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Report on Social norms Affecting the Adoption of Sustainable Practices

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Abstract

The transition toward sustainable agricultural and forestry practices is a central policy objective in Europe, yet adoption remains uneven despite the availability of proven solutions. Growing evidence suggests that this gap cannot be explained by economic or technical factors alone, but is also shaped by behavioural mechanisms and social norms embedded in decision-making contexts. This report investigates how different types of social norms influence the adoption of sustainable practices among farmers, foresters, and their advisors.

Using data from a large, multi-country survey conducted within the ForestAgriGreenNudge project, the analysis adopts a behavioural science perspective to examine descriptive, injunctive, personal (internalised), and dynamic social norms, as well as social comparison and norm transmission mechanisms. Beyond conventional norm measures, the report introduces two composite indicators to capture dynamic social norms: the Perceived Norm Momentum Index (PNMI), reflecting perceptions that sustainability is becoming mainstream, and the Early-Adopter Readiness Score (EARS), capturing willingness to adopt practices ahead of prevailing norms.

The results show that personal norms related to moral responsibility, stewardship, and concern for future generations are among the strongest normative drivers across all respondent groups. Descriptive norms and peer legitimacy also play an important role by enhancing confidence and reducing uncertainty, while direct conformity pressure and competitive social comparison are less influential. PNMI varies significantly across professional roles, with farmers and advisors perceiving stronger momentum toward sustainability than foresters. In contrast, early-adopter readiness is broadly distributed across groups and independent of age, gender, and farming experience.

Cluster analysis reveals two distinct dynamic norm profiles: a majority group combining high perceived norm momentum with strong early-adopter readiness, and a substantial minority characterised by lower scores on both dimensions. These profiles cut across demographic characteristics, underscoring the importance of behavioural rather than demographic segmentation.

Overall, the findings demonstrate that social norms influence sustainable practice adoption through differentiated perceptions of momentum, legitimacy, and readiness to act. The report concludes that effective policy and nudging strategies should leverage dynamic social norms, mobilise early adopters as credible messengers, and prioritise behavioural segmentation to accelerate sustainability transitions in agriculture and forestry.

Keywords: *Social norms; Dynamic norms; Sustainable practice adoption; Behavioural segmentation; Green nudges; Agriculture and forestry*

Executive Summary

This deliverable presents the results of a large, multi-country, multi-stakeholder survey conducted within the ForestAgriGreenNudge project, with the aim of analysing how social norms influence the adoption of sustainable practices in agriculture and forestry. Building on the behavioural bias analysis of the previous deliverable, this report shifts the analytical focus toward the social and normative mechanisms shaping decision-making, recognising that sustainability transitions are not only individual choices but collective, socially embedded processes.

Across farmers, foresters, and their advisors, the findings reveal strong environmental awareness and a pronounced sense of personal responsibility for sustainable land management. Personal (internalised) norms—such as moral obligation, stewardship values, and concern for future generations—emerge as the most consistent and powerful normative drivers across all respondent groups. These results suggest that sustainable behaviour is motivated primarily by internalised values and professional ethics, rather than by fear of social disapproval or competitive comparison.

Descriptive norms and norm transmission mechanisms nonetheless play an important enabling role. Respondents report higher confidence in adopting sustainable practices when such practices are visible within their community and when recommendations come from trusted, experienced peers or advisors. Trust in research institutions, advisory services, and experiential proof is particularly high, underscoring the importance of credibility and legitimacy in norm diffusion. By contrast, direct conformity pressure and social comparison are comparatively weak, indicating that respondents value autonomy and independent judgement alongside social learning.

Clear differences emerge across professional roles. Farmers and advisors consistently report stronger influence of descriptive, injunctive, and personal norms than foresters, who display lower sensitivity to most social norm dimensions—particularly dynamic norms and social comparison. These differences reflect variation in institutional context, visibility of practices, and modes of professional accountability, rather than differences in environmental concern. Importantly, substantial heterogeneity exists within each group, highlighting the limits of role-based generalisations.

A central contribution of this report is the explicit operationalisation of dynamic social norms through two composite indicators: the Perceived Norm Momentum Index (PNMI) and the Early-Adopter Readiness Score (EARS). PNMI captures perceptions that sustainable practices are gaining momentum and becoming mainstream, while EARS captures willingness to adopt practices ahead of prevailing norms. The results show that PNMI differs significantly across respondent types, with farmers and advisors perceiving stronger momentum toward sustainability than foresters. In contrast, early-adopter readiness is broadly distributed across all groups and independent of gender, age, and farming experience.

Cluster analysis based on these indices identifies two distinct dynamic norm profiles. A majority of respondents belong to a cluster characterised by high perceived norm momentum and strong early-adopter readiness, indicating readiness to both follow and reinforce sustainability transitions. A substantial minority exhibits lower scores on both dimensions, reflecting a more cautious, norm-dependent orientation. Crucially, cluster membership is not driven by demographic characteristics and only weakly related to professional role, confirming that normative orientation is a behavioural profile rather than a demographic trait.

