

ABSTRACT

The industrial sector's energy consumption has risen from Rs. 1451.1 billion in 2005 to Rs. 3771.8 billion in 2020, indicating a 159% rise in energy consumption. With sustainability goals emphasizing conscious and efficient employment of energy, research into the driving factors of energy consumption still needs to be done. This research aims to dissect the mechanism behind manufacturing sector energy consumption and investigate the potency of decoupling between energy consumption and economic output. Log Mean Divisia Index decomposition is applied to decompose the energy consumption in manufacturing sectors into technological, affluence, and economic output factors; the results indicate that investment intensity induces energy consumption while productivity intensity suppresses energy consumption. In addition to decomposition, the investigation into the spatial heterogeneity using geo-detector results indicate that the output productivity effect predominantly explains the heterogeneity observed between 2005 and 2020; synergistic effects are also observed between determinant factors that amplify spatial heterogeneity. Applying the Tapio decoupling, it is found that before 2012, India exhibited varying degrees of decoupling between energy consumption and economic output. Still, this trend reverses post-2012 to varying degrees of negative decoupling. Further refined Laspeyre's index using the total decomposition method is used to investigate the decoupling causal chain. Findings show investment-output decoupling closely mirroring the temporal variation in energy consumption-output decoupling; the influence of different effects to a varying degree can be observed in driving the decoupling between energy and output. This research provides essential implications for crafting policies that focus on improving energy efficiency and reducing energy dependency primarily generated using fossil fuels.

Keywords: Decoupling growth; Scale effect; Productivity; Investment intensity

JEL Classification: L6. O14. O44. Q40