

HOW TO DEVELOP KNOWLEDGE AND SKILLS FOR AGRICULTURAL MECHANIZATION IN AFRICA

Historical examples from the United States and Germany

Agricultural mechanization is now high on the policy agenda of many African countries, yet few of these efforts emphasize the development of knowledge and skills (see PARI Policy Brief No. 5). However, without the appropriate knowledge and skills, using farm machinery is not very profitable. For example, the International Food Policy Research Institute (IFPRI) found that more than 80% of the tractor-owners in Ghana regularly face long breakdowns of their equipment due to a lack of knowledge and skills on adequate operation and maintenance. A look into history shows that fully mechanized countries such as the United States of America and Germany once faced similar problems. This policy brief analyses how the United States and Germany built up the knowledge and skills needed for successful mechanization and derives insights that are relevant for developing countries.

Developing Knowledge and Skills for Mechanization: Actors and Approaches

Successful mechanization requires the provision of both theoretical knowledge (e.g., on the significance of maintenance) and practical skills (e.g., on how to do maintenance well). Both were neglected in the early stages of mechanization in Germany and the United States. Manufacturers frequently sold machinery to untrained operators, who were either not aware of the need for regular service or did not possess the skills to do this properly. This caused harm to the engines leading to costly repairs and slowed down agricultural mechanization.

Despite these challenges, these countries are among the most mechanized of the world today. How did they manage to solve these challenges and create the much needed knowledge and skills for mechanization? What was the role of government agencies (public sector), the manufacturers of agricultural machinery (private sector) and farmers' organizations (third sector)? What can developing countries that aim to mechanize their agricultural sector learn from the experiences of these countries?

Approaches and Strategies in the United States

In the United States, the development of knowledge and skills was largely driven by individual and private initiatives. Although public agencies, such as extension services and vocational programs, also helped supported mechanization, they did so at a later mechanization stage and to a less important degree than in Germany.

One example of a private sector initiative were **training programs that were offered by machinery manufacturing companies** to help farmers to operate and maintain their tractors. The companies had realized that future sales would be lower without such training, as farmers would fail to see the full benefit of purchasing new equipment.

Private initiatives also affected legislation, as illustrated by the case of the farmer Wilmot Crozie. After purchasing a tractors that did not live up to their manufacturers claims, he advocated for truth in tractor advertising. With help of the University of Nebraska, he authored a bill that was passed in the Nebraska Legislature in 1919 **requiring firms to have their tractors tested** before selling. Universities also contributed to mechanization; the California State Polytechnic required all students graduating from the agriculture division to be able to operate and service several common types of tractors and equipment.

There are other examples of grassroots solutions, including local **ploughing competitions**, which were sometimes held alongside events such as field days, conservation days and farm shows.

Approaches and strategies in Germany

Germany benefited from more systematic public sector support. In the 1920s, the government created a special "Committee for Technology in Agriculture" (Reichsausschuß für Technik in der Landwirtschaft), which helped establish parastatal and public agencies that supported mechanization, such as the **DEULA school caravans**. In the 1920s, six school-caravans travelled across the country to provide two-day trainings for trac-



tor operators and technicians. After World War II, the DEULA-schools were revived as permanent schools for agricultural machinery, which trained around 50,000 students every year in the 1960s.

Also during the 1920s, Prussia, a historical German state, set up **mechanization advisory centers**. These centers received limited public support, however, even though the demand for their services (e.g., training courses, consultations, checking of bills and repairs) far exceeded their capacities.

In the 1950s, **agricultural vocational schools** offering three-year certification trainings for agricultural apprentices were established. For agricultural apprentices who wanted to obtain an official certification, attendance of these schools was compulsory. The vocational schools trained 185,000 apprentices in 1954 alone. Students attended courses in the winter and work on farms for the rest of the year. The curriculum provided agronomic training and also comprised lectures on physics, machinery economics, and the use and maintenance of agricultural machinery. A similar scheme was set up for agricultural mechanics who received “hands on”-training in the workshops of manufactures and blacksmiths.

Farmer organizations also played a key role, most notably the German Agricultural Society (DLG), founded in 1885. The DLG continues to organize machinery exhibitions, set up standardized machinery tests and distribute leaflets and handbooks for agricultural schools, extension offices and farmers. Agritechnica, the largest exhibition of farm machinery worldwide is organized by the DLG.

Agricultural magazines, to which close to two thirds of farmers subscribed, began focusing on mechanization after the World War II. For example, from 1950 onwards,

the Bavarian Farmers’ Union, published the magazine “Der Traktor”, which provided machinery tests and practical advice on repairs and maintenance.

Recommendations

Successful mechanization requires knowledge and skills. The former can be developed through schooling, exhibitions and media. The latter require hands-on training. As shown by the examples from the United States and Germany, there exists a range of options to create knowledge and skills. No matter which strategy a country selects, dedication is key. Governments, private actors, farmer organizations and development partners can all contribute. The following insights can be derived from the historical study:

- **Accompany mechanization with sufficient knowledge and skills development** for machinery owners, operators and technicians.
- **Combine the institutional options for knowledge and skills creation** that are most promising. There is no “one size fits all” solution. Build on existing infrastructure such as agricultural or technical schools where appropriate.
- **“Get inspiration”** from the experiences of the United States and Germany but note that the “mechanization policy toolbox” is much larger and includes new trends such as ICTs.

This Policy Brief is based on the article:

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