

MECHANIZATION AND AUTOMATION IN AFRICA'S AGROPROCESSING SECTOR IMPLICATIONS FOR EMPLOYMENT AND SKILL NEEDS

A growing demand for higher-value agrifood products in Africa, driven in particular by the rapidly emerging urban middle class, will offer opportunities for the local food and beverage processing industry to generate revenue, create jobs and improve access to food on the continent. To be competitive, the industry will require efficient production methods that can generate a reliable supply of high-quality products. Globally, the food industry, particularly in higher-income countries, employ a myriad of technologies to meet these objectives, including power-driven machinery and more recently automation technologies, i.e. computer-controlled production systems. Little is known about the use and impact of these technologies in African agroprocessing. Based on a survey of firms in four African countries (South Africa, Kenya, Nigeria and Ethiopia), this policy brief presents insights on the status of mechanization and automation in Africa's food and beverage manufacturing sector and how these technologies may affect employment and skill requirements.

RESEARCH METHOD

The findings in this policy brief are based on two primary data sources:

1. A mapping of the formal food and beverages manufacturing sector was conducted in four African countries, Ethiopia, Kenya, Nigeria and South Africa, which resulted in a list of 1'585 registered firms, i.e. 267 in Ethiopia, 261 in Kenya, 572 in Nigeria and 485 in South Africa.
2. A sample of firms was randomly selected using stratified sampling based on company size, ownership and type of industry. A total of 498 firms were interviewed, i.e. 215 in Ethiopia, 92 in Kenya, 110 in Nigeria and 81 in South Africa, to determine the levels of adoption of mechanization / automation technologies and related implications for jobs and skill requirements.

Status of food and beverage manufacturing

The vast majority of agroprocessing companies in the four countries are privately and mostly domestically owned. Foreign firms are mainly found among the large companies. Food processors make up the majority of firms, operating in a wide range of sectors. Companies of all sizes can be found in all industries, with the exception of firms that produce multiple types of products which tend to be larger.

Overall, around half of the staff employed in the agroprocessing firms is performing low-skilled work while the remainder is equally spread between medium- and high-skilled jobs. South African firms have the largest share of low-skilled jobs while Kenya has the largest share of high-skilled jobs. Most women are employed for clerical support work. They are also represented in high-skilled jobs, but only few are found among technical staff.

Adoption of mechanization and automation

Virtually all surveyed companies use some form of power-driven machinery, most commonly for grinding, packaging and baking/cooking. Most of the machines are imported from outside the continent. Ethiopian and Nigerian firms most often rely on Asian machines, South African firms mostly import European technology and Kenyan companies commonly source machines from both regions. Only South African firms use domestically produced machines to a certain extent, mainly for their secondary machines.

Overall, just over half of firms also use automated control systems, but large differences can be observed between the four countries. The level of automation is lowest in Ethiopia (20%) and highest in Kenya (85%) while just over half of the companies in Nigeria and South Africa are using the technologies. Automation rates are higher among beverage than food companies, but not substantially so, while grain mill and bakery product producers are least frequently automated. Automated companies are more often larger and owned by foreign investors or shareholders than mechanized companies.



Mechanization and automation technologies are highly valued by the companies. Increased product quality and safety rank among the main benefits. The technologies are also appreciated for increasing efficiency of production, notably the efficient use of raw materials. In particular automated companies frequently highlight other efficiency gains, such as increased flexibility of production, lower overall production costs and reduce food losses/waste.

Employment impacts and skill needs

Mechanization and automation have not led to substantial job losses, at least since the firms' last major investment in the technologies. Instead, staff were at times assigned to different tasks, in particular those working in automated companies. Where changes in staff numbers occurred, they mainly translated into job gains, in particular among medium- and high-skilled staff. For all companies, the impacts of investments in the technologies are felt most among low-skilled workers with both job gains and losses.

The main obstacles to the use of mechanization and automation technologies are machinery- rather than staff-related. The most pressing concerns include power failures, machine malfunction and lack of spare parts. Staff constraints increase with firm size (but not substantially so) and are more often reported by automated firms. In particular resistance to adoption among staff is a more significant concern among automated than mechanized firms.

Technical skills to work with machines and computers are most needed and also most lacking while soft skills become more important with the adoption of automation. Women are clearly under-represented in the technical professions. Skill gaps are more pronounced among automated firms. To address skill gaps, companies employ diverse strategies of hiring, training and outsourcing. Formal training is mainly used to build automation-related skills while machinery skills are most commonly provided through on-the-job training.

POLICY RECOMMENDATIONS

Governments and businesses should:

- **Invest in the development of technical and soft skills:** Mechanization and automation technologies need to be an integral part of related vocational training and university curricula to build the necessary skills and reduce resistance.
- **Provide lifelong learning opportunities:** Continuous training programmes are needed to build a flexible workforce that can use the fast-changing technologies and adapt to the resulting changes in tasks.
- **Focus skill development on disadvantaged groups:** Particular attention should be paid to low-skilled workers to enable them to take advantage of employment opportunities. More emphasis also needs to be placed on bringing women into the technical professions.
- **Invest in infrastructure:** Priority should be given to ensuring a reliable power supply and facilitating access to repair services and spare parts.
- **Expand local machinery manufacturing:** Support measures should focus on the growing number of small entrepreneurs who are already manufacturing machines for the local market (see PARI Policy Brief 31).

The policy brief is based on the study:

Baumüller H., Kubik Z. and Getahun T.D. (2023) Mechanization and automation in Africa's agroprocessing sector: Implications for jobs and skill needs. ZEF Working Paper No. 222.

The studies will be available at www.r4ai.org.

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