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Alla Grechan**, Olena Iastremska**, Iaroslav Petrunenko, Taras Mukha, Tetiana Melnyk. Sustainable competitiveness under conflict: Innovation patterns and environmental pressures in Ukraine.

Abstract

Ukrainian enterprises face significant challenges in leveraging innovation for competitiveness and sustainable development amidst post-war reconstruction and global market integration, with limited empirical evidence guiding effective strategies. This study investigates how innovative activity influences firm competitiveness and contributes to sustainable development within Ukraine's national economy from 2018 to 2024.

Utilizing a quantitative data analysis of 612 enterprises across key sectors (IT, manufacturing, agriculture), the research employed fixed-effects regression models on longitudinal data from Ukraine's State Statistics Service. Key metrics included R&D intensity, patent activity, process innovation adoption alongside competitiveness (export/revenue growth, market share) and sustainability indicators (job creation, energy efficiency, GHG emissions). Results demonstrate that a 1% increase in R&D intensity drives 2.71% higher export growth ($p<0.001$), while process innovation boosts revenue by 4.38% per implementation level ($p<0.01$) and reduces GHG emissions by 12.7% ($p<0.001$). A critical R&D intensity threshold of 3.5% triggers exponential competitiveness returns. Sectoral analysis reveals IT superior innovation resilience (78% wartime retention vs. 42% in manufacturing) and agriculture's reliance on non-R&D innovation for job creation. The findings necessitate tiered R&D tax incentives for enterprises exceeding the 3.5% intensity benchmark and establishment of sector-specific innovation hubs. Policymakers should prioritize sustainability-linked financing and wartime adaptation funds targeting regions with >15% infrastructure damage. This study provides the first quantitative evidence linking innovation types to dual competitiveness-sustainability outcomes in conflict-affected Ukraine, offering actionable pathways for economic recovery.

Keywords: Innovation, Firm competitiveness, Sustainable development, Ukrainian enterprises, Wartime Economy.