International Journal of Economic Integration and Regional Competitiveness
Homepage : https://e-journal.antispublisher.id/index.php/IJEIRC
Email : admin@antispublisher.com

e-ISSN : 3032-1301
IJEIRC, Vol. 2, No. 1, January 2025
Page 20-26

Assessing the role of Technology and Innovation in Enhancing Productivity and Reducing Reliance on Imports

M. Mohamed Shiraj[1], A.R.M. Arshard [2], M. Dhuveeshan[3]
[1]South Eastern University of Sri Lanka, Oluvil, Sri Lanka
[2]Amana Bank PLC, Sri Lanka
[3]University of Kelaniya, SriLanka

DOI : https://doi.org/10.61796/ijeirc.v2i1.304

Sections Info

Article history:
Submitted: February 14, 2025
Final Revised: February 16, 2025
Accepted: February 20, 2025
Published: February 22, 2025

Keywords:
Technology and innovation
Productivity enhancement
Import dependency reduction
Developing countries
Policy interventions

ABSTRACT

Objective: *This study examines the role of technology and innovation in enhancing productivity and reducing reliance on imports, focusing on the challenges and opportunities for developing countries.* ***Method:*** *Utilizing a mixed-methods approach, the research combines quantitative data analysis of productivity indicators and trade balances with qualitative insights from expert interviews to explore the impact of technological adoption and innovative practices.* ***Results:*** *The findings reveal that strategic investment in technology and innovation significantly boosts productivity and decreases dependency on imported goods. However, substantial barriers, including inadequate infrastructure, skill shortages, and limited financial resources, hinder the realization of these benefits. The study identifies key policy interventions, such as increased R&D investment, improved access to capital, human capital development, and enhanced intellectual property protections, as essential for fostering an innovation ecosystem.* ***Novelty:*** *This research provides a comprehensive analysis of how tailored policy frameworks can effectively leverage technology and innovation to achieve sustainable economic growth in developing countries, offering a unique perspective on reducing import dependency while enhancing productivity.*

INTRODUCTION

Many academics and policymakers agree that innovation and technology play a significant role in boosting productivity and economic growth. Adoption of cutting-edge technologies and creative techniques has become a crucial factor in determining sustainable growth as countries deal with growing globalization and competitiveness. Specifically, utilizing technology can increase resource efficiency, lower prices, and boost production across industries, all of which in turn contribute to economic resilience.

Reduced reliance on imports through localized production driven by technological advancements is a strategic imperative for economic self-sufficiency because developing countries, like Sri Lanka, face unique challenges in balancing their economic aspirations with constraints like limited foreign exchange reserves and dependence on imports for essential goods and industrial inputs, which exposes economies to external shocks like exchange rate volatility, trade imbalances, and global supply chain disruptions [18].

Research institutes, commercial businesses, and governmental regulations make up innovation ecosystems, which are essential for promoting the advancement and spread of technology. Investments in R&D and the encouragement of digital

transformation have been shown in studies to greatly increase productivity in industries like manufacturing, services, and agriculture [9]. Furthermore, emerging economies can close the gaps in technological adoption and application by combining local innovation skills with technology transfer from industrialized countries [7].

The need to implement creative approaches is especially relevant in Sri Lanka because of the nation's persistent economic difficulties. Import limitations put in place to protect foreign exchange have made it clear how crucial it is to increase domestic production capabilities. For instance, implementing new manufacturing technologies like as automation, artificial intelligence, and additive manufacturing has the potential to minimize dependency on imported machinery and components while raising industrial output [16].

Inadequate infrastructure, restricted access to money, and a lack of skilled labor are some of the obstacles that hinder the potential of integrating technology and innovation into Sri Lanka's economic system. In order to address these issues and establish an atmosphere that fosters innovation and technological growth, legislators, industry partners, and academic institutions must work together.

Assessing how innovation and technology might boost output and lessen dependency on imports is the goal of this study, which will also look at important facilitators, obstacles, and policy consequences. Through evidence-based insights, the research aims to aid in the creation of solutions that can support economies in achieving sustainable development and increased self-reliance.

