenges. These universities will selectively admit the best and the brightest students whose talents will be refined by the most accomplished and productive faculty, who are involved in pioneering highest quality educational programmes. Currently six public and private universities in the country have been internationally ranked. HEC plans on supporting these universities to strive to raise their ranking level as well as to add more TIER I universities to the list of internationally ranked universities.

TIER II Universities are publicly and privately funded comprehensive institutions that provide higher educational opportunities to qualified masses in diverse disciplines and professions, to prepare standards based credentialed specialists to meet the multiple needs of society. Over the next 10 years HEC plans on expanding the number of TIER I and TIER II universities to 300 to enrol 7.1 million student scholars.
TIER III HEIs include the affiliated colleges which are currently providing education at the doorsteps of the students. They provide education to about 30% of the students enrolled in higher education and are the weakest link in the chain. HEC Vision 2025 calls for improving the quality and relevance of education offered by affiliated colleges through effective support and monitoring by their affiliating universities.

HEC plans to take higher education opportunities at the district level throughout the country by setting up 150 Community colleges affiliated with Skill universities to be established in each province, to prepare technical, vocational and support staff to meet the urgent need of skilled manpower. These colleges will be partially funded by HEC but will get their main resources from the provincial governments.

The qualitative improvement of higher education demands increasing use of information and instructional technologies. Under the Prime Minister's youth programme, tuition fee reimbursement and laptop distribution schemes more higher education scholars are using them to broaden their scholarly horizons. HEC has prepared a large scale programme to enable faculty and students to have high speed broadband access through upgrading PERN III, Digital Library Programme and setting up smart sub-campuses and smart classrooms. Technology embedded higher education is a high priority of HEC.

The expansion of quality higher education demands a significant increase in faculty development through indigenous and international initiatives. Currently with increased allocation of resources, HEC has managed to prepare 28% of faculty with PhD. In the next decade the HEC vision calls for preparing more than 95000 new faculty and enable 40% of them to complete their doctoral studies in domestic or international ranked universities.

HEC Vision 2025 plans to increase community involvement of universities through variety of hand-holding support activities involving students, faculty and staff. These service activities can be directly or indirectly related to the scholars' fields of study, and are designed to build a stronger bond between the universities and their surrounding communities. Inculcation of the concept of social service will benefit all.

HEC has approved a new standards based roadmap for preparing teachers for elementary and secondary schools. Twenty one universities are offering the new 134+ credit hours B.Ed. programme that is compliant with National Professional Standards for Teachers. 134 affiliated Colleges of Teacher Education are offering the 68 credit hours Associate Degree in Education programme. Quality teachers are needed to improve the quality of learning outcomes of school students who eventually add to the pool of candidates for admission to universities.

HEC Vision 2025 calls for improving quality of higher education through expanding the process of accreditation and monitoring of curriculum audits at all levels of higher education. National Curriculum Review Committees (NCRCs) are being involved in developing new interdisciplinary curricula. The NCRC process will be used to develop rigorous and relevant programmes of studies and research.
Finally the Leadership, Management and Administration of our tertiary education institutions demand a restructuring to attract, hire and retain visionary leaders. The merit-based selection of such leaders through search committee process will be strengthened. Vice Chancellors have to be supported by specialist Pro-Vice Chancellors responsible for Academic Affairs, Student Affairs, Institutional Development, Budget and Planning and Research. A model Governance framework needs to be developed through revising the University Acts by a high powered committee that includes Eminent Educators, Business Leaders and CEOs.

I am confident that the aspirational Vision of HEC will set the stage for further consolidation and improvement of tertiary education, and help Pakistan become an intellectually, morally and economically progressive country.

**Prof. Dr. Mukhtar Ahmed,**
Chairman Higher Education Commission
ACKNOWLEDGMENT

HEC Vision 2025 has been developed through a year-long process of consultative deliberations involving a host of leading higher educators, policy planners, friends and founders of Higher Education Commission under the leadership of Dr. Mukhtar Ahmed, Chairman HEC. The final draft text being launched today went through many iterations using historical data and emerging global trends in higher education.

I acknowledge the salutary role played by Prof. Dr. Mahmood ul Hasan Butt, who guided the various consultative processes within HEC and outside, involving former and current Vice Chancellors, distinguished national professors to take their valuable suggestions in setting aspirational targets for future of higher education in Pakistan. I thank all the Directors General and their staff for their prompt and diligent participation in actively delineating the ambitious goals of HEC Vision 2025. I particularly acknowledge the work done by Syed Samer Sibtain and Naveed Shah developing the cost estimates. This Vision has strong focus on achieving sustainable development goals with visible impact on society.

I also acknowledge the support of the World Bank funded Tertiary Education Support Program (TESP) which, in addition to financial support, provided international expertise to facilitate the development of HEC Vision 2025. I am confident this vision will consolidate and sustain the march of progress that began with the establishment of HEC.

Prof. Dr. Arshad Ali,
Executive Director,
Higher Education Commission of Pakistan,
H-9, Islamabad.
QUAID'S VISION

"Education is a matter of life and death for Pakistan. The world is progressing so rapidly that without requisite advancement in education, not only shall we be left behind but may be wiped out altogether."

Quaid-i-Azam, Muhammad Ali Jinnah
Karachi, September, 26, 1947
HEC VISION 2025

Preamble

HEC Commitment to Improve the State of Higher Education

A new and ambitious journey to comprehensively reform Higher Education in Pakistan started with the establishment of Higher Education Commission (HEC) in 2002. The Mission of HEC is to “facilitate Institutions of Higher Learning to serve as an Engine of Socio-Economic Development of Pakistan.” To achieve this strategic mission three core strategic aims were identified which included enhancing Equitable Access to Quality Higher Education; Technology Readiness to launch ICT embedded educational programmes and creating a culture of Research and Innovation in our higher educational institutions. The founding fathers of HEC recognized that by failing to plan for higher education's growth we had planned to fail in achieving our national development goals during the first six decades after Independence. This is borne by the harsh facts of extremely low gross enrolment rate in tertiary education (276274 in 2001-02), low quality and standards of teaching, learning and research, archaic and irrelevant curricula offered in structurally weak two year degree programmes, an assessment system riddled with lack of validity and reliability of results, out-dated system of governance and administration of universities and their affiliated colleges, and total reliance and dependence on government grants to meet the recurring and developmental expenditures. HEC was created as an autonomous NATIONAL REGULATORY AUTHORITY to reverse the effects of such neglect.

From its inception, HEC adopted a wholesome approach for development of the sector through preparing knowledgeable, skilled and competent human capital that could compete internationally; promoting quality basic and applied research to solve the critical problems in energy, water; food security and sharing its results through publications in well recognized journals; establishing university-industry linkages; encouraging entrepreneurial culture; ensuring quality of curricula and systems to refine them at all levels of higher education besides strengthening of physical and technological infrastructure. During the next decade HEC plans to sustain what has been achieved and initiate further reforms that are in line with Vision 2025 of GOP and align human resource development platform with the production platform to ensure that higher education sector plays a proactive and pivotal role in the socio economic development of the country.

During the first decade of its existence, HEC took bold steps to reverse the then prevailing problems afflicting higher education. Recognizing the demographic realities of a nation of 180 million people with a big bulge of university age youth, more of them out of tertiary education than in it, HEC set the goal of preparing a critical mass of constructive, creative, competent and
contributing human capital, not just credentialed to seek non-existing jobs but those who will add value to the work force of competent and critical professionals to accomplish the task of creating Quaid’s progressive, enlightened and disciplined Pakistan.

Guiding Principles of Road to Progress

To actualize this vision, the HEC team succeeded in persuading the Government in 2002 that increased access to quality Higher Education is the best investment that pays multiple dividends. To reap these dividends the following fundamental principles guided the process of systemic reforms:

• University education must be available to a growing number of competent and talented people, who will be builders of progressive, prosperous and productive Pakistan,

• Our system should be quickly expanded to produce more teachers, artists, information communication specialists, social scientists, natural scientists, engineers, health professionals and innovative producers of new knowledge to transform all our social institutions including all levels of education,

• Universities and other higher education institutions, as heart of a civilized society, are the most enterprising institutions to ameliorate the human condition, faculty is the heartbeat of universities, hence, every effort is to be made to increase the number and quality of faculty of our universities,

• At the beginning of the new millennium Pakistan must transform itself from an old agrarian society to a knowledge producing society exploring creative and innovative avenues of growth,

• Knowledge-based economy demands investment in human capital, innovative research and entrepreneurship for which our universities have to be radically redesigned and upgraded,

• Knowledge intensive education is the most productive asset that demands abiding by and upholding an ethical honour code of scholarly conduct by all participants and scholars to discover and disseminate new research findings and share them with policy makers and business entrepreneurs,

• The structure and purposes of our institutions of higher learning and the qualifications they offer has to comply with globally recognized standards and systems of teaching, learning and research,

• Wisdom is the outcome of virtuous search for useful knowledge which is shared more widely to create a progressive and democratic social order,

• Universities are the crucibles to refine the talents of the young so that they can lead the procession of academic excellence, meritocracy and intergenerational transformation,

• All levels of tertiary education must be socially embedded and engaged as catalysts to transform society.

These guiding principles led to a period (2002-2012) of numerical expansion of institutions from 59 universities in 2001-02 to 178 in 2014-15, increased enrolment from 276274 in 2001-02 to 1.28 million in 2014-15, increased gender parity from 36.8% females in higher education in 2001
to 47.2% in 2014 and increased investment in human resource development to improve the quality of faculty, instructional facilities and creative research activities.

During the first two Medium Term Development Frameworks (2005-2010 and 2010-2015), HEC embarked upon a more fundamental set of formative interventions that were designed to bring about structural reforms to improve the quality of curricular content particularly in engineering and scientific disciplines, introduce new instructional and assessment methodologies using ICT tools, develop national professional standards and accreditation councils to monitor the quality of instructional programmes and compliance. Quality Enhancement Cells (QECs), with a clearly defined role, were established at all the university campuses, and a gradual programme to replace the annual, two year degree programmes with a semester system of credit hour-based 4 year degree programmes was launched. Post-graduate programmes with a stringent set of qualitative guidelines and operational principles were launched to prepare the much needed human capital to guide and support the emerging social and economic institutions and also guide and support the expanding system of higher education. During these two plan periods significant efforts have been made to prepare higher education faculty with advanced graduate degrees, both indigenously and through partnership with eminent international universities. These efforts have resulted in increasing the university faculty holding PhD degrees to 28% of the total.

While focused attention to improve the quality of education in scientific disciplines offered by the universities has led to more robust and enterprising teaching and research in agriculture, engineering, veterinary sciences, applied and basic research in STEM studies, more attention is needed in performing arts and design, humanities, social, regional and cultural studies to foster national cohesion and cultural identity. Ethical and reflective thinkers and doers in these important disciplines of knowledge are increasingly needed to improve the quality of life, develop a sense of and commitment to social responsibility and create a just and fair social order. These structural and systemic reforms and quantitative expansion of higher education institutions have laid the foundation of more ambitious transformational and innovative interventions to refine the talents of our youth as informed, intelligent and ethically upright, constructive and contributing members of society.

The Road Ahead

HEC Vision 2025 is a well thought out aspirational plan to build on the quantitative and qualitative achievements of the last ten years, consolidate them through sustained efforts and chart a new course for the Academe to work collaboratively with Government Policy Planners and Business Entrepreneurs to meet evolving needs of society, culture and economy. The process of development of the HEC Vision 2025 started during the last year of MTDF-II (2015). It was the year to reflect and engage in stock taking and meaningful conversations involving a wide range of scholars and pertinent policy makers. A three pronged plan was devised for this purpose that included:

1) A critical, in-house evaluation of the successes and unfinished business of the last decade of
reforms was done through analysis of available data by HEC senior staff.

2) Through a World Bank Funded Tertiary Education Support Program (TESP) a team of experienced and eminently qualified national consultants was organized to develop technical working papers on key thematic areas. These themes included:

- Excellence in Leadership, Governance and Management of HEIs,
- Strengthening systems of Research, Innovation and Commercialization and and linking the ingredients of triple helix of Academe, Government and Business Entrepreneurs,
- Use of available and evolving Information Communication Technology resources in Teaching and Research,
- Technology Embedded Academic Programming to prepare scholars to participate effectively in the emerging “Fourth Industrial Revolution”* (K. Schwab, January 2016)
- Reforming Medical, Dental, Nursing and Allied Health Professions Education according to the twenty first century International Standards prepared by the World Federation of Medical Education at undergraduate and graduate levels,
- New Programmatic areas of Women’s Education that will empower them for broader social engagement to add value to society and economy. HEIs to open their doors to gender quality enhancement through increased and equitable access to women,
- Emerging undergraduate and graduate programmes in Engineering and Technology to prepare skilled human resources in key thrust areas of energy, material sciences, micro-electronics, mining and utilization of mineral resources, transportation (autos, rail and aviation), mega civil works and manufacture,
- Impact and implications of 18th Amendment on uniform standards of higher education throughout the nation.

3) A day long consultative session was held with 27 founding leaders, friends and current functionaries of HEC. The key recommendations of the working papers, historic HEC data, goals of the 11th Five year Development Plan related to higher education and GOP Vision 2025 were shared. Valuable institutional memories and recommendations of the participants were used to draft the priorities and new directions of HEC during the next ten years.

**Perspective**

The landscape of higher education in Pakistan over the last 12 years has drastically changed through planned and focused attention to the three core targets of Improved Equitable Access designed to increase the numbers and enhance the quality of higher educational opportunities for a growing number of men and women in all parts of the country, particularly the underserved ones. HEC annual reports have provided detailed information about this. Enhanced quality assurance has been emphasized through a series of actions including establishment of Quality Enhancement Cells (QECs) in all public universities, increased attention to setting up of National Curriculum Review Committees (NCRCs) and establishment of more professional and programmatic accreditation councils to refine and upgrade the curricula and professional practice of all the degree qualifications offered by Pakistani universities. The third core part of the
mission was to increasingly deploy and use information and communication technology tools in our institutions of higher education to enable the scholars at all levels of scholarship to improve their knowledge, skills and competencies.

**National Qualifications Framework of Pakistan**

A National Qualifications Framework of Pakistan (NQFP) has been approved by the HEC on the lines recommended by Bologna Agreement outlining the learning outcomes for all degree programmes at levels 5 through 8 and guidelines for semester-based assessment system using the widely used objective, reliable and valid tools have been developed. The NQF is designed to promote international transfer of credits and mutual recognition of degrees. It helps the employers to ascertain the knowledge, skills and competencies of the graduates. A unique highlight of NQF is its emphasis on meticulous development of ethics in all scholarly activities including cognitive and affective growth of scholars.

**Nurturing a Culture of Innovative Research**

A culture of research is being created and promoted at all public and private HEIs to discover and disseminate new knowledge that is a precursor of developing a vibrant, progressive economy. A significant goal of promoting high quality research is to connect it with improvement of teaching and learning along with cultivating responsible use of the new advanced ICT tools by the learners to hone their skills of acquiring, comprehending, applying, analysing, synthesizing and evaluating knowledge from diverse sources. HEC sponsored high speed networks of research (PERN I and PERN II), digital libraries and online access to eminent research journals for students and faculty have not only opened new and diverse sources and avenues of current and up to date knowledge but are gradually transforming learning methods and increasing the international visibility of the research output of Pakistani scholars. Additional efforts are needed to connect the innovative research being done at HEIs with government policy planners and business and industrial entrepreneurs. The strengthening of this triple helix is a significant task emphasized in the HEC vision. As it came to the close of the first decade of reforms, new challenges and opportunities appeared on the horizon that HEC cannot be oblivious to.

**The Three Tiered Model of Tertiary Education**

The emerging global trends in higher education call for new strategic vision of the roles and functions of tertiary education. There is a growing consensus that not all higher education institutions are designed for achieving the same ends. In a three tiered structure of higher education, TIER I Research Universities are being redesigned as global centres of trans-disciplinary scholarship and collaborative discovery of basic and applied knowledge to develop solutions to real life challenges. The Research 1 universities are the highest seats of learning which selectively admit the best and brightest students, have the most accomplished and productive faculty who are involved in pioneering highest quality educational and research
programmes. They compete for public and private resources for their research productivity which gives them their recognition and ranking. Typically they used to be small, elite communities of scholars, enjoying highest levels of academic autonomy to think the unthinkable, who devoted their lives to highest professional and ethical standards of scholarship and innovative research enterprise. Lately through active public support of state sponsors, TIER I universities have become large corporate enterprises with expanded missions of teaching and original research to produce increasing numbers and quality of competent and certified professionals in all sectors of importance to society. Research I universities have become global centres of collaborative, innovative and interdisciplinary research excellence.

The TIER II universities are publicly funded comprehensive institutions designed to provide higher educational opportunities to qualified masses in diverse disciplines and professions to prepare creative, competent and credentialed specialists to meet the multiple service needs of the society. These universities are characterized by the challenge to create a dynamic equilibrium among several internal tensions like institutional autonomy vs. accountability and regulation by state. Another challenge faced by them is to reconcile the competing claims of broad access vs. academic and scholarly excellence. These universities constantly strive to meet the social, cultural and economic needs of the society through developing robust intellectual human capital. Together these two tiers of higher education have produced the upward mobile middle classes of progressive and economically productive societies.

The Tier III of higher education is often called collegiate level education. These institutions are affiliated with public universities and offer their programmes of education at the doorsteps of the learners, hopefully with the guidance, supervision and support of their affiliating universities in underserved communities. There are 3600 affiliated or constituent colleges in the country which provide educational opportunities to prepare students for taking the examinations given by their affiliating universities. Studies have shown that they are the weakest link in our tertiary education chain. They need to be qualitatively improved according to well established criteria inherent in the rules of affiliation. Currently they are under the administrative control of the provincial departments of higher education. HEC approved affiliating universities have the responsibility to play their role to improve the quality of these TIER III institutions to make them qualitatively acceptable feeder institutions for the TIER I and TIER II comprehensive universities.

The Community College Initiative

Recently a promising initiative has been taken by an enterprising university in Sindh to establish two year community colleges. These community colleges are accessible to larger numbers providing opportunities in academic, technical and vocational tracks as well as enabling citizens of all ages to pursue diverse cultural programmes designed to develop their creative and problem solving skills. HEC Vision 2025 calls for setting up higher educational opportunities in each administrative district of the country to create a level playing field. HEC plans to add this new initiative to the mandate of TIER II universities to create a country-wide expanded system that will not only prepare high quality professionals but educate and train the much needed competent skilled support staff through 4 semesters, 68 credit hours, HEC approved, Associate
Degree programmes offered by community colleges. This is an ambitious new dimension in tertiary education to develop expanded and growing numbers of technically competent skilled workers. NEVTech developed standards can be implemented in these colleges. HEC is planning on setting up an apex National Skill University to coordinate the country-wide development of Community colleges in every district of Pakistan. During the next decade HEC plans to establish 200 special focus TIER II and TIER III universities, colleges and centres for advanced studies in technical and vocational Skill Development, Women's Education, Medical and allied health professions according to international standards developed by World Federation of undergraduate and graduate medical education, Engineering, Technologies and manufacture to offer new programmes in STEAM studies, Agriculture, Veterinary, Medicine offering programmes in all areas of specialization. HEC has already developed four centres for advanced studies at NUST and UET Peshawar for Energy, UET Mehran for Water Resources, and Agriculture University, Faisalabad, to foster new horizons of scholarship in Agriculture Sciences and Food Security. HEC plans to set up in Tier I universities new Centres for Advanced Studies and Research in Nano Technology and Material Sciences, Micro-Electronics, Climate Change, Marine resources, Biotechnology, Pharmacology, Space Sciences and Civil uses of Nuclear Technologies. These centres will develop new graduate programmes of study and research to prepare a growing critical mass of competent human resources, to produce new useful knowledge needed to indigenously solve prevailing problems in these areas and add value to the economy. Each centre will have a technology research park to share the new knowledge with entrepreneurs for ready commercialization.

