

Unlocking Rural Transformation through a WEFE-Based Digital Platform Linking Low Digital Readiness to High Market Potential

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Abstract

Rural communities face persistent challenges related to limited market access, weak value chain integration, and low levels of digital readiness. This study explores the potential of digitalization to drive rural transformation through the development of a bidirectional digital platform that connects rural producers and service providers directly with consumers, functioning as a continuously accessible virtual marketplace. The approach is aligned with the Water–Energy–Food–Ecosystems (WEFE) Nexus, aiming to enhance, resource accessibility and market participation. A Living Lab was established in selected municipalities in the northern and southern regions of North Macedonia. Data were collected from 37 rural production and service entities using the Rural Digital Readiness and Market Integration Assessment (RDRMIA) questionnaire. The instrument was developed through an iterative expert-driven refinement and validation process, reducing an initial pool of 100 items to 25 structured across four domains: digital literacy, market accessibility, production capacity and innovation readiness. Three composite indicators were derived: Digital Literacy and Innovation Index, Rural Challenges Identification Cluster, and Willingness and Transparency for Capacity Building. The results reveal a low digital readiness level (mean = 2.3/5), contrasted by a strong willingness to adopt digital tools, with over 80% of respondents ready to develop digital competencies for market participation. Modelling results indicate a significant positive relationship ($p < 0.05$) between willingness for capacity building and perceived market integration potential. No significant regional differences were observed. The findings confirm that digitalization can act as a catalyst for rural competitiveness, improved living standards, and more sustainable, shorter supply chains.

Keywords

Rural digitalization, Market integration, WEFE Nexus, Digital readiness.