From a policy and intervention perspective, these findings carry clear implications. Effective green nudges and policy measures should prioritise behavioural segmentation based on social norm profiles,

rather than demographic targeting. Early adopters should be mobilised as credible messengers and demonstration actors across sectors, while more cautious actors require combined approaches that integrate norm-based messaging with economic incentives, risk-reduction tools, and advisory support. Overall, the results demonstrate that social norms influence adoption not as uniform pressures, but through differentiated perceptions of momentum, legitimacy, and readiness to act. Embedding these insights into policy design can significantly enhance the effectiveness, credibility, and social grounding of sustainability transitions in agriculture and forestry.

Table of Contents

List of Figures

‘

List of Tables

Introduction

The transition toward more sustainable agricultural and forestry practices is a central objective of European and international policy agendas, driven by the need to address climate change, biodiversity loss, and long-term degradation of natural resources. Despite the availability of technically viable and economically justified sustainable practices, their adoption across agriculture and forestry remains uneven and often slower than anticipated. This persistent gap suggests that barriers to sustainability cannot be explained solely by structural, technical, or financial constraints, but are also rooted in behavioural and social processes influencing decision-making (Dessart et al., 2019; Swart et al., 2023).

Behavioural research increasingly highlights the role of social norms—shared expectations, values, and perceptions of appropriate behaviour—in shaping individual and collective action. Social norms influence decisions through multiple pathways, including perceptions of what others do (descriptive norms), perceived social approval (injunctive norms), internalised moral obligations (personal norms), and expectations about how behaviours are evolving over time (dynamic norms) (Cialdini et al., 1990; Lapinski & Rimal, 2005; Helferich et al., 2023). In sustainability practices adoption processes, these mechanisms interact with professional identity, peer learning, trust in information sources, and social comparison processes, contributing to both diffusion and inertia in practice adoption (Van Dijk et al., 2016; Qiu et al., 2021).

Within this context, the ForestAgriGreenNudge project aims to integrate behavioural science into the design of policy-relevant interventions that encourage sustainable practices in agriculture and forestry. Building on earlier work that identified key cognitive and motivational biases affecting decision-making, this deliverable focuses specifically on the role of social norms in shaping adoption behaviour among farmers, foresters, and their advisors, in line with established behavioural frameworks such as the Theory of Planned Behaviour (Ajzen, 1991).

The report draws on data from a large, multi-country survey designed to capture multiple dimensions of social norms, including descriptive, injunctive, personal, and dynamic norms, as well as social comparison and norm transmission mechanisms. Emphasis is placed on dynamic social norms, which capture perceptions of behavioural change over time and emerging mainstream practices (Lee & Liu, 2023; Chung & Lapinski, 2024). By systematically analysing these normative dimensions, the report provides an empirical basis for designing targeted, credible, and socially grounded green nudges capable of accelerating sustainability transitions in agriculture and forestry (Shukla et al., 2023; Yoder et al., 2026).

Components of a Conceptual Framework

A conceptual framework on social norms explains how socially shared expectations influence individual decision-making and interact with cognitive, economic, and institutional factors. In sustainability transitions such as the adoption of sustainable agricultural and forestry practices, social norms function as embedded and dynamic mechanisms that shape behaviour within social systems rather than as isolated behavioural drivers (Dessart et al., 2019; Shukla et al., 2023).

Normative Context and Social Environment

The framework is grounded in the normative context in which decisions are made. This context includes cultural values, professional identities (for example, perceptions of "good farming" or "responsible forest management"), historical land-use practices, and dominant narratives related to productivity, stewardship, and innovation. Together, these elements establish reference points that shape which practices are viewed as legitimate, desirable, or inappropriate within a community (Dessart et al., 2019).

Normative contexts are neither uniform nor static. They vary across regions, farming and forestry systems, and social networks, and they are shaped by interactions among farmers, foresters, advisors, cooperatives, markets, and society at large (Van Dijk et al., 2016).

Types of Social Norms

Within this context, different types of social norms influence behaviour through distinct pathways (Cialdini et al., 1990; Helferich et al., 2023). Descriptive norms concern perceptions of what others do and are especially influential when practices are visible and locally embedded, supporting social learning and reducing uncertainty. Injunctive norms reflect perceived social expectations and influence behaviour through anticipated approval or disapproval from relevant reference groups. Dynamic norms signal change over time and are particularly relevant for emerging sustainable practices that are gaining momentum but are not yet dominant (Shukla et al., 2023). Finally, personal norms arise when social expectations are internalized and experienced as moral obligations, forming the most proximal motivational driver of pro-environmental behaviour (Helferich et al., 2023).