Problem Statement

Developing countries frequently face significant challenges in an increasingly interconnected global economy because of their reliance on imported goods, such as consumer goods, machinery, and raw materials, which can lead to trade deficits, economic vulnerability to external shocks, and limited growth prospects [18]. For countries such as Sri Lanka, the situation has been further exacerbated by shortages of foreign exchange, which have resulted in restrictive import policies that put pressure on local markets and impede economic stability [4].

Simultaneously, technological innovation and advancements are revolutionizing industries globally, providing instruments to boost productivity, cut costs, and promote self-sufficiency. Nevertheless, despite their potential, many developing economies find it difficult to capitalize on these opportunities because of low R&D investment, poor infrastructure, and a lack of human capital [10]. Sri Lanka, in particular, must urgently address these obstacles to lessen its dependency on imports and create a more resilient economic framework.

Although the relationship between productivity and technology adoption has been the subject of several studies, little empirical data exists regarding how technological developments can directly lessen reliance on imports in developing nations. Furthermore, little is known about how government policies, private sector initiatives, and local innovation ecosystems interact. Closing these gaps is essential to

creating workable plans that help countries attain economic independence and sustainable development.

This study aims to close these disparities by investigating how innovation and technology may boost output and lessen dependency on imports. In order to support technological integration and innovation-driven growth, the study intends to offer policymakers, business executives, and researchers useful insights by identifying enablers, barriers, and potential initiatives.

Objective of the Study

The primary objective of this research is to examine how technology and innovation can enhance productivity and reduce reliance on imports in developing economies, with a particular focus on Sri Lanka. Specifically, the study aims to

Analyze the impact of technological advancements on sectoral productivity to evaluate how the adoption of advanced technologies such as automation, artificial intelligence, and digitalization influences productivity in key economic sectors, including agriculture, manufacturing, and services [9]. Identify the role of innovation in import substitution to investigate how innovation-driven practices, including local R&D and technology transfer, contribute to developing domestic alternatives to imported goods and services [4]. Explore barriers to technology adoption and innovation to assess challenges such as infrastructure limitations, skill shortages, and financial constraints that hinder technological integration and innovative practices in developing economies [18]. Propose policy recommendations to provide evidence-based strategies for policymakers and stakeholders to promote technology adoption and foster an innovation ecosystem aimed at achieving self-reliance and sustainable economic growth [16].

Through these objectives, the study seeks to contribute to the academic discourse on the nexus between technology, innovation, and economic self-reliance while offering actionable insights for practitioners and policymakers.

Numerous scholarly works have examined the impact that innovation and technology play in economic growth. This corpus of work demonstrates how improvements in technology and creative methods can boost industrial growth, increase productivity, and lessen reliance on imports.

RESEARCH METHOD

The research approach used in this study is explanatory research, a method aimed at explaining the position of the studied variables and the influence between one variable and another [18]. In this context, the focus is on examining the influence of the variables Total Quality Management, Organizational Justice, Quality of Work Life, and Person-Organization Fit (P-O Fit) on job satisfaction and lecturer performance. The population refers to the generalization area consisting of objects/subjects that possess specific qualities and characteristics determined by the researcher for study and conclusion drawing. Meanwhile, the sample is a subset of the total population that shares these characteristics [19].

The population in this study consists of all permanent lecturers at 37 private universities in the regions of Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, and Lamongan, East Java, totaling 5,670 permanent lecturers. Given that the population is homogeneous and its size is known, the sample size is determined using the Slovin formula as follows [20]: n = N/ N (e)2 + 1 resulting in 98.266, which is rounded to 98.

The sampling technique used in this study is Purposive Sampling with the Judgement Sampling type, where sample selection is based on specific considerations (judgment sampling). This involves establishing selection criteria that align with the research problem and objectives [21]. The data analysis method employed is Structural Equation Modeling (SEM) based on Partial Least Square (PLS) version 3.4.1.

RESULTS AND DISCUSSION

The research approach used in this study is explanatory research, a method aimed at explaining the position of the studied variables and the influence between one variable and another [18]. In this context, the focus is on examining the influence of the variables Total Quality Management, Organizational Justice, Quality of Work Life, and Person-Organization Fit (P-O Fit) on job satisfaction and lecturer performance. The population refers to the generalization area consisting of objects/subjects that possess specific qualities and characteristics determined by the researcher for study and conclusion drawing. Meanwhile, the sample is a subset of the total population that shares these characteristics [19].