The New Fourth Industrial Revolution

The world is facing the “New Fourth Industrial Revolution,” based on advanced digital technologies that will “fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity the transformation will be unlike anything humankind has experienced before.” This revolution is to be harnessed in our higher educational system. HEC has led the efforts to invest in information and communication technology resources for faculty and students for improving the quality of higher education through their use. Technology, however, has a very short shelf life and needs continuous upgrading. The advanced and advancing digital technologies need to be more deeply embedded in our higher education systems at all levels. HEC is planning to invest in developing smart classrooms for better teaching and learning strategies and smart campuses and sub campuses to develop mass online delivery of education. New planned investment in the educational uses of ICT will not only enable HEC to expand distance and virtual delivery of higher education throughout the country but will enhance global linkages with highly ranked partner universities of the world, to increase the productivity and quality of our scholars.

GOP VISION 2025: Framework for Growth and Development

Enhanced investment in higher education and serious efforts to actualize the seven pillars of Vision 2025, have started to show positive results. Concerted efforts of macroeconomic reforms
have led to steady growth of the economy. This has resulted in increased fiscal space to achieve the HEC’s substantial agenda driven by the Vision 2025, goals and targets. The investment of GOP in higher education sector has almost doubled during the last three financial years. The ambitious goals of VISION 2025 to create a society committed to progress, prosperity, and a just democratic social order call for sustained and well planned efforts in basic, vocational, technical and tertiary education. The seven pillars, five enablers and 25 specific goals of growth and development are summarized in the following diagram. During the next 10 years HEC plans to be an active partner to actualize the aspirational vision.

FRAMEWORK FOR GROWTH AND DEVELOPMENT

Based on the process of national consultation, Vision 2025 has identified 5 Key enablers and 7 pillars of development.
Pillar 1 of Vision 2025: Putting People First calls for an enhanced and expanding effort of developing human and social capital. It aims at substantial expansion at all levels of education and targets public expenditure on education to reach 4% of GDP by 2018. It recognizes the vital role of higher education in creating a highly skilled and innovative workforce that can successfully compete in the rapidly changing global environment. Enhanced investment in higher education from 0.2% to 1.4% of GDP is recognized as essential to increase enrolment from 1.28 million to 5 million and more, and undertake structural changes of higher education sector to produce innovative programmes of study and research to lay the foundations of a knowledge, economy and sustained indigenous and inclusive growth to take Pakistan to upper middle economies of the world. To provide quality basic education, HEC has approved a new Roadmap to improve the quality of school teachers through university based teacher education programmes. The 68 credit hours ADE and 142 credit hours B.Ed. programmes are designed to provide a judicious mix of in-depth general education, content education and modern interactive pedagogical skills and practical work-experiences in schools. These programmes have been piloted and implemented in all provinces. Better prepared teachers are the essential requirement of strengthening the foundation of our higher educational system. They have to be prepared in large numbers and deployed in our schools to significantly increase the numbers and improve the knowledge, skills and competencies of students who are to go on to higher educational institutions in the numbers that HEC Vision 2025 calls for.

International Post-2015 Sustained Development Agenda

On September 25, 2015 the United Nations adopted 17 goals to transform the world over the next 15 years. These 17 goals have implications for higher education as the engine of socio-economic progress. Government of Pakistan adopted these goals as Pakistan's Development Agenda and Ministry of Planning, Development and Reforms signed an MOU with UNDP to establish SDG Centres both at the Federal and Provincial levels, to monitor progress on achieving these goals and specific targets outlined in them to eradicate poverty (1), protect the environment (13), ensure prosperity for all through quality education (4), gender equality (5), decent work opportunities and economic growth (8), supportive industry, innovation and infrastructure (9). The Post 2015 development agenda is consistent with GOP and HEC Visions 2025.

China-Pakistan Economic Corridor (CPEC)

CPEC and its large scale investment in infrastructural development of highways, railroads, pipelines to transport fossil fuels from the port cities to the rest of the country, energy generation and transmission projects and building the necessary modern ingredients of a new Silk Route promises to be a game changer in the socio economic development of Pakistan and the region. Higher education sector has to play a critical role in preparing and providing competent, skilled human resources to fully participate in all the phases of this transformative mega project. HEC plans on undertaking the necessary reforms of the programmes offered by our universities of engineering and technology to fully participate in this programme. This changing landscape has
to be accommodated in the HEC long term development plans in a creative and constructive manner by building bridges of intellectual collaboration with Chinese higher educational institutions. To supplement the infrastructural highways envisioned in CPEC, HEC is planning to build an Intellectual Corridor to open new information and skills super highways through establishing new institutions of higher education in newly opened areas in Balochistan, KPK, FATA, Gilgit/Baltistan, Sindh and other underserved areas. HEC plans on expanding PERN II to provide increased bandwidth, cloud computing, data centres, smart university sub-campuses and augmenting the existing fibre network through PERN III and PERN IV during the next 10 years.

Promulgation of 18th Constitutional Amendment

Since the promulgation of the 18th Constitutional Amendment in 2010 there have emerged some serious concerns about the roles, responsibilities and functions of HEC as established through Ordinance No. LIII of 2002 promulgated on September 11, 2002 for the evaluation, improvement, regulation and promotion of higher education according to the highest international standards in the country. The said Ordinance envisaged HEC as an autonomous, self-governing national institution with the Prime Minister of Islamic Republic of Pakistan as its Executive Authority, having an 18 Member Commission comprising its Chairperson, two Federal Secretaries, four representatives, one each from the provincial governments, 10 members of international eminence (representing all disciplines and provinces) appointed by the Controlling Authority and an Executive Director/Member of the Commission. Federal government and all the provincial governments have a role in the functioning and clearly delineated policy making responsibilities of HEC under the Fourth Schedule (Article 70/4) and various items of Federal Legislative List, Part I and Part II.

With the enactment of the 18th Constitutional Amendment, two provinces have set up their own Higher Education Commissions which has necessitated a high level review of the situation by the Council of Common Interest to resolve the matter of any devolution of functions and responsibilities of HEC prescribed in the HEC Ordinance. A subcommittee of the Council was constituted to review and propose resolution of the issue. In its 2nd meeting held on October 7, 2015, after hearing the arguments from the provinces, decided that “The HEC Ordinance 2002 is still intact. Till the final outcome is not agreed upon in line with the Supreme Court verdict, nothing should be done unilaterally.” The establishment of HECs in Punjab and Sindh is not just an internal constitutional matter but has serious ramifications and consequences for higher educational standards, high quality research and professional training, international treaties and conventions related to higher education, mutual international recognition of degrees and qualifications, provision of technology embedded education and research networks on a national basis and financial allocations to higher education institutions.

The Council of Common Interest will make the final adjudication on the matter. Historically the promulgation of HEC Ordinance 2002 has provided a uniform platform of reforming higher education sector that is beneficial to all parts of Pakistan. Effective and efficient higher education policies are nationwide and are developed by centralised regulatory bodies in most countries. Pakistan’s HEC model has become the envy of the world because of its successful national higher
education reform agenda. Devolution of its functions and responsibilities will be a serious challenge to the strategic vision needed for the next phase of higher educational structural reforms and institution building.

Excellence in Leadership, Management and Governance

When HEC was established in 2002 a critical appraisal was done about the system of selecting key university leadership to govern and manage the affairs of the HEIs. There was no uniform system of putting in place an efficient management system to lead and guide the universities to become active partners in national growth and development. The system, barring a few exceptions in the private sector, followed the rules and regulations enshrined in the antiquated charters inherited from the colonial system of the past. Universities were led and managed by a trinity of key officials, Vice Chancellor, Controller of Examinations and Registrar often appointed by the officiandom. The autonomy of academic decision making was contingent upon the recurring and development grants provided through University Grants Commission based on the budgetary allocations provided by the government and limited resources availed through low tuition fees and examination and affiliation fees. This statutory, fiscal, academic and governance system created a total dependence of the universities on government munificence. It was designed in 1880s after the University of London model, which was more of an examining institution at that time than a teaching and research institution modelled on the Ox-Bridge tradition.

HEC embarked upon reviewing the administrative system of universities by reforming it to “facilitate institutions of Higher Learning to Serve as Engines of Growth for the Socio-Economic Development of Pakistan:” The HEC Mission statement, succinct as it is, demanded a major overhaul of the system of governance and management. The key changes were in developing a new model university charter, new Search Committee process of selecting and appointing visionary Vice Chancellor who could plan strategically to redesign the academic and scholarly programmes offered by their institutions, bring about structural changes of quality assurance in the scope and sequence of curricula according to global standards, raise new resources through involving philanthropists, business leaders, alumni, academicians and local, national and international donors and sponsors.

The new breed of visionary leaders is also to focus on improving the rigor and relevance of curricular offerings by attracting, hiring, retaining and promoting eminently qualified faculty and creating national and international programmes of faculty development without which the chronic curricular inertia could not be remedied. To achieve these goals HEC devoted a significant amount of available resources to provide domestic and foreign scholarships for faculty development. Tenure track System (TTS) was initiated to provide not just higher salaries but R&D incentives to do world class research and disseminate it through eminent, refereed scholarly journals and to develop a structured system of performance accountability of faculty. A foreign faculty programme was developed to beckon Pakistani scholars working outside the country, to return and alleviate the shortage of high quality faculty.

As more financial allocations became available to rapidly increase quality and access, it became imperative to use new technology based systems of transparent financial accountability. A
modern system of judicious allocation and utilization of funds for the transparently approved purposes was put in place to achieve the academic, infrastructure development goals. HEC used an open system of allocation of funds to universities all over the country according to well laid out criteria of need and merit. Ethical reporting systems were prescribed for system-wide usage.

While rapid progress has been made during the last two decades to create an open, transparent and rationally responsive system of leadership, management and governance, important challenges still need to be met in this area during the next 10 year period. Innovative systems of funding Research 1 universities call for allocating large, competitive grants to undertake applied research programmes and projects to develop readily commercializable solutions, tools and products.

National and International Systems of Ranking Universities

Ranking of higher educational institutions has become a global phenomenon. Diverse standards and criteria of assessing and documenting the quality of faculty, quality of teaching tools and methods, research output, finances, facilities, social responsibility and community integration, and institutional policies for quality assurance are often used to determine the rank and recognition of institutions and their programmes. Rankings are done globally, regionally or locally within countries. A variety of ranking agencies have developed their criteria and methodologies to compare universities and their output. A system of Academic Ranking of World Universities (ARWU) has been developed by Shanghai University starting in 2003 and is funded by Chinese government. It was an official effort to transparently measure the qualitative differences between the Chinese universities and the leading universities of the world and take measures to enable Chinese universities to meet or exceed the global standards. It primarily ranked universities based on research indicators in natural sciences and English. The ranking exercise pointed out strengths and weaknesses of Chinese universities that led to stringent remedial actions, wherever needed. Chinese students were provided with better learning platforms and taught by better qualified faculty to compete in international tests of educational achievement in Sciences, Mathematics and English like OECD Programme for International Student Assessment (PISA). The 2012-13 test results of PISA showed the superior results achieved by Chinese students as a result of stringent quality controls designed to demonstrate what the Chinese students know and can do.

QS World University Rankings produced by Quacquarelli Symonds has been annually ranking 712 universities of the world since 2004. In 2009 QS started an Asian Universities Ranking system focusing on 300 Asian universities. In 2015 it ranked the Asian universities both institutionally and by programmatic specialization.

Pakistan Universities are gradually inching up their ranks in QS Asian ranking. In 2015/16 six Pakistani Universities have been ranked above the rank of170. With increasing research output and HEC support, the number is expected to grow. An important indicator of this increase in number of ranked Pakistani universities is the dramatic increase in the number of research publications indexed in ISI Web of Knowledge from 977 in 2002 to over 10,000 publications in 2015. According to the HEC’s own ranking criteria the following Pakistani universities are ranked top 10 in 2015/16 in the country:
1. Quaid-e-Azam University, Islamabad,
2. Pakistan Institute of Engineering and Applied Sciences, Islamabad
3. Aga Khan University, Karachi
4. University of Agriculture, Faisalabad
5. University of Punjab, Lahore
6. National University of Science and Technology (NUST)
7. Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi/Islamabad
8. University of Health Sciences, Lahore
9. COMSATS Institute of Information Technology
10. Lahore University of Management Sciences.

Five of these universities are included in the top 170 universities in QS ranking also. With extra support from HEC, top five universities ranked in each of the six areas of specialization in Agriculture and Veterinary Sciences, Engineering and Technology, Computer Science and IT, Business, Medical Sciences and Allied Health Professions, Art and Design, can be specially nurtured to become the top TIER I research universities in the country over the next decade. These 30 Pakistani universities can be the potential leaders to play an important role in producing innovative research and human resource development for collaborative research. These universities will be carefully nurtured through substantial R&D grants for commercially viable research, reconfigured Teaching and Research work loads of faculty, institutional funds for setting up relevant research facilities, support for international patents and setting up of Knowledge and Industrial Parks.

Increased Emphasis on Humanities, Social Sciences, Arts and Design

During the last 10 years HEC has deliberately focused on encouraging human resource development in natural sciences, technology and engineering. The institutions offering these programmes are maturing now. While more attention is needed to launch innovative engineering and technology programmes of national interest, HEC will focus more attention on relatively less emphasized programmes in Humanities, Social Sciences, Creative and Performing Arts and Design. The rich cultural traditions in these areas need to be nurtured further to create an enlightened soft global image of our society, add value to our economy through creative and performing arts and design, tourism and highlight our ethical and aesthetic values. Strong undergraduate and graduate programmes in global history, geography, regional and area studies, economics, anthropology/sociology, philosophy, languages, religious studies, need to be offered in our universities both as part of required general education and major areas of emphasis. Our cultural renaissance demands bridging the divide between natural sciences and social sciences over the next 10 years by giving additional resources and to foster these programmes in both TIER1 and TIER 2 universities through effective outreach and community mobilization programmes in Social Sciences and Arts.
Major Challenges

- Search Committee Process of selection and appointment of VC/Rectors needs to be depoliticized and effectively used to identify and recruit eminently qualified and visionary leaders. HEC is to be represented in the selection process of Vice Chancellors and Rectors.
- Redefine the role of the VC/Rectors to include fund raising and institutional development as their additional primary duties. Under their leadership, Universities are to discover new ways of generating resources from non-traditional sources for funding new disciplines of teaching, research and setting up quality improvement of infrastructure.
- Establish endowments to fund financial aid systems, to attract better quality students and nurture their talents to become productive scholars irrespective of their financial background.
- R&D is to be provided additional public and private resources to create a knowledge-based productive economy.
- Develop of an elaborate system of merit and need-based financial assistance, including grants and low or no interest loans.
- Increased University involvement and collaboration in developing applied research programmes, to help the business and industry to design and produce high value commercial products through the Business Incubation Centres (BICs) and Offices of Research, Innovation and Commercialization (ORICs).
- Improve University and Community hand-holding to develop new modes and models of cooperation with stakeholders in the community.
- Develop new programmes of auxiliary enterprises to generate additional resources through accelerators and partnerships with venture capitalists.
- Substantially increase the investment in indigenous and international programmes of Faculty Development to increase the number of faculty with advanced qualifications to 40% of the total, with the final goal to have all faculty in the tertiary education institutions with advanced credentials.
- Employ trained Chief Financial Officers of all public universities to implement new and advanced accounting and accountability models to ensure transparent utilization of funds.
- Conduct annual independent financial audits of all public universities receiving grants and funds.
- Review and revise the prevailing system of leadership, administration and management to create new senior management positions responsible for Graduate Studies and Research, Financial Management, Academic Affairs, and Institutional Development and Fund Raising.

HEC Strategic Vision for Higher Education

A three-tiered differentiated system of publicly and privately supported tertiary education with a judicious blend of comprehensive universities, special purpose Advanced Studies Centres and Institutes focusing on and catering to the intellectual and professional needs of society, and mass collegiate education will be the strategic vision driving HEC policies. Enhanced equitable access in all three tiers of tertiary education to increase the enrolment in
higher education in the next 10 years through setting up new universities and their smart sub-campuses, setting up of expanded collegiate facilities offering four semester Associate Degree and eight semesters baccalaureate qualification programmes in collaboration with provincial departments of higher education.
Increase the numbers of TIER I research universities to 30 for offering Innovative programmes complying with international standards in Agriculture, Engineering and Technologies, Medicine and Allied Health Professions, Information and Communication Technologies, Social Sciences and Humanities and develop centres of advanced studies in each of these universities.
HEC will set up 100 new smart sub-campuses of Tier II universities in under-served large districts. Private Tier I and Tier II universities will be established with strict compliance with HEC regulations of quality.
Technology embedded distance education opportunities will be increased to provide targeted expansion of educational opportunities for working men and women.
Shift higher education paradigm from teacher dominated input based initiatives to student centric knowledge, skills and competency based outputs.
Set up 150 affiliated Community Colleges with Skill universities in each district over the next 10 years to prepare skilled human resources.

Key Strategic Priorities: Sustain Progress and Meet New Challenges

A. Sustain and Consolidate National Higher Education Commission

Aim
Strengthen national HEC to plan, regulate and reform standards-based tertiary education to create a knowledge economy to enable Pakistan to reach upper middle income country status.

Introduction
The national journey to build a rigorous, responsive and relevant tertiary education system in the country to develop competent, committed and constructive human capital began in 2002 with the establishment of an autonomous national Higher Education Commission to “facilitate Institutions of Higher Learning to serve as Engines of Growth for Socio-Economic Development of Pakistan.” The avowed role of HEC was to change the landscape of tertiary education through planned, nation-wide activities to increase equitable access, invest in human resources to improve quality of faculty, facilities and functionaries, introduce advanced methods and tools of teaching, learning and research to disseminate and discover new useful knowledge. The law that established HEC is still intact to build on the achievements of the last 12 years through nation-wide Higher Education policies.

Objectives
• To maintain the momentum of reform, growth and development of Tertiary Education in Pakistan, capitalize on the quantitative achievements of the last 12 years, harness the available geopolitical opportunities and chart a more ambitious trajectory of qualitative and
quantitative improvement of HEIs through central planning and regulation of tertiary education through national HEC.

- The HEC to develop policies and design operating principles and procedures in consultation with the provincial departments of higher education.
- HEC Vision is built on a holistic three tier model of tertiary education capped by 30 ranked and recognized TIER I research universities focusing on innovative research output and preparing world class scholars to discover and disseminate useful knowledge; expand the number and capacity of TIER II comprehensive universities and TIER III affiliated colleges to provide equitable access to 25% of the eligible age group, and prepare the productive, upwardly mobile and well prepared middle class who can successfully compete in the world economy; and to strengthen the third tier of collegiate education to prepare constructive and competent scholars, technical and vocational workforce through close cooperation with provincial departments of higher education.

Major Programmes
- Nationwide provision of current tools of advanced digital learning, upgraded PERN III, expanded digital library including scholarly research Journals and infusion of instructional technology to set up smart sub-campuses of TIER II and TIER III institutions,
- Increased development, access and shared utilization of advanced equipment to promote high quality research in TIER I universities,
- Reform R&D grants award procedures to promote collaborative research in the new Centres of Advanced Studies to be established in critically needed emerging disciplines of knowledge in partnership with universities in all the provinces,
- Expand and activate 100 Offices of Research, Innovation and Commercialization (ORICs) in TIER I and TIER II universities to focus on selected aspects of Agricultural productivity and food security, Veterinary sciences to increase meat and milk production, cost effective Energy alternatives, Engineering and Technology in Material Sciences, Nanotechnology, Medicine, Pharmacy, Nursing and allied health professions to add value through provision of world class health delivery systems in all regions of the nation, production of quality generic, low cost pharmaceuticals and refining the manufacture of high quality advanced surgical tools for local use and exports.
- Accelerate emergence of knowledge-based economy by developing five Science, Technology and Industrial Parks to connect academia with business entrepreneurs and policy planners.
- Develop and fund programmes of international collaboration of research, faculty development, student exchange and wide sharing of knowledge.
- National Qualifications Framework of Pakistan for higher education has been approved by HEC and is designed on the basis of Bologna principles of mutual recognition of degrees and transfer of credit. HEC will share the NQF and Guideline for semester-based assessment of student learning, widely, with HEIs in the country for continuous improvement of quality and international recognition, and transfer of credits to facilitate familiarity with and acceptance
of qualifications of our scholars enrolled in programmes offered by the higher education institutions of Pakistan.

