

# **Impact of Hermetic Storage Technology Adoption on Smallholder Maize Farmers' Income in Gatsibo District, Rwanda**

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## **ABSTRACT**

The growing food demand occasioned by the rising global population is emerging a major issue of global concern. This implies that food production needs to increase in order to meet global food demand. Studies show that more than one-third of the global food production is lost through postharvest operations along food supply chain. Therefore, reducing food losses using appropriate storage technologies is important due to curb food losses to ensure food and nutrition security. In Rwanda, most of the maize losses occur at storage level. Hermetic Storage Technologies (HST) have been proved to be effective in the control of post-harvest storage losses in maize. However, the adoption of HST has been low and farmers keep using non-advanced storage technologies. Empirical evidence on the effect of adopting HST on storage loss reduction vis-à-vis other storage technologies is virtually non-existent. Yet such information is needed by Rwandan policy makers in designing policies and programs aimed at maize loss reduction to enhance food security. This study characterized different storage technologies used by farmers in terms of level of adoption, benefits and constraints using descriptive statistics. It also investigated the factors affecting smallholder maize farmers' decision about using alternative storage technologies using multivariate probit. Finally, the study assessed the impact of HST on maize storage income among smallholder maize farmers using an endogenous switching regression (ESR) on a sample of 301 smallholder maize farmers from Gatsibo District of Rwanda who had been selected using a multi-stage sampling technique.

The results revealed that the common maize storage technologies used among smallholder farmers were polypropylene bags, chemicals, hermetic bag and silos. Only 40.5% were HST adopters. Membership to farmer group, access to credit, quantity of maize produced, access to training and selling maize immediately after harvest were the major factors influencing farmer's

choice of alternative storage technologies. The results from ESR show that household size, training, access to credit, distance to input provider and household head experience in maize production influenced smallholder farmer decision to adopt HST. The occupation of household head, other crops, plot number, training, household size, age of household head and household maize self-sufficiency goal affect significantly influenced income from stored maize for both HST adopters and non-adopters. Overall, by considering both HST adopters and non-adopters, adoption of HST had a positive and significant impact on stored maize income among those who adopted.

The study recommends that the government of Rwanda should support the dissemination of HST to increase access. In addition, the government should support training of smallholder maize farmer on postharvest loss reduction through HST and facilitate smallholder farmer access to credit.

**Keyword:** Hermetic Storage Technology, Post-harvest storage losses, advanced storage technologies, Smallholder maize farmers, adoption and income