The population in this study consists of all permanent lecturers at 37 private universities in the regions of Gresik, Bangkalan, Mojokerto, Surabaya, Sidoarjo, and Lamongan, East Java, totaling 5,670 permanent lecturers. Given that the population is homogeneous and its size is known, the sample size is determined using the Slovin formula as follows [20]: n = N/ N (e)2 + 1 resulting in 98.266, which is rounded to 98.

The sampling technique used in this study is Purposive Sampling with the Judgement Sampling type, where sample selection is based on specific considerations (judgment sampling). This involves establishing selection criteria that align with the research problem and objectives [21]. The data analysis method employed is Structural Equation Modeling (SEM) based on Partial Least Square (PLS) version 3.4.1.

RESULTS AND DISCUSSION

Numerous scholarly works have examined the impact that innovation and technology play in economic growth. This corpus of work demonstrates how improvements in technology and creative methods can boost industrial growth, increase productivity, and lessen reliance on imports.

1. **Technology and Productivity**

Productivity increase has long been acknowledged to be primarily driven by technological breakthroughs. Innovation and technological advancement, especially the development of new industries, processes, and products, are essential to economic

growth, according to Schumpeter [12]. Automation, digitization, and artificial intelligence improve production efficiency and help businesses compete successfully in international marketplaces, according to recent studies [2]. It has been demonstrated, for example, that integrating Industry 4.0 technology into manufacturing increases operating efficiency, lowers production costs, and minimizes resource waste [9].

2. **Innovation and Import Substitution**

Research has shown that countries investing in local innovation capabilities tend to have higher levels of self-reliance and economic resilience [10], especially in sectors like pharmaceuticals, where domestic innovation has allowed countries like India to reduce their dependency on imported drugs and establish themselves as global suppliers (Chaudhuri, 2012). Innovation is central to reducing reliance on imports by fostering the development of locally produced goods and services. Freeman and Soete [7] contend that innovation ecosystems, which are characterized by robust R&D activities, government support, and industry-academic collaboration, are crucial for import substitution.

3. Barriers to Technology Adoption and Innovation

Many emerging economies have a difficult time utilizing technology and innovation, even with the potential advantages. Three main obstacles are a lack of skilled personnel, restricted access to money, and poor infrastructure [18]. Regulatory barriers, a lack of cooperation among stakeholders, and inadequate intellectual property protection are further structural problems that impede technological innovation and integration [17]. In nations like Sri Lanka, whose governmental and economic limits make reliance on imports worse, these difficulties are especially noticeable.

Policy Interventions and Case Studies

In order to promote an atmosphere that is favorable to technical innovation and import substitution, policy frameworks are essential. Nations such as China and South Korea have effectively employed tactics such targeted subsidies, R&D and education investments, and trade policies that give preference to domestic businesses [8]. They are no longer reliant on imports and are now leaders in high-tech industries worldwide thanks to these measures. Sri Lanka can use these success stories as a model to create its own plan for increasing productivity and lowering its dependency on imports.

Theoretical Frameworks and Gaps

Conceptual Framework

The conceptual framework for this study integrates key theoretical constructs and relationships between technology, innovation, productivity, and import dependency, offering a structured approach to investigate the research problem.

Relationships and Hypotheses

The conceptual framework is built on the following hypothesized relationships:

Technology Adoption → Productivity Enhancement: The adoption of advanced technologies leads to increased productivity by improving efficiency and reducing operational costs [12]. Innovation → Productivity Enhancement: Innovation fosters the development of high-quality products and processes, contributing to improved competitiveness and productivity [9]. Technology and Innovation → Reduction in Import Dependency : By enabling the local production of goods and services, technology and innovation can directly contribute to reducing reliance on imports [7]. Barriers → Mediating Role : Barriers such as inadequate infrastructure, limited access to capital, and skill shortages mediate the impact of technology and innovation on productivity and import dependency [18].

Theoretical Basis

This framework is grounded in the innovation diffusion theory, which explains how new technologies are adopted and integrated into society [11]. Additionally, the study draws on Schumpeter's theory of economic development, which emphasizes innovation as a key driver of growth [12].