B. Increase Equitable Access

Aim
To increase opportunities of equitable access for gender balanced, regionally responsive, diverse and quality higher education to a larger segment of eligible 17-23 year olds to enable them to effectively participate in building a fair, just, ethical, wise and self-reliant society.

Introduction
The bedrock of our agenda of progress is to invest in people to refine their talents and polish their cognitive skills and constructive competencies. Our demographic data indicates a big and burgeoning group of basic and tertiary education age group who can and must be provided opportunities to become an asset rather than a burden for the nation. This group, with proper education and development opportunities, can achieve “sustained, indigenous and inclusive growth,” create a modern system of governance and institutional reform, creatively solve the problems of insufficient energy, food security, environmental change and ameliorate human condition through developing a vibrant economy geared to substantial increase in productivity. Our sustained development goals can only be achieved by preparing a critical mass of informed, skilled, competent and enlightened thinkers and doers who work collaboratively to reduce poverty, replace paucity of opportunities with abundance and promote self-reliance and private initiative to solve problems. The following Figure 1 and Table 1 show increase in number of public and private universities and DAIs from 1947 to 2014 in the country and by regions. HEC will strengthen quality assurance mechanisms currently in place including faculty student ratio in both public and private HEIs. The growth trend is positive and will be carefully accelerated during the next 10 years to reach the goal of 7.1 million students enrolled in all three levels of higher education.
Table 1: Number of Public and Private Sector Universities/DAI by region as on Nov11, 2015

<table>
<thead>
<tr>
<th>Region</th>
<th>Public</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>25</td>
<td>24</td>
<td>49</td>
</tr>
<tr>
<td>Sindh</td>
<td>19</td>
<td>30</td>
<td>49</td>
</tr>
<tr>
<td>KPK</td>
<td>19</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>Baluchistan</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Federal</td>
<td>25</td>
<td>8</td>
<td>33</td>
</tr>
<tr>
<td>AJK</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>GB</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Punjab</td>
<td>99</td>
<td>76</td>
<td>175</td>
</tr>
</tbody>
</table>

Figure 2 provides enrolment data by gender to show the evolving gender balance in higher education in the country. This healthy trend of gender balance will be maintained through establishing more women universities to ensure educational and economic empowerment of females. The merit based admission system continues to enrol more women in higher education.
Fig. 2: Enrolment at University (Campus + Constituent Colleges) over the years

Table 2 shows annual increase in enrolment in public and private HEIs during 2001-02 to 2014-15. The Table does not include the enrolment numbers for affiliated colleges. The positive enrolment trend has to be accelerated during the next decade to achieve HEC’s ambitious equitable access targets. HEC will gather enrolment data for all affiliated colleges and it will be included to get a better picture of the total size of students in HEIs.

Table 2: Enrolment growth at Universities/DAI & Distance learning

<table>
<thead>
<tr>
<th>Year</th>
<th>Distance Learning</th>
<th>Public</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>89749</td>
<td>142652</td>
<td>43873</td>
<td>276274</td>
</tr>
<tr>
<td>2002-03</td>
<td>108709</td>
<td>167775</td>
<td>55261</td>
<td>331745</td>
</tr>
<tr>
<td>2003-04</td>
<td>159257</td>
<td>202871</td>
<td>61108</td>
<td>423236</td>
</tr>
<tr>
<td>2004-05</td>
<td>187557</td>
<td>216454</td>
<td>67953</td>
<td>471964</td>
</tr>
<tr>
<td>2005-06</td>
<td>199660</td>
<td>242879</td>
<td>78934</td>
<td>521473</td>
</tr>
<tr>
<td>2006-07</td>
<td>272272</td>
<td>276226</td>
<td>91563</td>
<td>640061</td>
</tr>
<tr>
<td>2007-08</td>
<td>305962</td>
<td>331664</td>
<td>103466</td>
<td>741092</td>
</tr>
<tr>
<td>2008-09</td>
<td>339704</td>
<td>348434</td>
<td>115369</td>
<td>803507</td>
</tr>
<tr>
<td>2009-10</td>
<td>386329</td>
<td>419852</td>
<td>142087</td>
<td>948268</td>
</tr>
<tr>
<td>2010-11</td>
<td>439515</td>
<td>430320</td>
<td>147447</td>
<td>1017282</td>
</tr>
<tr>
<td>2011-12</td>
<td>436850</td>
<td>459487</td>
<td>142812</td>
<td>1030149</td>
</tr>
<tr>
<td>2012-13</td>
<td>477890</td>
<td>482877</td>
<td>177968</td>
<td>1138735</td>
</tr>
<tr>
<td>2013-14P</td>
<td>490596</td>
<td>543257</td>
<td>209207</td>
<td>1243060</td>
</tr>
<tr>
<td>2014-15P</td>
<td>472395</td>
<td>597624</td>
<td>228581</td>
<td>1298600</td>
</tr>
</tbody>
</table>
**Graphic Data from Table 2**

**Regionwise Total Universities Enrolment Annually**

**Actual Enrolment Trend** (Numbers)

**Fig. 3 Annual Enrolment Trend**

**Enrolment Projections for HEC vision 2025**

Table 3 presents the projected enrolment in higher educational institutions. It is based on the projected demographic growth data available from various indigenous and international sources. The portion of 17-23 years olds enrolled in all three tiers of tertiary education needs to be gradually increased from the present level to 15% of the age group over the next 10 years to meet the growing needs of trained human resources in the country. This significant increase in enrolment demands increased numbers of HEIs both in the public and private sectors, preparation and deployment of quality faculty and use of technology embedded tools and methods of instruction, assessment and research. Many countries in the region are striving to meet their human resource needs by even higher rates of enrolment. The socio-economic goals of Pakistan cannot be achieved without the proposed projected increase of enrolment and graduation of credentialed human capital.
**Table 3: Projected Enrolment by Year 2025**

<table>
<thead>
<tr>
<th></th>
<th>(Y_0) 2014-15</th>
<th>(Y_1) 2015-16</th>
<th>(Y_2) 2016-17</th>
<th>(Y_3) 2017-18</th>
<th>(Y_4) 2018-19</th>
<th>(Y_5) 2019-20</th>
<th>(Y_6) 2020-21</th>
<th>(Y_7) 2021-22</th>
<th>(Y_8) 2022-23</th>
<th>(Y_9) 2023-24</th>
<th>(Y_{10}) 2024-25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrolment in Public, Private, Distance Univ.</td>
<td>1.299</td>
<td>1.574</td>
<td>1.736</td>
<td>1.914</td>
<td>2.112</td>
<td>2.329</td>
<td>2.568</td>
<td>2.833</td>
<td>3.124</td>
<td>3.446</td>
<td>3.801</td>
</tr>
<tr>
<td>Enrolment of [Affiliated Colleges]</td>
<td>0.728</td>
<td>0.713</td>
<td>0.786</td>
<td>0.867</td>
<td>0.956</td>
<td>1.055</td>
<td>1.163</td>
<td>1.283</td>
<td>1.415</td>
<td>1.561</td>
<td>1.721</td>
</tr>
<tr>
<td>External Students</td>
<td>0.665</td>
<td>0.683</td>
<td>0.753</td>
<td>0.831</td>
<td>0.916</td>
<td>1.011</td>
<td>1.115</td>
<td>1.229</td>
<td>1.356</td>
<td>1.496</td>
<td>1.650</td>
</tr>
</tbody>
</table>

**Fig 4: Projected Enrolment in universities by Year 2025** (in millions)
Table 4: Distribution of Projected Enrolment* - Universities only
During the next 10 years enrolment increases in universities is projected to increase as describe in table 4.

<table>
<thead>
<tr>
<th>Period</th>
<th>Distance</th>
<th>Public</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y0-2014-15</td>
<td>472,395</td>
<td>597,624</td>
<td>228,581</td>
<td>1,298,600</td>
</tr>
<tr>
<td>Y1 2015-16</td>
<td>526,840</td>
<td>662,400</td>
<td>256,450</td>
<td>1,445,690</td>
</tr>
<tr>
<td>Y2-2016-17</td>
<td>587,560</td>
<td>734,200</td>
<td>287,720</td>
<td>1,609,480</td>
</tr>
<tr>
<td>Y3-2017-18</td>
<td>655,280</td>
<td>813,780</td>
<td>322,800</td>
<td>1,791,860</td>
</tr>
<tr>
<td>Y4-2018-19</td>
<td>730,810</td>
<td>901,980</td>
<td>362,160</td>
<td>1,994,950</td>
</tr>
<tr>
<td>Y5-2019-20</td>
<td>815,040</td>
<td>999,740</td>
<td>406,310</td>
<td>2,221,090</td>
</tr>
<tr>
<td>Y6-2020-21</td>
<td>908,980</td>
<td>1,108,100</td>
<td>455,850</td>
<td>2,472,930</td>
</tr>
<tr>
<td>Y7-2021-22</td>
<td>1,013,750</td>
<td>1,228,210</td>
<td>511,430</td>
<td>2,753,390</td>
</tr>
<tr>
<td>Y8-2022-23</td>
<td>1,130,590</td>
<td>1,361,330</td>
<td>573,780</td>
<td>3,065,700</td>
</tr>
<tr>
<td>Y9-2023-24</td>
<td>1,260,900</td>
<td>1,508,880</td>
<td>643,730</td>
<td>3,413,510</td>
</tr>
<tr>
<td>Y10-2024-25</td>
<td>1,406,230</td>
<td>1,672,430</td>
<td>722,210</td>
<td>3,800,870</td>
</tr>
</tbody>
</table>

Fig 5: The Trends of Enrolment Increase

[Graph showing enrolment increase from Y0-2014-15 to Y10-2024-25 with projected numbers for each year.]
In order to accommodate the projected growth of enrolment over the next 10 years HEC plans not only to increase the capacity of existing universities, distance education institutions and colleges, but to increase the number of public and private universities and colleges. Distance education facilities will be expanded to provide technology embedded higher education opportunities. Table 5 provides projected numbers of annual enrolment growth and total number of public and private universities.

Table 5: Projected Number of Public & Private Universities and enrolment by 2025

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Enrolment - Public</td>
<td>597,624</td>
<td>662,400</td>
<td>734,200</td>
<td>813,780</td>
<td>901,980</td>
<td>999,740</td>
<td>1,108,100</td>
<td>1,228,210</td>
<td>1,361,330</td>
<td>1,508,880</td>
<td>1,672,430</td>
</tr>
<tr>
<td>Universities</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Enrolment - Private</td>
<td>228,581</td>
<td>256,450</td>
<td>287,720</td>
<td>322,800</td>
<td>362,160</td>
<td>406,310</td>
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<td>511,430</td>
<td>573,780</td>
<td>643,730</td>
<td>722,210</td>
</tr>
<tr>
<td>Universities</td>
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<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Total Enrolment</td>
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<td>918,850</td>
<td>1,021,920</td>
<td>1,136,580</td>
<td>1,264,140</td>
<td>1,406,050</td>
<td>1,563,950</td>
<td>1,739,640</td>
<td>1,935,110</td>
<td>2,152,610</td>
<td>2,394,640</td>
</tr>
<tr>
<td>Number of Public</td>
<td>99</td>
<td>108</td>
<td>118</td>
<td>128</td>
<td>139</td>
<td>151</td>
<td>165</td>
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<td>Number of Private</td>
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<td>92</td>
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<td>Total Universities</td>
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<td>215</td>
<td>229</td>
<td>243</td>
<td>262</td>
<td>275</td>
<td>285</td>
<td>294</td>
<td>300</td>
</tr>
</tbody>
</table>

The basic assumptions are as follows:

1. Public - Private Universities mix would be 70% and 30% respectively, as public universities have to be increased by a higher rate to accommodate the new enrolment.
2. Most of the infrastructure needs (establishment of new universities) would be completed in the first 7 years.

Since private sector is not being incentivized in Vision 2025, the growth in number of private universities may be substantially lower.
Fig 6: Projected Growth in Private and Public Universities by 2025 (source table 5)

Major Programmes
Higher education institutions in Pakistan will be increased and expanded to provide:

Increased equitable access from the current level to 15% of 17-23 years age cohort to reach a critical mass of 7+ million educated manpower for a nation of almost 246 million people in 2025 (projection source United Nations Department of Economic and Social Affairs, Department of Population Projection, 2015).

The bulk of this growth will be accommodated in increased and improved TIER II and TIER III institutions. Currently TIER III colleges are affiliated with TIER I or TIER II universities. Their performance standards need significant improvement, curricula need to be more rigorous and relevant to the developing economy, and faculty to be better prepared academically and in the use of technology embedded, interactive strategies of teaching, learning, research and assessment of learning outcomes. The number of 3600 existing colleges is projected to grow to 6000, with the help and guidance of affiliating universities. They are to develop and implement college improvement plans. Currently these institutions cater to 25% of the enrolment in tertiary education. Their institutional strategic plans shall also include 15% increase in enrolment. Their curricula need synchronization with new academic programmes offered by the universities and include increased emphasis on research, supervised internships and ethical acquisition, use and analysis of data.

The collegiate sector needs to initiate development of 150 Community colleges to prepare vocationally competent and certified work force who will improve the quality of workmanship through 4 semesters of academic study and technical and vocational work, after completing 12
grades of basic education to achieve Associate Degrees (AD) with a salient emphasis on
development of skills and competencies to add value to the world of work. A National Skill
University along with TIER II affiliating universities will exercise stringent quality control
measures to establish these new colleges. Similar Skill universities will be developed in all units
of the federation. New funding arrangements for these colleges have to be made through
public/private partnership. Assessment of students will focus on problem solving skills and
productive work under supervision of master craftsmen and college faculty.
Establish 15 new public Science and Technology, ICT, Agriculture, Medicine and allied health
professions Universities/Degree granting institutions to develop the needed human resources.
This will entail international collaboration with eminent Universities in selected countries for
collaborative faculty development, curricula based on international standards of science and
technology disciplines, investing in laboratories equipment to undertake research that can be
readily commercialized to continuously solve national problems in critical areas identified in the
GOP Vision 2025 and 11th five year National Development Plan. These new universities can be the
harbingers of Knowledge and Technology based development of economy and will be the
platform for innovative, applied, utilitarian research that will add value to exploitation,
production and utilization of natural resources in the twelve key “thrust areas” identified in the
11th plan.
Facilitate the establishment of 105 Private Sector Comprehensive Universities to provide quality
undergraduate and graduate level education in Social and Natural Sciences, and professional
education to increasing numbers of male and female students. The HEC policies and regulations
for setting up these universities will be strictly enforced.
Programmatic accreditation will be ensured through the existing and 15 new national
accreditation councils. HEC monitoring and evaluation of all HEIs will be expanded through
better staffed Quality Assurance Division (QAD).
Set up 100+ smart sub-campuses of Selected Universities in districts with sufficient but under-
served population. HEC plans on adding 50 new public comprehensive universities in the less
developed parts of the country to meet the target of increased enrolment in communities being
opened up through CPEC and other mega development projects and programmes.
Increase number of sub-campuses of VU and AIOU to offer technology delivered Mass Open
Courses and Degree programmes for additional cost effective opportunities of higher
education. All TIER II universities will establish Distance Education Directorates to provide online
programmes of higher education, to increasing number of students including external students.
Enhance use of high speed connectivity to all degree granting institutions through availing
Universal Services Fund and National ICT R&D Fund. HEC plans on expanding availability of high
speed connectivity and digital materials and services to facilitate expansion and improvement of
higher educational opportunities.

Performance Indicator
• HEC will regularly collect enrolment data from all HEIs and disaggregate it in terms of gender,
disciplines of studies at the undergraduate and graduate levels,
• Increase number, qualifications and ranks of full time and adjunct faculty employed by all
three levels of higher education by discipline,
• Numbers of students enrolled in private HEIs by major areas of study,
• Numbers of HEIs which have established Directorates of Distance/External students and their enrolment by gender, disciplines studied and major areas of emphasis,
• Increase numbers and facilitate issuance of NOCs by HEC for starting new relevant programmes of studies offered by HEIs,
• Gather data about students enrolled in Universities and Institutes of Professional studies in Agriculture Sciences, Arts and Design, Business, Commerce and Entrepreneurship, Engineering and Technology, ICT, Medicine and Allied Health professions, Natural Sciences, Social Sciences, STEM studies, Women’s Education,
• Number of new comprehensive TIER II universities established in the public and private sectors
• Number of smart sub-campuses established,
• Number of Community Colleges and new Degree Colleges established,
• Number of new National Curriculum Review Committees established,
• Number of new Accreditation Councils established each year and numbers of HEIs/programmes accredited by each,
• Schedule regular Monitoring and Evaluation site visits conducted each year by HEC teams of M&E visitors to ensure compliance with HEC rules and regulations for all graduate programmes at Level 7 and 8 of NQF,
• Numbers of recipients of Merit and Need based students at UG levels particularly in the under-served areas,
• Numbers of Students receiving Tuition Waivers from under-served areas,
• Data on Research publications from TIER I and TIER II institutions posted on the WEB of Knowledge; Citations reported,
• Annual ranking of universities by HEC, QS criteria for Asian Universities and synchronization of the two sets of criteria to streamline the process of ranking,
• Increase the number of QS ranked Pakistani universities from 10 to 15 and improve the rank of top ten universities,
• HEC will strengthen collaboration with QS and other global university ranking systems,
• HEC will establish a Data gathering Authority to collect, analyse, quantitative data regarding all three Tiers of Higher Education Institution.

C. Excellence in Leadership, Governance and Management

Aim
An elaborate well planned system of higher education reforms calls for visionary leaders, strategic planners and excellent managers to implement their collectively developed collegial designs of growth and development. Significantly improve the effectiveness and efficiency of both the internal and external systems of governance of all tiers of HEIs.

Introduction
The reform and redesign of higher education sector all over the world requires innovative reconceptualization of the role and functions of HEIs by their leaders and key personnel, faculty,
students and alumni. Mere expanding the old institutional structures is not enough. HEIs at all three tiers have to come out of their traditional ivory tower role and redefine their leadership as socially embedded catalysts of change. We have to transform our leading universities from being isolated communities of scholars into corporations of scholars committed to knowledge entrepreneurship and instituting new service delivery systems and structures that inform, instruct and inspire successive generations of students to do their part in becoming active partners in the intellectual, cultural transformation process through a well-designed, ethically defensible roadmap.

The visionary leaders are committed to recalibrate their institutional mission not to be all things to everybody but to choose to do those things well that will distinguish their institutions. They and their teams of scholars are to be involved in constant pursuit of perfection in what they have chosen to do exceptionally well in carefully selected and contextually important programmes of studies and research. These visionary leaders are not lone riders but leaders of teams who work in a collegial manner as they leverage their place in the global intellectual enterprise of discovery and dissemination of useful knowledge and skills. They know how to deal with stresses and strains of the change process based on collective creativity. The scholar leader of a modern university knows how to reconcile the conflicting claims of autonomy and accountability, restructuring and implementing policies of hiring, retention and promotion of faculty through a fair and objective tenure track system, raising institutional resources from diverse sources and allocating them through a well-defined budget planning process involving all stakeholders and they recognize that priority one is ensuring the success of their students to achieve their academic and professional development goals. They and their colleagues pave the multiple avenues to convert newly admitted students into life-long learners who are successful in their professional endeavours us and are supportive alums for their alma mater.

The excellent managing leaders of our universities also need to be proficient in the acquisition and utilization of evolving technological tools of gathering and using reliable institutional data, whether it deals with student services and academic advising, budget planning and allocation, enrolment, quality enhancement of curricula, assessment of learning outcomes, faculty research output and institutional development.

During MTDF II attempts have been made to pilot a comprehensive Higher Education Management Information System (HEMIS). To enhance transparency, quality, reliability and timeliness of enrolment, financial data for better institutional management a New Accounting Model (NAM) was introduced to ensure timely availability of annual financial reports for audit and budget planning purposes. These efforts will be continued and training programmes developed for financial managers and registrars for making effective data-driven policy decisions.

