

Essays on the Economics of Artificial Intelligence and Innovation

Shah Syed Muhammad Ali

Abstract

This thesis explores the multifaceted impact of Artificial Intelligence (AI) on firm performance, productivity, and sustainable innovation within industrial ecosystems. Utilizing data from over 600,000 individuals across 3,251 Italian firms, we develop a firm-level AI investment indicator and connect it to firm performance. Our findings reveal that AI investments significantly enhance technological newness and firm performance, driven by internal AI knowledge, university AI graduates, and patent acquisitions. Additionally, we analyze the strategic impact of AI on firm productivity, focusing on customer centricity, international market expansion, and environmental sustainability. Data from 1,800 manufacturing firms indicate that AI investments improve production efficiency, particularly when combined with international market expansion strategies. However, customer-centric strategies show less productivity improvement, and no significant relationship is found between AI and environmental sustainability. Lastly, we investigate AI capabilities—comprising tangible, human, and intangible knowledge (Triple Helix)—and their role in driving sustainable innovation (Twin). Survey data from 6,732 companies highlight the positive impact of university-industry-government interactions on both brown and green innovation. Firms with greater AI capabilities are more likely to adopt AI technology, supporting theories of cumulative advantage and absorptive capacity. This thesis underscores the importance of AI in enhancing firm performance, productivity, and sustainable innovation, providing valuable insights for policymakers and business leaders.

Keywords: Artificial Intelligence (AI) Investment, Knowledge Spillovers, Industrial Ecosystem, Firm Strategies, Trip Helix Twin, Innovation.