



Technopreneurship for Driving Economic Growth in Pakistan: A Comprehensive Literature Review

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Abstract

Technopreneurship is one type of technology-based entrepreneurship that can help Pakistan's economy grow. It could reduce the percentage of intellectual unemployment among freshly graduated college students by creating jobs. Numerous research works have illustrated the ways in which a college education shapes and moulds individuals' personalities and thought processes, ultimately influencing their choice to pursue a career in technopreneurship. The purpose of this study is to provide a summary of the literature on technopreneurship. Technopreneurship research was conducted by reviewing and analysing technology evaluations and scholarly publications. The problem with this study is that the understanding and proficiency of technopreneurship varies across students from different professions. To address these gaps, higher education should be able to take the initiative in making sure that every student has the chance to pursue technopreneurship as a career. The article underscores the need of fostering an inventive, imaginative, and daring culture inside the entrepreneurial milieu. Through the use of surveys, interviews with technopreneurs, policy officials, and corporate executives, as well as quantitative and qualitative analysis, the research gave a full understanding of the possibilities and challenges associated to technopreneurship in Pakistan. This research aims to provide useful recommendations to investors, entrepreneurs, and policy makers on how to leverage technopreneurship to propel economic growth in Pakistan. By fostering a robust technopreneurial environment, Pakistan may increase job chances, enhance its global competitiveness, and promote sustainable economic growth.

Keywords: Economic Growth, Entrepreneurship, Technopreneurship, Pakistan

1. Introduction

Pakistan is situated at a crossroads in the swiftly growing global economy (Khurshid, Emmanuel Egbe, Fiaz, & Sheraz, 2023). Its entrepreneurial spirit is booming, but in order to translate this potential into steady, long-term economic growth, a paradigm change is required (Ikram, Kenayathulla, & Saleem, 2023). This suggests that technopreneurship a robust synthesis of technological innovation and entrepreneurial dynamism must be recognised as the cornerstone for advancing Pakistan's economic trajectory (Bhatti & Shahrukh, 2023). The primary goals of every startup are growth and profitability. Convincing prospective firms to join you requires courage and effort, as starting a business usually involves taking many risks. An investor must have the willingness to commit to and embark on new businesses and activities, including potentially hazardous ones (Nenova, Niang, & Ahmad, 2009).

Entrepreneurs are known for their initiative, inventiveness, creativity, and invention in addition to their audacity and daring personality. other than the typical business tycoon. They are always thinking of creative and novel approaches to deal with societal problems (Okorie, Kwa, Olusunle, Akinyanmi, & Momoh, 2014). Technology is the ability to apply scientific knowledge to a variety of commercial applications. Industry uses technology to generate new concepts that are eventually brought to market as finished commodities. Entrepreneurs employ innovation as a specific tool (Rath, Khang, & Roy, 2024). The definition of innovation is the application of better solutions to new problems. Innovation originates from the process of commercialising an invention (Nassereddine & Khang, 2024).

A business's capacity to launch new products onto the market determines how successful it will be (Howells, 2024). Therefore, in order to successfully transfer cutting-edge processes to manufacturing, a material scientist or engineer must possess innovation in order to be a successful entrepreneur. Innovation in technology and entrepreneurship are closely related. Enterprise dynamism, variety, and economies of scale are fostered by technology. The development of small and medium-sized enterprises in Pakistan has been hampered by a number of factors, such as low levels of research and technology absorption, restricted market access, low skill levels, subpar infrastructure, and insufficient power sources. Industry problems can only be solved by the innovative thinking of academics and business professionals working in tandem with the government's continuous support and collaboration (Zafar & Mustafa, 2017).

A method for making technology accessible and reasonably priced has to exist. SMEs should have frequent access to research findings in manufacturing processes from organisations like the National organisations for Science and Engineering Infrastructure in Abuja and its equivalent organisations. A supportive environment is necessary for creativity to flourish. To examine the factors that support and obstruct creative entrepreneurship, professionals from business, government, and academia must work together (Okorie et al., 2014).

