



Food and Agriculture
Organization of the
United Nations

2022

THE STATE OF
**FOOD AND
AGRICULTURE**

LEVERAGING AUTOMATION IN
AGRICULTURE FOR TRANSFORMING
AGRIFOOD SYSTEMS



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Rome | 2 November 2022

**About 10 000 years ago, humans began to farm and
the first agricultural revolution began**

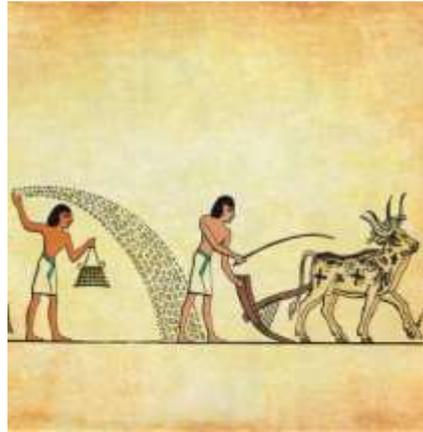
~10000 BCE

~4000 BCE

1910s



Manual tools



Animal traction

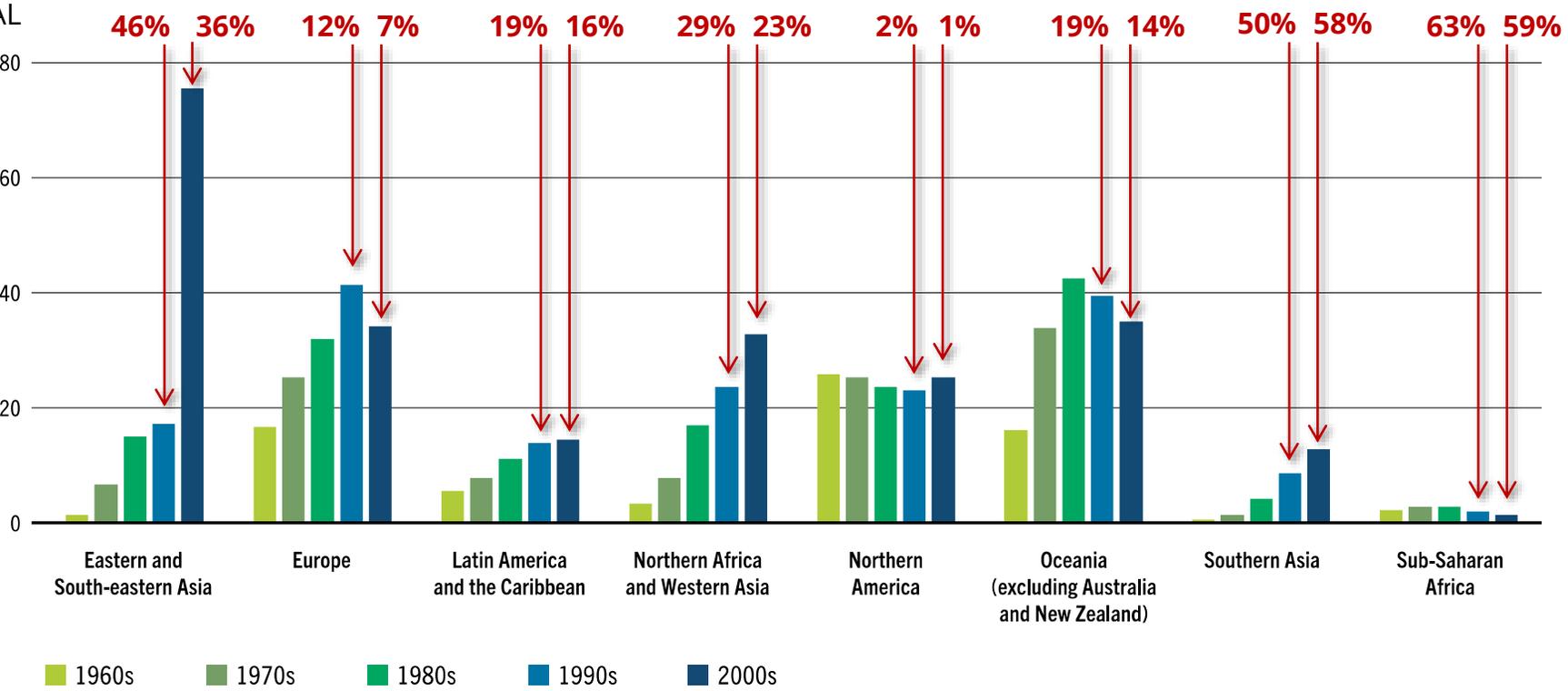


**Motorized
mechanization**

Since the 1960s, mechanization spread rapidly around the world, except in sub-Saharan Africa