Norm Perception, Mediation, and Behavioural Response

Social norms affect behaviour only insofar as they are perceived. Perceptions depend on the visibility of practices, communication channels, social networks, and the credibility of information sources (Lapinski & Rimal, 2005). Through social comparison, individuals assess their own behaviour relative to peers, often seeking legitimacy, belonging, or professional recognition—processes that help explain spatial clustering and diffusion of sustainable practices (Festinger, 1954; Dessart et al., 2019). Importantly, norms rarely translate directly into behaviour. Their effects are mediated through psychological and cognitive mechanisms, including perceptions of risk, confidence, values, and perceived behavioural control. Observing peer adoption can reduce perceived agronomic or financial risk, reinforce positive beliefs about environmental benefits, and strengthen confidence in one's own capacity to adopt new practices (Ajzen, 1991; Qiu et al., 2021).

A central insight from meta-analytic research is that personal norms play a key mediating role. Descriptive and injunctive norms largely influence behaviour indirectly by strengthening internalized moral obligations, which in turn drive pro-environmental intentions and actions (Helferich et al., 2023).

Adoption Outcomes and Norm Dynamics

Adoption is best understood as a dynamic process involving consideration, trial, uptake, persistence, or abandonment rather than a simple binary decision (Dessart et al., 2019). Social norms can accelerate

progression along this pathway but may also reinforce inertia when environmentally harmful practices remain socially dominant.

Feedback loops are therefore integral to the framework. As more farmers or foresters adopt sustainable practices, descriptive and dynamic norms evolve, visibility increases, and incentives for further uptake strengthen. Conversely, weak adoption can stabilize norms that favour conventional practices, slowing sustainability transitions (Helferich et al., 2023).

Evidence from behavioural policy research indicates that social norms alone typically have limited effect sizes when used in isolation. Their effectiveness increases substantially when combined with complementary instruments such as economic incentives, advisory services, skills training, and regulatory frameworks (Shukla et al., 2023).

Effective norm-based interventions should therefore (i) leverage positive descriptive norms where uptake is already substantial, (ii) emphasise dynamic norms for emerging practices, (iii) activate injunctive norms through trusted messengers, and (iv) explicitly support internalization by linking sustainable practices to moral responsibility and professional identity rather than relying solely on external pressure.

Taken together, behavioural science and agricultural economics show that social norms are a central driver of sustainable practice adoption among farmers and foresters. Their influence operates through social expectations, risk reduction, social comparison, and moral internalization. When used strategically and embedded within broader policy mixes, social norms offer a low-cost and socially grounded pathway for accelerating sustainability transitions in agriculture and forestry.

Methodology

Building on the overall methodological framework of the ForestAgriGreenNudge project, this report specifies how social norms and social influence mechanisms are identified and analysed within the surveys' questionnaires. While the general survey design aims to capture a broad set of psychological factors, cognitive biases, and motivational drivers shaping farmers' decisions, the present methodological focus concentrates on the social dimension of decision-making, in line with behavioural and social-norms theory.

The questionnaire-based approach moves beyond purely economic or technical determinants of adoption by embedding social norms within a wider behavioural framework that links individual perceptions, peer influence, and moral responsibility to structural farm characteristics. This is consistent with behavioural science evidence showing that adoption of sustainable agricultural practices is strongly shaped by social context, identity, and normative expectations, rather than by financial incentives alone (Dessart et al., 2019; Shukla et al., 2023).

Social norms are operationalised in the questionnaire through a distributed measurement strategy, whereby normative constructs are embedded across multiple sections rather than isolated into a single block of questions. This approach reflects the understanding that social norms influence behaviour indirectly, through perception, comparison, trust, and internalisation, rather than through overt social pressure (Ajzen, 1991; Helferich et al., 2023). The questionnaire captures four interrelated dimensions of social norms: descriptive norms, injunctive (subjective) norms, personal norms, and social comparison processes. These dimensions are measured using Likert-type items that allow respondents to express degrees of agreement, confidence, and relative standing, facilitating both descriptive analysis and the construction of composite norm indicators.

Descriptive norms, defined as perceptions of what others do, are measured through items assessing the visibility of farming practices and peer behaviour within local communities. Farmers are asked to report how often they consult other farmers for information, whether they observe and consider neighbours' practices when making decisions, and whether seeing others adopt sustainable practices increases their confidence to do the same. Additional items assess willingness to adopt practices once they become common in the area, capturing diffusion and normalisation dynamics (Dessart et al., 2019).

Injunctive (subjective) norms, understood as perceptions of social approval or expectations, are measured more implicitly. Items assess the importance of aligning one's practices with those of neighbours, perceived encouragement or pressure from peers, and trust in advice from advisors, research institutions, and experienced farmers. This indirect operationalisation reflects empirical findings that farmers tend to resist explicit conformity pressure, while remaining sensitive to legitimacy signals and socially endorsed practices (Ajzen, 1991).

