



DEPARTMENT OF MANAGEMENT
AARHUS UNIVERSITY



The Smarterfarmer Project

Farms and the Digital Frontier:

Mapping the Digital Landscape of Farming in Denmark

Research approach

Authors

Martin Wurzer
Andrea Carugati
Claus Aage Grøn Sørensen
Katrine Duus Terkelsen

Lars Frederiksen
Pernille Kallehave
Pernille Smith
Rene Gislum

The Smarterfarmer project is funded by Aarhus University Research Foundation.

1. Research Approach

To examine the state of digitalization across Danish agriculture and explore farmers and farm managers perception on agriculture digitalization, we conducted a large-scale survey among Danish farmers in collaboration with Statistics Denmark between the 31st of May and the 23rd of August 2024. The survey was conducted through both web and telephone interviews and focused on commercially active arable and livestock farms across all Danish regions.

1.1. Population and Sample

The population for this study is based on the 2024 Agricultural and Horticultural Census from Statistics Denmark and was refined using additional criteria from the Business Register. Farms categorized as horticulture, unknown, or without registered land area were excluded, along with business types such as estates, associations, public administrations, and those with an annual turnover below DKK 500.000. After these adjustments, the final population consisted of 14.227 farms.

The target sample was stratified by turnover over the 12-month reference period, dividing farms into two groups: those within the top 25% and those in the remaining 75%. From each group, 2,000 farms were randomly selected, resulting in a total sample of 4,000 farms. This approach was chosen to place greater emphasis on farms where digital technologies are likely to play a more significant role in daily operations. It also reflects the broader trend in Danish agriculture, which is increasingly characterized by fewer but larger and more commercially active farms¹.

To ensure broad representation, the sample covers all major farm types and regions across Denmark. In the end, we received 1,373 valid responses, corresponding to a response rate of 34%.

We provide a detailed description of the SmarterFarmer sample in the next section of the report (“The SmarterFarmer Sample”).

1.2. Survey Design and Analysis

The survey consisted of two main sections and was pre-tested prior to the main data collection to ensure clarity and functionality.

The first section focused on inquiring about a farm’s digital status and -advancement. Agricultural digitalization encompasses multiple dimensions beyond the mere adoption of technology. To

¹ Statistics Denmark, 2025

capture this complexity, we used a modified version of the “Digital Maturity Index and Assessment Tool for the Agricultural Industry” developed by the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO)² to examine digital advancement from four key aspects (see Figure 1). Two of the four aspects relate to the extent to which farms use digital technologies, specifically the use of FMIS and primary-operation PA technologies, while the other two focus on the managerial side of farm digitalization, namely the degree of the farm’s strategic and operational engagement with agricultural digitalization.

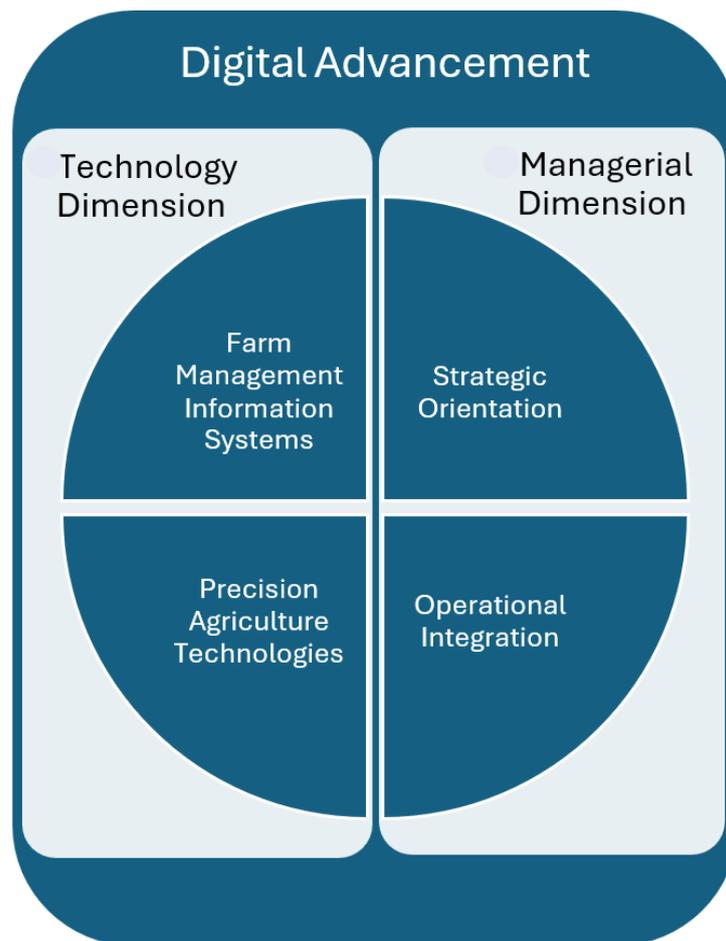


Figure 1: Aspects of Digital Advancement examined in this report

To streamline the questionnaire and ensure that respondents answered questions most relevant to their specific situation, the first part of the survey followed an adaptive design. This meant that respondents received questions tailored to their production type (primarily arable, primarily livestock, or about equal mixed operation) and technology use status. For example, if a respondent indicated that they did not use any FMIS or PA technologies, they were not asked

² Zhang et al., 2019

further questions about operational capabilities or the use of specific technologies, thus avoiding unnecessary or irrelevant items.

In the second section, respondents were asked to evaluate their digital technologies in terms of overall usefulness in supporting farm operations, their contribution to the farm's economic performance and environmental impact, and their ease of use. This provides insights into farmers' experiences with digital technologies and their perceptions of their value.

Respondents were also asked to assess the personal relevance of key barriers to and incentives for adopting digital technologies. These barriers and incentives were derived from a literature review to ensure coverage of the most commonly identified factors in previous research. Analyzing these responses helps to identify practical challenges and opportunities, forming a basis for prioritizing and developing targeted solutions and interventions.

To examine the status of agricultural digitalization and the factors associated with it, we first distinguished between digital adopter and non-adopter farms based on the extent to which surveyed farmers reported using FMIS and primary-operation PA technologies, as well as the degree of data collection on their farms. Based on this classification, we examined which farm and farmer characteristics were associated with (not) being on the digital track. This part of the report offers insight into which types of farms are more or less likely to engage in digitalization, at least at a basic level of adoption.

Next, we took a closer look at the level of digital advancement among the digital adopter farms. For each of the four digitalization aspects, we first conducted a descriptive analysis of the respondents' answers. We then aggregated these responses into digital advancement indicators and used them to explore how various farm characteristics relate to each aspect of digital advancement. Assessing digital advancement from these four angles allows for a more nuanced understanding of how digitalization is integrated across both technological use and managerial practices on the farm. This approach also helps reveal potential discrepancies. For example, certain farms may adopt fewer technologies but still demonstrate a high level of digital maturity through well-developed operational practices or a clear strategic plan.

To strengthen the analysis, the survey data were linked with register data from Statistics Denmark, providing insights into farm and farmer characteristics such as farm type, geographic location, legal structure, economic output, age, education level, and more. In the following section, we describe the sample in detail based on these extracted characteristics.