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| Title | A Fermatean fuzzy approach to analyze the drivers of digital transformation in the agricultural production sector: A pathway to sustainability for emerging economies |
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| Abstract |
| The adoption of digital technologies in agriculture offers opportunities for efficiency and sustainability, particularly in emerging economies with resource and infrastructure constraints. However, challenges persist, exacerbated by crises such as COVID-19 and geopolitical instabilities, highlighting agricultural supply chains’ fragility. Industry 5.0-driven digital transformation (DT) can mitigate these challenges by enhancing food security, supply chain resilience, and environmental sustainability. This study identifies and analyzes key drivers of DT in agricultural production from a holistic perspective. Through a literature review and expert validation, 19 key drivers were identified in the context of Bangladesh. An integrated multi-criteria decision-making (MCDM) approach, combining the Fermatean fuzzy sets (FFS) with the decision-making trial and evaluation laboratory (DEMATEL) technique, was applied to examine the drivers and explore interrelations among them. The results indicate that the most influential drivers are ’commitment from regulatory bodies’, ’maximizing the use of dwindling resources’, ’fostering rural development’, and ’the need for safe food’, with prominence values of 4.175, 4.001, 3.999, and 3.888, respectively. Additionally, ’commitment from regulatory bodies’ emerges as the most impactful causal factor, having a causal weight of 1.848. These findings provide insights for policymakers and industry managers in emerging economies, supporting strategic decision-making to drive sustainable agricultural transformation and achieve the relevant sustainable development goals. |
| Sustainable Development Goal(s) (SDG) |
| Example: Goal 9: Industry, Innovation and Infrastructure |

Goal 2: Zero Hunger

Goal 8: Decent Work and Economic Growth

Goal 9: Industry, Innovation and Infrastructure

Goal 12: Responsible Consumption and Production

Goal 13: Climate Action

Goal 17: Partnerships for the Goals