A central methodological strength of the questionnaire is the explicit measurement of personal (internalised) norms, which are widely recognised as the most proximal drivers of pro-environmental behaviour. These norms are captured through items assessing moral responsibility, emotional responses to missed opportunities for environmental protection, and identity-based statements linking farming to stewardship, community well-being, and long-term environmental care.

Identity and belonging items allow examination of how strongly respondents associate farming with who they are, their sense of membership in the farming community, and their self-perception as environmentally responsible farmers. This design enables analysis of moral internalisation processes through which social norms become self-enforced motivations rather than externally imposed rules (Helferich et al., 2023).

Social comparison mechanisms are measured explicitly through items that ask respondents to evaluate their own environmental behaviour and values relative to other farmers in their area. These questions capture upward and downward comparison processes that can motivate behavioural change through concern about falling behind peers or through pride in performing better, without relying on coercive pressure. Trust-related items complement norm measurement by identifying who functions as a legitimate reference group or norm carrier. Trust in advisors, researchers, NGOs, and neighbouring farmers is assessed to determine which actors are most influential in shaping normative beliefs. Willingness to adopt or recommend practices only after personal or peer success further captures conditional norm diffusion and reciprocity, which are central to socially grounded adoption pathways (Shukla et al., 2023).

Social norm variables are analysed alongside adoption intentions, motivational drivers, and evaluations of nudging strategies. Likert-scale items are examined individually and, where conceptually appropriate, aggregated into indices representing descriptive norms, injunctive norms, personal norms, and social comparison. Comparative questions distinguishing respondents' own motivations from those attributed to "other farmers" allow identification of self–other asymmetries, which are particularly relevant for the design of norm-based nudges. Rather than treating social norms as isolated predictors, the analytical strategy explicitly examines their interaction with cognitive biases (e.g. risk aversion, status quo bias) and with structural farm characteristics. This integrated approach supports the design of nudging strategies that leverage social proof, peer visibility, and moral identity while avoiding excessive social pressure and preserving farmers' sense of autonomy (Dessart et al., 2019; Helferich et al., 2023).

This deliverable report results from the multi-stakeholder survey performed in the previous task of the 3rd work package of the project. Table 1 summarize the farmers, foresters and their advisors that took part in the surveys while figure 1 graphically presents the methodological approach of this report

The sample consists of 437 respondents with a predominantly male representation (65.0%), while 33.0% identified as female; a small proportion of responses (2%) were missing. In terms of marital status, most respondents were married (66.1%), followed by single respondents (24.5%), and a smaller share who were divorced (7.1%).

The respondents' mean age was 47.5 years (SD = 14.4), indicating a mature sample with substantial professional experience. This is further reflected in the reported mean agricultural and forestry experience of 19.5 years (SD = 14.75), suggesting that most participants possess long-term engagement in their respective sectors.

Educational attainment was relatively high, with nearly three quarters of respondents holding at least a bachelor's degree. Specifically, 30.0% had a bachelor's degree, while 44.4% held a Master's or PhD, indicating a well-qualified sample. Lower and upper secondary education accounted for 5.3% and 14.2% of respondents respectively, while 5.7% reported college-level education.

Regarding professional activity, farmers comprised the largest group (37.8%), followed by farm advisors (30.2%), foresters (23.8%), and forest advisors (8.2%), ensuring representation of both practitioners and advisory professionals.

The respondents were geographically diverse, representing 11 countries. The largest shares were from Greece (21.3%), Portugal (18.1%), Finland (15.3%), and Lithuania (14.0%), followed by Serbia (8.2%), the United Kingdom (6.9%), and Tunisia (4.1%). Smaller proportions originated from Poland, Spain, Sweden, Slovenia, and other countries.

Overall, the sample reflects a highly experienced, well-educated, and professionally diverse group of respondents, providing a strong empirical basis for analysing perceptions and attitudes related to agriculture, forestry, and environmental management.

