

2. Research in this model refers to science, in contrast to technology. Scientific research seeks new knowledge, and it does so by abstracting from the real world. It seeks as much control over variables as is feasible. It is analytical. New knowledge, of itself, has no value to farmers, until it is put into a technology. Farmers can't use science. They need technology.

However, most technology advances are based on science, and science is the basis for so-called breakthroughs. Technological advance is often stopped for want of new knowledge that only science can provide.

3. Technology generation puts together knowledge, technology, even folk wisdom into a form that serves a useful function. This form may be a commodity, such as seed, or it may be a practice, such as placement of fertilizer. Technology generation synthesizes. It makes new knowledge useful. Technology must serve in un-controlled conditions and is more useful the wider range of conditions it tolerates. The role of technology generation is to produce new technology alternatives.

While there is a conceptual distinction between scientific research and technology generation, they often blend into each other in practice. They both use the scientific method, and both can make use of a high degree of training and creativity. Both are essential to agricultural progress.

4. Technology testing moves the technology from the conditions in which it was generated to determine its performance in other conditions. Eventually the new technology must be tested on farms--i.e. in the farming systems in which it is expected to perform. On-farm testing is essential, and if research and extension do not do it, then the farmer will have to do it himself. Farmer testing may be effective, but it will also be inefficient and will greatly delay technology innovation.

5. Technology adaptation serves two functions. It is the process by which a newly generated technology can be fine tuned to fit the farming system for which it is intended. It is also the process by which minor changes are made to fit the technology to a wider range of farming systems. Efficiency in the process is increased as the technology serves a wider range of systems.

6. Technology Integration is that fits a new technology into into current farming systems. It has three dimensions.

a. One pertains directly to the system of production. integration is facilitated by a knowledge of the farmer client as a basis for selecting problems and designing interventions. It is also facilitated by research on related problems and by extension instructing farmers on its use.