

Characterising crop farmers' viewpoints on soil management

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Abstract - We categorise Austrian crop farmers' viewpoints on the determinants of their soil management using Q methodology. We identify four distinct groups with diverging motivational priorities: innovative stewards, driven by environmental concerns and innovation; self-reliant environmentalists, sharing a concern for nature and focusing on freedom; nature-distant producers, prioritising food production; and profit maximisers, being motivated by profitability. These group characterisations can inform targeting by extension services and policymakers who wish to incentivise farmers for soil conservation. Farmers are likely to be responsive to different arguments based on their prioritisations. Incentive scheme design should take these variations into account.

INTRODUCTION

Soil degradation is a global problem that is increasingly gaining attention and provoking efforts to foster soil conservation. Farmers are key actors in this respect, inducing policy makers to tailor conservation programs and support for sustainable farming practices. To reach farmers effectively, it is vital to understand their motivations and views on soil management. Research into farmer typologies and farming styles as ways to classify farmer behavior and viewpoints has a long tradition. However, farming styles are often only characterized along a dichotomy of environment vs. business-mindedness, while other types and nuances exist but receive less attention (Walder and Kantelhardt 2018). Moreover, most studies examine farming and environmental practices as a whole and are not targeted to soil management and conservation in particular.

The objective of our study is thus to uncover and define farmers' viewpoints with respect to their soil management, and in particular the factors driving their decisions in this respect. The results can then aid policy makers in designing appropriate soil conservation programs. The research question guiding our study is: *How do crop farmers view the determinants of their soil management?*

METHODS AND DATA

We apply Q methodology, a method that identifies different perspectives on a topic present in a population, and that quantifies this subjectivity through statistical calculations (Watts and Stenner 2012). In Q Methodology, respondents rank statements relat-

ing to a main question by placing them in a quasi-normal distribution (a 'Q sort') according to their level of (dis)agreement. Statistical analysis of the resulting Q sorts works like a 'flipped around' factor analysis. The factors (patterns of similarity) are extracted from a correlation matrix between participants' Q sorts, rotated, and characterized by the Q sorts that define ('load on') the factor. This results in a set of typical statement rankings that each depict a distinct viewpoint or group perspective. The final results are descriptive narratives of these rankings that additionally draw on short post-sorting interviews with respondents.

We interviewed 33 farmers of arable land across the main Austrian crop production areas. They cover a wide variety of farming backgrounds, including dairy, cattle, hog, mixed and cash crop farms; organic as well as conventional farms; full-time and part-time farming; and different regional, age and educational backgrounds. Table 1 lists the 33 statements compiled from literature, interviews and pre-testing, covering the entire discourse on soil management. They comprise the areas 'natural stimuli', 'exogenous contextual stimuli', and 'farm and farmer specific stimuli'. Farmers placed them in response to the question "What influences how you deal with your soil?" in a quasi-normal Q sort distribution ranging from -4 (fully disagree) to +4 (fully agree).

RESULTS

The Q method yielded four different factors or viewpoints on soil management held by the interviewed farmers. These viewpoints were termed *innovative stewards*, *self-reliant environmentalists*, *nature-distant producers* and *profit maximisers*.

The *innovative stewards* factor groups farmers whose view on soil management is determined by their close relationship with nature and keenness to improve their soil management. The farmers sharing this perspective rank all nature-related statements highly and agree strongly that they have a responsibility for future generations when working with the soil, as "[soil and] farm are only borrowed from future generations"². The focus on nature is underlined by the view that the weather is one of the most important determinants of soil use, as are the natural conditions of a plot. In contrast, profitability is relatively unimportant for this viewpoint. Trying new things and making investments, even if expensive or risky, are also relevant aspects of soil management.

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² Quotes in italics are direct quotes from post-sorting interviews.

While the *self-reliant environmentalists* viewpoint is placing a similar emphasis on environmental aspects as the 'innovative stewards', it is distinct in its self-reliance and focus on freedom and pleasure. In particular, these farmers assert that they work together with nature and feel as a part of nature when working with their soil. Quite distinctly, this perspective rejects production of food being a main determinant of soil use – instead, personal enjoyment and the pleasure derived from dealing with the soil give meaning to farming and soil use. Similarly, this perspective values freedom highly and does not see its soil management as influenced by laws or guided by AES. Coordination with neighbors is another non-issue, as is potential gossip by others.