TRACTORS IN USE PER 1 000 HECTARES OF ARABLE LAND

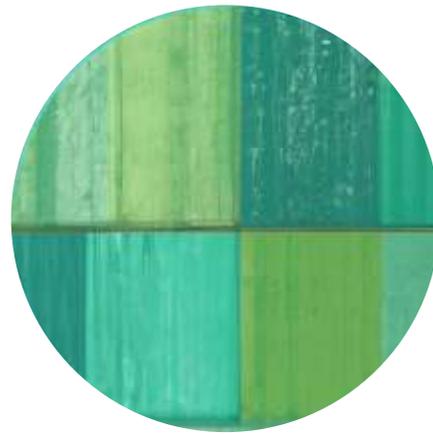
SHARE OF AGRICULTURAL
EMPLOYMENT
IN 1999 AND 2009



**How can we sustainably nourish a continuously growing population?
What must be done?**



**Shrinking
agricultural
workforce**



**Limited
agricultural
land**



**Unsustainable
water use**



**Accelerating
climate change**

Meeting this goal will require evolving towards a new paradigm – agricultural automation

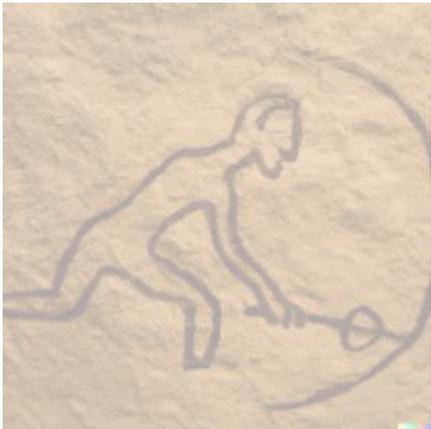
~10000 BCE

~4000 BCE

1910s

1980s

2000s



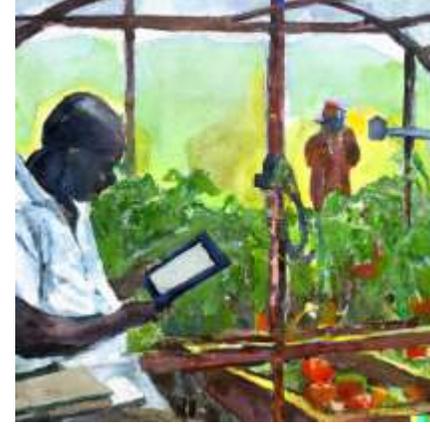
Manual tools



Animal traction



Motorized
mechanization



Digital
equipment



Robotics
with AI

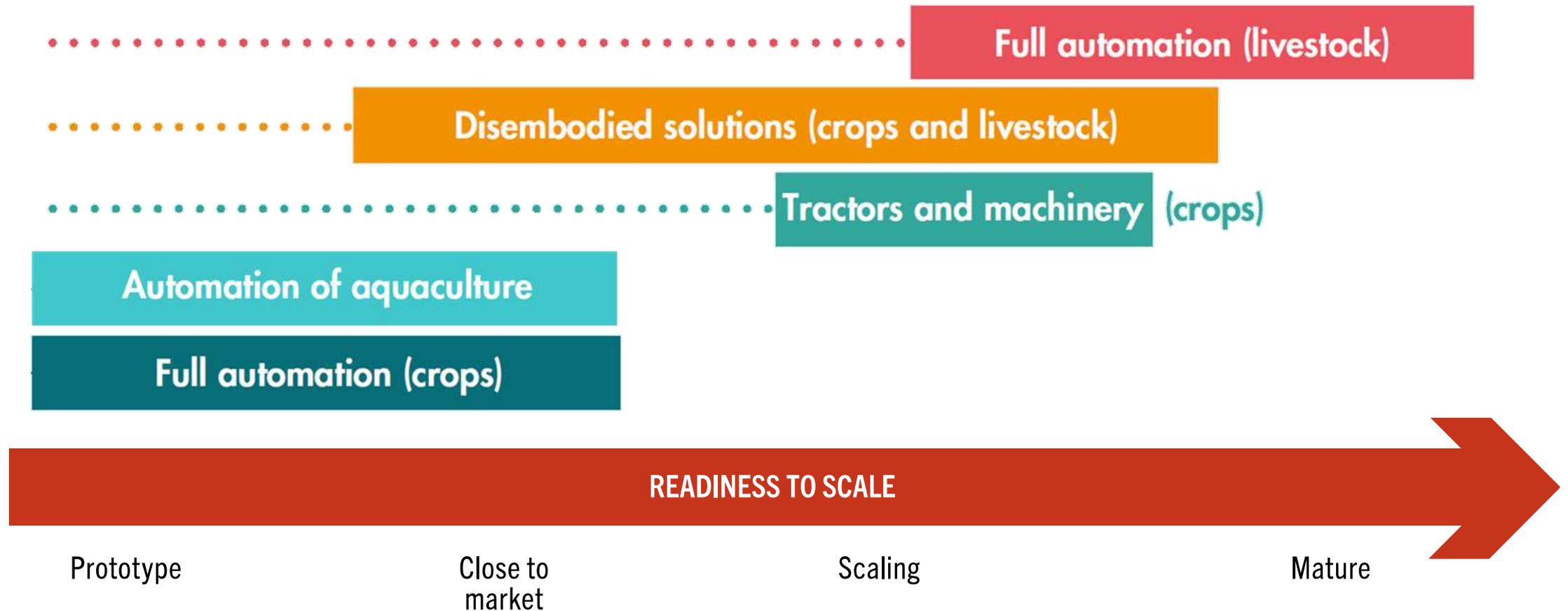
Focus of the report

Definition of agricultural automation



The use of machinery and equipment in agricultural operations to improve their **diagnosis, decision-making** or **performing**, reducing the drudgery of agricultural work and/or improving the timeliness, and potentially the precision, of agricultural operations.

**The development and use of digital automation technologies is growing,
but mostly in high-income countries**



With automation, what will agricultural production look like?

More
productive



More
efficient



More
environmen
tally
sustainable



More
resilient



More
safe



Key questions and ways to avoid trade-offs while leveraging agricultural automation



Risk of unemployment



Risk of social inequalities

Will agricultural automation lead to growing unemployment?



Risk of unemployment

Common fears that automation leads to unemployment are not supported by historical realities; automation is a gradual process

- In situations of rising wages and labour scarcity, agricultural automation can benefit both employers and workers