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Like technology, the primary goal of entrepreneurship in the business sector is to make it possible for entrepreneurs to realise their dreams of solving social problems. For instance, households utilise filament lightbulbs. Compared to incandescent light bulbs, the more recent invention of energy-saving light bulbs saves society a substantial sum of money. There is growing recognition of the role that entrepreneurship plays in driving economic development in both developed and developing countries. It would be a mistake to believe that innovation is only available to a small group of people. Both the public and private sectors may provide the necessary structures to enable everybody to express their creativity in any form. In an attempt to foster innovation, wealthy global corporations invest a large sum of money on research and development each year (Maziriri, Dzingirai, Nyagadza, & Mabuyana, 2024).

The introduction of industry 4.0 in recent years has led to a growth in technology-driven businesses that boost GDP and employment prospects. Businesses need to stay on top of trends and integrate them into their operations as technology develops. Utilising cutting-edge technologies in business, including automation, smart technology, and the Internet of Things, is a key component of Industry 4.0. For this reason, technopreneurship is a crucial competency for conventional entrepreneurs. Pakistan, a nation full of promise, must take on the task of guiding its economy towards fair, long-term growth. Pakistan is home to a young, active population, a developing middle class, and a quickly growing digital economy. More than 70% of individuals use cell phones, and more people are accessing the internet, both of which are positive signs for technology-enabled solutions (Qasim & Mahmood, 2021).

Furthermore, the government's focus on IT growth and initiatives like the National Incubation Centre project demonstrate its dedication to fostering an environment that is supportive to digital entrepreneurs (Jamil et al., 2016). This article discusses the strategic potential of a strong tech-enabled corporate environment as a key driver of Pakistan's economic growth.

1.1. Technopreneurship

Technopreneurs continually go through an organic process of constant improvement and always try to redefine our dynamic digital economy. Entrepreneurship begins at home and in school and is nurtured by tutors. We need to promote an entrepreneurial spirit at all levels of the society and at all levels of the academia. Strategic direction and decision-making processes are getting demanding and complex. This requires methodology that can transform professionals and even students into creative, innovative, and visionary leaders who understand the importance of technopreneurship in a changing global environment (Zein, Ghalih, & Pebriana, 2021).

Technopreneurship is a basic kind of entrepreneurship in a technologically sophisticated setting that combines entrepreneurial skill, technological know-how, and the ability to transform goods and services. Technopreneurship has recently been credited with a major portion of the increased economic growth in both industrialised and emerging nations. Technopreneurship is also a driving factor behind economic growth, economic competitiveness, job creation, and the promotion of social interests when viewed through the lens of social development. A sustainable, long-term competitive advantage is mostly based on technopreneurship (Abbas, 2018).

Furthermore, as a result of the Covid-19 pandemic, many organisations are compelled to innovate and incorporate technology into their business operations in order to be ready for any post-Covid-19 scenarios. Information and communication technology is developing quickly, which promotes the expansion of technology-driven businesses and offers new chances for financial gain and employment prospects. Technopreneurs are critical to the promotion and development of innovative information and communication technologies (ICTs) goods and services for both local and international markets, as well as to meeting consumer demand in the digital economy (Qasim & Mahmood, 2022).

In addition to lucrative markets, new goods and services are produced via the fusion of technology and business acumen. Technopreneurship is a vital element in boosting economic output and generating jobs (Adeoti, 2019). Despite technopreneurship's importance in the future competitive climate, many people still consider technology-based entrepreneurship to be a novel form of company. As such, a number of obstacles still need to be overcome, particularly with regard to entrepreneurship development and education. Pakistan is a country that thrives at networking but has difficulty using technology (SABA, NSUBUGA-KYOB, & MEHMOOD, 2021).

2. Research Method

The primary goal of the study is to examine Technopreneurship for driving economic growth in Pakistan using the databases Scopus and Google. A substantial collection of over 200 articles with relevant credentials were first found by the search; they were then manually filtered to yield a more focused selection of 100 pieces. Twenty from Research Gates, thirty from Google Scholar, fifty from the Social Science Research Networks, and twenty from other sources comprised the total number of research articles on Islamic finance technology that were gathered for the study. The study's scope is further restricted to journal articles, which is a helpful method for locating the prevalent trends in reliable indexed journals.

3. Findings

In the contemporary digital economy, technopreneurship the ability to launch technology based businesses is regarded as essential. Technopreneurs need to have a foundation in science and technology, but they also need to

be technically skilled and business-savvy. Since encouraging students to become technopreneurs takes more work, technopreneurship may be taught in a suitable educational context. The process of creating a novel, flexible business model by combining technology expertise and entrepreneurial skills is known as technopreneurship (Masenya, 2021).

