

Metal silo, beyond minimising food losses – Ethiopian experience

Ethiopia loses between 10 and 22 per cent of grains during storage because a large share of the country's farmers still use traditional structures. A study by the United Nations Food and Agriculture Organization based on a project implemented in different regions of Ethiopia shows that much awareness raising as well as other measures, such as policy development, are needed to change this. Our author summarises the most important findings on the impact of post-harvest loss management on social, economic and environmental aspects, and develops recommendations for the future.

By Aresawum Mengesha

Ethiopia's agricultural production is unable to meet the country's total food needs. The reasons for this include food losses, limited access to, and availability of, suitable storage units and inefficient institutional and legal frameworks. Therefore, the project "Reducing Food Losses through Improved Post Harvest Management in Ethiopia"

was implemented between 2013 and 2023 by the UN Food and Agriculture Organization (FAO) in collaboration with Swiss Development Cooperation and the Federal Government of Ethiopia via the Ministry of Agriculture. The project was carried out in the following five regions: Amhara, Oromia, Southern Nations, Nationalities and Peoples' Region (SNNPR), Sidama and Central Ethiopia (according to the new rearrangement of the regional states). Its overall goal was to contribute to improved food security of smallholder farmers in Ethiopia through reducing post-harvest losses (PHLs).

The findings of the study show that there is a shift in the attitudes of the government and policy-makers. Continuous awareness on the issues regarding post-harvest losses made by FAO and the Ministry of Agriculture has led to the development of a grain post-harvest management strategy. While

this policy is yet to be operationalised in totality, it is certainly a step in the right direction.

Farmers have also become aware of the PHLs and are taking steps to mitigate them. Albeit very slow, there is a shift from the traditional structures such as *Gotera* (above-ground bins), underground pits and roof or ceiling storage towards hermetic storage technologies such as hermetic bags and metal silos. Prior to the post-harvest loss management (PHLM) project, 4 per cent of farmers had stored their produce in metal silos and 8 per cent in hermetic bags, while 94 per cent had used traditional structures. After the implementation of the project, farmers storing their produce in metal silos were estimated to account for 44 per cent of all farmers, while 34 per cent were storing it in hermetic bags and 79 per cent in traditional structures. Since farmers keep their produce in several types of store, the percentages here do not add up to 100.

Why are many farmers still preferring traditional storage structures?

Despite all successes, the amount of grain which is stored in traditional structures is still high. Why do so many farmers continue to prefer these structures? Several reasons are at the forefront here, as shown in the study. For example, farmers indicated that traditional structures are cheap to construct. Metal silos, for example, are more expensive and difficult to transport, especially for farmers in remote rural areas, so that this can inhibit their purchase and use. And in their opinion, traditional structures maintain cultural values as well as minimising theft and misuse of grains stored for use during the emergencies. For instance, farmers in SNNPR pointed to conflict as one of the influencing factors for continued use of underground pits. Enemies who would oth-

erwise burn all the stored food do not easily locate these pits. Moreover, underground pits do not offer easy access to the stored food as it is strenuous to get the food out, and this prohibits unnecessary sales, unlike metal silos and hermetic bags.

Several factors drive the adoption of PHLM practices. These include the level of income and the farmers' age. Participation in trainings, demonstrations and exchange visits also have a positive impact on the adoption of new technologies. Moreover, households headed by males were more likely to adopt hermetic bags and metal silos, perhaps thanks to better access to resources and ease of decision-making. Access to auxiliary services, including extension services, media and credit, was found to lead to changes in behaviour. PHLM sustainability will hinge on the training and capacity building that has taken place so far.

The assessment indicated that farmers can save up to 22 per cent of the grain which would otherwise be lost. This is thought to be 0.28 tons per farmer, or 15 per cent of the typical 1.8 tons of grain kept in conventional storage facilities. It was also found that storage of grains enables quality preservation and provides a farmer with the chance to profit from temporary price fluctuations between the periods of harvest and the times of sales. Although there may be variances depending on the crops and storage facilities, farmers often receive a better price when selling their grains after storage instead of straightaway. Grains stored in hermetic bags and metal silos cost significantly more than those stored in conventional structures.

