# SCIENCE PARKS AND NATIONAL DEVELOPMENT

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A fresh wave of technological revolution and open innovation is gaining momentum around the globe stirred by substantial changes in the economic landscape. The recognizance demands greater capacity of states for upgradation of transformative knowledge-based structures and in-depth integration of innovation-driven models of development, centred on a new paradigm that strategically leverages all sources of ideas on emerging social and technological trends and takes them to market through collaborative avenues. On this matter, the quadruple helix model of innovation is constituted of elements which interact in the production, diffusion, and use of new and economically useful knowledge and recognizes four major actors in the national innovation system – government, university, industry/enterprise, and society. The model aims at providing a stimulus for economic development by keeping these four components involved in multi-layered interactions and ensuring their continued significance for any country’s R&D processes.

At the heart of quad-helix is the government that plays a pivotal role in configuring the state’s innovation systems. Rational policies and institutional frameworks formulated by a government enhance national competitiveness through dynamic linkages and interactive learning between knowledge producers and users. The creation of science and technology parks (STPs) as ideal workshops, using knowledge as the key resource, thus gain salience to transform research into innovations on the market by incubating ideas generated by university faculty, researchers, and students, and connecting them with the industry and enterprises. These parks offer viable resource networks for new technology companies. The development of STPs is among the most efficient instruments for furthering local socioeconomic growth.

Since the arrival of the world’s first STP, instituted on the campus of Stanford University in the early 1950s and later on named as the Silicon Valley, the understanding and acceptance of the idea has seen paces. The transformation of one of the most marginalized areas in the United States into an unrivaled epicenter of global education, research, finance, and technology, swiftly gained cognizance featured into the contemporary trends of STPs created in world’s metropolises as power houses of knowledge, training, and collaboration. There are presently around 400 science parks worldwide – more than 150 in the U.S., 111 in Japan, 100 in China, 60 in UK and France – and the number is on the rise. The high technology clusters in a science park are generally more organized, planned, and managed, and contribute largely toward implementation of a comprehensive science policy, build capacity, and foster innovation. They have therefore seized the attention of policymakers as well as the industrialists and innovators.

The International Association of Science Parks (IASP) confirms STPs as a ‘growing phenomenon’ and defines them as organizations governed by specialists and professionals, whose main objective is to increase well-being of the community by promoting the culture of innovation and competitiveness of associated businesses and knowledge-based institutions. For reaching such goals, a science park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, SMEs and the market; enables the creation and growth of innovation-based companies through incubation and spin-off mechanisms; and offers other services, quality space, and facilities.

At the STP, business, science, and innovation meet in a cross-disciplinary make, linking new markets, customers, companies, and workers, along with mutual sharing of experiences. Knowledge, learning, and innovation are critical to a company’s progress, whether a multinational (MNE) giant or a small and medium sized enterprise (SME). According to a Swedish study, companies located in an STP grow faster than their similar types located elsewhere. Access to quality facilities, value-added services, networking opportunities, strategic business development and management models, professional competence based at the university, and financial services provided by the government and investors – such as in the form of supply chain finance, venture capital, equity investment, finance lease – are lifelines for the STP sector, given their significance for strengthening structural foundations of investment and finance, positioning the growth compass toward cultivation of strategically important industries, and accelerating commercialization of tech-achievements. As the local financial systems mature, the STP would enjoy better and easy access to financial institutions. Similarly, the industry’s demands for research and components provide favorable market conditions for STP products. A stable and reliable operational and investment environment affords confidence to stakeholders besides ensuring conservation of value chains and investment cycles.

As Pakistan springs up the growth spectrum, a stable knowledge-based economic evolution will offer promising avenues for advancement of competitive strengths to complement the country’s distinct geographical advantages and vast human resource. Each actor in the knowledge economy has to factor in the calculus and the process is already rolling out. Situated at a place favored by multiple plans of national growth and concentrated with technological talent, the National University of Sciences and Technology (NUST) is a leading national center of knowledge creation. Drawing on best international experiences, NUST has launched its National Science and Technology Park (NSTP). Various successful innovative solutions for the society through recent years, such as production of cost-effective cardiac stunts and an indigenous diagnostic kit for COVID-19, place NUST at a high pedestal of competence. The creation of NSTP as Pakistan's first fully integrated university-hosted STP manifest the pivot of NUST’s multidimensional R&D efforts, contingent on knowledge and technology transfer, research commercialization, joint ventures, and academic entrepreneurship. The world-class facilities, ranging from incubators to accommodation tailored for companies at various stages of maturity, have transformed the campus into a creativity hub.

The NSTP has introduced a number of favorable policies to support sustainable development of quad-helix, provides subsidies and incentive packages, and strongly encourages the factor-based, hi-tech, and service sectors, with a closer emphasis on agri-tech, auto-tech, ed-tech, energy-tech, def-tech, fin-tech, health-tech, and smart-tech areas. The auto-tech theme, for instance, seeks to provide profitable and robust solutions to the auto industry by utilizing the expertise at NUST Automotive Research Center (The ARC). NSTP is set to develop into a zone featuring internationalization of R&D through agreements of cooperation with multinational helixes of research and manufacturing, high-end industries, and formation of an innovation capital investment forum to provide support for incubation, acceleration, and next phase development of innovative companies.

Science and technology parks generate enormous economic activity and increase the productivity of resident companies. Such trends are universally recognized as necessary elements for triggering a country’s innovation potential and socioeconomic growth. Initiatives such as the NSTP thus hold capacity for fostering the economic sectors of Pakistan and permitting it to leapfrog into a new phase of development.