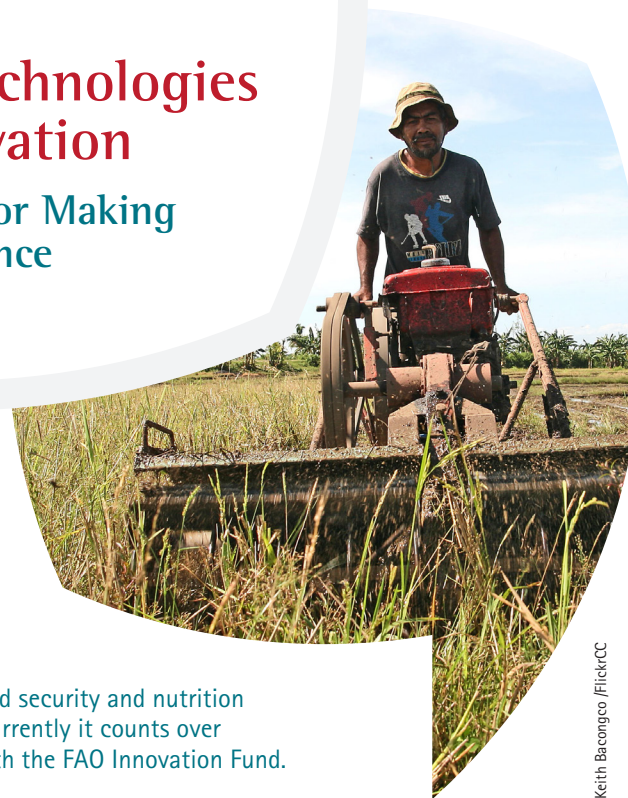




**Global  
Forum**  
on Food Security  
and Nutrition

# Agricultural Technologies and Innovation

## Opportunities for Making a Difference



Keith Baongco / FlickrCC

This brief is based on an online discussions held by the Global Forum on Food Security and Nutrition in 2010.

The FSN Forum is an online community for sharing knowledge and discussing food security and nutrition issues that are fundamental for development and for the fight against hunger. Currently it counts over 2800 Members from more than 140 countries and has recently been awarded with the FAO Innovation Fund. For the complete proceedings of the discussion please visit <http://km.fao.org/fsn>

Technologies play an essential role in agricultural production and impact upon the life of farmers everywhere. Technical innovations such as the plough, irrigation, mills, crop rotations, fertilizers and much more have shaped the history of mankind time and time again.

Even in our modern age where technologies are readily available and innovations plentiful, the process and impact of new agricultural technologies application is complex and challenging and it carries with it many unknowns and risks.

When used indiscriminately and without proper assessment, technological innovations can quickly displace older, proven, highly specialized and well-adapted systems, and this can have a detrimental effect on sustainability and food security.

People typically trust proven technologies that may have been adapted to particular settings and systems over many generations. New technologies, by contrast, can run the risk of being seen as a novelty and/or a tool for the wealthy with emphasis upon boosting income and less on food security. This can sometimes hamper their acceptance among smallholder farmers, who traditionally are averse to risk taking.

Factors typically influencing the acceptance of new technologies include inter alia gender, age, and education level of the farmer; farm size, access to information, land ownership, off-farm income and infrastructure.

The larger the farm, the more confident the farmer, the higher the level of income from on-farm and off-farm sources and the better informed the farmer, the more likely the adoption of new technologies.

To have a positive and long-term impact on fostering food security and to be broadly accepted by stakeholders, technologies need to be introduced with care, be readily adaptable to the demands of a particular setting and be easy to understand and to use. Importantly, technologies need to take into account the socio-economic basis of the community and/or current farming practices, that they will be of immediate benefit.

### Technologies in the service of people

As a result of prevailing economic, educational and infrastructural constraints farmers and others making up rural communities are frequently unable to take advantage of novel technologies and innovations.

Further, a 'one size fits all' approach can be detrimental to the application of technologies, and highlights the need to consider the different categories of farmers. The introduction, application and utilization of agricultural technologies needs to be supported by capable and well-organized extension services and other service providers. Many novel and valuable agricultural innovations become lost to communities as a result of inadequate information, poor application and mistakes made. A number of key issues arise:

- Small-scale farmers should be encouraged to group to enable them to match the economies of scale required that will enable them to adopt novel technologies and keep pace with change. Farmer organizations typically have improved negotiating position for members, better access to credit and other farm inputs and are more likely to adapt to change.
- Rural people are typically unable to keep abreast of technical development due to lack of ability, education and/or financial resources. They may have difficulties with understanding information even when it is readily available.
- Novel technologies frequently appear to be better suited to large-scale farming application and may be readily adopted by those not adverse to risk taking. Small-scale farmers, by contrast, are typically vulnerable, resource-poor and isolated, and will require technical support when adopting novel technologies.
- For best, novel technologies should have the potential to become commercially viable, to help overcome the constraints faced with aid-funded programmes that sometimes support technical change but then fail once sources of funding have ceased.
- Agricultural production has always been gender-biased, with women dominating small-scale food industries.