Intramural and team sports are nurseries of promoting healthy bodies and healthy minds and preparing sports champions at local, national and international levels. Our university leaders have to reinvigorate efforts in this regard by collaborating with National Sports Board and Pakistan Olympics Association. Sports competitions are avenues of increasing community involvement and support for HEIs. Pride in the performance of their athletes and sportsmen increases a community’s pride in its teams and institutions. Universities can tap into this activity for mutual benefit.
Objective

- Merit based selection of Upper Management of Universities through depoliticized Search Committees consisting of eminent scholars, CEOs of successful business corporations and research specialists with stellar records of research productivity. The process of selecting Vice Chancellors / Rectors needs serious revision and redesign. Currently the provincial departments of higher education advertise the vacancies of VCs, often in groups, resulting in large numbers of applicants. Short listing a panel of four to six applicants is done at the discretion of some section officer using a variety of criteria, interpreted according to the judgement of the one doing the shortlisting. The short listed candidates appear before the search committee for a brief interview. Thereafter the committee recommends to the Chancellor of the university a slate of three candidates, with or without an order of merit, to select the head of a university. This process can be influenced at any stage by unrelated extraneous factors and does not include any consultation with internal stakeholders of the institution. The Chancellor, who is the Governor of the Province or the President of the country in case of Federal Universities, has the discretionary authority to accept any or none of the names on the panel recommended by the committee. The process ought to be revised to create a new balance between the civil society, bureaucracy and institutional representatives in the selection of the Chief Executive of a modern university.

- The appointment of Deans of Faculties also involves the Chancellors of the universities resulting in delays in appointments. Academic leadership positions need to be filled by the university Syndicates on the recommendation of the Vice Chancellors/Rectors.

- Administrative structure of a large, public, modern university demands internal reorganization of the prevailing traditional system. The three main offices of the Vice Chancellor, Controller and Registrar need to be restructured, through amendments in the University Acts, to effectively manage the Academic Affairs and Student Services, Graduate Studies and Research, Budget planning/ Finance and Institutional Development. Depending on the size of the universities at least three to four Pro Vice-Chancellors need to be appointed to effectively manage their new growth and development agenda. The Pro Vice-Chancellors for Academic Affairs and Student Services will be responsible for quality enhancement of curricula and developing new relevant and rigorous programmes of study, developing and implementing a student advising system to monitor the academic progress of the students. This office will also develop an effective committee structure at the Department, Faculty and Institutional levels to monitor all aspects of faculty hiring, retention, promotion and tenure based on teaching performance and research output. The Pro Vice-Chancellor Graduate Studies and Research will be responsible for development of graduate faculty and facilities to create an environment conducive to innovative research and its marketing in the community. The office will facilitate accelerators for venture capital infusion for large R&D projects with commercial potential.

- The Pro Vice-Chancellor for Institutional Development will be responsible for developing and implementing comprehensive programmes of fundraising. It will explore additional sources of funds through alumni, philanthropy, auxiliary enterprises, publicly and privately funded commercialized research and collaboration with corporate world and establish linkages with
business community through growing activities of Business Incubation Centres (BICs) and Offices of Research, Innovation and Commercialization (ORICs). An important goal of the new office will be to raise an Endowment through annual alumni giving, deferred donor giving, major gifts from community elite, income from auxiliary programmes and royalties from intellectual property produced on campus. The office will manage the corpus of the endowment through making wise, safe and high yield investments to generate income that will be used to sponsor and support new research projects, provided financial aid to the needy, meritorious students and reduce reliance on the traditional sources of funding.

- A USAID Funded project has established Centres of Advanced Studies (CAS) at four Pakistani universities to undertake graduate studies and research programmes in Energy, Water and Food Security areas. These centres are offering programmes of studies developed in collaboration with three US universities and are designing 100+ research projects each that will have the potential of immediate commercialization. HEC plans on building additional Centres of Advanced Studies at more universities and set up Technology Parks at five Universities, one in each province, to demonstrate role of applied research in creating knowledge–based economy and increased linkages with business and industry.

- Redefine the role of the VC/Rector to include fund raising and institutional development as their additional primary duty. The role of senior leadership of 21st century universities has significantly changed. Universities are discovering new ways of generating resources from non-traditional sources of funding teaching and research. Vice Chancellors of public universities have to lead these efforts to solicit additional resources through raising research grants from public and private sources, philanthropy and intellectual property commercialization. In these efforts they will be assisted by well qualified professional staff.

- A National Institute of Leadership Development in Higher Education at HEC shall be established to prepare senior administrators of universities for effective and efficient participatory governance. The National Institute for Leadership Development will provide programmes of in-depth professional training for key managers to implement technology embedded programmes of institutional management. The heads of TIER II and TIER III HEIs/DAIs and their key staff will be trained at the Institute to develop institutional improvement plans for enhancing the institutional quality. A series of in-service topical trainings will be provided to the College Principals to develop the capacity of their faculty to better perform their teaching and research duties, utilize the digital resources for curriculum refinement, research and general infusion of instructional and information technologies in their programmes.

- All HEIs receiving recurring and development grants from HEC will be provided training and resources for developing internal audit and financial control procedures to develop and submit timely annual reports. All future HEC fund allocations will be contingent on timely submission of financial and enrolment data reports. All public universities will be encouraged to have independent external audits.
Major Programmes

- HEC will set up a high powered committee of Administrators, faculty and business leaders to revise the University Acts and redesign the administrative organizational structure of TIER I and TIER II universities to devolve authority and responsibilities to three to four Pro Vice-Chancellors to improve the quality of Academic services, Student services, Graduate Research programmes and Institutional Development as described.

- Merit based selection and appointment of CEOs/Rector/Vice Chancellors through the Search Committee process developed by HEC. They shall be selected through a thorough search, based on their Eminent Academic preparation, outstanding professional experiences, and demonstrated leadership qualities and through a detailed programme of on campus interactions with stakeholders. Only after such a detailed interactive interview process with positive recommendations from all key segments of the university the reins of the institution be handed over to the new leader.

- HEC will strengthen the institutional Monitoring and Evaluation system to ensure quality of programmes of teaching and research. The Quality Enhancement Cells have been established at all public universities. HEC has prepared and provided training programmes to University staff of QECs for effective performance of their duties. Their mandate needs to be expanded to include development and implementation of student advising system from initial admission to graduation and follow up after graduation; collaborate with the Pro-Vice Chancellor for Academic Affairs to develop a Curriculum Audit programme to check the relevance and rigor of course/ programme offerings. A standard Faculty Portfolio that includes the Syllabi of courses taught by them, a knowledge management system and assessment procedures used, record of student evaluations, peer review and 360 degrees performance evaluation results and research papers published in peer reviewed journals will be maintained by faculty and will be the basis of retention, promotion and tenure decisions.

- Provide facilitation to pursue research grants from public and private funding sources. HEC will continue to provide R&D travel grants to faculty to present their peer reviewed scholarly papers at national and international conferences. Such activities promote networking among scholars and recognition of scholarship produced in our universities.

- To improve the workmanship and quality of technical and vocational staff at levels 3 and 4 of National Qualifications Framework of Pakistan, a new programme of setting up Community Colleges is being started. The community colleges will offer three tracks of preparing human capital. The academic track will enable scholars to complete the first four semesters of the eight semester (four year) degree programme in their own community thus obviating costs of staying in hostels away from home. The Community college will offer the second track of four semesters of technical and vocational preparation with judicious blend of on campus theory and laboratory experiences and on the job apprenticeship under the supervision of faculty and master craftsmen. HEC has developed the 68 credit hour Associate degree programmes in an increasing number of skills, technologies and professional preparation areas in engineering, medical technologies and allied health programmes, ICT, electronics, automobile industry, hospitality industry, computers, arts and design, business and teaching.
The third track offered in the Community colleges enrolls citizens of all ages in the community to develop skills of their choice in non-degree programmes. The TEVETA standards will be followed in these colleges. A new National Skill university will play a critically important leadership role in ensuring compliance with programmatic standards. Community colleges promise to provide low-cost higher education in under-served areas of the country. A skill university will be developed in each unit of the federation for this purpose. HEC plans on developing leadership training programmes of Principals of these new units of TIER III of tertiary education.

- The prevailing rules of affiliating TIER III colleges with TIER I and TIER II universities need to be revised for effective monitoring of the quality of programmes, academic support facilities like libraries and laboratories, faculty skills to use new tools and strategies of teaching. Affiliation calls for serious support and sharing of resources by the affiliating universities with college students, faculty and staff. HEC will monitor how the universities are implementing their affiliating rules designed to nurture quality programmes of study and creative research.

- The proposed leadership and management structure of HEIs will promote inter-disciplinary collaboration in teaching and research on our campuses. The rigid departmental and disciplinary boundaries are being restructured through collaborative planning and offering of programmes to solve more complex cognitive and cognition problems. Research and study is no longer done in splendid isolation but has become a team effort. The bonds among scholars of natural and social sciences are being strengthened in modern universities by lessening barriers among them. While social scientists are using more empirical methods in their pursuit of perfection, natural scientists are increasingly becoming concerned about social implications of their disciplines of knowledge. The two cultures are coming closer through common, collaborative pursuit of knowledge. This requires restructuring of management at department level in Tier I and Tier II universities to facilitate interdisciplinary studies.

**Performance Indicators**

- The number of new interdisciplinary programmes started by TIER I and TIER II universities at different levels of study,
- Increased numbers of Merit and Need-based scholarships provided,
- How many smart sub-campuses established to take higher education opportunities to the doorsteps of the learners,
- How many QECs have managed to offer a coordinated student advising programme,
- Timely reporting of institutional data to HEC and its use for analytical data-driven decision-making,
- The number and size of University endowments set up in universities,
- Quantum of Tuition waivers granted,
- Number of universities conducting independent financial audits,
- Number of College improvement plans developed and implemented,
- Have ORICs and BICs coordinate their work together to produce marketable inventions and products,
• Changes in Administrative organizational structure of the universities to meet their development needs.

D. Increased Faculty with Highest Academic Qualifications

Aim
Increase the number of Faculty in Tertiary Education institutions with highest academic qualifications to improve the quality of teaching and research to prepare self-reliant, problem solving scholars.

Introduction
Since its inception HEC has devoted focused attention to invest resources for qualitative improvement of higher education through improving the intellectual calibre of the faculty. All other core goals of changing the landscape of higher education could not be accomplished without having sufficient numbers of highly qualified faculty who themselves have worked at the frontiers of knowledge and have acquired the modern skills of interactive teaching using the new digital systems of discovery of knowledge and knowhow. Majority of faculty in our higher education institutions have not attained highest academic qualifications. Through devoting a significant portion of its resources on various indigenous and international programmes of faculty development HEC has managed to have 27% of our university faculty with PhDs in their fields of specialization. HEC developed a variety of interim, short term arrangements of acquiring highly qualified faculty for our HEIs through Foreign Faculty hiring programme, incentivizing expatriate Pakistani scholars to return home even for short term temporary assignments during the first few years of its existence. Faculty development is a long and arduous task which takes sustained individual and collective efforts. HEC soon realized that all investment in increased, equitable access and qualitative improvement will go awry without significant investment in indigenous and international programmes of developing our own faculty with mastery of knowledge in their fields and proficiency in disseminating and mediating it to the younger scholars.

HEC also realized that while it takes time and effort to prepare highly qualified faculty, it is also important to deploy and retain them through an enabling scholarly environment for them to teach well and do what their post graduate programmes have prepared them for. A performance and productivity based Tenure Track System (TTS) was introduced for that purpose. It provides higher salaries and status to professors but more importantly gave them the means to create a culture of research on their campuses. The system has been evolving gradually and is being adopted through approval of the statutory bodies of the universities. The TTS rewards are coupled with performance output as measured through better teaching/learning, development of new, relevant and rigorous curricula and increasing research publications. Like all bold reform interventions in a closed system TTS is facing some transitional challenges. The encouraging signs are that new faculty with PhDs is being hired in the system. HEC is providing their first year’s higher salaries and expects the universities to regularize them in the TTS. It is also providing large and small R&D grants to do research and present it at scholarly conferences where their papers have been accepted.
Table 6 provides the recent data about PhD and non-PhD full time faculty in our public and private universities and DAIs to show the slow but steady progress being made through HEC interventions. The march is on but we have long ways to go.

**Table 6: PhD and Non-PhD Full Time Faculty by Region during 2012-13. (Provisional)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Faculty</th>
<th>%age of PhD Faculty</th>
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<tbody>
<tr>
<td></td>
<td>PhD</td>
<td>Non-PhD</td>
</tr>
<tr>
<td>Public</td>
<td>7449</td>
<td>16891</td>
</tr>
<tr>
<td>Private</td>
<td>1804</td>
<td>8300</td>
</tr>
<tr>
<td>Overall</td>
<td>9253</td>
<td>25191</td>
</tr>
</tbody>
</table>

HEC Vision calls for increasing the total number of faculty needed to accommodate the enrolment growth over the next 10 years and increase the share of PhD faculty to 40% of the total by 2025. Figure 3 indicates this trend. Another tangible evidence of the impact of this increase of PhD faculty members is supported by increase in research publications and the resulting improvement in ranking of our universities in the last four years.

Table 7 provides regional distribution of PhD and Non PhD full time faculty. Regional disparities demand more intense efforts to mitigate. Merit based Post graduate programmes of study demand a much stronger foundational preparation and intense desire and devotion. HEC is providing additional grants for talent hunting and development for this purpose.

**Table 7: PhD and Non PhD Full Time Faculty by Public and Private Sector Universities/DAIs during 2012-13.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Faculty</th>
<th>%age of PhD Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PhD</td>
<td>Non-PhD</td>
</tr>
<tr>
<td>Balochistan</td>
<td>181</td>
<td>1083</td>
</tr>
<tr>
<td>Khyber Pakhtoon khuwa</td>
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<td>3499</td>
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<tr>
<td>Punjab</td>
<td>3434</td>
<td>8017</td>
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<tr>
<td>Sindh</td>
<td>1568</td>
<td>6356</td>
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<tr>
<td>Federal</td>
<td>2360</td>
<td>5134</td>
</tr>
<tr>
<td>Azad Jammu &amp; Kashmir</td>
<td>178</td>
<td>765</td>
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<tr>
<td>Distance Learning</td>
<td>80</td>
<td>337</td>
</tr>
<tr>
<td>Total</td>
<td>9253</td>
<td>25191</td>
</tr>
</tbody>
</table>
Fig 7 Number of PhDs Produced by Pakistani Universities over the years.

![Graph showing the number of PhDs produced by Pakistani universities over the years.](image)

Table 8 Total Faculty Needed and 40% PhD Faculty by 2025 - A BIG CHALLENGE

The following Table 8 presents a major challenge. In order to increase the projected enrolment a substantial increase is needed in both the number and quality of Faculty. Transformation of universities in Pakistan as engines of socio-economic growth needs significant increase in numbers of faculty with highest academic preparation.

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</tr>
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<tbody>
<tr>
<td>Faculty - Public</td>
<td>25,812</td>
<td>28,391</td>
<td>31,228</td>
<td>34,348</td>
<td>37,780</td>
<td>41,555</td>
<td>45,707</td>
<td>50,274</td>
<td>55,297</td>
<td>60,822</td>
<td>66,897</td>
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<tr>
<td>Faculty - Private</td>
<td>11,177</td>
<td>12,294</td>
<td>13,522</td>
<td>14,873</td>
<td>16,359</td>
<td>17,993</td>
<td>19,791</td>
<td>21,768</td>
<td>23,943</td>
<td>26,335</td>
<td>28,888</td>
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<td>Sector</td>
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<tr>
<td>Total Faculty</td>
<td>37,428</td>
<td>40,685</td>
<td>44,750</td>
<td>49,221</td>
<td>54,139</td>
<td>59,548</td>
<td>65,498</td>
<td>72,042</td>
<td>79,240</td>
<td>87,157</td>
<td>95,786</td>
</tr>
<tr>
<td>PhD Faculty-</td>
<td>7,944</td>
<td>8,970</td>
<td>10,128</td>
<td>11,436</td>
<td>12,913</td>
<td>14,580</td>
<td>16,463</td>
<td>18,589</td>
<td>20,989</td>
<td>23,699</td>
<td>26,759</td>
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<tr>
<td>Public</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PhD Faculty-</td>
<td>2,088</td>
<td>2,478</td>
<td>2,940</td>
<td>3,489</td>
<td>4,140</td>
<td>4,913</td>
<td>5,830</td>
<td>6,918</td>
<td>6,918</td>
<td>9,741</td>
<td>11,555</td>
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<tr>
<td>Private</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Universities</td>
<td>10,032</td>
<td>11,448</td>
<td>13,068</td>
<td>14,925</td>
<td>17,053</td>
<td>19,493</td>
<td>22,293</td>
<td>25,507</td>
<td>29,198</td>
<td>33,440</td>
<td>38,314</td>
</tr>
</tbody>
</table>

Note:
1. The ambitious expansion of numbers and quality of faculty demands significant increase in scholarships both indigenous and international.
2. (a) Currently 7000+ PhD Scholars are enrolled under HEC Faculty Development Programmes and are expected to complete their studies by 2020.
   (b) US-Pakistan Knowledge Corridor is expected to prepare 10,000 PhD scholars in US ranked Universities.
International Programmes for post-graduate studies in other countries are expected to prepare 5000 PhD faculty.

**Fig 8 PhD Faculty Projection for Private and Public Sector by 2025**

Since its inception HEC has initiated a number of human resource development scholarship programmes from undergraduate to PhD and post-doctoral programmes in all fields of studies and research. The following Table 9 provides information about programme wise summary of overseas scholarships. It also sheds light on the completion rate.

**Table: 9 Programme-Wise Summary of Awarded Overseas Scholarships**

<table>
<thead>
<tr>
<th>Programme</th>
<th>Completed</th>
<th>Studying</th>
<th>Dropped</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PhD Scholarships</td>
<td>5089</td>
<td>2856</td>
<td>186</td>
<td>8131</td>
</tr>
<tr>
<td>MS/MPhil Scholarships</td>
<td>520</td>
<td>86</td>
<td>9</td>
<td>615</td>
</tr>
<tr>
<td>Split PhD</td>
<td>12</td>
<td>29</td>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>5621</strong></td>
<td><strong>2971</strong></td>
<td><strong>195</strong></td>
<td><strong>8787</strong></td>
</tr>
</tbody>
</table>

**Objectives**

- Development and deployment of highly qualified faculty remains a premier goal of HEC. Our target is to appoint and retain 40% of total faculty in universities with terminal degrees,
- To reach this ambitious goal HEC will increase the number of scholarships for both indigenous PhD scholars and international HEC funded opportunities for earning PhDs,
- HEC plans to strengthen the monitoring and evaluation of the doctoral programmes offered indigenously to ensure compliance with HEC prescribed rules to ensure quality,
- There is a rapidly expanding pool of scholars enrolled in level 7 graduate programmes. The most outstanding scholars out of this group will be provided financial aid to pursue doctoral studies at level 8 of NQF,
• New programmes of paid Teaching Assistantships (TAs) and Research Assistantships (RAs) will be designed, through which valuable experiences can be gained by scholars to strengthen the culture of research and improve teaching skills,
• HEC is cultivating partnerships with international universities and Higher Education governing authorities to support split degree, Post Doc and sabbatical exchange programmes. Scholarships are being arranged with China, European Union countries, Australia, the Americas and Pacific region countries and institutions. HEC will set up an office of International Programs for this purpose,
• Tenure Track System will be expanded, additional resources budgeted and stronger M&E system will be established to ensure strict compliance; salaries will be regularly reviewed to stay ahead of inflation
• The office of Academic Affairs, in cooperation with Faculty Deans, will internally monitor the implementation of the TTS as an objective tool of performance assessment based retention, promotion and tenure, decisions,
• Expand the reward and recognition incentive system to encourage outstanding teaching and research,
• HEC will refine and implement the fast track system of employing fresh returning PhDs in the rapidly growing higher education sector,
• Programmes for continuous professional development will be developed through expanded Learning Innovations Division of HEC,
• The scholars who publish research papers, supplementary study materials and text and reference books will be rewarded,
• Three standing Institutional Committees for curriculum refinement and new course development, faculty hiring, retention, promotion and tenure and Budget and Planning will be established to take objective, merit based decisions in these three important areas of institutional development,
• Quality of affiliated colleges will be improved through full and rigorous implementation of criteria prescribed in the affiliating rules,
• Affiliation rules to be reviewed and updated to include Tier III Colleges more closely with the University governance, management and quality assurance systems.