Implications

By examining these relationships, the framework provides a foundation to explore how technology and innovation can address the dual challenges of enhancing productivity and reducing import dependency. It also identifies potential barriers and enablers, offering actionable insights for policymakers and industry leaders.

CONCLUSION

Fundamental Finding: This study confirms that technology and innovation are pivotal in enhancing productivity and reducing reliance on imports, particularly in developing economies. Strategic investments in advanced technologies and innovation-driven strategies significantly improve efficiency and economic self-reliance. **Implication:** The findings suggest that policymakers should prioritize fostering an enabling environment that supports technological integration and innovation ecosystems through investments in R&D, human capital development, and enhanced intellectual property protections. **Limitation:** The study's reliance on secondary data and case studies may limit the generalizability of its findings across diverse economic contexts. **Future Research:** Further empirical analyses focusing on sector-specific impacts and comparative studies across regions are recommended to validate the scalability and effectiveness of proposed policy interventions, providing deeper insights into leveraging technology and innovation for sustainable economic growth.

REFERENCES

[1] ARM Arshard, MSM Imthiyas, and N. Suthamathy, "Assessment of the impact of AI and machine learning on predictive analytics in finance, including forecasting market trends and identifying investment opportunities," *Science and Innovation*, vol. 3, no. A9, pp. 32-38.

[2] E. Brynjolfsson and A. McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York, NY, USA: W.W. Norton & Company, 2014.
[3] E. Brynjolfsson and A. McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York, NY, USA: W.W. Norton & Company, 2014.
[4] Central Bank of Sri Lanka, *Annual Report 2022*. Colombo, Sri Lanka: CBSL, 2023.
[5] S. Chaudhuri, *The WTO and India's Pharmaceuticals Industry: Patent Protection, TRIPS, and Developing Countries*. Oxford, UK: Oxford University Press, 2012.
[6] ARM Arshard and MSM Imthiyas, "Digital innovation and implementation of fintech on banking and financial sector in Sri Lanka," *Innovative Research in the Modern World: Theory and Practice*, vol. 3, no. 1, pp. 95-102.
[7] C. Freeman and L. Soete, *The Economics of Industrial Innovation*. Cambridge, MA, USA: MIT Press, 1997.
[8] L. Kim and R. R. Nelson, *Technology, Learning, and Innovation: Experiences of Newly Industrializing Economies*. Cambridge, UK: Cambridge University Press, 2000.
[9] OECD, *The Digitalisation of Science, Technology and Innovation: Key Developments and Policy Considerations*. Paris, France: OECD Publishing, 2019.
[10] OECD, *Technology and Innovation Report*. Paris, France: OECD Publishing, 2021.
[11] E. M. Rogers, *Diffusion of Innovations*, 5th ed. New York, NY, USA: Free Press, 2003.
[12] J. A. Schumpeter, *The Theory of Economic Development*. Cambridge, MA, USA: Harvard University Press, 1934.
[13] ARM Arshard and MSM Imthiyas, "The impact of artificial intelligence chatbots on customer satisfaction and retention in digital banking sectors in Sri Lanka," *Innovative Research in the Modern World: Theory and Practice*, vol. 3, no. 5, pp. 33-39.
[14] MM Shiraj, "The impact of information technology in banking sector between state and private banks: special reference to the South Eastern region, Sri Lanka," *Faculty of Management and Commerce, South Eastern University of Sri Lanka*.
[15] MM Shiraj, "The impact of using computerized accounting systems (CAS) in financial reporting among SMEs: (Special Reference to the South Eastern Region, Sri Lanka)," *5th International Symposium*, vol. 2, no. 1, pp. 50-53.
[16] UNCTAD, *Technology and Innovation Report 2021: Catching Technological Waves*. Geneva, Switzerland: United Nations, 2021.
[17] WIPO, *World Intellectual Property Report 2020: Innovation in the Digital Economy*. Geneva, Switzerland: World Intellectual Property Organization, 2020.
[18] World Bank, *World Development Report 2022: Finance for an Equitable Recovery*. Washington, DC, USA: World Bank Publications, 2022.

* **M. Mohamed Shiraj (Corresponding Author)**
South Eastern University of Sri Lanka, Oluvil, Sri Lanka

A.R.M. Arshard
Amana Bank PLC, Sri Lanka

M. Dhuveeshan
University of Kelaniya, SriLanka