

Role of Office of Research Innovation and Commercialization in Promotion of Research and Development in Degree Awarding Institutes of Pakistan

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A country's sustainable growth relies heavily on indigenous, authentic, and continuous research activities. The research process is a creative endeavor with objectives to expand existing theories, discover new knowledge through various organized research methods, and resolve everyday problems.¹ As technology advances, universities have become increasingly pivotal in the processes of invention, innovation, and commercialization. Traditionally, Degree Awarding Institutes (DAIs), remained concentrated on scientific knowledge and research, seeking to expand fundamental phenomena without an immediate commercial focus. However, with the increasing use of fifth generations digitalization and artificial intelligence, DAIs have become the nucleus of research productivity instrumental in the socio-economic uplift of the communities and country.¹⁻³ The role of the Office of Research, Innovation and Commercialization (ORIC) in DAIs has become important, bridging the gap between innovations and the market. Universities have the potential to cater to the interests of inventors and investors significantly, playing a crucial role in benefiting society by translating valuable scientific advancements translate into practical and positive impacts.^{4,5}

Pakistan's independence and partition from India in 1947 had a significant impact on the scientific and higher education landscape of the newly born country. At the time of independence, Pakistan inherited only a small fraction of the scientific and technological infrastructure that existed in pre-partition India. This limited inheritance posed challenges to the development of science, higher education, and research. Coming seventy years after its inception, the trajectory of innovation took a low rise. Pakistan is the fourth most populous country in Asia homing 231 million people. As per 2021-22 statistics, \$374.7 Billion was its Gross Domestic Product (GDP), and the GDP per capita recorded was \$1,501 having the 9th largest labor

force estimated at 63.89 million, spending 2% of its GDP on education. Till 2020-21, a total of 2,245,998 students were enrolled in 222 Higher Education Institutes (HEIs) (Public and Private) across the county.⁶

Research and Development (R&D) in Pakistan is mainly conducted by public universities and research institutes, with most of the funding provided by the government. The private sector's contribution to the Gross Expenditure on Research and Development (GERD) is not substantial. The government has shown unprecedented support for science and technology, particularly in higher education, even with limited resources. R&D expenditure in higher education has seen a significant increase, rising nearly fourfold from about 530 million Rupees to 2,000 million Rupees over the last few years.⁵ The primary focus areas for R&D in Pakistan include agriculture, engineering, defense, health and industrial research. Despite these substantial improvements in support for R&D and higher education over the past five years, Pakistan continues to face challenges. The country has one of the lowest ratios of scientists and engineers per million population, highlighting the need for ongoing investment and development in this sector.^{3,5,6} Since their establishment in 2011 by HEC, it is impressive how the Offices of Research Innovation and Commercialization (ORICs) have effectively cultivated research culture and boosted industry involvement in applied research programs within universities. This was made possible through collaborations with businesses and industries.^{3,5}

The concept of a formal office of ORIC in universities is comparatively recent in Pakistan. Previously, the universities kept on promoting their research without commercialization in isolation. In 2011, only six universities across the country had ORIC office in their campus.⁵ Currently, a total of 89 ORIC offices in medical and non-medical DAIs, resulting in a steady increase in R&D-related activities.⁵ However, the United Nations Educational, Scientific and Cultural Organization's Institute of Statistics has revealed that just 0.16% of Pakistan's GDP is invested in domestic

R&D.⁷ Even this minimal allocation underscores the nation's commitment to promoting innovation and driving industrial advancement. A recent survey by the Pakistan Institute of Development Economics (PIDE) reveals that in Pakistan's Golden Triangle, nine out of ten firms did not allocate any funds to research in the past year. Among firms that have embraced enhanced processes, 34% emphasize the substantial improvements in their operations. The remaining stagnant discovery emphasizes the crucial relationship between R&D, skilled manpower, and operational efficiency.⁷ This further highlights the development of links between research and development (R&D), innovation, and operational efficiency, and ORIC in strategic planning. ORIC can prove effective in creating this relationship by encouraging productive and relevant research and its commercialization utilizing Business Incubation Centers (BICs), development of industrial linkages, collaborating and networking among themselves in subject matters, and strategically placing research and innovation in the center.^{5,7} Embracing R&D should not be just a choice but a necessity. It serves as the cornerstone for navigating through a swiftly evolving business environment, unlocking undiscovered potential, and gaining a competitive advantage. Although ORIC's role in collaboration of R&D in industry and academia, may pose challenges, the benefits seem to outweigh monetary numbers, impacting researchers, academics, industries, and the overall economic prosperity of the nation.

Medical DAIs are special in this context. Besides the call for aligning research to national health policy, lack of infrastructure, appropriate funding, human resource, and regulatory mechanisms are identified as barriers towards evidence-based healthcare.⁸ The augmented burden of disease for resource-limited countries like Pakistan highlights the urgent need for quality and relevant clinical research to identify and implement cost-effective and innovative contextual treatment regimens. The 'triple helix model' consisting of university-industry-government is also proposed for the medical and life sciences ecosystem.⁴ Given the growing interdependencies among these traditionally separate entities, it is becoming essential for medical-related DAIs to overcome the above-mentioned key hurdles through collaboration and commercialization.^{2,4,8}

Establishment of ORICs in medical DAIs are expected to encourage and redirect their focus towards developing research programs, advancing from invention to innovation, and expanding these discoveries through industrial collaboration.² Facilitating these initiatives within universities, especially medical DAIs and encouraging knowledge exchange among institutions and industries can play a crucial role in reaching these objectives. Establishing incubators would further, aid in the commercialization of research and development (R&D) projects and networking.^{4,5,7} While the outcomes of these efforts may not be immediately apparent, they will establish crucial foundations for self-sufficiency and long-term sustainability. This will ultimately lead to substantial growth in evidence-based practices within healthcare settings.

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