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Farming Sustainably using Technology

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European Union
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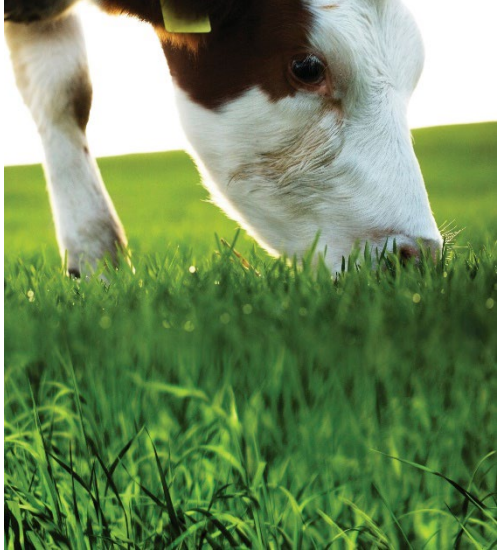
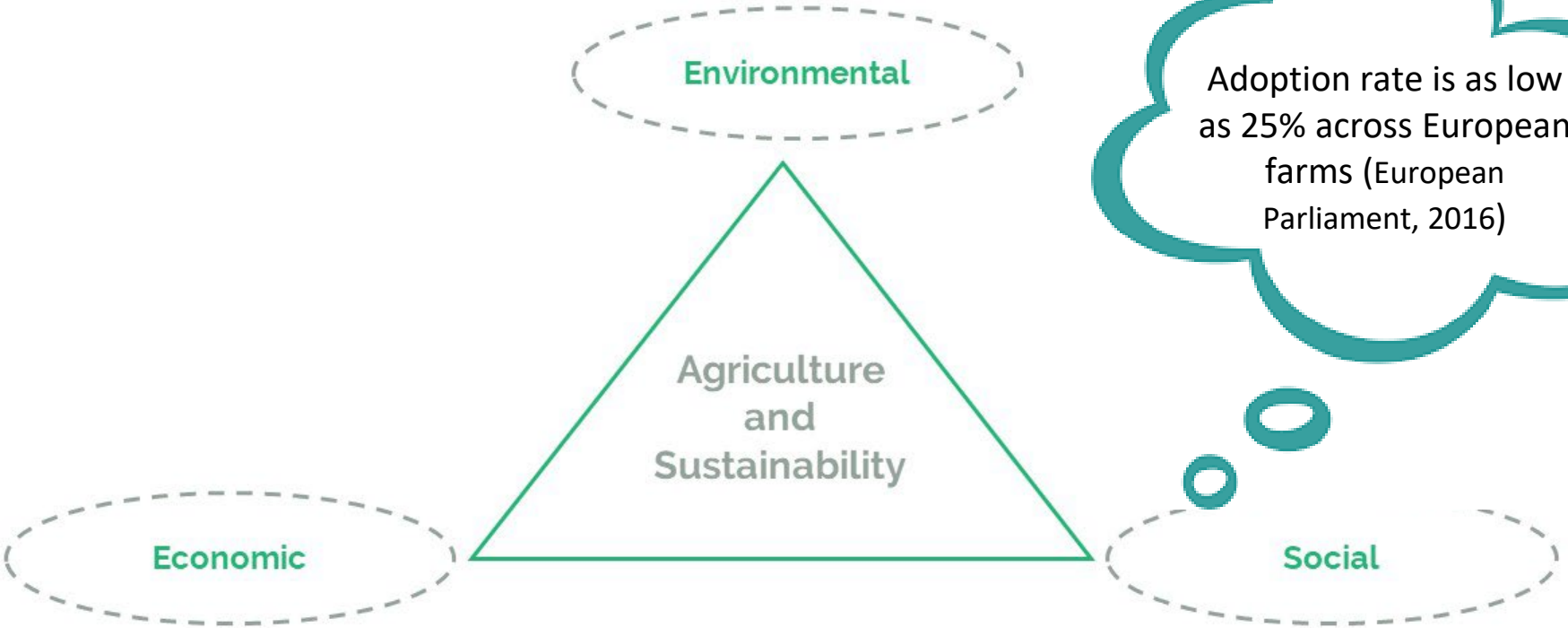


Sustainable Development Goals

- UN has developed 17 goals to achieve global sustainable development.
- Smart Farming is related to several goals, directly and indirectly.



Adoption rate is as low as 25% across European farms (European Parliament, 2016)

(Adnan *et al*., 2019; Brewster *et al.,* 2017; Lowenberg-DeBoer and Erickson, 2019; Walter *et al.,* 2017)

Survey Demographic

484

Farmers participated from across the globe.

