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Editorial: Evaluating the adoption and impacts of agricultural technologies

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Editorial on the Research Topic

Evaluating the adoption and impacts of agricultural technologies

The development of innovations in agriculture can contribute to achieving many of the development and environmental goals included in government policy agendas. New agricultural technologies play a key role in enhancing output efficiency, thereby minimizing resource usage, addressing climate change, and fostering socio-economic development by alleviating poverty and hunger, creating the opportunity to allocate resources to other critical areas such as education and health. However, just as important as the development of innovations to achieve development and environmental goals is the adoption of these innovations by users and the environmental conditions. Therefore, understanding the role of users' perspectives on the advantages and drawbacks of agricultural innovations, considering factors like the innovation attributes, potential uses, and costs is vital to assess the success of innovations in assessing and achieving policy objectives. Likewise, environmental conditions including peers' views, government support and communication channels used, play a pivotal role in evaluating and enhancing the success of new technologies.

A total of 12 articles contributed to the Research Topic on *Evaluating the adoption and impacts of agricultural technologies*. The articles included in this topic identify intrinsic and extrinsic factors shaping agricultural innovation adoption, assessing their roles in adopters' decisions and success. Evaluations explore interlinkages to land, livelihoods, gender aspects, the environment and food security. Valuable insights for policy design emerge, recognizing that a need for tailored approaches, as emphasized by [Malabayabas and Mishra](#), [Mishra et al.](#), [Singbo et al.](#), and [Korir et al.](#). More specifically [Malabayabas and Mishra](#) found an inverse relationship between farm size and productivity (IR) in eastern India, moderated by joint farming decision-making. Their study revealed a negative association between joint farming decision-making and rice farm productivity, moderating the positive impact found of new rice variety adoption. Hence, policies supporting non-farm income and joint decision making could enhance productivity. [Mohammed and Abdulai](#) examine the impact of extending legume inoculant technology adoption on farmers' efficiency, productivity, and welfare in Ghana. The study reveals that technology adoption is linked to increased yield, revenue, efficiency, and farmers' welfare, emphasizing the importance of investing in research and development for yield-enhancing agricultural technologies in impoverished soil conditions. Additionally, robust extension services are crucial to fully exploit the potential of these new technologies. [Mishra et al.](#) also examined the relationship between land size

and productivity, but in Ethiopia. The study revealed variations based on data collection method (crop-cut yields or self-reported yields). A significant negative relationship was found between plot size, self-reported yield, and gross revenue, with a greater impact on gross revenue than yields. Conversely, in crop-cut yield, a positive and significant association was observed. The authors emphasize minimizing measurement errors, standardizing measurement units and tools, and addressing imperfections in land, labor, and credit markets. Gender issues associated with technology adoption were explored by [Singbo et al.](#) and [Arouna et al.](#) [Singbo et al.](#) studied the impact of land-enhancing technology, specifically bio-reclamation of degraded land (BDL), on women farmers in Niger. They found that adopting BDL is linked to increased income, dependent on spatial, economic, environmental, temporal and cultural contexts. Prioritizing BDL implementations in areas with significant degraded farmland and economically vulnerable farmers is recommended for formulating policies addressing food security and poverty alleviation in rural dryland areas. [Arouna et al.](#) investigated the impact of adopting an improved parboiling technology on the livelihood of women rice parboilers in Benin. Findings indicate that technology adoption positively influenced women parboilers' rice output rate, income, and food security, while reducing poverty. From a policy perspective, it is crucial to provide training for local fabricators and establish credit options. [Martinez et al.](#) studied farmers' dual decisions on adopting improved rice varieties and chemical fertilizers and the consequential impact on crop productivity in Bolivia. They found that partial adoption of rice varieties or fertilizers has no impact on yields, but combining these technologies nearly doubles rice productivity. Promoting integrated packages of agricultural technologies for small farmers in Bolivia, rather than individual technologies, would leverage their complementarity, enhancing rice yields and aiming for self-sufficiency while aligning with regional trends of becoming net exporters in global food system.

Spatial and temporal dynamics in adoption decisions were explored by several authors. [Wang et al.](#) study the role of farmers' adoption of hybrid rice varieties in addressing food security in China. The authors found a positive but decreasing effect of the adoption of such varieties on rice production with possible spillover and crowding effects of adoption across provinces, highlighting the importance of appropriate designing of agricultural extension strategies. [Korir et al.](#) found that farm location and herd size influence adoption decisions when studying 19 technologies in dairy production systems in Ethiopia. Trust in information from government agencies and sharing knowledge between farmers were found to be key to adopt multiple technologies. The authors recommended tailoring innovation strategies to specific farming community situations. Interestingly, female workers were found to be more likely to adopt multiple technologies. [Joshi et al.](#) investigated the dynamics of agricultural technology adoption, rice varietal changes, and shifts in natural resource management and land use in Nepal over 16 years using GPS-determined transects. The strategic utilization of GPS-based methods established a durable database, recording long-term shifts in technology and resource adoption patterns. The study found dominance in old-improved varieties, slow adoption of new rice varieties, and

suggested the transformation of agricultural land into real estate could impact food and nutrition security in Nepal.

[Tennhardt et al.](#) assessed the importance of value chain factors vs. farmer and farm factors in influencing cocoa farmers' adoption of sustainable practices in Ecuador and Uganda. They explored how value chain factors impact implementation and found their significant role alongside farmer and farm factors. Capacity building and stable relationships were linked to specific practices. However, their potential was found not to be fully exploited, indicating a need for improved knowledge dissemination, addressing inhibitors, and aligning sustainability goals within chocolate company value chain initiatives.

Finally the specific impact of seed costs on adoption was also explored by authors like [Yan et al.](#) who studied hybrid rice adoption in southern China. While hybrid rice adoption had a positive effect on yields, it led to a decrease in income due to the cost of the new variety. [Agossou et al.](#) found that farmers' decisions on improved kersting's groundnut varieties in Benin and Togo were influenced by market availability, with farmers' willingness to pay ~15% less than the fixed price set by seed companies.

The collection of articles in this Research Topic makes a significant contribution to the literature on technology adoption in agriculture. This Research Topic emphasizes the importance of understanding the intricate relationship between innovation adoption and achieving broader development and environmental goals. The studies examine the adoption and impact of agricultural technologies, identifying factors that shape adoption decisions and exploring their roles in success. The insights gained are crucial for policy design, recognizing the need for tailored approaches. Spatial and temporal dynamics, as well as gender considerations, are explored, providing a comprehensive understanding of adoption patterns. The investigation of value chain factors in cocoa farming and the exploration of seed costs' impact on adoption provides additional depth to this Research Topic. Overall, this compilation serves as a valuable resource for policymakers and practitioners seeking effective strategies for technology adoption in agriculture.

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