Since the curriculum emphasises creating an entrepreneurial attitude and fostering innovative thinking when it comes to obtaining the high-quality commodities required for all occupations, all students may profit from entrepreneurship education. Research has shown that educating students about entrepreneurship is an effective way to promote entrepreneurial values. It's common knowledge that enrolling in entrepreneurship courses may significantly increase graduates' feeling of entrepreneurship. Character, self-assurance, personality, and communication skills are all positively correlated with the choices pupils make about their careers (Rafiana, 2024). Therefore, pupils would not want to become technopreneurs or chose technopreneurs as their professional route if they were eager to learn and try new things. The findings suggested that higher education may encourage students to pursue careers in entrepreneurship by providing them with appealing business prospects and the necessary skills and tools. Since education lays the foundation for knowledge and moral conceptions in a person, it plays a significant role in shaping attitudes. The processes that begin with individuals and move on to encompass familial, organisational, and environmental components form the foundation of the entrepreneurial process (Chen & Goldstein, 2024). Since learning support is a component of the process that motivates someone to enter the realm of entrepreneurship, a person's mentality affects their ability to grow as a person or make their first professional step (Heriberta, Gaus, Ridwansyah, Hastuti, & Octavia, 2024).

As part of the practical application of entrepreneurial education, students create entrepreneurial groups and apply the knowledge they have gained to real-world circumstances as well as carry out in-depth theoretical questions. Emphasising real-world experience over academic material or boring lectures might help students comprehend technopreneurship and encourage them to get into the field as a profession. The manner that the theoretical aspects of commercial activity are taught to students while they are still honing their practical judgement will be of tremendous help to them. Students can develop their technical literacy and independence by being exposed to the theoretical and practical facets of economic activity and integrating them with innovation (Rafiana, 2024).

Technopreneurship education is provided to understudies in all programmes with the objective that they will study business and technopreneurships and would be required to make money inside item model frameworks. By encouraging cooperation and idea exchange, universities that act as business incubators support entrepreneurs in their endeavours to launch new businesses. To get better results, a technopreneurship incubator has to take an inventive strategy to administration and operation (Hasan, Khan, & Nabi, 2017). In order to implement follow-up activities, a university incubator assists students in creating the ideal prototype while also offering advice to enhance their comprehension of business and product innovation. The business incubator helps finance company capital, teaches technopreneurs in many areas, and facilitates information access as one of the incubators' potential expansions. Additionally, it imparts company management concepts. Firm incubators can help students get funding from potential investors who are prepared to provide them large returns in order to support their technology-based ventures. It is important to see incubator programmes as vital academic endeavours that support innovation and the advancement of values (Jansen, Van De Zande, Brinkkemper, Stam, & Varma, 2015).

A higher education institution may face a number of difficulties while implementing a technological entrepreneurship programme, such as problems and worries about ongoing operations and potential solutions to enhance performance. Implementing incubator management calls for a certain set of abilities and knowledge. Teachers and personnel who work for corporations need to keep developing their skills. Another important human resource strategy that a business or organisation may adopt is training. Each employee can gain new talents or abilities and further hone those already applied to the advancement of the organisation through specialised training (Antlová, 2009).

So, in order to maximise mutual resources and boost trade and innovation, higher education and business should work together. When combined, the two components can address and provide light on certain real-world challenges. Enhancing instruction may guarantee that its curricula are up to date, applicable, and meet industry expectations by collaborating with a high-tech company or graduating class. Private companies, non-governmental organisations (NGOs), and charity groups can also promote the Technopreneurship process in higher education by helping to provide ICT resources that students can use to further their business objectives (Xu, Hsu, Meen, & Zhu, 2020).

On the other hand, ties between academics and business support both obtaining and maintaining a competitive advantage in the current fast-moving global economy as well as higher education. Create dependable alliances, take cues from prosperous circumstances, and support business growth (Chow, Hua, & Hung, 2020).

