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The lion's share of research is disciplinary.

Closing the adoption gap

It can easily take years for agricultural innovations to find real-world practical application. There are a wide range of reasons for this which are familiar to the agricultural research community. But how can innovations succeed in making it from the development stage in the lab to being applied in the field? By the agrifood sector following the example of the health sector in opting more for implementation research practices, our authors maintain.

By **Manfred Denich and Cory Whitney**

The volume of scientific knowledge in the agricultural sector is growing unabatedly, and there is widespread agreement that rural development is hampered not by a lack of knowledge, but by a lack of implementation of that knowledge. It is important to consider that billions of euros are spent each year on research and development (R&D) in the agricultural and food sector, not only in the Global North, but also in the South. These investments are directly linked to raising agricultural productivity and food supply, but they also include R&D on environmental and social issues. However, it is not always clear that the investments will ultimately pay off. Indeed, it can take decades to observe the impact of research and respective investments on agricultural practices, i.e. research-based innovations (technologies, practices and policy or institutional concepts based on R&D that are new to their users) and scientific knowledge find their way into practice either very slowly or not at all. It often takes several years for an innovation such as a new crop variety to be adopted by farmers, or even several decades, e.g. when mechanisation or irrigation facilities are concerned.

It goes without saying that researchers want their findings to have impact, and that funding agencies expect measurable effects and seek mechanisms to assess the contributions of research for development. The primary method for measuring impact on agricultural practice is to determine adoption rates, i.e. the number of farmers adopting a given innovation in a particular research area (see article on pages 20–22). So far, the results of the majority of such assessments have been dismal. Recent CGIAR studies found that the adoption rates regarding natural resources management, animal agriculture, improved crop varieties and government policies are predominantly in the single digit percentage.

The lack of adoption of R&D innovations by farmers may stem from a number of factors, such as lack of access to the innovation, lack of appropriate services and training and other socio-economic conditions that were overlooked in the R&D process. A positive attitude towards innovative agricultural practices alone does not mean that land users will adopt them. However, extension services can only

contribute to achieving research-based agronomic objectives if farmers perceive the advice provided as relevant and useful. Farmers may also dismiss innovations out of hand as irrelevant or incomprehensible (whether rational or not).

Research for implementation

The agricultural R&D sector is familiar with the issues listed above and, accordingly, has implemented a variety of research approaches that aim to increase the practical relevance of research-based findings and thus facilitate their implementation. For example, it has become a standard in recent times that research targeting farmers' needs and rural development is interdisciplinary. Interdisciplinary research involves different scientific disciplines, whereby the disciplines are brought together in an integrative manner to solve problems. Another approach is transdisciplinary research, which goes a step further by involving target groups and end users ideally in the planning, execution, discussion, and interpretation of research, i.e. it combines scientific and practical knowledge. Both types of approach, inter- and transdisciplinary, should ultimately help to make the implementation of research results in practice more successful. When it comes to experimental studies, approaches described as 'researcher-managed on-farm research' and 'farmer managed on-farm research' are common. Such participatory or collaborative research approaches exist in a wide variety of forms including approaches known as Follow the Technology (FTT) and Follow the Innovation (FTI) and extend to field research with strong action research components.

Although inter- and transdisciplinarity are often applied in research projects, the lion's share of research is disciplinary. Usually, disciplinary research facilitates specific research questions to be answered. However, in many cases, it is difficult for the findings make it into practice. Thus, often relatively short-term research is contrasted with long time lags before implementation. It can also happen that innovations are never implemented in practice. Complicating matters further, the immediate target group of research is often not the farmer but rather

extension services or policy-makers. Therefore, to ensure that research efforts do not fizzle out without effect, a connecting step must be inserted between research and operational practice, which may be described as 'implementation research'.

The agricultural research community can learn from the processes and methods applied in the health sector, where implementation research, also known as translational medicine, is common. With the so-called "bench-to-bedside" approach, in translational medicine, researchers and practitioners transfer new diagnostic approaches and treatments from the research laboratory into practical application. Translational research is occasionally encouraged in agricultural and landscape research, primarily for the transfer of research findings from basic to applied research, providing the link from the laboratory to the field. However, this is rarely applied, with few exceptions, including the detailed discussion of translational research and knowledge exchange and its application in a study on UK wheat value chains a decade ago.

The notion of implementation research

Implementation research is a collection of scientific inter- and transdisciplinary approaches aimed at identifying barriers to the implementation of research-based innovations and developing solutions for the implementation of research outputs in practice. Accordingly, implementation research attempts to understand which innovations have to be applied where, when, how and for whom. An important aspect of implementation research is the iterative linkage of research and practice that provides researchers, as innovation developers, with information about the applicability of the innovation or useful modifications.

Implementation research is transdisciplinary by nature. Concerning the agricultural sector, it requires the cooperation of not only agronomy, economy and social science, but also of disciplines such as psychology, education research and communication science, among others. Besides researchers, stakeholders to be included are farmers, extension workers, the authorities, companies from the life sciences, plant breeding, agrochemistry and agricultural engineering as well as banks, the trading sector and consumers. Implementation research in agriculture has to adequately capture the complexity of the farmers' personal, social, economic and ecological conditions. Furthermore, psychological, pedagogical and behavioural aspects have to be considered when it comes to the implementation of newly developed agricultural technologies and concepts – these seem to receive little attention at present. From the researchers' perspective, implementation research is a logical consequence of research-based development of innovative technologies and concepts. Unlike

adoption research, which is preceded by the dissemination of research-based innovations by agricultural extension services or via farmers' networks, and later assessed as to whether or not or to what extent it has been adopted by the target group, implementation research represents the direct continuation of formal research, i.e. the research community holds the reins and can use the findings to implement the innovation in accordance with the research hypotheses originally established. Maintaining a practice-oriented view can be particularly useful when innovations emerge from a large number of small-scale and potentially disparate, disciplinary research projects (e.g. doctoral theses).

Implementation research in practice

Funding mechanisms aimed at research-for-development provide a fertile environment for putting implementation research into practice. For example, the research-for-development (R4D) continuum of the CGIAR system, also adopted by the German Federal Ministry for Economic Cooperation and Development, is divided into four phases: discovery, proof of concept, piloting and scaling up. The transitions from 'proof of concept' to 'piloting' and from 'piloting' to 'scaling up' represent gaps that can be the focus of implementation research. Implementation research applied before the piloting phase addresses the barriers and corresponding issues regarding the transition from the experimental field to farm reality. Implementation research applied after the piloting phase addresses aspects of the broad implementation of the innovation into the local farm sector or beyond. In this way implementation research covers the transition of the innovations from smaller protected, monitored and supervised spaces to the larger scale. Thus applied, implementation research helps shape the transition from one phase to the other and ensure widespread implementation of innovations. Furthermore, the implementation research approach is flexible and can also start together with disciplinary solution-oriented research where innovations are developed. In this case, the extent of implementation research would increase over time, while the activities of solution-oriented research would decrease as innovations are rolled out and scaled up.

Implementation research for agriculture R&D not only benefits farmers, but also satisfies researchers and donors. National and international funding mechanisms that aim to have impact should include the expectation that implementation research is practised in funded projects. The international research community should be supported in applying implementation research through targeted support programmes.

Further reading: www.rural21.com



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