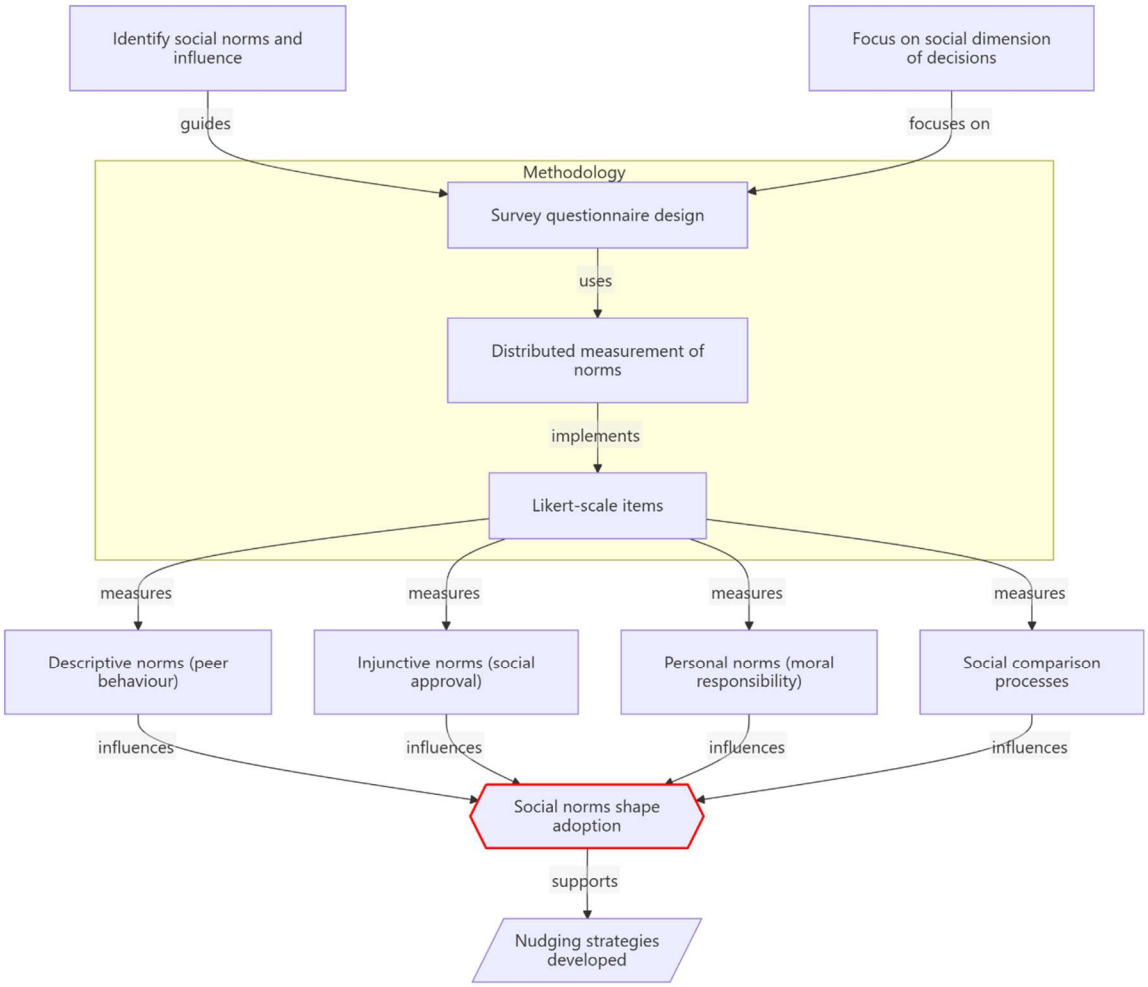

***Figure 1**: The methodological approach*

Table 1 Respondents' Basic demographic variables

Respondents' Demographic	Responses	
Gender	*count*	*percentage*
Male	284	65.0
Female	144	33.0
Missing	9	2.%
Marital Status	*count*	*percentage*
Married	289	66.1
Divorced	31	7.1
Single	107	24.5
Missing	10	2.3
Age	*Mean*	*SD*
Age (Mean) in years	47.5	14.4
Farming Experience	*Mean*	*SD*
Mean agricultural / forest experienc in years	19.50	14.75
Education	*count*	*percentage*
Lower Secondary	23	5.3
Upper Secondary	62	14.2
College	25	5.7
Bachelor	131	30.0
MSc or Phd	194	44.4
Missing	2	
Activity	*count*	*percentage*
Farmers	165	37.8
Farm Advisors	132	30.2
Foresters	104	23.8
Forest Advisors	36	8.2
Country of activity	*count*	*percentage*
Greece	93	21.3
Portugal	79	18.1
Finland	67	15.3
Lithuania	61	14
Serbia	36	8.2
UK	30	6.9
Tunisia	18	4.1
Poland	17	3.9
Spain	13	3
Sweden	10	2.3
Slovenija	7	1.6
Other	6	1.3

Exploring Respondents' Perceptions and Attitudes

Respondents were asked to evaluate a series of 16 different perceptions compared to their peers (see Table 2). Table 2 presents respondents' self-perceptions relative to their peers regarding farming identity, environmental responsibility, and sustainable farming practices. Overall, the positive mean values across all items indicate that respondents generally perceive themselves as being more environmentally responsible and sustainability-oriented than other farmers in their local context.

The highest mean scores are observed for perceptions related to the farm as an agricultural ecosystem interacting with neighbouring landscapes (Mean = 0.867), the appropriate use of plant protection products (Mean = 0.850), biodiversity management (Mean = 0.818), and enabling organic carbon formation in soils and biomass (Mean = 0.799). These findings suggest strong awareness of environmental stewardship and ecosystem management responsibilities among respondents.