Major Programmes

To Prepare 10,000 PhD Faculty in 10 Years through US-Pakistan Knowledge Corridor
During the official visit of the Prime Minister of Pakistan to meet with President Obama, the two leaders discussed the proposal to establish US-Pakistan Knowledge Corridor and directed their respective governments to intensify their cooperation in this important framework, to achieve the ambitious priority targets of developing high level human capital and producing innovative research envisioned in Pakistan's policy document Vision 2025
HEC plans on increasing equitable access to higher education in Pakistan from its present level of 1.3 million to 7.1 million students over the next 10 years. It demands improving the quality of faculty through programmes of advanced graduate studies and research in ranked US universities and increasing the numbers of faculty to accommodate the planned enrolment
growth in universities and other institutions of higher learning in Pakistan; developing programmes of innovative, applied, utilitarian research to discover and disseminate new knowledge necessary to solve critical problems facing Pakistan; establishing Centres of Advanced Studies in selected universities and establish new Tier 1 research universities to develop creative and constructive scholars and practitioners in agriculture, engineering, medicine, STEM studies, IT, humanities and social science and other thrust areas identified in Vision 2025 and 11th Five year plan to facilitate knowledge-based economic growth; developing low cost Community colleges and smart campuses in all districts of Pakistan to prepare competent skilled vocational and technical personnel to add value to the economy through improved workmanship.

A joint action plan for operationalizing the US-Pakistan Knowledge Corridor has been developed. US has agreed to support Pakistan's efforts to strengthen its University system by jointly increasing the number of Pakistani faculty who will obtain their PhDs. in the United States universities. Recently an MOU has been signed between HEC and the US Educational Foundation in Pakistan (USEFP) to equally fund scholarships to enable 250 Pakistani scholars to pursue their doctoral studies in the US over the next five years through the Fulbright programme. Each government has committed to provide US$ 25.78 million to this programme. Both parties shared the desire to increase the number of Pakistani scholars studying in the US at the graduate level and use the existing university partnerships, on-going Education USA Advising programme and explore other ways to facilitate increased enrolment, financial support, and reduced tuition at selected universities to achieve the ambitious target of preparing 10,000 Pakistani faculty members at US universities.

The PhD programme for 10,000 scholars, in critically needed selected areas of scholarship, calls for detailed development of modalities including nation-wide open, transparent selection of competent students who meet all the admission criteria of host universities; prepare a training plan for candidates to develop their test taking skills to get high scores in standardized tests to enter graduate programmes in the US; developing a detailed pre-departure advising and orientation system to ensure smooth transition and effective participation in the US system of higher education; identification of US partner universities and development of cooperative agreements with their selected graduate schools and departments; negotiating concessional tuition/fee, structures and contractual arrangements with beneficiaries to return and serve in Pakistani universities. HEC has policies in place to appoint the returning graduates to existing or new universities by giving them tenure- track appointments and funds and facilities for research. A list of critically needed thrust areas and disciplines of studies based on the HEC survey and planned growth priorities of Vision 2025 has been prepared. An HEC need assessment survey of 100 universities has indicated that critical faculty shortages exist in Engineering and Technology, Physical Sciences, Social Sciences, Biomedical technologies, Medical Sciences, Arts and Humanities, Agriculture and Veterinary Sciences, Business and Entrepreneurship. In these broad categories interdisciplinary specializations continue to emerge based on cutting edge research. A PC-1 for the first phase of the programme has been submitted and prompt approval to work out the details of sending the first group of scholars to their US host universities by fall semester 2017 is expected. Earning a graduate degree from an American university takes a big investment
of time, brainpower and financial resources. Graduating from a ranked, recognized and respected programme will give a huge return on investment.

HEC has developed the list of US Public and Land Grant universities and State systems. The Association of Public and Land Grant Universities (APLU) has 235 member universities and 25 university systems with multiple campuses in all the 50 states. HEC proposes to coordinate with the Office of International Education of the Association to explore the possibility of developing negotiated agreements with well reputed public universities for admission of Pakistani students at relatively reduced tuition rates. We have started contacting our partner universities and other public universities with relatively low tuition and living expenses. This requires experienced and knowledgeable staff to work out the details, one university system at a time. This effort is to be completed over the next six months to have agreements in place for sending the first batch of our students by fall 2017.

HEC plans to avail the US-Pakistan Knowledge Corridor to design new intellectually vibrant, socially responsible universities fostering high academic achievements, enhanced graduation rates and scholarly productivity. Adding 10,000 highly qualified faculty over 10 years is necessary to create and sustain universities that value ethical entrepreneurship, conduct useful interdisciplinary research to produce new knowledge and are socially involved and globally engaged. HEC plans to:

- Allocate increased funds for indigenous PhD development programmes that focus on Pakistani research problems and generate effective and efficient solutions through discovery of useful knowledge,
- Develop a comprehensive programme of preparing faculty in critically needed areas of innovative applied research,
- Build expertise to enhance the technical and professional capacity of Tier I research universities to do world class research that will make Pakistan a hub of scholarly productivity,
- Focus on redressing the balance between Social Sciences and Natural Sciences. New programmes of advanced studies in teaching of Languages, Sociology/Anthropology, Arts and Design, Economics, Urban Planning and modern Business Education are needed,
- Implement the reformed, university based programme of preparing knowledgeable and skilled teachers for Elementary, Middle and Secondary schools. Twenty one universities and over 200 colleges of teacher education are offering the HEC approved ADE and B.Ed (Hons) programmes. All provinces have endorsed these programmes. University Faculties of Education will focus on preparing Competency Enhancement Programmes of practicing teachers,
- Will provide faculty incentives to write current and up to date textual materials for students enrolled in schools, colleges and universities,
- Encourage HEI faculty to forge stronger links with the business and industry leaders to add value to their products developed by their innovative research,
- Expand programmes of support related to institutional and individual faculty’s Intellectual Property Rights.
Performance Indicators

- Accurate institutional data gathered by HEC about PhD scholars being produced indigenously and through international Doctoral programmes each year,
- Annual mapping of progress of increasing the percentage ratio of PhD faculty in all three tiers of tertiary education,
- Monitor programmes of quality improvement of college education by the affiliating universities,
- Maintain student/faculty ratio of 1:25 at level 5 and 6 programmes in the NQF and data about level 7 and 8 programmes gathered to demonstrate compliance with HEC rules,
- Amount of research funding received from private sources,
- Reform the private students system at all major universities and bring them under the technology-delivered distance education system through establishing Directorates of External Continuing Education of Students,
- Provide competitive scholarships for 500 post doc research projects in humanities, STEM studies including natural sciences and technology, engineering and mathematics,
- Increase subsidized opportunities for domestic PhD programmes for 6000 lecturers in all disciplines of knowledge including Social Sciences and Languages,
- Develop sector based knowledge exchanges among university consortia to use Offices of Research, Innovation and Commercialization (ORIC) and Business Incubation Centres (BIC) through collaboration with development partners and international donors,
- Monitor progress of HEC approved, modern standards-based system of Pre- and in-service preparation of K-12 teachers which is being implemented in all the provinces of the country to replace the old 19th century normal school type of teacher education programmes. We are set to implement it through all the comprehensive universities in the country to prepare 150,000 better qualified teachers each year to achieve the national target of quality, universal basic education in ten years.

E. Enhanced Quality of Curricular Offerings

Objectives

- Phase out all 1and 2 year Bachelor's degrees in all universities by 2018 and replace them with 4 year, 136+ credit hours degrees based on semester system. A new National Qualifications Framework for all 8 levels of education, following the Bologna Principles, has been prepared to ensure achievement of learning outcomes at all levels. Higher Education segment and Vocational Technical Education segments of the National Qualifications Framework have been finalized and are ready for implementation.
- Institute 2+2 year degree programmes in all 4 year degree programmes with strong applied internship and field work programmes in collaboration with community and businesses. Moe two year Associate Degree programmes for professional and technical training need to be created at level 4.
- Quality Enhancement Cells in all public universities to undertake and report directly the quality enhancement measures taken in academic audits of curricula offered and provide
reliable data about well-staffed quality of instruction by faculty, semester based assessment practices, development and implementation of academic honour code for all scholars and academic advising of all students are planned for implementation by the QECs on each campus. This is a significant step to prepare ethical scholars who will transform the social ills of society also.

- Curriculum is the heart of a community of scholars. It needs to be continuously refined and updated by leading scholars in the universities. The current system of three yearly reviews of course content by National Curriculum Review Committees (NCRCs) will to be refined because it is no longer valid in an age of knowledge explosion where new knowledge is being created daily. HEC has invested heavily in making Pakistan Education Research Network (PERN) available to the University faculties and Boards of Studies for undergraduate and graduate programmes to use this network to continually refine curricula and share them with the NCRCs so that uniform quality of curriculum offerings could be ensured in all universities in the country.

- Low cost Split-degree graduate programmes of studies need to be developed in collaboration with ranked universities of the world through tuition exchange programmes where students pay tuition to their own universities at their rates and study for a semester/year in collaborating universities. Such scholarly exchanges are powerful instruments for qualitative improvement of curricula based on international standards and networking of scholars.

- Programs of faculty sabbatical exchange will be developed at all the public universities to undertake teaching and collaborative research in STEM studies in partner and graduate universities.

- The undergraduate academic programmes are to have mandatory elements of supervised practical internship and research to develop reflective thinking and problem solving scholars.

F. Research, Innovation and Commercialization

Aim
HEC plans on making higher education institutions as the major source of new knowledge to create a knowledge-based economy. It plans on creating TIER 1 research universities with effective and well-staffed offices of research, innovation and commercialization to add value to the economy in the emerging thrust areas of growth. The existing six internationally ranked research universities will be supported to improve their ranking to be included in the top 200 universities of the world through their scholarly output published in impact factor scholarly journals.

Objectives
- Build on the significant gains in the research publications in both national and international journals of high repute through ORIC centres developed in 30 TIER I universities. HEC plans on further strengthening these centres to foster, through R&D grants for applied research projects with immediate impact on the economic development of the country.
• Increase the numbers of collaborative research with the growing industries in the country and develop new programmes and curricula that add value to these newly emerging areas to increase productivity and development of new readily marketable products that can be supplied to national and international markets.

• Enhance the programmes of Business Incubation Centres (BICs) in universities where they have been established to undertake commercialized research.

• Applied research programmes in scientific study/exploration and commercial exploitation of natural resources like precious gems, copper, iron, gold, marble, rare metals, and hydrocarbons Textile/fashion design industries need to be undertaken to positively impact the economy of Pakistan. HEC plans to establish 15 new Science and Technology Universities for this purpose on an urgent basis.

• Increased utilization of the investment made by HEC and Ministry of Science and Technology in ICT, video conferencing network, PERN I and II by faculty and students to be ensured through effective use of ORICs and BICs in undertaking globally relevant commercial research in IT and its use in commercial activities.

• Increase number and amount of research grants and award special support to those leading to international patents.

• Set up Five Research and Technology Parks, one in each province, with the collaboration of Universities, Business and Industries and international partners. Pakistan’s major businesses are to be motivated to invest in universities devoted to innovative R&D and utilize their research for new product development and business ventures.

G. Financial Management and Enhanced Investment

Objectives

• Realistic budget estimates have been developed based on the achievements of the MTDF11. The increased enrolment, quality enhancement, new degree and research programmes to be started and faculty development need substantial additional resources. The present government has, thankfully reversed the bleak negative trend of investment in higher education of the past. The damage done in initial period of MTDF II (2011-12) is being mitigated slowly but the ambitious strategic priorities listed above need substantial increase in both recurring and developmental budgets of HEIs.

• HEC will work on requesting funds from World Bank, prominent international development partners/donors and stakeholders for targeted growth in promotion of research, faculty development, interuniversity academic programming activities and starting new relevant productive and promising programmes of studies and research organizations.

• Universities get about 40-46% of their budget through fees from students and other sources of income. This has made access to higher education less equitable. The targets identified above are designed to transform the economy of the country by additional revenue generating activities and programmes to be started in the next decade.

• A sustained increased investment in HEIs will enable us to prepare the critical mass to move more successfully towards a knowledge-based economy, that will ensure overall national economic take-off to improve Pakistan’s ranking in the global competitive index. Pakistan is
on the cusp of moving from the lowest ranking Human Resource Development countries (146 out of 187 on UNDP HRD Index in 2014) to medium level Human Resource Development countries. Our efforts to move up and increase the per capita income from its present low level to its doubling can be achieved with ensuring a steady annual increase in investment in quality Higher Education.

H. I.T Embedded Higher Education

Aim

To ensure that potential of Information Technology is fully used for benefitting Higher Education sector. Increase productivity, efficiency, research output, cost effectiveness of higher education sector by providing state of the art IT technologies. HEC plans to provide new and advanced systems of digital technologies to enable scholars and institutions to fully participate in the emerging Fourth Industrial Revolution.

Introduction

ICT has proven track record of contributing in the economic development of many countries. Information and communication technologies are transforming every aspect of 21st century: Manufacture of information products (computers, e-books, multimedia devices, and software) and the delivery of information services (financial services, utilities, telecast services, education) are the prime emphases of leading countries for their development.

The Higher Education Commission is implementing new strategies for meeting the rising demand of technology embedded higher education and growth challenges. It has embraced the digital revolution of information and communication technology and is successfully utilizing it for dissemination of higher education, increasing productivity and promoting innovation.

HEC’s Vision 2025 aims to ensure a comprehensive information and communication technology plan for implementation so as to develop a knowledge-society in Pakistan while providing means and resources to higher education institutions for strengthening computing and telecommunications infrastructure.

There have been significant developments and enhancements in various services offered by HEC to the higher education institutions across Pakistan. Pakistan Education & Research Network (PERN), being at the forefront, has expanded its footprints across the country and grown bigger and better to provide higher speed connectivity to higher education institutions. The bandwidth growth has been significant, whereas, core network service availability surpassed the 99.9% mark. The research and collaborative activities in the field of higher energy physics, telemedicine, and network technologies brought true value as per the spirit of PERN. Video conferencing, being one of the applications of PERN, has been a true enabler to the students and researchers of higher education. So far, over 3,500 interactive lectures, workshops, seminars and other interactive sessions have been organized under the Virtual Education Project while the lectures of eminent scholars are delivered from 18 countries across the world.

Helping universities with technology upgrades has been a significant; achievement whereby desktop computers and servers are upgraded with the latest operating systems and software. Other technological advancements witnessed the introduction of virtual desktop interface as a
cloud application and SaaS based unified communication services to the higher education institutions. The online services of degree attestation & equivalency services, online scholarship services and HEIs ranking offered by HEC underwent major developments in past years to provide feature-rich experience to the public seeking various services from HEC.

1. Planned ICT4Education Projects during the next 10 years

1.1. Smart Universities
The “Smart Universities” are to have few building blocks and greater reliance on technology embedded teaching, learning and research to create a complete new ecosystem of higher education.

1.1.1 Smart Bags initiative of Government of Pakistan

Background
Amongst the challenges in the higher education sector, are restricted access to computer laboratories due to high students to computer ratio, and unavailability of wireless internet coverage across the campus as well as the hostel areas at the universities. In most cases, the computer labs are predominantly occupied by the senior students and/ or for some scheduled lectures. Access to computers is hardly available to students for their final year projects and to the researchers for their research work during the semesters and for off-time usage of computers and internet. Given the situation due consideration is being given to the provision of laptops/ tablets for all graduate students and meritorious undergraduates which will greatly help in achieving the objectives of qualitative improvement as set forth by Higher Education Commission.

Prime Minister’s Laptops Scheme commenced in 2013-14 with a target to cover 100,000 students each year. Students are being provided with laptops along with internet on the move with access of digital library. The scheme addresses only a small fraction of currently enrolled students in the public sector HEIs. Students studying at the private sector HEIs are not covered under this scheme. However, there have been schemes initiated by two of the provincial governments to extend the laptop distribution to college students as well.

Goals
The programme aims to reduce the digital divide for students enrolled in higher education and to provide easy and wide access of internet to the students to enhance their research and learning skills.

Targets
Prime Minister’s Laptops Scheme will continue during the next three years and will provide 100,000 laptops and internet devices each year to talented students studying at public sector HEIs. Accordingly 300,000 students will benefit in 3 years and the programme needs to be expanded and extended.
1.1.2. Towards Smart Campuses

**Background**
Public sector higher education institutes across the country will be equipped with the most advanced Wi-Fi technology providing wireless blanket coverage across campuses, enabling users to freely access internet in all open and indoor areas across the campus. HEC has done a pilot project earlier, and four universities were provided with the limited Wi-Fi coverage. However, most recently HEC has taken an initiative called Smart University – Smart Campus which has been launched and successfully implemented at seven universities providing Wi-Fi blanket coverage across campus and residential areas. This will be expended to cover all TIER I universities and other ranked comprehensive universities.

**Goals**
The project is aimed to provide Wi-Fi services at HEIs enabling students, faculty and researchers to freely access network and internet resources in all open and indoor areas across the campus at all universities.

**Targets**
HEC plans to extend the Smart Campus project to all public sector HEIs by 2025. Under this project, initially the main campuses of the higher education institutes are being provided with necessary indoor and outdoor Access Points, and a Wireless LAN Controller which will allow local management of the Wi-Fi Services. However, a backup Wireless LAN Controller will always be available to deal with unforeseen situations. The monitoring system will be deployed centrally with full access to the HEIs to monitor and manage their respective wireless network. Ninety four public sector HEIs’ campuses will be transformed to Smart Campuses.

1.1.3. Safe Campus

**Background**
In order to address the prevailing security situation, Safe Campus project will be initiated to help in improving the overall security situation and to take important measures for protection of life and property of the people working within the campus.

**Targets**
Along with the Wi-Fi Access Points, IP Surveillance cameras will be installed in major areas of the campus i.e. building main gates, campus perimeter, parking lots, corridors, etc. Campuses will be equipped with HD IP camera system integrated with Power-over-Ethernet (PoE) ports on the NVR having Centralised and distributed monitoring, with an addition of facial detection system, including facial recognition software, video summary software. Ninety four TIER I and TIER II public sector HEIs’ campuses will be supported to become Safe Campuses.

1.1.4. Transforming Classrooms into Smart Classrooms

**Background**
Students’ ability to find and then evaluate information and construct new knowledge is
enhanced through connecting with the world outside the classroom, opening new possibilities that will enable individuals to build new nodes of knowledge depending on their needs and learning styles. This fundamental change will impact on what we teach, how we teach and where we teach. Higher Education Commission of Pakistan, therefore, intends to equip universities with Smart Classroom facilities up to the department level. This will allow better engagement among the educators and the learners which will motivate the digital age students to use new ways of learning and research.

**Goals**

Bridge the digital divide by connecting students with the digital devices and teaching aid equipment within the classroom. Provide opportunities to distant learners for their virtual presence in the classroom along with their cohorts. Automate creation and development of digital contents (i.e. lectures, presentations) for interactive on-site and off-site learning.

**Targets**

The project is conceived to have a comprehensive ecosystem around the e-Classrooms instead of distributing “Smart touchscreen boards” to universities. Ecosystem, as envisaged around the Smart Classrooms for this project, consists of various components ranging from student/faculty online collaboration tool (IM); contents creation/ management and sharing; teachers Internet/working Incentives and curriculum digitization. These aspects will not only bring value to money but will create synergy with relevant industries, as well as help HEIs to provide state-of-the-art technologically enabled academic environment at par with HEIs in developed world. Accordingly, 350 conventional classrooms will be converted into Smart Classrooms.

1.1.5. **Introducing Smart Assessment at the universities/DAIs**

**Background**

A dynamic learning environment which automatically tailors itself to the needs of each individual student is Imperative to enhance the quality standards of teaching and learning experiences at the higher education institutions. The desired solution will be used to monitor each student by the teacher. This will also help in gauging the learning outcomes both at course and programme levels. This is another significant component of the ecosystem of Smart Universities under which the automated methodology of assessment, on deliverables of programme and course learning objectives will be worked out.