Participant Country Breakdown

Ireland
19.83%

Romania
16.12%

Norway
16.12%

Italy
9.09%

South Africa
6.40%

< 5% Respondents

Serbia – 4.96%

Slovenia – 3.51%

Georgia – 3.51%

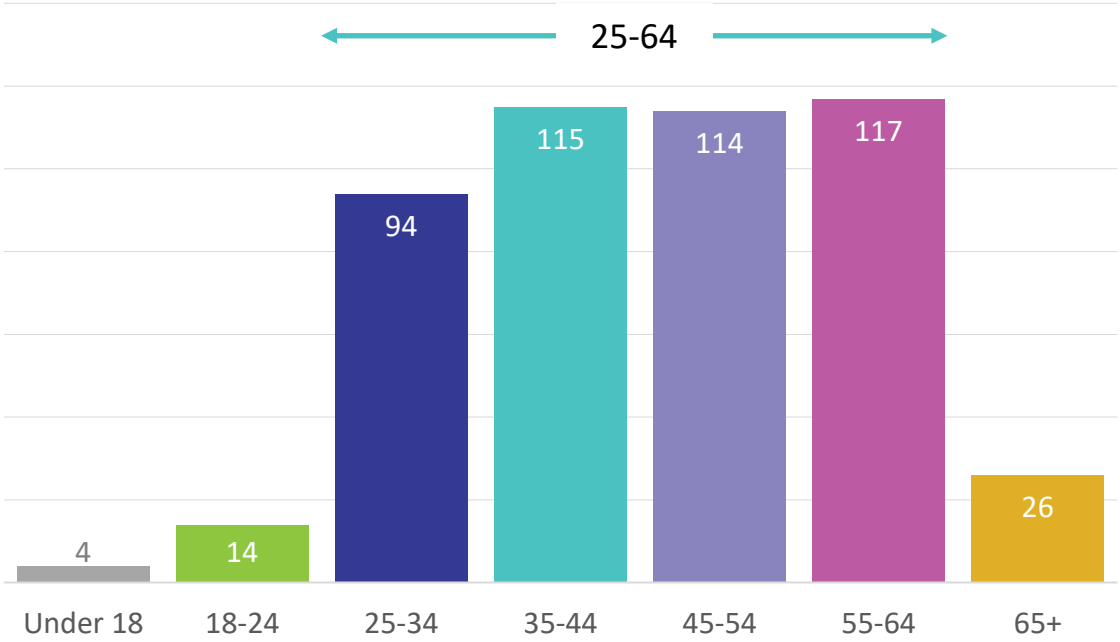
Germany – 1.86%

Greece – 3.93%

Czech republic – 1.45%

Spain – 2.48%

Age



Source: DEMETER Farmer Voice Survey

Drivers for Tech Adoption

#1 ✓

Provide better information to manage the farm

#2 ✓

Simplify Work

#3 ✓

Increase profitability

Environmental Sustainability

Farmers believe that SFTs could help further improve their environmental impact and somewhat agree that they would help meet climate change impacts.

Sustainability

Smart-farming technology would help me further improve my environmental impact

Source: DEMETER Farmer Voice Survey

Sustainability

Smart farming technology would help me cope with climate change impacts

Source: DEMETER Farmer Voice Survey

What do farmers think?

"A big issue in the future will be the climate change, so I think it will be one of the main causes to buy a new technology - to improve our crops, save money, and impact less the environment."

Crop Farmer, Romania M35

"I think they will invent some sensors that we will use to help us have a low environmental impact"

Cereal Farmer, Italy, F26

"All the environmental things, that is going to have a big impact on how I work"

Winemaker, Georgia, M28

"I suppose the big thing coming down the line for farmers will be the environment. And smart farming technologies they are supposed to help that – I'm looking at GPS controlled fertiliser spreaders"

Dairy Farmer, Ireland M40

Source: Qualitative interviews - PhD Research

Barriers to Adoption

- Cost
- Data Privacy Concerns
- Access to finance

Source: DEMETER Farmer Voice Survey

Internal and external influences on the farmer's intention to adopt smart farming technology

Factors impacting adoption

INFORMATIONAL

BEHAVIOURAL & SOCIAL

BUSINESS & ECONOMIC

TECHNOLOGICAL

EXTERNAL INFLUENCES

INFORMATIONAL FACTORS

Lack of awareness

- Gap & disconnect in the knowledge transfer to farmers. [1]
- Overload of information – which tech is best? [3]
- Unclear on the benefits. [3]
  - Needs to be relatable
- Overuse of technical language. [4]
- Use peer farmers to share knowledge

[1] Busse et al., 2014, [32]Klerkx and Rose, 2020; 3 Klerkx, Jakki and Labarthe, 2018; [4] Harris and Achora,2018