Moderately high scores are also reported for personal responsibility to protect the environment (Mean = 0.745), implementation of soil management plans (Mean = 0.730), and water management practices (Mean = 0.672). In contrast, lower mean values are observed for farming identity and community belonging, including "Being a farmer is an important reflection of who I am" (Mean = 0.380) and "I have a strong sense of belonging to the farming community" (Mean = 0.280).

The standard deviations, ranging approximately from 1.20 to 1.36, indicate substantial variation among respondents in how they position themselves relative to peers. Overall, the results suggest a tendency toward positive self-assessment in environmental attitudes and sustainable farming behaviours compared to other farmers in the same local context.

In this way respondents tend to position themselves slightly above their peers across most perception items, as indicated by consistently positive mean values. The strongest comparative positioning is observed for perceptions related to ecosystem thinking and management responsibilities, such as viewing the farm as an interacting agro-ecosystem, managing biodiversity, applying appropriate plant protection practices, and supporting soil, water, carbon, and energy management. These results suggest a broadly shared perception of heightened environmental awareness and responsibility relative to others in the local context.

Identity-related items, such as seeing farming as a core reflection of personal identity and feeling a strong sense of belonging to the farming community, show more moderate positive means, indicating weaker differentiation from peers on social identity dimensions. Similarly, willingness to prioritise environmental protection even at the expense of economic growth exhibits comparatively lower mean values, suggesting greater caution regarding trade-offs between environmental and economic objectives.

The relatively large standard deviations across all items indicate substantial heterogeneity in respondents' comparative perceptions, highlighting that while the overall tendency is positive, views vary considerably within the sample. This variability supports subsequent analyses aimed at identifying distinct perception profiles rather than assuming a uniform stance across respondents.

Table 2 Respondents' Perceptions

Perceptions compared to other peers:	N	Mean	Std. Dev.
Being a farmer is an important reflection of who I am	424	0.380	1.207
I have a strong sense of belonging to the farming community	421	0.280	1.325
I perceive that the ecology of the farm is what farming is about	420	0.650	1.287
I see myself as a farmer who prioritises the environment	421	0.606	1.254
My farming practices have an impact on the environment	421	0.561	1.272
It is my personal responsibility to help protect the environment.	420	0.745	1.311
It is important to me to protect the environment even if it slow down economic growth of my farming activities.	419	0.420	1.309
The well-being of the community depends on the preservation the environment	419	0.597	1.331
It is important to continuously assess the environmental an social impact of my farm	420	0.664	1.303
I perceive that my farm is an agricultural ecosystem that interact with neighbouring landscapes.	421	0.867	1.264
I perceive that biodiversity should be managed to enable i protection and enhancement	418	0.818	1.323
I perceive that I should manage energy consumption of m farming activities	419	0.654	1.342
I perceive that I should enable the formation of organic carbon soils and in biomass	417	0.799	1.327
I perceive that I should apply a soil management plan to improv and optimize soil health	419	0.730	1.293
I perceive that I should apply a water management plan t improve and optimize water use and quality	414	0.672	1.275
I perceive that plant protection products and other treatment should be applied appropriately and as recommended.	419	0.850	1.355
Valid N (listwise)	388		

Values range from Much less than others (-3) to much more than others (3)
*Likert scale with values, -3, -1, 0,1,3**
*This scale reflects respondents' self-assessed positioning relative to their peers in the same local context, with negative values indicating a perception of being less aligned than others, zero indicating similarity to peers, and positive values indicating a perception of being more aligned than others.

Tables A1 and A2 in the appendix presents an Anova analysis of perceptions by the type of respondents. This analysis of perceptions by respondent type reveals both shared orientations and statistically meaningful differences in how farmers, farm advisors, foresters, and forest advisors position themselves relative to others in their local context. Overall, most respondent groups tend to place themselves slightly above the local average on environmental responsibility and sustainable management perceptions, although the strength and consistency of this positioning varies across occupational roles.

Farmers display relatively strong positive perceptions across most environmental responsibility and management-related items. They report higher-than-average positioning in terms of personal responsibility for environmental protection, prioritisation of the environment even at the expense of economic growth, and recognition of the links between environmental preservation and community well-being. Farmers also score positively on ecosystem-based perceptions of farming and on practical measures such as soil, water, carbon, and plant protection management. These patterns suggest a comparatively strong integration of environmental considerations into both identity and practice. Several of these differences are statistically significant, particularly for personal responsibility, prioritisation of environmental protection, and management-related practices.

Farm advisors consistently report positive positioning across nearly all perception items, often matching or exceeding farmers on ecosystem-based views, biodiversity management, energy management, and the assessment of environmental and social impacts. They also show relatively strong identification with environmental responsibility, although their farming identity is less pronounced. The ANOVA results indicate significant differences between respondent types for many of these items, suggesting that farm advisors occupy a distinct role as environmentally oriented professionals who emphasise management planning and systemic perspectives rather than identity-based attachment to farming.

