AI and Productivity

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Outline

- From the KSF description:
  - "... examine how AI reshapes productivity landscapes across various industries and showcases remarkable efficiency gains."

- Showcase "Smart Agriculture", within the context of the WCPS dimensions of productivity.

World Confederation of Productivity Science

- To be sustainable in the longer-term, organizations, nations and regions need to improve their **social, environmental and economic productivities** so that their operations are socially equitable, environmentally bearable and economically viable

- **Social productivity** focuses on the output or outcomes generated by social interactions.

- **Environmental productivity** measures an economy's relative efficiency in its use of and impact on natural resources.

- **Economic productivity measures** how efficiently goods and services can be produced.

Three Dimensions of Productivity

Social Productivity

Bearable

Environmental Productivity

Sustainable

Equitable

Viable

Economic Productivity
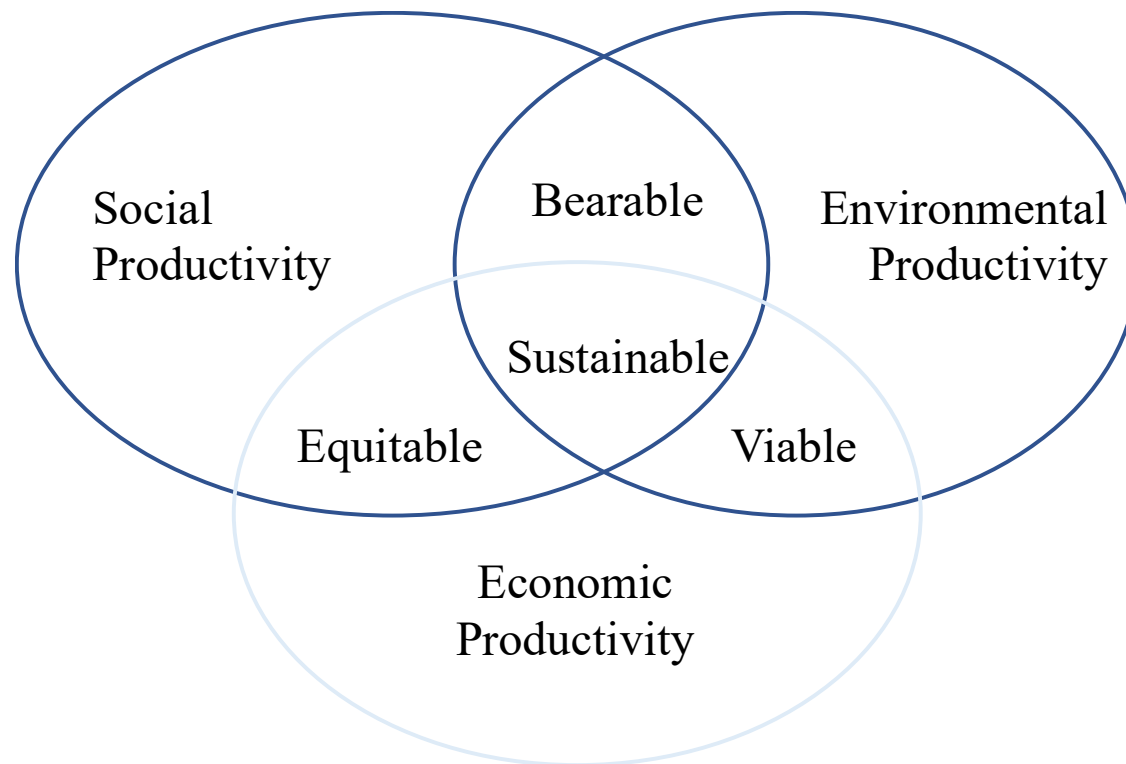
Agricultural Productivity

- Agricultural productivity growth measures the efficiency with which inputs are used to produce agricultural output

- Sustainable agricultural productivity growth advances social, environmental, and economic development objectives to provide food security for current and future generations.

Smart Agriculture

- The adoption of advanced technologies and data-driven farm operations to optimize and improve sustainability in agricultural production.

- Technologies include AI and the Internet of Things (IoT).

- Chief concern driving this is food security:
  - Food production must increase by 70% by 2050 to keep pace with global population growth

https://www.ibm.com/topics/smart-farming#:~:text=Smart%20farming%2C%20also%20known%20as,Internet%20of%20Things%20(IoT).

AI-Powered Crop Monitoring

- Drones equipped with cameras and AI algorithms are deployed to monitor crop health, detect early signs of pests or diseases, and to seed fields

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Automated Harvesting and Sorting

- Harvesting machines with computer vision technology can automatically detect ripe fruits or vegetables, harvest them with precision, and sort them based on size, color, and quality.
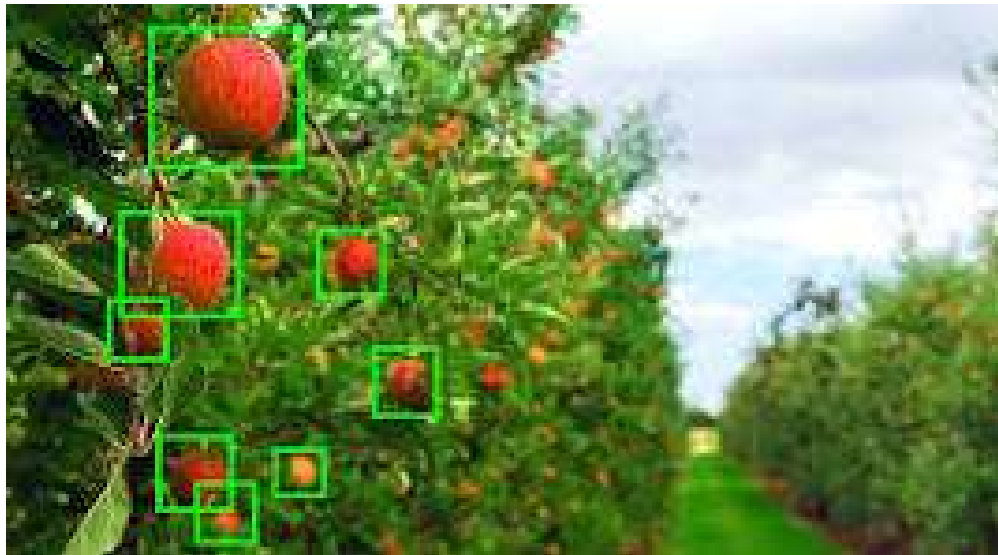
Precision Irrigation Systems