**Goals**

To use a Learning Management System for learning outcomes and speedy reporting of grades.

**Targets**

This programme is envisaged to assist the teachers/ mentors in gauging the deliverables as well as productivity of the classroom interactions with the students/ learners. This will work in tandem with Learning Management System (LMS) which is another major component in enhancing quality of education. It is therefore planned to have such solution(s) acquired and implemented at 50 HEIs in next the five years and will be expanded later.
1.2 EduCloud & Services

**Background**
The rise of Internet, Intranet and Web-based technologies have made data centre more strategic than ever for improving productivity, enhancing business processes, and accelerating change. Data centres are the strategic focus of IT efforts, to protect, optimise and enhance the professional activities.

Realising the overarching benefits, HEC has established a Cloud Data centre facility which is referred to as EduCloud. HEC will be able to extend a rich services and collaboration platform to HEIs along with other cloud services, like Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS). Moreover, Virtual Desktop Interface (VDI) is a strategic initiative and a cloud service which is aimed to address the challenge of ever changing technology of computing devices and inability of the universities/ institutes to replace them on regular basis.

**Goals**
Increasing efficiency, productivity and collaboration among universities of Pakistan and offering cost effective IT solutions by providing optimized IT infrastructure through the provisioning of hosted resources and services.

**Targets**
The EduCloud is based on the most-advanced cloud technology having capacity to grow in years to come with resources comprising of 20,000 physical Cores, 20 Peta Byte Storage, and 300 Tera Byte RAM distributed over 35 Racks. EduCloud will serve in combination of 100,000 Virtual Desktops and/or 5,000 hosted servers, which is expected to meet the requirements of higher education sector for next five years.

1.3 Pakistan Education & Research Network

**Background**
The HEIs have been encouraged and empowered with strong ICT infrastructure and within the campuses, are interconnected through a high speed backbone of Pakistan Education & Research Network (PERN). There is an emerging need for increased access to high speed broadband services to our universities and other tertiary education institutions. PERN provides advanced digital services to faculty and students.

**Goals**
Upgrading of PERN, which will be ultra-high-speed backbone network to provide 40Gbps of back bone connectivity by interlinking 50 cities across the country and territorial network partners (HED’s).

**Targets**
HEC is in process of launching third phase of the project, named as PERN-III which is aimed to upgrade the existing network to meet the current and future requirements. This upgrade will
include capacity enhancement of existing core network to 40Gbps; completion of fibre ring from Karachi to Quetta, and further to D. I. Khan; more penetration of PERN services to the remotely located HEIs and their campuses in the province of Balochistan; and acquisition of dark fibre for ultra-high speed connectivity to higher education institutions in Azad Jammu & Kashmir and Gilgit-Baltistan. PERN-III will increase its footprints to extend ICT services to relatively smaller cities to facilitate tertiary education at all levels across the country. This is an early harvesting project to achieve the goals of setting up an intellectual corridor companion of CPEC.

1.4 Higher Education Management Information System (HEMIS)

Background
The higher education sector in Pakistan has undergone major changes in response to a rapidly-changing social, economic and political environment, and in particular, changing patterns of the deployed services and their outcome. The implementation of Higher Education Management Information System (HEMIS) for the higher education sector will be information-intensive and will require not only the development of the quantitative and qualitative analytical skills and capacities, but also provide reliable and high-quality data. HEMIS requires cohesive architecture of comprehensive Campus Management Solution (CMS) and Enterprise Resource Planning (ERP) features with the strong understanding and integration of both.

Goals
To reduce expenses and control costs colleges and universities face increasing demands to compete effectively by upgrading their administrative infrastructure to better manage key business processes. HEMIS will assist them to achieve their targets well in time and within defined budget.

Targets
HEC’s vision 2016-2025 is to take up a solitary process for the best system selection with a standard and inter-operable architecture to manage and implement HEMIS across all the HEIs in Pakistan. HEC intends to rollout HEMIS at 50 higher education institutions during next five years with an average rollout of HEMIS at 10 HEIs each year. The newly established universities will particularly benefit from HEMIS as well as the growing number of Research I universities.

1.4.1. Online Learning Platform (LMS)/ Managed Learning Environment (MLE)

Background
Managed Learning Environment (MLE) is a set of teaching and learning tools designed to enhance students’ learning experience by including computers and the Internet in the learning process. The principal components of MLE includes curriculum mapping, student tracking, online support for both teacher and student, electronic communication (e-mail, threaded discussions, chat, web publishing), and internet links to outside curriculum resources. Online Learning Platform (OLP) / Learning Management System (LMS) as a component of MLE, is a tool that allows instructors to post course material on the web without having to know or understand HTML or other computer languages. Defining it comprehensively, LMS is a set of
tools and framework that delivers and manages instructional content, identifies and assesses individual and organizational learning goals, tracks the progress towards meeting those goals and collects and presents data for supervising the learning process of an organization as a whole. In short, it is an online tool to enhance the learning environment.

HEC’s Vision 2025 calls for instituting the LMS in the Research I universities and expand it gradually to other smart campuses. HEC took an initiative with the comprehensive study on Managed Learning Environment (MLE) through focal persons (vice chancellors from selected Universities) and a resource person (HEC consultant) to ensure Universities have appropriate advice for Deployment & Operations of LMS in Public Sector Universities to meet the changing educational needs of today’s students.

**Goals**

Early intervention by the HEC will provide direction and support to the universities to successfully implement the LMS and Campus Management Systems (CMS). This MLE initiative is designed to improve quality of teaching, learning, assessment and innovative research activities on campus.

Deployment of an MLE at the Universities will offer the following benefits:

- Provide a central repository where all the course-related information will be available for on campus and Distance Learning,
- Standardization in course delivery,
- Electronic course folders for accreditation bodies,
- Online audit of courses,
- Ease in Course Feedback Collection (CFC),
- Attendance automation and monitoring,
- Results preparation,
- Sharing of course related material (hand-outs, e-books, articles etc.),
- Improved communication between students and faculty members,
- Reuse of the course material in LMS by the newly inducted faculty,
- Significant cost saving in terms of paper printing,
- Online assignments, Online Quizzes, online assessment and sharing of results,
- Time saving for faculty that can be used in research, student supervision, improvement of course contents,
- Distance Learning management (information broadcasting and evaluation).

**Targets**

Keeping in view the benefits that LMS can offer to Universities, this project is being proposed to deploy and operate LMS including training at all the public sector universities by 2025. However, keeping in view the scale of this project and the relevant challenges, in the first phase the project is under deployment in five public sector universities
1.4.2 Introducing EduCard: All-in-One Student Card

Background
Today’s students are exceptionally technology savvy. As such, they expect their information to always be protected, readily accessible and integrated into a variety of campus-wide systems. EduCard (All-in-One Card Solution) is a kind of fundamental project for complementing Higher Education Management Information System (HEMIS). With this initiative, HEC aims to provide university students, faculty, staff and the community with convenient, safe, and fast way of conducting transactions and accessing services using the EduCard Solution.

Goals
Enhance the centralised management for universities and provide highly effective management system for universities’ administration.

Targets
HEC intends to implement the EduCard solution at the higher education institutions alongside the HEMIS implementation. Accordingly, on average 10 HEIs will be provided with EduCard for their students each year with a cumulative issuance of EduCard among 300,000 graduate students during next five years.

1.5. Promotion of ICT R&D and Innovation at HEIs

1.5.1. The Knowledge Incubation Centre

Background
HEC intends to develop Knowledge Incubation Centres (KIC) at HEC and selected universities to provide a unified platform to develop synergy amongst the stakeholders relating to IT solutions and services. The Centres are aimed at accommodating multinational ICT companies Microsoft, Oracle, SAP, Cisco, Huawei, and others, along with their partners or system integrators, who are to work closely and develop synergy with researchers from higher education institutes. It is also planned that entrepreneurs are encouraged to work alongside faculty and other solution providers to develop components to complement the overall solutions being developed for the HEIs. In addition, to ensure effective coordination and integration amongst the various solution(s), a core team of professionals will be deployed at HEC for the overall management and operations of the centres. The centres will also provide conducive environment for the start-up companies and entrepreneurs with growth potential, technology facilitation, knowledge sharing, mentoring, and guidance towards commercialization.

Goals
Provide an ecosystem for the development of IT solutions and services with the support and synergy of all stakeholders. Help in promoting and nurturing research, innovation and incubation of technology as well as knowledge towards indigenous solutions of local problems.

Targets
The aim of establishing Knowledge Incubation Centres (KIC) is to develop a well-structured
multi-stakeholder/partners’ platform, encompassing advocacy and creating synergy amongst the key stakeholders sitting under one roof, identifying and prioritizing the ICT projects addressing the areas of common interest to HEIs requiring robust ICT solutions, facilitating the development and promotion of national e-strategies through ICT solutions for HEIs, human and institutional capacity-building, enhancement of resource mobilization, investment promotion and socially responsible market development.

There exist diversified areas of common interest for HEIs which require that cohesive and robust ICT Solution(s) be developed and offered. The ICT solutions can be defined in two major categories that are:

i) Infrastructure solutions, and

ii) Software solutions. There are a number of urgent and emerging needs of offering ICT solution(s) to HEIs around these categories.

1.5.2 Huawei R&D Centre & HAINA Programme

Background
As an early harvesting programme Higher Education Commission, Pakistan has signed a Document-of-Understanding (DoU) with Huawei Technologies, for the establishment of a Huawei R&D Centre in Pakistan. The signing of DoU is a significant step ahead in promoting research culture and technological development in the higher education sector in Pakistan. This is a strategic move of working together to provide innovative, state-of-the-art and customized solutions using information & communication technologies to meet the challenges in every walk of life. The DoU has been signed in March 2016 with overall objectives of increasing cooperation between the provider and HEC towards the promotion of R&D activities in Pakistan. In order to oversee the implementation of decisions taken in the said DoU, a Steering Committee comprising of eminent researchers and academicians has been constituted.

Goals
To provide evidence of the positive impact of this interaction on innovation and creativity, integrate different disciplines to stimulate new forms of collaboration and encourage young scholars to engage in scientific activities as well as to support entrepreneurship and business development.

Targets
Huawei R&D centre will be established in Islamabad initially at the designated space of Higher Education Commission with facilities of conference room and research spaces/ cubicles. However, at a later stage a purpose built R&D Centre will be constructed with all necessary operational and administrative support from HEC. Equipment relating to the R&D centre for the key technology areas as identified (i.e. Cloud Computing, Software Defined Networks, Network Security, and Unified Communication) will be provided by Huawei Technologies. Moreover, for the HAINA Programme 3 HEIs from each province, Federal Capital and one HEI from AJ&K will be selected on competitive basis. These initiatives are designed to make our scholars producers rather than consumers of ICT tools over the next 10 years.
1.5.3 Design & Engineering Verification for local manufacturing of IT Equipment

Background
Over the past few decades, assembling and manufacturing of electronic appliances has followed a growth trajectory in Asia. Starting from Japan, it moved to Taiwan, to Malaysia, then to Korea. China has become a major contributor to this march of progress. It has been observed during the past couple of years that this trail is now moving towards South Asia and Africa, due to low labour cost, a major determinant of prices of consumer goods. Pakistan has created higher educational opportunities to produce a large number of ICT specialists, both in hardware and software development, who can facilitate the development and deployment of the new ICT tools. Collaborative research and development will facilitate indigenous development of advanced digital products adding value to economy.

HEC has created an opportunity for establishing a laptop assembly plant within Pakistan for procurement of large number of laptops for distribution to students. This capitalisation is anticipated to produce advanced outcomes in three contexts; 1) As a “seed” initiative in ICT manufacturing of laptops in Pakistan, this will inevitably lead to development and assembly of innovative mobiles and tablets, 2) This goes beyond “technology transfer” and ushers in a productive knowledge economy, and 3) It will open a progressive new market and create jobs in ICT assembly and manufacturing industry.

Goals
To support local production of high quality products and micro-electronic devices through collaborative research in areas of equipment performance testing, engineering and design verification in collaboration with renowned manufacturers in this industry.

Targets
In order to achieve these objectives, HEC has devised a realistic and doable roadmap for the manufacturing of electronic devices in Pakistan. Though, the mass assembly of laptops has already taken place with Haier, the next step is setting up laboratories at the facility for Performance Testing and Final ID preview. In next five years, the local assembling facility is expected to offer opportunities for the researchers and engineers at the HEIs in areas of Design Verification. HEIs are encouraged through R&D and Technology Development Funds granted on competitive basis to participate in this rewarding journey of discovery.

1.5.4 Establishment of Open Source Research Laboratories

Background
Hi-tech equipment and devices are mostly found operating based on a closed or proprietary system. However, there are open platforms as well which the researchers and technologists in the developed world are widely leveraging, for hi-tech product development and technological solutions. HEC envisions to promote, Open Source platform for indigenous product development through establishing Open Source Research Laboratories at the TIER I universities. Moreover, this will help in providing hands-on opportunity to the students to fill the demand in this domain nationally and internationally. Further, it will widen the employability and
acceptability in any industry where diverse hi-tech systems are in place and used. This initiative is being taken in collaboration with Open Source Forum Pakistan (OSFP).

**Goals**
To promote appliance/product development and technologically advanced solutions on open platforms by the students and researchers of HEIs.

**Targets**
HEC intends to establish 30 Open Source Research Laboratories comprising of at least 25 computing terminals at the higher education institutions. These laboratories will be supported by HEC, however the trainers and mentors required for capacity building and technical assistance will be sought from the Open Source Forum Pakistan (OSFP) and international organizations.

1.5.5 **PiNet Platform**

**Background**
PiNet is amongst the IT solutions which HEC has sought under its initiative of supporting technology-based solution offered by a university for other universities. PiNet is an applied research project proposed by COMSATS Institute of Information Technology (CIIT) to establish synergic development of industrial and academic resources which help in producing knowledge-based economy.

**Goals**
To create an online platform to connect industrialists and investors from all over Pakistan with the engineering technology researchers, in order to solve problems faced by the industry and produce marketable products for domestic and international markets.

**Targets**
The Net portal will enable the representatives from industry to share problems faced by them with researchers, from concerned departments to suggest viable solution(s) online. This web-enabled system will cater to needs of different stakeholders in the innovation R&D ecosystem.

1.5.6 **ORIC Automation and Research Cluster Management System**

**Background**
ORIC Automation and Research Cluster Management System is in pursuit of the HEC’s mission the responsibility of guaranteeing that all research programmes and policies reflect the core values of academic freedom, professional integrity, ethical conduct and full compliance with all intellectual property policies, legal requirements and operational standards of the university in term of research output.

The purpose of ORIC Automation and Research Cluster Management System is planning, monitoring, evaluation and collaboration in the context of results-based management (RBM) and managing for development results (MfDR) and depicts how these functions are important in context of research clusters across HEIs. It will also provide system based key definitions and principles that are integral to planning, monitoring and evaluation for research under ORICs and
BICs. This System is intended for HEC and ORIC Senior Management, managers, staff, key partners (HEIS) and cluster stakeholders who are involved in the design and implementation of development initiatives and decision making. The culture of results orientation and the principles of RBM and MfDR will be embraced by all in order for HEC to effectively contribute to development of productive ORICs of HEI's across the country.

Goals
This Project will provide evidence of workable, administrative, collaborative research cluster oriented processes on programmes/projects/products and protocols for ensuring the dissemination and analysis on data/information in real-time across HEIs. The research cluster management system will offer utilization of information such as number of resources and its utilization in HEIs. The following specific action oriented goals with measurable objectives can be achieved by using this system:

- GIS-based research cluster mapping/profiling,
- ORIC Profiling,
- ORIC Planning for Programme/project/product classification,
- Stakeholder Management,
- Research Cluster Management,
- Project Time Management,
- Gantt chart based activities Management,
- Supporting the HEIs strategic research directions and policies,
- Increasing and diversifying external research funding,
- Commercialization of Research Management through clusters,
- Improving integration of research and education at all three tiers of the HEIs,
- Improving translation of research into the public benefit,
- Strengthening university-industry relationships and partnerships,
- Promoting entrepreneurship, technology-transfer and commercialization activities that energize and support the local and national economy,
- Promoting and enhancing cross-cutting and multi-disciplinary research initiatives,
- Communication Management across the HEC & ORICs,
- KPI Based Monitoring of ORICs,
- Dashboard Based Monitoring & Evaluation,
- Multiplatform and Mobile support,
- Next Generation Info-Graphic Based visibility with highest grade information security.

Targets
The project is perceived to have a comprehensive research cluster-based ecology across HEIs of the country. Keeping in view the change management and the benefits that the research cluster management system can offer to the HEIs, this project is being proposed to deploy and operate across public and private sector universities including training. However, initially keeping in view the scale of this project and the relevant challenges, in the first phase the project will be deployed in the 12 selected public sectors.
1.6 EduTV and Education Counselling Services

Background
Higher Education Web TV will provide educational information and counselling services to the citizens of Pakistan. The educational television will provide relevant information on matters relating to available scholarship and financial aid opportunities, admission procedures in different universities, academic advising, programmes offered by each university, laptop scheme, live talk with university management, degree attestation and equivalence, and guidance.

Goal
To provide a live broadcasting platform to offer education counselling services that can facilitate the students, parents and citizens of Pakistan seeking information on educational qualifications and services across the country.

Target
Through internet based Edu TV, HEC intends to target a vast audience seeking advice, guidance and counselling on education services being offered by the higher education institutions across Pakistan. Initially, various programmes and media content will be developed and telecasted over the internet based TV 8 hours a day with repeat telecast for 16 hours. However, in next five years the duration of programmes and media content will be extended to 16 hours with a repeat telecast of 8 hours. Moreover, HEC will create regional hubs and clusters of HEIs around an identified media and mass communication department of an HEI who will develop and produce programmes and media contents for HEC.

1.7. Capacity Building Programmes

HEC believes in the capacity building and human resource development to address the challenges being faced by the country and to produce skilled resources in order to compete at the international level.

1.7.1. Exchanges and Training of IT Talent

Background
The Higher Education Commission aims to strengthen the ties with technology and industry leaders, and therefore encourages sharing of IT talent from the higher education institutions through internship programmes and consultancies. The objective is to provide an opportunity to young and talented students and researchers to visit and spend some time at the production and/or research facility of these technology giants. This will help HEIs of Pakistan to replicate the strategy of empowering human resource trained on the advanced technologies and to leapfrog towards high-tech research on cutting-edge technologies.
Moreover, IT academies and testing centres are to enhance the competitiveness of all students through training and the certification that is globally accepted and acknowledged. The objective of IT academy and testing centres is to enhance the competitiveness and marketability of all
students through training and certification. Moreover, Training as a Service (TaaS) is a relatively new, largely unknown concept in Pakistan. From its inception, it was designed to be more creative and adaptive by avoiding the inherent flaws of traditional outsourcing. It provides a flexible model that promotes usage-based scalability of new and evolving training solutions.

**Goals**
To provide trainings, leading to certification, to the technical resources of TIER III HEIs in order to produce highly skilled technical resources on the technologies being deployed under this project.

**Targets**
The aim of IT academy at HEIs is to train the students and faculty for the future by building their expertise in today’s most popular technologies so that it helps them in shaping their professional career. It also helps to groom the future workforce in the use of IT skills and technology in education and learning, helping to secure the future of our people.

### 1.7.2 Digital Library & Training Resource Centres

**Background**
HEC has initiated many capacity building programmes which offer high level trainings and international certifications for the technical facilities and students of HEIs. This provides an easy platform to get beginner, intermediate and expert level trainings and certifications from ICT industry leaders. However, there is a dire need of continuing professional development programmes to prepare skilled and trained workforce at the Associate and advanced degree levels towards self-reliance for the emerging and advance technologies.

Technology leaders in the field of ICTs are required to establish world class training academy & certification centres (TACC) that are duly registered and acknowledged internationally and within Pakistan. The TACC would be a pragmatic resource centre which will advance a wide range of information technologies and their deployment in industry. It would also be a reference point as the knowledge hub in the country.