In addition, the government may start providing loans and financial resources to prospective students who wish to engage in technopreneurship (Adeoti, 2019). Related governmental organisations may also offer financial assistance or awards for technological start-ups to encourage students to begin technopreneurship. Governments must pass profitable rules and regulations, offer venture capital, and construct the required infrastructure, which includes upgraded phone networks, the Internet, and basic utilities like electricity. To encourage

technopreneurship, higher education should consider improving its technological infrastructure to allow students to become acquainted with state-of-the-art technology. Given the significance of technology in the context of the Fourth Industrial Revolution, giving students the opportunity to study cutting edge technologies like cognitive technologies, robots, and the Internet of Things is a smart way to prepare them for it. to become a profitable IT business owner (Skilton & Hovsepian, 2018).

3.1. Discussion

The process of transforming an economy into a contemporary, manufacturing- and services-driven economy is known as economic development. Along with corresponding quantitative increases in productivity and production per person, this process modifies the qualitative characteristics of an economy. Economic "development" is typically defined as the observable rise in human well-being that follows these qualitative and quantitative breakthroughs. Entrepreneurship has the potential to positively affect economic growth on both a qualitative and quantitative level. The mainstream media portrays entrepreneurship as critical to economic growth, emphasising its ability to generate employment, reduce debt, and foster competitiveness (Dhaliwal, 2016).

3.2. Challenges and opportunities

Pakistan's rapidly expanding technology sector has great promise for advancing social progress and economic expansion. But there are a number of obstacles preventing a prosperous tech-enabled future. This section provides a framework for overcoming these problems and identifying paths to success by outlining the major challenges and possibilities faced by technopreneurs in Pakistan (Mujahid, 2002).

3.3. Challenges

- Getting capital is still a big challenge for Pakistani companies. Complicated bureaucratic processes and restricted access to venture capital and angel investors hamper the flow of finance needed for scaling and growing (World Bank, 2023).
- Insufficient infrastructure is a hindrance to the smooth operation and expandability of digital businesses, particularly in rural areas. Instable electricity sources and inadequate internet connectivity are examples of this (World Economic Forum, 2023).
- It might be difficult for startups to locate competent employees due to the skills gap between the current workforce and the expectations of the IT sector. Spending a lot of money on STEM education and reskilling programmes is thus necessary (National Incubation Centre, 2023)
- Complicated and antiquated laws might hinder innovation and deter foreign investment in the IT industry. Because digital businesses are dynamic, less regulation is needed to provide a favourable environment (Pakistan Telecommunication Authority, 2023).
- Due to limited access to resources and assistance, women and young entrepreneurs in particular may find it difficult to negotiate cultural norms and expectations (Hundera, Duysters, Naudé, & Dijkhuizen, 2019).

3.4. Opportunities

- Pakistan offers a sizable market for tech-enabled solutions in a variety of industries due to its sizable, youthful population and expanding middle class. The demand for cutting-edge goods and services might increase as a result of this demographic dividend (World Bank, 2023)..
- Digital Leap: Pakistan's fast technological adoption is demonstrated by the nation's increasing smartphone and internet usage, which fosters the ideal environment for the growth of digital enterprises (Pakistan Telecommunication Authority, 2023).
- Government Support: Through programmes like the National Incubation Centre project, which gives businesses access to vital resources and assistance, the government is putting more of an emphasis on encouraging digital entrepreneurship necessary (National Incubation Centre, 2023)
- Pakistani startups may be able to access finance, expertise, and knowledge by forming alliances with universities, investors, and IT behemoths worldwide, which might help them grow their businesses to unprecedented heights (World Economic Forum, 2023).
- Making use of Pakistan's unique assets in areas such as education, healthcare, and agriculture might lead to the development of innovative solutions that could find global adoption (Tlaiss, 2015).
- We examine the wide field of strategic interventions, evaluating certain laws and programmes that may support a vibrant community of technopreneurs. This means creating a strong infrastructure, encouraging a culture of innovation, and bridging the vital divide between business and academics. We recognise that obtaining funding, providing chances for skill development, and attracting people are essential elements of a thriving technopreneurial ecosystem (Wong, 2013).
- The ultimate objective of this study is to present a convincing plan for utilising technopreneurial leadership to boost Pakistan's economic growth. We intend to enable educators, business owners, and legislators to create a future where innovation flourishes, companies succeed, and Pakistan's economic engine roars to life by breaking down the tactics, opportunities, and obstacles (Qasim & Mahmood, 2021).