- Systems use data from soil moisture sensors, weather forecasts, and crop water requirements to adjust the timing and amount of irrigation automatically.

https://www.agritechtomorrow.com/article/2017/10/precision-irrigation-–-seeing-the-big-picture/1029010

Smart Agriculture and the Environment

- **Resource Efficiency**:
  - Optimize water and fertilizer usage.
  - Minimizing runoff and leaching into nearby water bodies, thus protecting water quality.

- **Improved Soil Health**:
  - By using precision agriculture techniques such as soil sensors and GPS-guided machinery, farmers can monitor and manage soil health more effectively.
  - Leads to better soil conservation practices, reduced soil erosion, and improved soil fertility over time.

- **Reduced Greenhouse Gas Emissions**:
  - Smart farming technologies can optimize machinery usage, leading to fewer fuel inputs and reduced greenhouse gas emissions per unit of production. Additionally, practices like no-till farming, which is often facilitated by precision agriculture, can sequester carbon in the soil, mitigating climate change.

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Agricultural Cooperatives

- Small farms are being bought up by large agricultural companies that can afford to invest in smart technologies

- Agricultural cooperatives unite single growers to boost their business productivity and increase yields. The co-ops are large enough to invest in smart technologies.

- All co-op members help each other and share risks, exhibiting social productivity

- There are over 1.2m agricultural co-ops worldwide.

https://eos.com/blog/agricultural-cooperatives/

Sustainable Smart Agricultural Coops

- Social Productivity
  - Empowerment of local people as informed decision-makers regarding different aspects of farm management; new creative alliances between different professional actors

- Environmental Productivity
  - Less impact on the environment regarding carbon emissions, water usage, chemicals, etc.

- Economic Productivity
  - Increased profitability from improved farm management, increased local food diversity and security.

Sustainable Smart Agricultural Coops

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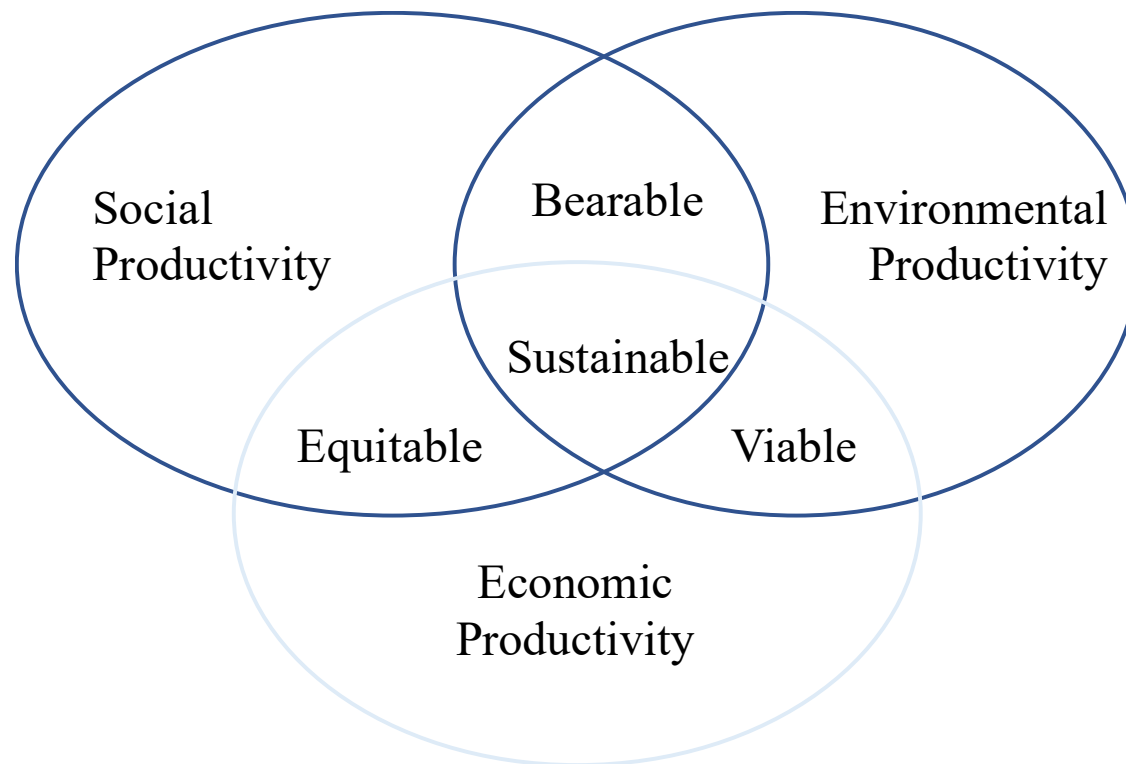
AI and Agricultural Productivity

- AI has been with us for over 70 years.

- Most of the technologies being used in smart agriculture are not new.

- AI-driven technologies have the potential to transform the agriculture industry to meet our current and future food security needs

Thank You

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