- Automation can lead to unemployment if subsidies make automation artificially cheap or sudden technological breakthroughs bring automation costs down very rapidly
 - When this happens there is a need for immediate, inclusive social policies to help unskilled workers find employment elsewhere

Will agricultural automation lead to growing social inequalities?



Risk of social inequalities (evidence from 27 case studies)

Agricultural automation technologies are mostly accessible to large-scale producers in high-income countries

- Provide public or collective goods that contribute to an enabling environment – e.g. developing communications infrastructure – will be key
- Tailoring solutions to local conditions through technological and institutional innovations (e.g. advancing small-sized machinery and hire services)
- Build human capacity, including investments to scale digital skills

In a nutshell – what are the entry points for leveraging agricultural automation?

Tailor motorized mechanization to local needs and support it with digital tools

Invest in enabling infrastructure (e.g. electricity and connectivity) that strengthens the business case of digital technologies

Facilitate the transition to automation and new skilled jobs by improving access to rural services & training

Avoid subsidizing automation in labour-abundant contexts, nor restrict it thinking it will preserve jobs; instead, focus on creating an enabling environment

Involve all stakeholders in developing and tailoring technologies to the needs of end users

Country context

Transforming agrifood systems for food security and access to healthy diets for all



Thank you

To consult the SOFA series from 1947

www.fao.org/publications/sofa