Much can be done to ensure that novel technologies are gender sensitive that they can be readily adopted by women farmers. Herein is the role required for planning, extension and/or R&D.

- Agriculture technicians and policy-makers have a key role with preparing the approach required for the distribution and/or application of novel technologies; to provide for exposure and to encourage take-up.
- The appropriateness of novel technologies is rarely explored in full, and many applications fail as a result of the limited analysis provided pre-introduction. Novel technologies sometimes remain narrow in application and never spread beyond introductory sectors and/or areas.
- Large-scale commercial farms are typically self-sufficient; and are serviced by the private sector once the public laws, frameworks and policies are in place. By contrast, smaller-scale farms may require continuing support during times in which novel technologies are being introduced; to help people and systems to adapt.

### Value of older Technologies

Old and/or traditional technologies continue to play an important role for food security in rural communities given their widespread use and application by local people in Africa. Traditions of this kind help provide security and safety nets in times of strife. Older and/or indigenous technologies have great value to rural societies, and typically present a number of advantages over newer technologies. However, it is important for rural people *not* to remain captive to out-dated or less valuable technologies; and to explore opportunities for change as newer technologies are made available. Consider:

- Indigenous technologies are typically based on the local experience of people and have been adapted over time to best suit the environment by taking into account the specific circumstances, demands and resources of local communities.
- Novel technologies linked to conservation agriculture and the sustainability of agro-ecological systems can sometimes gain benefit from technologies inherited from the past.
- People have a measure of trust in their traditional technologies – they are not seen as foreign or alien. Modern technologies sometimes face these issues at time of introduction, notwithstanding the many advantages that may be gained from their introduction.
- Development agencies could do more to foster the effectiveness of many novel interventions, and take into account the value and application of existing technologies. Existing technologies can sometimes be adapted to take account of new ways, rather than replacing them. This comes from working with farmers to determine the best ways of making change.
- Researchers, extension workers and other change agents could do more to take advantage of existing and traditional knowledge, innovation and technologies; to adapt and modify for new opportunities.
- Many new technologies are linked to traditional technologies in terms of origin, for example, the much heralded NERICA rice varieties have been derived from parent-stock based on the traditional African and Asian rice varieties, respectively, *Glaberrima* and *Sativa*.

### Scaling Technologies

Technologies need to be scaled and adapted to better suit recipients and their requirements; they are rarely universally valid for all crops, all systems and all regions. Technologies need to make use of the existing natural resources, human labour, community requirements and marketing channels available. Consider:

- Scaling according to local requirements can sometimes be difficult due to the many variables involved. The resources required with which to make a proper assessment prior to application and then to follow-through with monitoring and evaluation after a period of implementation can be demanding.
- Understanding the social dimension of technologies is more challenging than focusing on the technical aspects of application.
- There will be continuing need for public sector R&D to provide support for technology adaptation; to help with adoption and to ensure sustainability.
- A just system of incentives, rewards and recognition is typical of an effective R&D system.

*The Technologies for Agriculture (TECA) programme implemented by FAO provides an interactive repository of agricultural technologies and best practices proven with smallholder farmers. TECA is available at: <http://www.fao.org/TECA>*

### Servicing Africa

While Africa has had many success stories, they frequently remain hidden. Much of development has been fragmented, and national and regional development can be constrained by out-dated structures, slow and overburdening bureaucracy and a traditional top down approach. Consider:

- Small-scale producers in Africa have long been identified as a key resource for the development of agriculture; these are people who need to be targeted with appropriate agricultural innovation.
- To enhance the productivity of small-scale farmers and to foster their role in feeding the continent, it is essential to support them within the appropriate public-private-partnerships, including the formation of farmer groups and/or cooperatives. Grouping allows them to pool resources, share risks and provides greater access to technologies and innovation.
- The lessons of the Asian 'Green Revolution' can be learned; and its dependency on high input/high output systems can be modified to suit growers and systems of production in Africa.
- There is a dichotomy between the cities and rural areas, with the former dominating the socio-economic agenda, directing investments and attracting people, but also providing markets for goods and services.
- Too few resources continue to be channelled into the R&D institutes, universities and commercial farming blocs in Africa to allow for the development of technological innovations.