**Goals**
To provide trainings, leading to internationally recognized certification of the technical resources of higher education institutions and human resources they produce.

**Targets**
HEC intends to start at least seven such training facilities established all across Pakistan and AJ&K, at least in all major cities during next five years. HEC has therefore devised a strategy/policy to ensure that such TACCs are established as part of all major ICT projects and procurements. These TACCs will be established at the Digital Library & Resource Centre (DLRC) which will be sponsored by the equipment manufacturers as part of their engagement with HEC in their respective projects, and will maintain as well as successfully operate the facility for at least two years before handing it over to HEC.
Cost Projections for HEC Vision 2025 To Manage And Sustain Growth

The qualitative improvement and quantitative expansion of higher education sector over the next 10 years identified in the HEC Vision 2025 demands a considerable increase in investment, which is necessary to achieve the goals of building a more productive knowledge-based economy. The following tables provide the details of the estimates for developmental and recurring costs based on estimated nominal growth of GDP at 5% per annum. The increased investment projected in the summary table is to give high rates of return through preparing a large pool of well-educated, competent, creative and ethically upright human resources who will add value to the economy through their innovative and constructive scholarly efforts. The estimated cost of HEC Vision 2025 is high, but the cost of not investing in higher education sector will be much higher.

The above Fig 9 shows the level of total grants released by the Government of Pakistan to HEC compared to GDP nominal and is classified into two sections. The first section represents historical trend of Grants to GDP ratio for HEC while the second focuses on future forecasts. The Historic GDP figures have been taken from the Economic Survey of Pakistan 2015-16. For future forecasting a conservative annual nominal growth rate of 5% increase in GDP has been used. Substantial funding from the government in Higher Education resulted in the annual investment
reaching a maximum of 0.33% of GDP in 2006-07 however it declined to 0.19% in 2011-12. The present government has raised the level of funding and put it back on a rising trajectory. It reached to Rs. 91.890 Billion in 2015-16 translating into 0.31% of GDP.

Table 10: HEC Grants to GDP Ratio - Historic

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>FY 01-02</th>
<th>FY 02-03</th>
<th>FY 03-04</th>
<th>FY 04-05</th>
<th>FY 05-06</th>
<th>FY 06-07</th>
<th>FY 07-08</th>
<th>FY 08-09</th>
<th>FY 09-10</th>
<th>FY 10-11</th>
<th>FY 11-12</th>
<th>FY 12-13</th>
<th>FY 13-14</th>
<th>FY 14-15</th>
<th>FY 15-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Grant</td>
<td>0.42</td>
<td>4.00</td>
<td>4.97</td>
<td>8.89</td>
<td>10.88</td>
<td>14.41</td>
<td>15.39</td>
<td>16.42</td>
<td>11.30</td>
<td>14.07</td>
<td>9.76</td>
<td>12.01</td>
<td>22.81</td>
<td>26.80</td>
<td>31.60</td>
</tr>
<tr>
<td>Recurring Grant</td>
<td>3.48</td>
<td>4.12</td>
<td>5.84</td>
<td>7.83</td>
<td>10.54</td>
<td>14.33</td>
<td>12.54</td>
<td>15.77</td>
<td>21.50</td>
<td>29.06</td>
<td>28.89</td>
<td>36.28</td>
<td>43.12</td>
<td>47.55</td>
<td>56.30</td>
</tr>
<tr>
<td>Total</td>
<td>3.90</td>
<td>8.12</td>
<td>10.80</td>
<td>16.72</td>
<td>21.42</td>
<td>28.74</td>
<td>27.93</td>
<td>32.18</td>
<td>32.80</td>
<td>43.13</td>
<td>38.65</td>
<td>48.29</td>
<td>65.93</td>
<td>74.35</td>
<td>87.90</td>
</tr>
<tr>
<td>Grant to GDP (mp) Ratio</td>
<td>0.09%</td>
<td>0.17%</td>
<td>0.19%</td>
<td>0.26%</td>
<td>0.28%</td>
<td>0.33%</td>
<td>0.27%</td>
<td>0.25%</td>
<td>0.22%</td>
<td>0.24%</td>
<td>0.19%</td>
<td>0.22%</td>
<td>0.26%</td>
<td>0.27%</td>
<td>0.30%</td>
</tr>
</tbody>
</table>

In the GOP Vision 2025 document, Government of Pakistan set a target of sizeable increase in public expenditure on Higher Education from 0.2% of GDP to 1.4% by 2025. To align itself with the GOP Vision 2025 document targets, HEC has come up with a plan to further strengthen the Higher Education sector in Pakistan. The HEC Vision 2025 targets will need substantial increase of resources. The cost and total funding required has been forecasted in the following two tables from 2016-17 to 2024-25. The Government’s target of allocating 1.4% of the GDP by 2025 to higher education sector translates into total investment of Rs. 2.834 trillion in 10 years (2016-25) as reflected in Table 11. The dotted line in the Fig 9 represents the level of funding required to attain the target of 1.4% of the GDP seen in Table 11.

Table 11: Target Grants Projections for HEC Vision 2025 - 1.4% Grant to GDP Ratio Targeted in GOP Vision 2025

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 16-17</td>
<td>114.99</td>
</tr>
<tr>
<td>FY 17-18</td>
<td>140.32</td>
</tr>
<tr>
<td>FY 18-19</td>
<td>174.74</td>
</tr>
<tr>
<td>FY 19-20</td>
<td>219.46</td>
</tr>
<tr>
<td>FY 20-21</td>
<td>271.98</td>
</tr>
<tr>
<td>FY 21-22</td>
<td>337.14</td>
</tr>
<tr>
<td>FY 22-23</td>
<td>416.47</td>
</tr>
<tr>
<td>FY 23-24</td>
<td>516.01</td>
</tr>
<tr>
<td>FY 24-25</td>
<td>642.82</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2833.93</td>
</tr>
</tbody>
</table>
After detailed working on estimating the development and recurring grant forecasts, HEC estimates that in order to achieve the future goals, the required minimum funding over the planned period will be Rs. 2.012 trillion which is 0.90% of the forecasted GDP as of 2025. The recent economic data about Pakistan’s GDP growth rate estimated by the World Bank projects a very healthy pattern of GDP growth which indicates that actual investment in higher education sector can be increased at the promised rate of 1.4% of GDP.

**Table 12: Grants Projections for HEC Vision 2025-Based on 0.90% Grant to GDP ratio by 2025**

<table>
<thead>
<tr>
<th>Annual Target Grant</th>
<th>Fiscal Year</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FY 16-17</td>
<td>FY 17-18</td>
</tr>
<tr>
<td>Development Grants</td>
<td>26.84</td>
<td>30.00</td>
</tr>
<tr>
<td>Recurring Grants</td>
<td>70.01</td>
<td>82.69</td>
</tr>
<tr>
<td>Total</td>
<td>96.85</td>
<td>112.69</td>
</tr>
<tr>
<td>Percentage of Projected GDP</td>
<td>0.31%</td>
<td>0.35%</td>
</tr>
</tbody>
</table>

**Targeted Enrolment By 2025 - All Components (Millions)**

Figure 10 provides the graphic enrolment growth in all three tiers of tertiary education to reach the goal of equitable access to 15% of the 17-23 age groups. Given the trajectory of enrolment growth during the last 12 years, the planned enrolment increase over the next 10 years is not only reasonable but essential.
Figure 11: Projected growth of universities
The growth in enrolment calls for the projected increase in the numbers of public and private higher education institutions as reflected in Figure 11. HEC also plans to increase the capacity of existing tertiary education institution to accommodate projected enrolment growth.

2. Details of Development budget Projection 2016-2025

Development Funding is the key driver to provide equitable access, quality of teaching, research and providing enabling environment in institutions and includes faculty development through indigenous and foreign scholarship, development and expansion of infrastructure and establishment of research laboratories. The current development portfolio of higher education sector comprises 100 approved projects with fiscal outlay of Rs. 162.00 billion. At the start of current financial year, the throw forward of these projects is Rs. 88.36 billion apart from 22 new yet to be approved schemes reflected in PSDP with an estimated outlay of Rs. 53.00 billion. The new development schemes will be added in subsequent years to meet the Vision 2025 envisaged targets. The TIER I universities are budgeted to have Rs. 80.00 billion.

The following Table 13 presents the estimated expenditure that is projected to be incurred against ongoing and yet to be approved projects of current PSDP and new schemes of subsequent year up to 2025.
Table 13: Estimated Development Cost 2016-2025

<table>
<thead>
<tr>
<th>Projects Category</th>
<th>FY 16-17</th>
<th>FY 17-18</th>
<th>FY 18-19</th>
<th>FY 19-20</th>
<th>FY 20-21</th>
<th>FY 21-22</th>
<th>FY 22-23</th>
<th>FY 23-24</th>
<th>FY 24-25</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Ongoing</td>
<td>23.15</td>
<td>18.50</td>
<td>17.71</td>
<td>14.50</td>
<td>8.50</td>
<td>6.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>88.36</td>
</tr>
<tr>
<td>Un-Approved</td>
<td>3.69</td>
<td>6.00</td>
<td>8.31</td>
<td>11.00</td>
<td>15.00</td>
<td>7.00</td>
<td>2.00</td>
<td>-</td>
<td>-</td>
<td>53.00</td>
</tr>
<tr>
<td>New Schemes</td>
<td>-</td>
<td>3.50</td>
<td>6.00</td>
<td>10.50</td>
<td>18.00</td>
<td>35.00</td>
<td>52.00</td>
<td>59.00</td>
<td>60.00</td>
<td>244.00</td>
</tr>
<tr>
<td>Special initiatives for R-1 Universities</td>
<td>-</td>
<td>2.00</td>
<td>4.00</td>
<td>6.00</td>
<td>8.50</td>
<td>10.50</td>
<td>13.00</td>
<td>16.00</td>
<td>20.00</td>
<td>80.00</td>
</tr>
<tr>
<td>Total</td>
<td>26.84</td>
<td>30.00</td>
<td>36.02</td>
<td>42.00</td>
<td>50.00</td>
<td>58.50</td>
<td>67.00</td>
<td>75.00</td>
<td>80.00</td>
<td>465.36</td>
</tr>
</tbody>
</table>

Key Assumptions

- To meet the requirement of 18,000 additional PhD faculty by 2025, with bifurcation of 7,400 from 2016-21, and 10,600 from 2021-2025, currently 7,400 scholars are enrolled who will come into the system during the next five years, and PhD faculty requirement up to 2020 will be met. In addition, 5,000 PhD scholarships are yet to be awarded in approved portfolio and to meet the requirement from 2021-2025, the remaining 5,000 scholarships will be available from the approved portfolio. The new schemes with provision of over 12,000 Scholarships are in the process of approval and included in yet to be approved category, which will also meet requirement of subsequent years as well.

- To achieve the projected enrolment targets, 96 additional public universities are proposed to be established by 2025 along with a significant increase in enrolment capacity of existing institutions. The approved on-going portfolio includes projects of 12 sub campuses and 3 new universities for provision of infrastructure, well equipped research facilities, faculty development and operational, besides 9 projects of newly established universities and 58 projects of existing universities related to expansion and provision of missing facilities.

- The yet to be approved projects include seven new universities, four sub-campus, and an umbrella project for the establishment of 16 sub-campuses of existing universities, and 15 virtual university campuses particularly in less served districts where no sub-campus / DAI exists.

- The new schemes in the subsequent year will enable establishment of new universities, upgrading of existing sub-campuses into full-fledged universities and strengthening and expansion requirement of newly established universities with special focus on enhancement of research facilities in older comprehensive universities.

- To improve the quality of teaching, learning and research, substantial investment will be required for strengthening of existing research labs, development and upgrading of ICT, PERN-III, smart classrooms/campuses and capacity building of the management and operational personnel's that will be funded through new schemes.

- Provision of special financial assistance for TIER-I research universities has been included in the development portfolio to enrich research culture. Major competitive research grants are provided to produce innovative useful knowledge, skills and competencies necessary for
indigenous solutions and self-reliance. These research universities will also increase world class, highly cited research output having impact on Pakistani economy. While scientific research output of Pakistani universities has increased more than four times in the last 12 years, the proposed increase in number of Research 1 universities with increased numbers of highly qualified faculty and well equipped research facilities will produce innovative, marketable research and increase the international ranking of Pakistani universities.

3. Annual Recurring Cost Projections

The recurring grants allocated to HEC each year are provided to meet the recurring needs of the universities as well as to fund the National programmes of the higher education sector such as Inter- University Academic Activities, Digital Library, Pakistan Education and Research Network (PERN), Promotion of innovative, high Quality Research, R&D activities, Prime Minister’s Tuition Fee reimbursement for needy students and PM’s Laptop distribution scheme. Bulk of the funding goes in direct Recurring grants to universities according to a well-defined formula.

HEC Vision calls for a three tiered system of tertiary education, which has new initiatives in supporting 30 TIER I research universities which will be the flagships of innovative research in the areas of Agriculture and Veterinary Sciences, Engineering, New and Emerging Technologies, ICT, Social Sciences, Arts, Design and Humanities, Medicine and Allied Health professions, and Centres of Advanced Studies in STEAM disciplines.

HEC will seek to improve the quality of TIER III affiliated colleges with active support and supervision of affiliating universities. Higher education opportunities will be provided at district level through establishing smart sub-campuses of TIER II universities and setting up 150 community colleges to provide technical, vocational educational opportunities to prepare high quality skilled human resources. HEC will provide partial seed money grants to universities to set up these colleges which will be primarily funded by provincial governments.
Table 14 provides a summary of required annual recurring grant projections till 2025 and Table 16 provides detailed summary of funding continuing and new initiatives.

**Table 14: Summary of Required Annual Recurring Grant - Projections For HEC Vision 2025 (In Billions)**

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>FY 16-17</th>
<th>FY 17-18</th>
<th>FY 18-19</th>
<th>FY 19-20</th>
<th>FY 20-21</th>
<th>FY 21-22</th>
<th>FY 22-23</th>
<th>FY 23-24</th>
<th>FY 24-25</th>
<th>Cumulative Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurring Grants for TIER I &amp; II Universities</td>
<td>61.19</td>
<td>69.04</td>
<td>81.11</td>
<td>96.67</td>
<td>114.70</td>
<td>137.82</td>
<td>163.43</td>
<td>196.84</td>
<td>239.80</td>
<td>1160.60</td>
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<tr>
<td>Annual Recurring Cost</td>
<td>115.47</td>
<td>133.25</td>
<td>157.03</td>
<td>186.41</td>
<td>220.77</td>
<td>263.20</td>
<td>311.64</td>
<td>372.08</td>
<td>447.05</td>
<td>2206.90</td>
</tr>
<tr>
<td>Self-generated income by Universities</td>
<td>54.29</td>
<td>64.21</td>
<td>75.92</td>
<td>89.74</td>
<td>106.07</td>
<td>125.37</td>
<td>148.21</td>
<td>175.24</td>
<td>207.25</td>
<td>1046.30</td>
</tr>
<tr>
<td>Recurring Grants for HEC National Programmes</td>
<td>8.83</td>
<td>13.65</td>
<td>19.53</td>
<td>27.65</td>
<td>37.51</td>
<td>48.77</td>
<td>61.64</td>
<td>76.45</td>
<td>91.85</td>
<td>385.87</td>
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<tr>
<td>Total Required Grants</td>
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<td>82.69</td>
<td>100.63</td>
<td>124.31</td>
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<td>186.59</td>
<td>225.08</td>
<td>273.30</td>
<td>331.65</td>
<td>1546.47</td>
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</table>

HEC Vision 2025 calls for TIER I & II universities to generate 46% of their resources through creative and innovative programmes of fundraising. The Research and Development investments made by Government of Pakistan are expected to pay back dividends. The leaders and managers of HEIs, as community leaders, are expected to initiate institutional development programmes that will generate additional funds from major donors, alums and philanthropists.
Table 15 gives details of self-generated income of the universities.

### Table 15. TIER I & II Universities' Annual Income Forecasts (In Billions)

<table>
<thead>
<tr>
<th></th>
<th>FY 16-17</th>
<th>FY 17-18</th>
<th>FY 18-19</th>
<th>FY 19-20</th>
<th>FY 20-21</th>
<th>FY 21-22</th>
<th>FY 22-23</th>
<th>FY 23-24</th>
<th>FY 24-25</th>
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<td>75.98</td>
<td>89.27</td>
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<td>Other Fee</td>
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<td>27.66</td>
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<td>5.80</td>
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<td>8.53</td>
<td>10.35</td>
<td>12.56</td>
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<td>9.67</td>
<td>11.73</td>
<td>14.23</td>
<td>17.27</td>
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<td>8.74</td>
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<td>Research Related</td>
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<td>Total Annual</td>
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</table>

Cumulative

Table 16 provides details of recurring cost projections for 2016-17 to 2024-25.

### Table 16. Summary of Recurring Cost Projections For HEC Vision 2025 (In Billions)

<table>
<thead>
<tr>
<th></th>
<th>FY 16-17</th>
<th>FY 17-18</th>
<th>FY 18-19</th>
<th>FY 19-20</th>
<th>FY 20-21</th>
<th>FY 21-22</th>
<th>FY 22-23</th>
<th>FY 23-24</th>
<th>FY 24-25</th>
<th>Cumulative Total</th>
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<td>TIER I - Research</td>
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<td>303.96</td>
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<td>220.77</td>
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Component 2- HEC National Programs

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<tr>
<th></th>
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<th>FY 18-19</th>
<th>FY 19-20</th>
<th>FY 20-21</th>
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<th>FY 23-24</th>
<th>FY 24-25</th>
<th>Cumulative Total</th>
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<td>Promotion of Research</td>
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<td>0.08</td>
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<td>0.24</td>
<td>0.24</td>
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Table 16 (condt): Summary of Recurring Cost Projections For HEC Vision 2025

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<th>FY 17/18</th>
<th>FY 18/19</th>
<th>FY 19/20</th>
<th>FY 20/21</th>
<th>FY 21/22</th>
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<th>FY 23/24</th>
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<td>1.24</td>
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</table>

Total Projected Cost: 124.30 146.90 176.55 214.05 258.28 311.97 373.29 484.54 538.90 2592.77
Key Assumptions

- The cost projections used FY 2016-17 as the baseline year. Cumulative cost estimates are for 2016/17 – 2024/25.
- The cost projections are only for public universities. The affiliated college students and external/private students account for a large part of the student projections, but since they do not fall under the purview of the Higher Education Commission, as such, are excluded.
- Annual grant requirements for universities have been calculated based on their total cost minus self-generated income.

TIER I - Research Universities and TIER II - Comprehensive Universities Estimation:

a) TIER I - Research Universities

- Faculty for Research universities is estimated based on maintaining a 1:15 faculty to student ratio for graduate students and 1:23 for undergraduate students by year 2025 to reduce the teaching workload.
- 50% of the faculty at TIER-1 Universities will be employed under Tenure-Track System by 2025.
- Average annual faculty salary is calculated based on prevalent salary structure, expected to rise according to government policies. The current mix of faculty in the Higher Education System will be changed over the period.
- The TTS annual cost includes 13 months’ salary in line with the approved package.
- Faculty will seek research grants from indigenous and international sources.

b) TIER II - Comprehensive Universities

- The faculty to student ratio for TIER II – Comprehensive Universities ranges between 1:23 to 1:27.
- Faculty will be supported through R&D funds.
- Quality of affiliated colleges will be improved through collaborative support by the affiliating universities.

c) Community Colleges Support

- Average Grant support for community colleges is Rs. 50 Million per college increasing at a constant 20% per annum to be funded by provincial governments.
- The grant ranges from 44% to 48% of the total community college cost.