Social and environmental impact

There is a close link between PHLM technologies and health issues because most of the farmers who store their grain in traditional structures apply storage chemicals to reduce losses. Thus, 76 per cent of farmers in Amhara and 25 per cent in Oromia and SNNPR report health problems caused by the use of chemicals. Widely reported illnesses include eye problems, sneezing, coughing and stomach problems. In addition, when applied, these chemicals remain on the produce, and taste and smell are evident at the time of consumption. Despite the illnesses reported by farmers, they continue to use chemicals since they cannot afford to purchase the metal silos. Also, pesticides like Malathion are readily available at the local agro-dealers stores and offer a cheaper alternative to reduce PHLs.

Despite the patriarchal nature of Ethiopian society, men and women share roles along the production value chains. However, the use of post-harvest loss management technologies had noticeable effects on women, particularly in terms of labour saved from constructing traditional structures and the release of women from daily management of the grains kept in these structures. The study shows that women save almost 75 per cent of the time and drudgery they would have spent. Importantly, the study revealed that domestic disputes brought on by damaged grains had decreased, which contributed to a decrease in gender-based violence. The time saved by women was used in other economic activities including strengthening social relationships within the community and spending more time caring for children.

Post-harvest losses have an impact on the environment. Agricultural production always involves the use of natural resources. According to the study's findings, for every tonne of grain saved through post-harvest losses, 0.81 tonnes of greenhouse gas emissions would otherwise have been released into the atmosphere. In terms of cultivated land, for every hectare used for grain production, an average of 0.22 hectares is used to produce grains wasted through PHLs. And in terms of water footprint, 1 tonne of wasted food is equivalent to 192 cubic metres of water. Consequently, PHLs of 0.288 tonnes per farmer correspond to a water loss of 55 cubic metres.

Recommendations for the future

The survey has demonstrated that especially training and capacity building positively influence the likelihood of adoption and should therefore be continued. With 79 per cent of the storable produce still finding its way into traditional structures, efforts must carry on to further promote and support PHLM technologies and practices. Awareness of the negative effects and consequences of pesticides must be raised through training. Moreover, experience sharing that exposes farmers to practical learning sessions, especially from model farmers, has to be supported and facilitated.

Extension services play an important role in demystifying the technical aspects of technologies and encouraging farmers to trust them. There is need to widen extension outreach to involve more farm households. This should be coupled with increased information supply via various media channels – radio, television and social media if available.

Another way to encourage farmers to adopt improved storage structures is to develop a grading standard mechanism and develop a price-reward system for quality grains. This can be implemented in the form of price premiums or quality certificates.

Also, it is necessary to develop and customise the credit market to meet the demand for the post-harvest loss management technology sector. The majority of the small-scale farmers may not be able to afford the silo without financial assistance. As such, in order to stimulate demand, it will be important to create market linkages between the artisans, farmers and financial institutions in the respective regions. The micro-finance institutions must create products relevant to PHLM. The cost of the credit product must consider the fluctuations of demand for the technologies in the market, fluctuations in food prices and the collateral requirements.

Policy development has been good so far, with strategies being created to deal with PHLs. However, these need to be operationalised down to the lowest administrative level with requisite human resources and facilitation. The strategy on agricultural extension needs to incorporate PHLM in the national extension system.

The PHLM technology agenda has to be deepened along the value chains. Although there are losses at the storage stage after harvest, more losses are presumed to take place at the harvesting stage, with food being lost through poor harvesting techniques. Widening the PHLM agenda to include the harvesting stage is likely to save farmers more losses. Moreover, there is need to incorporate pre-harvest practice technologies such as drying, transporting and threshing.

The study has shown that better post-harvest management contributes significantly to improving food and nutrition security as well as increasing the income of smallholder farmers in Ethiopia. However, extensive efforts still need to be made for the techniques to find their way into farmers' everyday practices.

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