The third perspective on soil management, the *nature-distant producers*, is, in contrast, defined by a productivist attitude together with a focus on traditional values. The nature-distant producers rank virtually all nature-related statements lower than any other factor. Correspondingly, the natural conditions of a plot as well as weather are of little importance to this viewpoint's soil management. What matters is to provide food for society. Distinct from the other viewpoints, the nature-distant producers rely on traditional and passed-down knowledge, in addition to training by professionals. Moreover, the tidiness and neatness of plots are of great importance for this viewpoints' soil management, so that "[a plot] is also attractive for the eye".

The farmers grouped by the *profit maximisers* factor share a business-oriented mindset and a focus on profitability when dealing with their soil. Indeed, they rank the profitability of their farm as the most important determinant of soil management, as "*the soil is important for profitability [...] [and] without profitability you are gone*". In contrast to others, this viewpoint does not disagree that laws and governmental sanctions as well as AES determine their soil management. Nevertheless, they regard natural conditions and nature as essential influences on soil use. The profit maximiser viewpoint is more risk-averse than the other factors and places less importance on the pleasure derived from farming as a driver of soil use than any other viewpoint.

DISCUSSION AND CONCLUSION

The four viewpoints on soil management that we find among Austrian farmers can be linked to previous studies on farming styles and viewpoints, but also show some distinct features. We find that for some farmers, soil management is largely driven by environmental and nature-related concerns, corroborating findings on environmental behavior more broadly. Other views more driven by business-mindedness and the wish to provide food for society exist alongside. Here we see that producing food and economic profitability are two different aspects that define different viewpoints. We do not find societal concerns to strongly determine soil management for any viewpoint, contrasting previous studies.

Further, our results show that farmers' soil management is influenced not only by economic considerations. We therefore suggest policy makers to

broaden their governance portfolio in order to attract or crowd-in different viewpoints, such as focusing on training services or pointing out long-term environmental benefits.

Table 1. List of Q statements

Statements	
1	When dealing with my soil I pay attention to the tidiness and neatness of my plots.
2	I attend training and extension services to learn more about soil tillage.
3	My freedom as a farmer when working with my soil is important to me.
4	When dealing with my soil I avoid expensive investments
5	Traditional and passed-down knowledge determines how I deal with my soil
6	My duty to provide food for society shapes how I deal with my soil
7	How I deal with my soil depends on agri-environmental schemes
8	When dealing with my soil I do not think about nature
9	When dealing with my soil I go by the requirements and expectations of my customers
10	When dealing with my soil I have a responsibility for employees and assisting persons
11	When dealing with my soil I steer nature for my own use
12	When dealing with my soil I want to avoid risks
13	Experiences of colleagues give me guidance for dealing with my soil
14	When dealing with my soil I rely on my own education and experience
15	I coordinate with my neighbors when dealing with my soil
16	When dealing with my soil I take account of the natural conditions of the plot, such as soil quality, slope, etc.
17	When dealing with my soil I feel as a part of nature and its cycles
18	When dealing with my soil I pay attention to my health
19	Dealing with my soil ought to give me pleasure
20	I try new things when dealing with my soil
21	When dealing with my soil I avoid doing things that would make me the subject of gossip
22	The profitability of my farm is top priority for me when dealing with my soil
23	How I deal with my soil is determined by laws and governmental sanction
24	By dealing with my soil I avoid damages by natural influences (e.g., climate change, pests)
25	I would deal with my soil differently if I had more time
26	When dealing with my soil I think about future generations
27	Voluntary programs and schemes are a useful guidance for how I deal with my soil, no matter whether I formally participate
28	The distance between a plot and my farm determines how I deal with my soil
29	The number of years that I will still farm a plot determines how I deal with my soil
30	How I deal with my soil ought not to have any negative impact on my neighborhood
31	I implement expectations of society in how I deal with my soil
32	When dealing with my soil I have a responsibility for nature
33	When dealing with my soil I work together with nature
34	The weather determines how I deal with my soil

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