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# TECHNOLOGY DISSEMINATION IN BANGLADESH'S CROP PRODUCTION: A COMPREHENSIVE REVIEW OF SYSTEMS, ADOPTION, AND IMPACT

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**ABSTRACT**

Technology dissemination is crucial for densely populated Bangladesh, with its vulnerable climate, to achieve food security and safeguard livelihoods. This review integrates information on dissemination systems, adoption trends, and their effects on crop production in Bangladesh. The review is based on secondary qualitative data. It illustrates the evolving and fragmented landscape of dissemination and adoption, encompassing public extension (DAE), research institutes (BRRI, BARI), private agribusinesses, NGOs, and digital and farmer networks. There are critical and systematic gaps, such as gender inequality, where 60 percent of women farmers do not have formal extension services. There is significant regional variation in adoption, such as 70% HYV adoption in the northwest compared to <30% in coastal regions. In addition to geography, technology type (75% HYV rice adoption vs <15% for mechanized seeders), peer influence, subsidies, profitability, risk aversion, land fragmentation, digital access, and fragmentation all play key roles. Dissemination has significantly improved productivity, with rice yields tripled since the 1970s, as well as enhanced climate resilience, with over 1.2 million hectares planted with saline-tolerant rice. However, some trade-offs result in agrochemical overuse, harming water and soil, which is often caused by mechanization. This also displaces labor, excluding smallholders and women. Scalable impact is limited by systemic and fragmented extension, inconsistent policies, and infrastructure gaps. To achieve a balance between productivity, sustainability, and resilience, we recommend digitizing extension services, cultivating inclusive public-private partnerships, prioritizing climate-smart technologies tailored to specific contexts, and integrating equity into dissemination frameworks. To integrate equity into dissemination frameworks, it is essential to ensure that extension services are accessible to marginalized groups, including

women and smallholder farmers, by providing targeted training and resources tailored to their needs. Developing gender-sensitive policies and programs can help address the specific needs and challenges faced by women farmers. Additionally, fostering community-led initiatives and participatory approaches can empower local stakeholders and ensure that the diverse voices of all farmers are represented and heard in decision-making processes.