Foresters generally report lower or more moderate comparative perceptions, particularly on items related to personal responsibility, prioritisation of environmental protection over economic growth, and the perceived importance of management interventions such as soil, water, and carbon management. In some cases, mean values for foresters are close to zero, indicating alignment with rather than differentiation from peers. Despite this, foresters still express positive perceptions regarding the ecological nature of land management and biodiversity protection. The statistically significant differences observed in several items suggest that foresters adopt a more restrained or institutionally embedded environmental stance, less framed in terms of individual responsibility.

Forest advisors occupy an intermediate position between advisors and foresters. They tend to report positive perceptions regarding ecosystem interactions, biodiversity management, and appropriate application of treatments, while showing weaker differentiation on identity-related and value-based items. Although sample sizes are smaller, forest advisors generally position themselves as moderately more engaged in environmental management than their peers, without strongly emphasising moral responsibility or professional identity.

The results indicate that occupation explains part of the variation in environmental perceptions, particularly with respect to management practices and personal responsibility. Farmers and farm advisors tend to express stronger comparative positioning on both value-based and practice-oriented dimensions, whereas foresters and forest advisors show more moderate or selective differentiation. However, the presence of significant within-group variation and overlapping confidence intervals suggests that professional role alone does not fully determine perception profiles, supporting the relevance of the following cluster-based analysis.

In the next stage of the analysis the respondents' attitudes are examined. Respondents were asked to evaluate a series of attitudes towards farming management sustainability and in general environmental approaches (see table 3). The results indicate a generally balanced profile combining cautious decision-making with a strong orientation toward learning and environmental concern. Respondents report moderate levels of risk aversion and path dependency, as reflected in their reluctance to try unproven practices and their tendency to change management systems only when positive outcomes are expected. At the same time, respondents display a relatively strong managerial locus of control, endorsing the view that outcomes are primarily the result of good management rather than luck, while external factors such as weather are acknowledged but not fully dominant.

Attitudes toward sustainability are notably positive. Understanding sustainable practices receives the highest mean score, and respondents also report discomfort when missing opportunities to protect the environment, indicating a substantive level of environmental awareness and moral engagement. In contrast, social comparison with peers regarding environmental performance evokes weaker emotional responses, suggesting that environmental action is driven more by internal motivation than by competitive or normative pressure. Overall, the standard deviations indicate considerable variability across respondents, supporting the relevance of further analyses to identify distinct attitudinal profiles within the sample.

Table 3: Respondents'' Attitudes

Attitudes	N	Mean	Std. Dev.
I never try anything that might not work	428	2.94	1.381
I'm using the same production methods over years	419	2.74	1.286
I reckon 'good luck' doesn't exist: 'luck' is good manageme and 'bad luck' poor management.	426	3.43	1.197
Although good management requires some training, experienc and reading, the ability to manage is mainly determined b genes.	427	2.33	1.250
When the farm has shown poor yield, this is due t circumstances totally out of my control.	425	2.67	1.193
In local communities it's easy for a hard-working and dedicate individual to have an impact in getting changes for the bette	424	3.37	1.127
I seldom change my management and production system unless I'm sure the change will be positive.	425	3.24	1.146
When things go wrong this is often due to events beyond m control (e.g. bad weather).	425	3.02	1.139
It bothers me when I think that other farmers are helping prote environment more than me	426	2.36	1.252
It is important that I understand sustainable practices	423	4.14	.987
It bothers me when I miss an opportunity to help protecting th environment	427	3.50	1.219
Valid N (listwise)	403		

Likert scale with values, 1 to 5
Values range from Not at all true of me (1) to Extremely true of me (5)

Table 3 presents respondents' attitudes toward risk, management practices, personal control, and environmental responsibility. Overall, the findings indicate a relatively cautious approach to decision-making, combined with strong recognition of the importance of sustainable practices and personal management responsibility.

Respondents reported high agreement with statements related to understanding sustainable practices (Mean = 4.14) and feeling concerned when missing opportunities to protect the environment (Mean = 3.50), suggesting strong pro-environmental attitudes. High mean values were also observed for beliefs that farming success depends primarily on good management rather than luck (Mean = 3.43) and that individuals can positively influence change within local communities (Mean = 3.37).

At the same time, respondents demonstrated relatively risk-averse attitudes. Many indicated that they seldom change production systems unless they are confident the outcome will be positive (Mean = 3.24), while moderate agreement was also found for statements such as “I never try anything that might not work” (Mean = 2.94) and continued use of the same production methods over time (Mean = 2.74). These findings suggest a tendency toward cautious adoption behaviour and preference for proven practices.

Perceptions of external control were moderate, with respondents acknowledging that poor yields or farming problems may result from circumstances beyond their control, such as weather conditions. Lower agreement was observed for the belief that management ability is mainly determined by genes (Mean = 2.33) and for concerns about other farmers doing more for environmental protection (Mean = 2.36).