4. Conclusion

The future of Pakistan's economy will depend on its ability to foster a robust and prosperous technopreneur ecosystem. By adopting technology-driven entrepreneurship, the nation may create new avenues for social progress, economic advancement, and increased competitiveness in the global market. Technological entrepreneurial is a powerful force driving economic progress, not merely a trendy term. Pakistan can achieve its enormous potential, provide high-quality employment, and get closer to a sustainable, inclusive future by fostering a strong ICT economy. It's time to boost Pakistan's techpreneurs' entrepreneurial spirit and provide them the tools they need to advance the nation's economy.

Thus, in along with assisting students in developing their professions and becoming technology-based entrepreneurs with innovative ideas and the ability to generate new employment, higher education develops entrepreneurs who are capable of managing fluctuations in the market and an unpredictable external environment. Additionally, it is anticipated that this curriculum would produce business owners who can guarantee the long-term viability of their technology-based businesses and propel them to previously unheard-of heights. Collaborations with the industry may also assist pupils in finding funders to support their technology-related initiatives.

Producing engineers and scientists who create new products, markets, and businesses is the aim of technopreneurship. These scientists and engineers are driven by productivity, skilled with technology, and competitive in both domestic and global markets. A nation cannot become a sophisticated economy unless it actively embraces technopreneurship. We need to shift the way we think about things. We must do market research in addition to product and service technology research to decide which technologies to employ and what innovative strategies to employ in order to meet customer demand. Stated differently, the government must embrace creativity and create the circumstances required for it to thrive. Technopreneurs in Pakistan confront difficult but surmountable obstacles. Pakistan's IT sector has enormous potential that it may realise by tackling these challenges and seizing the many opportunities that present themselves. It will be possible for Pakistani digital entrepreneurs to promote economic growth and establish a more wealthy and inclusive society in the future by embracing innovation, cultivating a supportive ecosystem, and forming strong collaborations.

5. Recommendations for Policy-Makers

- Invest in human capital by encouraging young people to take measured risks and be inventive, and by giving STEM education high emphasis at all educational levels. Offer targeted training to equip aspiring technopreneurs with the skills necessary to navigate the difficult startup landscape.
- Create technical incubators, accelerators, and mentorship networks to provide prospective technopreneurs the guidance, resources, and connections they need to thrive. Streamline administrative processes and increase financial accessibility, particularly for new businesses.
- Promote cooperation amongst investors, governmental organisations, corporations, and academic institutions to create a synergistic environment that fosters innovation and commercialization. Promote knowledge and idea sharing among technopreneurs inside the ecosystem.
- Encourage the development of technology driven solutions to Pakistan's pressing social and environmental issues, including as healthcare, education, and climate change. Promote inclusive innovation that promotes sustainable development and gives marginalised people more clout.
- Adopt adaptable and innovative legislation that, in keeping with the rapid advancement of technology, safeguards the interests of consumers and promotes moral conduct.
- By actively pursuing these strategies, Pakistan may take advantage of technopreneurship's transformative potential to drive economic growth, provide high-value jobs, and propel the nation towards a future of riches and innovation. Remember that nurturing the technopreneur within each and every aspirant is the first step towards becoming a technologically adept Pakistan.

5.1. Future Research Directions

Subsequent research endeavours should concentrate on augmenting Pakistan's technopreneurship milieu, surpassing merely verifying the monetary advantages of specific undertakings. You may enhance best practices by researching similar nations to your own, and you can gauge the impact on poverty, health, and education by using social development indicators. Investigating ecologically acceptable solutions for sustainable growth is supported by environmental consciousness, and inclusion necessitates an understanding of the challenges encountered by female and rural enterprises. By investigating these numerous areas like tourism play a vital role in economic growth (Awan, Arslan, & Hussain, 2023; Awan, Bibi, Bano, & Shoukat, 2023; Awan, Rahman, Ali, & Zafar, 2023) . So, tourism can be added with entrepreneur start-ups and research can be done on tourism and technopreneurship for the services of tourism. Academics can provide crucial viewpoints to improve Pakistan's course towards a prosperous and creative future driven by technopreneurship. Furthermore, mixed-method studies combining quantitative and qualitative techniques may be a part of the research.

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