BEHAVIOURAL & SOCIAL FACTORS

AGE

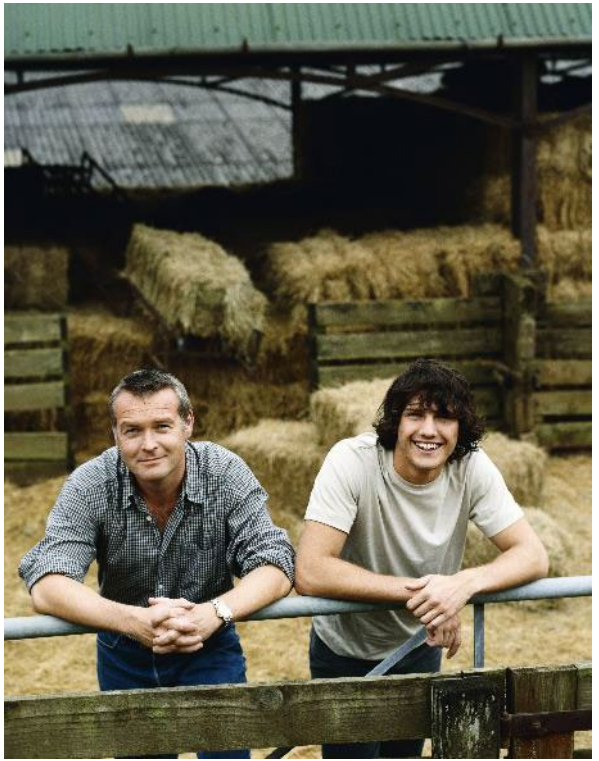
EDUCATION

CULTURE

LOCATION

Perception & Attitude

- Adoption is related to the farmer's anticipation of impact [1]
  - Economic benefit/ Profitability
  - Farm performance
- Perceived Usefulness & Perceived Ease of Use creates attitude.
- Positive attitude towards technology will increase likelihood to adopt. [2]
- Farmers' expectations/perceptions on what SFT will deliver differs to that of tech providers or scientists. [4]

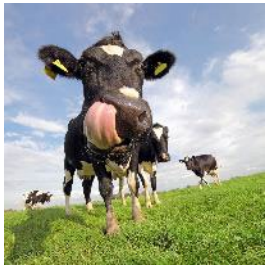


[1] Naspetti et al., 2017; [2] Meijer et al., 2014;[3] Godoe and Johansen. 2012; [4] Kernecker et al.,2019

BUSINESS & ECONOMIC FACTORS

Farm size & investment cost

- Cost of SFT can be prohibitive. [1]
  - Initial investment & time to upskill
- Large farms are more willing and able to adopt due to mostly higher income levels
  - Absorb financial risk
- Farming context affects the speed of adoption
  - Adoption is more prevalent in arable and viticulture but to a lesser extent in animal-based farming.[2]

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[1] Lawson et al., 2011; [2] Borchers and Bewley, 2015; Eastwood et al., 2017a

TECHNOLOGICAL FACTORS

Characteristics of the technology

- Ease of use/ Complexity
- Compatibility
- Trialability
- Relative Advantage
- Observability

USER PERCEPTION

Connectivity and data privacy concerns

- Poor 3G/4G coverage & broadband issues:
  - Increases the digital divide.
- Trust in the technology supplier is key
- Data storage & privacy issue:
  - Who owns the data?
  - How is it stored?
  - What happens if data is hacked?

What do farmers think?

"I would trust the technology, but I probably would be a little more sceptical with the person selling the technology".
Sheep Farmer, M42

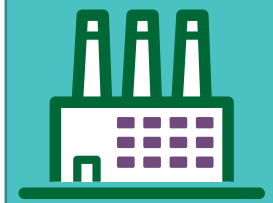
"Some of the technologies are being oversold and you're kind of told you can't manage without this and everybody is using it and it's going to do this for you, like that is just not the case."

Dairy Farmer, F32

"There needs to be reassurance that if you sign up to these things that that information is going to be used in the right way and if they had that reassurance, then they might trust them a bit more."
Beef Farmer, M42

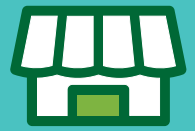
"For me, buying something, whatever it is, the biggest thing is backup from the supplier, no matter what you are buying"
Dairy Farmer, M36

External influences



PROCESSOR

DISTRIBUTOR



RETAILER

CUSTOMER

REGULATOR/
POLICY

FARMER

- **Conclusion**
- Relatable case studies for several farming contexts - facts & figures.
- Training, education & workshops – blended learning approach.
- Peer learning.
- Access to capital
- Govt investment in tech infrastructure & incentivise.
- Contracts & Agreements.

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For more information visit:

www.h2020-demeter.eu

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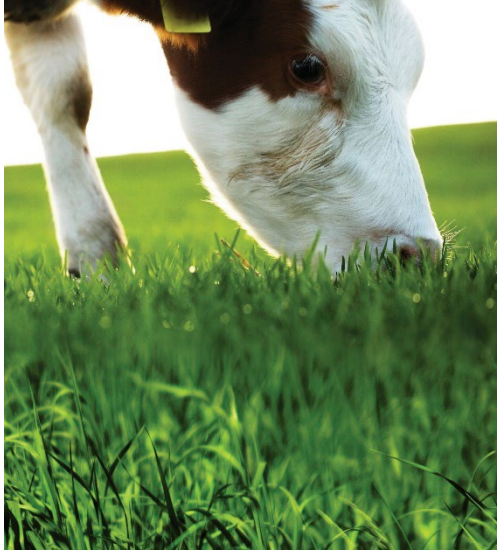

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