THE ROLE OF INNOVATION AND TECHNOLOGY TRANSFER IN ENTREPRENEURIAL GROWTH: A STUDY OF ENTREPRENEURSHIP EDUCATION ECOSYSTEM

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by

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Dedication

This work is dedicated to my family, whose steadfast support, patience, and encouragement have been the cornerstone of my academic journey. Your unwavering support and faith in my goals have been my most significant source of motivation, and I am eternally thankful.
I extend my deepest appreciation to my mentor and guide, **Prof. Harish Chaudhry**, whose insightful guidance, unwavering support, and constant encouragement have been pivotal in shaping this work. Your belief in my research has been truly inspiring, and I am profoundly thankful for your invaluable mentorship.
This journey would not have been possible without your support, and I wholeheartedly dedicate this work to all of you.

Certificate

This is to certify that the thesis entitled **"The Role of Innovation and Technology Transfer in Entrepreneurial Growth: A study of Entrepreneurship Education Ecosystem"** being submitted by **Neeraj Sengar** to the **Indian Institute of Technology Delhi** for the award of the degree of **Doctor of Philosophy** is a bonafide record of the research work carried out by him under my supervision and guidance. The thesis work, in my opinion, has reached the requisite standard, fulfilling the requirements of the said degree. The results contained in the thesis have not been submitted, in part or full, to any other University or Institute for the award of any degree or diploma.

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Abstract

The significance of entrepreneurship in stimulating economic growth cannot be overstated, and the influence of Innovation and Technology Transfer (ITT) within an Entrepreneurship Education Ecosystem (EEE) is essential for nurturing entrepreneurial achievement. This study investigates how innovation and technology transfer contribute to entrepreneurial growth through a structured Input-Process-Output (IPO) model of EEE. The research integrates theoretical foundations and empirical insights to examine the interconnections between various enablers, mechanisms, and outcomes that shape the entrepreneurial landscape.

The Input phase of the model identifies key factors, including Entrepreneurial Enablers, Funding & Support Mechanisms, Innovation Nurturers, and Collaborative Synergy among Academia-Industry-Government, which provide a foundation for the entrepreneurial education ecosystem. The Process phase focuses on Product Design & Development, Entrepreneurial Education & Training, and Technology Commercialization, emphasizing how structured interventions translate innovative ideas into viable ventures. Finally, the Output phase evaluates the creation of successful new ventures, startup sustainability, job generation, and economic impact as key measures of entrepreneurial growth.

This investigation utilises Total Interpretive Structural Modelling (TISM) and MICMAC Analysis to delineate the hierarchical framework of interconnected factors and their impact within the EEE. Furthermore, Partial Least Squares Structural Equation Modelling (PLS-SEM) serves to validate the IPO model through the analysis of causal relationships among the identified constructs. Findings indicate that the cooperative interaction among educational institutions, businesses, and governmental bodies is essential in enhancing the mechanisms of technology transfer and commercialization, ultimately promoting entrepreneurial achievement.

Furthermore, previous studies have emphasised the significance of organised entrepreneurial education and innovation centres in improving entrepreneurial skills. Improvement in the existing knowledge can also be expected from the outcome of present study of knowledge by empirically validating the EEE framework and shedding light on the significance of ITT in promoting entrepreneurial growth.

The findings hold considerable importance for decision-makers, educators, and industry participants in crafting a strong Entrepreneurship Education Ecosystem that successfully supports technology-driven startups. By integrating innovation, technology transfer, and structured educational interventions, this research underscores the importance of EEE as a catalyst for sustainable entrepreneurial development.

Keywords: Entrepreneurship Education Ecosystem, Innovation, Technology Transfer, IPO Model, TISM, PLS-SEM, Entrepreneurial Growth

सारांश

आर्थिक विकास को प्रोत्साहित करने में उद्यमिता के महत्व को कम करके नहीं आंका जा सकता है, और उद्यमशीलता शिक्षा पारिस्थितिकी तंत्र (ईईई) के भीतर नवाचार और प्रौद्योगिकी हस्तांतरण (आईटीटी) का प्रभाव उद्यमशीलता की उपलब्धि को बढ़ावा देने के लिए आवश्यक है।यह अध्ययन जांच करता है कि ईईई के संरचित इनपुट-प्रोसेस-आउटपुट (आईपीओ) मॉडल के माध्यम से नवाचार और प्रौद्योगिकी हस्तांतरण उद्यमशीलता विकास में कैसे योगदान करते हैं। यह शोध उद्यमशीलता परिदृश्य को आकार देने वाले विभिन्न समर्थकों, तंत्रों और परिणामों के बीच अंतर्संबंधों की जांच करने के लिए सैद्धांतिक नींव और अनुभवजन्य अंतर्दृष्टि को एकीकृत करता है।