HEC National Programmes

- Grants under ‘Promotion of Research’ are based on PhD faculty numbers, which is projected to increase. The level of support will vary according to competitive proposal.
- A new line item, ‘Mega Research Grants’ of Rs. 20 Million per research proposal has been added. These mega grants are to result in commercially viable research solution and for creating opportunities to produce new knowledge products and tools.
- PERN III operational cost is estimated based on 10 to 20% increase considering their upgradation and scope enhancement.
- Cost for National Digital Library is estimated by calculating the annual subscription fee per university.
- Inter University Academic Activities projections are based on the current annual per university grant.
• Support cost for distance learning and community colleges are included in component two.
• 'Financial Management and Administrative Reform' is another new item for HEC initiatives comprising ERP implementation, continuous training of key administrative staff. The budget is based on Rs. 15 Million per university increasing by 20% per annum. These trainings are necessary for quality enhancement of university support services.
• The estimates for ‘PM Tuition Fee Reimbursement Scheme' are included to facilitate growth of enrolment.
• A new item for 'ORICs /QECs and Patent Support' has been included to fund these important initiatives. The underlying assumptions are that Rs. 10 million per university, increasing at 20% annually based on functioning and performance of the universities.
• HEC secretariat cost would be doubled every 3 years to handle the increased workload.
• Table 16 provides details of universities self-generated income. A new element has been added in the Table to systematically increase the self-generated income of universities through developing a well-defined and staffed system of institutional development through annual giving by alumni, garnering major gifts by the affluent people in the community for named facilities and activities, and strategically planned fund raising campaigns. The Vice Chancellors, as community leaders, are expected to play a leading role in institutional development to substantially increase dedicated funds through philanthropy. TIER I universities and their eminent faculty shall be expected to raise research project grants and commercialize the results of their research products that have economic potential.

**ACTION PLAN OF HEC VISION 2017-2025**

1. IMPLEMENT THREE TIER INTEGRATED SYSTEM OF TERTIARY EDUCATION
   a) Establish 20 new Tier I research universities, in six critically needed disciplines including Agriculture; Arts, Design, Business and STEAM studies; Engineering; Information Communications Technologies; Medicine and Allied Health Professions and Social Sciences by 2025. These universities will be the producers of innovative, useful knowledge that will create a growing knowledge-based economy and solve critical national problems through indigenous solutions and international best practices; Centres for Advanced Studies in 12 critical fields of study will be established at the higher ranked public and private institutions during 2017-2022, at selected TIER I universities.
   b) Set up 120 new public and private TIER II Comprehensive universities during 2017-2022 to prepare quality credentialed professionals including 5 Skill universities to develop, implement and monitor the programmatic quality of technical vocational community colleges in each district of Pakistan.
   c) Increase the number and quality and relevance of TIER III Collegiate tertiary education facilities by establishing 150 two year community colleges, one in each district of the country, offering programmes designed to complete the first two years of four degree programmes in the community of the learner, complete two year Associate Degree programmes in technical and vocational skill development to train skilled human resources
in the available and emerging vocations and technologies. This will entail close collaboration with provincial departments of higher education since college education is in their administrative and financial control. Academic quality control, however, is to be managed by affiliating universities.

d) Provide support to the 10 public and private universities which are currently in the world ranking list to better their rank through improved high quality research publication and their international citations.

e) Substantially increase R&D grants, including two competitive mega grants for each TIER I university every three years for innovative, commercially viable research to solve national problems in selected critical areas.

f) HEC will seek increased annual development and recurring funds and distribute them recognizing and rewarding the output of TIER I and TIER II universities.

g) TIER I universities will be supported to create a Collaborative Research Hub in Pakistan.

h) All new Public TIER I Research universities and TIER II Comprehensive universities will be started and developed during 2017-2022, for which additional development funds will be requested each year through Planning and Development Division.

i) Best equipped research laboratories will be developed at 15 Public universities which will be available to scholars in all public and private universities to avoid duplication of costs.

2. RESEARCH INNOVATION AND COMMERCIALIZATION

a) All 30 TIER I universities will have functional ORICS with full time scholarly staff who will work collaboratively with research scholars; 100 TIER II universities will also develop functional ORICS to facilitate commercially viable research projects. All ORICS will be monitored to assess their productivity and productive utilization of public and private grants through National Data Centres, supervised by HEC IT division.

b) Increased R&D funds will be provided to ranked and more productive research universities. All universities will be encouraged to solicit collaborative, sponsored research projects funded by business and industries to increase their productivity.

c) Five Industrial and Technology Parks, one in each province, will be built during 2017-2020 period in collaboration with business, industry and international partners.

d) One hundred new Business and Technology Incubation Centres will be initially established by competitive HEC grants during 2017-2020. Subsequent funding will be based on their performance.

e) Fifteen TIER I universities will increase their collaboration with international sponsored research projects and seek grants from the sponsors for carrying out joint research.

f) HEC will partially fund the seventh phase of USAID and STATE Department funded research projects in Science, Technology and Health during 2017-2020.

g) Technology Fund will be augmented through contractual agreements of support with Korea, China, EU countries and Turkey to specially develop collaborative programmes with ORICS in microelectronics, avionics, manmade materials, computer hardware and auto parts.
3. ENHANCED EQUITABLE ACCESS TO HIGHER EDUCATION

a) HEC plans to increase access to quality higher education to 15% of the 17-23 age group through increasing the capacity of existing 180 public and private universities, establishing 120 new universities, setting up smart sub-campuses and working with provincial departments of higher education to establish 1400 new colleges in underserved areas of the country during the next ten years.

b) Increase the quality of Post-graduate programmes and enrol and graduate 200,000 students in them over the next ten years in critically needed programmes of study.

c) Twenty one public universities and 134 Colleges of Education in all provinces have been upgraded and well-equipped, purpose built Faculty of Education buildings have been built to offer HEC approved teacher education programmes designed to prepare 100,000 teachers for elementary and secondary schools in the country each year to improve the quality and universal availability of basic education up to 10th grade. University based teacher education roadmap will be implemented in 2017-18 as a high national priority.

d) Annually increased funding for PM’s programmes of Tuition fee waivers and Laptop distribution to needy and meritorious students will be solicited to extend the programmes over the 2017-2025 period.

e) All public and private universities to develop financial aid and institutional development offices to raise funds through philanthropy in their communities, to fund named scholarships for needy students.

f) HEC will fund 7000 scholarships for post graduate students leading to indigenous PhD completion during 2017-2021, and increase the number to 9000 scholarships during 2021-2025.

g) Development funds will be provided to set up new regional study centres of AIOU and VU to increase enrolment of programmes of higher studies through distance delivery mode.

h) To increase access to higher education the number and quality of affiliated colleges will be increased. HEC approved criteria of affiliation will be strictly implemented and monitored by expanded QAA Division to ensure rigor and relevance of their programmes.

i) A detailed programme of Student Loans will be developed in collaboration with the lending agencies and will be implemented by an autonomous public company.

j) HEC will regularly collect enrolment data from all HEIs and disaggregate it in terms of gender, disciplines of knowledge offered at the undergraduate and postgraduate levels and number and quality of full time faculty.

4. EXCELLENCE IN LEADERSHIP, GOVERNANCE AND MANAGEMENT

a) All Rectors, Vice Chancellors of public universities shall be appointed through Search Committees constituted by HEC consisting of eminent scholars, CEOs of well managed business corporations and representatives of HEC. The Search Committees will select visionary leaders, solely on merit in a depoliticised manner,

b) HEC will set up a high powered Committee of eminent higher educational administrators,
senior faculty and business leaders in 2017 to revise the University Acts and redesign the administrative organizational and managerial structure of TIER I and TIER II universities,

c) Modern University management system committed to implement the best practices of governance calls for appointing designated officials responsible for Academic Affairs, Student Advising and Support Services, Budget Planning and Finance, Research and Institutional Development. They shall form a Senior Management Committee of the university. This system will be included in the Universities Acts and be uniformly implemented in the country,

d) While strengthening the university autonomy, HEC will strengthen the Institutional Monitoring and Evaluation system to ensure the quality of programmes of teaching and research through Quality Enhancement Cells that have been set up in all public universities. QECs will be strengthened through appointments of dedicated and specialized full time staff.

e) The prevailing Rules of Affiliating TIER III colleges with universities will be revised and strictly implemented to monitor the quality of academic programmes, student support services, faculty skills to use digital tools and interactive strategies of teaching, online library resources, science laboratories. The criteria of affiliation demand continuing support from the affiliating universities of their affiliated colleges through shared faculty and curricular materials and resources,

f) The proposed leadership and management structure calls for visionary leaders who will lead and create the universities which will not only discover and disseminate new, interdisciplinary and useful knowledge but will prepare honest and ethical transformative scholar leaders. This is a long term process, 2017 to 2025 will lay the foundations of this transformation of higher education.

5. INCREASED FACULTY WITH HIGHEST ACADEMIC QUALIFICATIONS

a) 40% of university faculty will have earned doctorates from indigenous and ranked international institutions by 2025.

b) Planned ambitious increases in access to higher education institutions during the 2017-2025 period will need a total of 95786 faculty members including 38314 faculty members with doctoral degrees in the projected 300 public and private universities by 2025. This will take substantial amount of talent, time and treasure.

c) Pakistan's postgraduate talent pool has increased through a variety of initiatives taken by HEC during the last twelve years. The number of scholars enrolled in Masters and M.Phil. programmes has grown steadily. The best among them are candidates for domestic and international scholarship to complete doctoral programmes.

d) Currently 7400 scholars are enrolled in HEC funded doctoral studies programmes in foreign ranked universities who will come into the system during the next five years. In addition HEC has 5000 new PhD scholarships in the approved portfolio yet to be awarded to partially meet the requirements of 2020-2025. New schemes to provide funds for 12000 additional doctoral scholarships are at various stages of approval for the 2021-2025 period.

e) HEC has identified six critically needed areas for which these scholarships will be awarded, through a detailed survey of faculty needs identified by 100 universities. In addition data is
continuously being gathered about the programmes that have not been attended to in the past and will be included in the next cycle. Social Sciences, Arts, Design and Media and languages are going to have a bigger share. A comprehensive list of critically needed thrust areas and emerging disciplines of knowledge has been developed and is consistently revised to reflect the planned priorities of 11th Five Year Development Plan and GOP Vision 2025.

f) A joint Action Plan for developing a US-Pakistan Knowledge Corridor has been developed which calls for preparing 10,000 Pakistani scholars to complete their doctoral studies programme in ranked US Land Grant universities over the next ten years. GOP has approved in principle the programme. Funds are being solicited for a Talent Farming programme designed to prepare Pakistani scholars to successfully seek admission in US universities on merit.

g) HEC has also worked out arrangements for post graduate studies scholarships from European countries, Australia, New Zealand, South Korea, Hungary and China to prepare outstanding scholars to strengthen the culture of research in Pakistani universities during 2017-2025. The most outstanding group of scholars will be given preference in appointment in TIER I universities.

h) HEC is developing less costly split degree programmes of collaborative study and research with partner universities to reach our ambitious targets of faculty development.

i) HEC will provide 500 scholarships for Post-Doctoral studies and research to selected scholars with outstanding research output record and linkages with eminent international research scholars and programmes.

j) Increase subsidised opportunities for indigenous PhD completion programmes for 6000 lecturers in all disciplines including Social Sciences shall be provided during 2017-2020.

k) Develop Sector based knowledge exchanges among universities consortia to use ORICS and Business Incubation Centres through collaboration with development partner universities and international donors.

l) HEC will monitor, in collaboration with provincial Departments of Education, preparation of 100,000 school teachers each year through the Standards based 2 year ADE and 4 year B.ED programmes to improve the quality of school education.

6. ENHANCED QUALITY OF CURRICULAR CONTENT FOR ALL LEVELS OF QUALIFICATIONS OFFERED

a) Phase out all 1 & 2 year Bachelor’s degree programmes in all universities by 2018, and replace them with 4 year 136+ credit hours degrees based on semester system.

b) Develop through National Curriculum Review Committees (NCRCs) 2+2 year degree programmes including strong applied internship and professional experiences programmes in collaboration with Businesses and industries in the community.

c) Curriculum refinement in the age of knowledge explosion is a continuous process. The existing NCRC system will be refined in 2017 in consultation with provincial departments of higher education. All NCRCs will include, besides nationally known disciplines experts, representatives of relevant accreditation councils, business and public services commissions. The NCRCs will meet more frequently to upgrade rigor and relevance of curricula that
comply with both national and international standards of the disciplines of knowledge.

d) National Qualifications Framework consistent with Bologna Agreement has been prepared for levels 5-8. It includes well defined learning outcomes for each level of qualifications, Guidelines for Standardized Semester based Assessment and a register of all the qualifications offered by Public and Private Institutions of higher education.

e) HEC will provide training through its expanded Quality Assurance Division to university QEC staff to implement the assessment guidelines and monitor the quality improvement plans based on reliable data. A comprehensive plan will be developed in 2017 to provide these trainings throughout 2017-2025.

f) Accreditation Councils will be instituted for the emerging new disciplines of knowledge to guide and monitor compliance with professional standards of the discipline. The Councils will develop their standard Manuals of Accreditation which will assess their quality through mandatory institutional and programmatic accreditation visits.

g) HEC will develop a National Council of Academic Accreditation & Assessment (NCAA) in 2017. The Councils will develop General Standards of Quality Assurance and Accreditation of Higher Education Programs with clearly defined Key Performance Indicators based on universal best practices. These general standards will guide accreditation councils to develop their specific manuals of assessing quality relevant to special requirements for their particular Fields of Study.

h) Work with all accreditation councils to train 150 evaluators each in 2017-18 to perform mandatory, objective, standards based programme assessment visits and write reports based on documented evidence supportive of their recommendation whether to approve continuation of the programme, approve with conditions or to deny approval.

7. PLANNED ICT FOR EDUCATION FOR 2017-2025

a) Under the smart bags initiative, HEC will provide 300,000 laptops with internet devices to meritorious students in 2017 to 2019. These laptops will enable students to avail digital resources for improving the quality of studies and research. HEC plans on continuing the programme till 2025.

b) Smart universities project is designed to provide Wi-Fi services to 94 public universities to enable students, faculty and researchers to freely access internet resources during the plan period.

c) All TIER I and 64 TIER II universities will be supported to install HD cameras, intelligent video analysis and monitoring equipment to make their campuses safe.

d) A comprehensive ecosystem for e-classroom will be developed to convert, in seven years, 350 fully equipped smart classrooms to provide faculty/student online interaction and collaboration and increase access to the latest information databases to create, manage and share new, current curriculum content.

e) Learning Management System will be initiated at 50 new universities for online assessment of student learning outcomes and during 2017-2020. Students will be provided grade reports for all assignments as they are completed. Eventually all public universities will institutionalize Learning Management System for all courses. LMS will be initiated at five
public universities in 2017 and will be deployed at all public universities gradually.

f) HEC has already set up a Cloud Data Centre facility called EDU Cloud that is designed to provide a variety of services to HEIs including Virtual Desktop Interface (VDI) that will enable 600,000 old desktop computers currently in use to meet the new requirements of software and applications. HEC EDU Cloud with its latest cloud technology and advanced systems will comprise of 20,000 physical cores, 20 Peta Byte storage, 300 Tera Byte RAM distributed over 35 Racks. The system will serve 100,000 Virtual Desktops and/or 5000 hosted servers to meet the needs of higher education sector for the next five years.

g) HEC is in the process of upgrading its Pakistan Education and Research Network (PERN). PERN III will be an ultra- high speed network to provide 40 GPS backbone connectivity by interlinking 50 cities of Pakistan and other territorial network partners. PERN III structure will provide more penetration of digital services to remotely locate higher educational institutions and their sub-campuses in underserved areas in AJK, Balochistan and Gilgit-Baltistan. The upgraded PERN III is projected to be completed by 2017-18.

h) Higher Education Management Information System (HEMIS) is designed to improve the efficiency of the rapidly expanding higher education sector during 2017-2025. HEC plans to roll out HEMIS with proper staff training at ten universities each year during the vision plan period. The system will be initiated at the TIER I universities to generate reliable and high quality data.

i) HEC plans to implement EDU Card solution at 10 universities each year where HEMIS is also being implemented. 300,000 students are expected to avail the EDU Card between 2017 and 2022. The card is a convenient, secure and fast way to conduct transactions and access services on campus.

j) In 2016 HEC has signed a Document of Understanding with Huawei Technologies to establish a Research and Development Centre for promotion of innovative and constructive research in Islamabad. The equipment for the centre related to Cloud Computing, Software Defined Networks, Network Security and Unified Communications will be provided by Huawei and HEC will provide space and infrastructure for the centre. The centre is designed to prepare scholars who will be producers of ICT tools rather than being consumers only. The centre will be completed in 2017-18.

k) HEC IT Division has devised a plan to support local production of high quality electronic devices through collaborative research in design, engineering, performance testing and design verification with reputable manufacturers through the effective use of R&D and Technology funds.30 Open Source Research Laboratories of at least 25 computing terminals will be established at TIER I universities. HEC will provide initial seed money support to these laboratories to accelerate their productivity in patents, products and processes.

l) ORICS have been set up in a growing number of universities. HEC plans on setting up an ORIC Automation and Research Cluster Management System to plan, monitor, evaluate Output and performance of ORICS. The project in its initial phase during 2017-2020 will be deployed in 12 selected TIER I universities in all provinces and will be expanded during 2020-2025.
m) HEC plans to set up IT Academies and Testing Centres at all 5 skill universities in collaboration with IT industries to empower large numbers of trained human resources in cutting edge technologies and enable them to achieve certification during 2017-2020.

n) HEC plans to implement Capacity Planning System at all public and private higher education institutions through GIS-based monitoring to gather timely and useful data for enrolment distribution in different programmes and levels, faculty employed, their qualifications, teaching and research output based on well-defined KPIs. The CPS will be centrally deployed at HEC in 2017 and will be initially deployed at 12 public universities as a pilot in 2018.

8. FINANCIAL MANAGEMENT TO SUSTAIN GROWTH

a) HEC will seek the required development and recurring financial resources to achieve the ambitious targets of increased equitable access, faculty development and quality enhancement, technology infusion, research innovation and commercialization, excellence of leadership and management and modernization of curricula at all levels of higher education.

b) GOP Vision 2025 calls for 1.4% GDP investment in higher education. HEC will annually request gradual increase to reach the targets listed in HEC Vision 2025. This level of investment will pay back dividends through creating a dynamic knowledge-based economy.

c) HEI leadership will be involved in generating increased income through various institutional development activities including local and international donor contacts, philanthropy, commercially productive research output and developing endowments through annual giving and major fund-raising campaigns.

d) All TIER III institutions to develop and implement College improvement plans to improve quality of faculty, curricula, infrastructure and instructional support facilities.

e) All public universities to be required to have professional financial audits done.

f) Continuous training opportunities provided to senior financial officials of fifty public universities each year to implement timely preparation, implementation of recurring budget, to conduct Public Expenditure Tracking Surveys and results to be shared with HEC.
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<td>Energy</td>
<td>Electrical Engineering, Mechanical Engineering, Chemical Engineering, Mining Engineering, Materials, Cleantech, Nuclear Engineering and Energy Systems Engineering, Nanotechnology, Photovoltaic (PV) and Thin Film Technology</td>
<td>High</td>
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<td>Interdisciplinary Areas for China-Pakistan Economic Corridor and Development</td>
<td>Civil Engineering, Mining Engineering, Transportation Engineering, Mechanical Engineering, Petroleum &amp; Gas Engineering, Automobile and Materials Engineering, IIT, Telecom and Computer Engineering and Advanced Design, Applied Sciences and Management, Entrepreneurship and Innovation</td>
<td>High</td>
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<td>IP Gas Pipeline, Oil and gas exploration</td>
<td>Petroleum and Gas Engineering, Chemical Engineering, IT, Materials and Manufacturing Engineering, Mechanical Engineering, Industrial Engineering and Automation, Product Design, Process Engineering, Telecom</td>
<td>High</td>
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<td>Environment and Climate Change (Glacial Melting)</td>
<td>Environmental Engineering, Public Policy, Civil Engineering, Modeling and Simulation, Water Resource Engineering and Management</td>
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<td>Manufacturing and Innovation</td>
<td>Industrial and Systems Engineering, Mechanical Engineering, Mechatronics Engineering, Lean and Modern Technologies, Automation, Materials Molecular Dynamics, Advanced Manufacturing, Nanotechnology</td>
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<td>Job Creation, Technology Commercialization, Start-ups, Small Businesses</td>
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