मॉडल का इनपुट चरण प्रमुख कारकों की पहचान करता है, जिसमें उद्यमी सक्षमकर्ता, फंडिंग और समर्थन तंत्र, नवाचार पोषक, और शिक्षा-उद्योग-सरकार के बीच सहयोगात्मक तालमेल शामिल हैं, जो उद्यमशीलता शिक्षा पारिस्थितिकी तंत्र के लिए एक आधार प्रदान करते हैं। प्रक्रिया चरण उत्पाद डिजाइन और विकास, उद्यमशीलता शिक्षा और प्रशिक्षण और प्रौद्योगिकी व्यावसायीकरण पर केंद्रित है, जिसमें इस बात पर जोर दिया गया है कि कैसे संरचित हस्तक्षेप नवीन विचारों को व्यवहार्य उद्यमों में परिवर्तित करते हैं। अंत में, आउटपुट चरण उद्यमशीलता विकास के प्रमुख उपायों के रूप में सफल नए उद्यमों के निर्माण, स्टार्टअप स्थिरता, नौकरी सृजन और आर्थिक प्रभाव का मूल्यांकन करता है।

यह जांच ईईई के भीतर परस्पर जुड़े कारकों के पदानुक्रमित ढांचे और उनके प्रभाव को चित्रित करने के लिए टोटल इंटरप्रिटिव स्ट्रक्चरल मॉडलिंग (टीआईएसएम) और एमआईसीएमएसी विश्लेषण का उपयोग करती है।

इसके अलावा, आंशिक न्यूनतम वर्ग संरचनात्मक समीकरण मॉडलिंग (पीएलएस-एसईएम) पहचाने गए निर्माणों के बीच कारण संबंधों के विश्लेषण के माध्यम से आईपीओ मॉडल को मान्य करने का कार्य करता है। निष्कर्षों से संकेत मिलता है कि शैक्षिक संस्थानों, व्यवसायों और सरकारी निकायों के बीच सहयोगात्मक बातचीत प्रौद्योगिकी हस्तांतरण और व्यावसायीकरण के तंत्र को बढ़ाने, अंततः उद्यमशीलता की उपलब्धि को बढ़ावा देने के लिए आवश्यक है। इसके अलावा, पिछले अध्ययनों ने उद्यमशीलता कौशल में सुधार के लिए संगठित उद्यमशीलता शिक्षा और नवाचार केंद्रों के महत्व पर जोर दिया है। यह अध्ययन ईईई ढांचे को अनुभवजन्य रूप से मान्य करके और उद्यमशीलता विकास को बढ़ावा देने में आईटीटी के महत्व पर प्रकाश डालकर ज्ञान के वर्तमान भंडार को बढ़ाता है।

निष्कर्ष एक मजबूत उद्यमिता शिक्षा पारिस्थितिकी तंत्र तैयार करने में निर्णय निर्माताओं, शिक्षकों और उद्योग प्रतिभागियों के लिए काफी महत्व रखते हैं जो प्रौद्योगिकी-संचालित स्टार्टअप का सफलतापूर्वक समर्थन करते हैं।

नवाचार, प्रौद्योगिकी हस्तांतरण और संरचित शैक्षिक हस्तक्षेपों को एकीकृत करके, यह शोध टिकाऊ उद्यमशीलता विकास के उत्प्रेरक के रूप में ईईई के महत्व को रेखांकित करता है।

कीवर्ड: उद्यमिता शिक्षा पारिस्थितिकी तंत्र, नवाचार, प्रौद्योगिकी हस्तांतरण, आईपीओ मॉडल, टीआईएसएम, पीएलएस-एसईएम, उद्यमशीलता विकास

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Acronym Index

EEE – Entrepreneurship Education Ecosystem

TIHs – Technology Incubation Hubs

TBIs – Technology Business Incubators

IPO – Input-Process-Output

EFA- Exploratory factor analysis

CFA- Confirmatory factor analysis

TISM- Total Interpretive Structural Modeling (TISM)

SEM- Structural equation modeling

PLS-SEM- Partial least squares structural equation modeling