Overall, the results indicate that respondents combine strong environmental awareness and confidence in management with relatively cautious and risk-sensitive decision-making patterns. An analysis of variance (ANOVA) was conducted to examine differences in attitudes across four respondent types: farmers, farm advisors, foresters, and forest advisors. The results (see table A3 and A4 in the appendix) indicate that respondent type significantly influences several attitude dimensions, particularly those related to locus of control, social comparison, and environmental concern, while other attitudes appear to be broadly shared across groups. Statistically significant differences were identified for attitudes reflecting the extent to which respondents attribute outcomes to factors beyond their control.

For the statement “When the farm has shown poor yield, this is due to circumstances totally out of my control”, the ANOVA revealed a significant effect of respondent type ($F = 3.69$, $p = .012$). Farmers reported higher agreement with this statement compared to foresters, indicating a stronger tendency to attribute negative outcomes to uncontrollable external factors. A similar pattern emerged for the statement “When things go wrong this is often due to events beyond my control (e.g. bad weather)”, where differences across groups were also statistically significant ($F = 2.65$, $p = .049$). These findings suggest that farmers perceive themselves as more exposed to external risks and uncertainties, which is consistent with the highly variable and weather-dependent conditions of agricultural production. In contrast, foresters appear to express a relatively stronger internal locus of control.

No statistically significant differences were observed regarding beliefs about managerial ability being genetically determined ($p = .111$), indicating a broadly shared view across all respondent types that management competence is not primarily innate.

The strongest group differences were observed for the item “It bothers me when I think that other farmers are helping protect the environment more than me”. The ANOVA results show a highly significant effect of respondent type ($F = 8.06$, $p < .001$). Farmers reported the highest levels of discomfort, while foresters reported the lowest. This pattern suggests that farmers experience greater social comparison and normative pressure regarding environmental performance, likely due to the higher visibility of farming practices within local communities. In contrast, foresters may experience less peer-comparison pressure because environmental protection is more closely embedded in formal institutional mandates rather than informal social expectations.

Significant differences were also found for attitudes directly related to environmental engagement and sustainability learning. The importance attributed to understanding sustainable practices differed significantly across groups ($F = 4.34$, $p = .005$), with forest advisors and farm advisors reporting the highest mean scores. This result reflects their professional role as knowledge brokers and intermediaries in sustainability transitions.

Similarly, the statement “It bothers me when I miss an opportunity to help protecting the environment” showed significant variation by respondent type ($F = 5.98$, $p < .001$). Advisors again exhibited higher levels of concern, while foresters displayed comparatively lower emotional sensitivity. This may indicate that, for foresters, environmental protection is perceived as a routine and structural part of professional practice rather than an optional or episodic action.

No statistically significant differences were found for attitudes related to perceived capacity for change in local communities ($p = .547$) or cautious decision-making regarding management changes ($p = .136$). These results suggest that beliefs in gradual change and precautionary management are shared across respondent types, indicating a common attitudinal foundation irrespective of professional role.

Overall, the ANOVA results demonstrate that respondent type selectively shapes attitudes, particularly in relation to perceived control over outcomes, social norms, and environmental moral engagement. Farmers show stronger external attribution and social comparison effects, while advisors display the highest levels of sustainability-related concern and learning orientation. At the same time, several attitudes—especially those related to managerial caution and perceived agency in communities—appear to be broadly consistent across all groups.

Additionally, the findings presented in Table 3 provide a critical insight into a commonly observed phenomenon in sustainability transitions: the gap between the urgency of environmental challenges and the actual pace of adoption of sustainable practices. While respondents demonstrate strong environmental awareness – evidenced by high agreement with the importance of understanding sustainable practices (Mean = 4.14) and concern when missing opportunities to protect the environment (Mean = 3.50) – their behavioural orientation remains consistently cautious and risk-sensitive. In particular, the relatively high agreement with the statement that they seldom change management practices unless they are confident of positive outcomes (Mean = 3.24), alongside moderate agreement with avoiding practices that might not work (Mean = 2.94), reflects a preference for gradual, evidence-based change rather than rapid transformation. This suggests the presence of an implicit norm of precaution and stepwise change, whereby change is expected to be slow, monitored, and contingent on proven results.

Such an “in-built” cautious attitude can act as a structural barrier to accelerating sustainability transitions, even when alternative practices are technically effective and environmentally necessary. The coexistence of strong pro-environmental values with reluctance to adopt unproven innovations indicates that the challenge is not a lack of motivation, but rather a mismatch between perceived risk and urgency. This is further reinforced by moderate external attribution patterns (e.g. weather-related uncertainty), which heighten risk perceptions and justify conservative decision-making. Consequently, even highly effective sustainable solutions may face delayed uptake if they are perceived as uncertain or insufficiently validated.

These findings underscore the importance of addressing this “gradualism bias” through targeted interventions. Policies and nudges should not only highlight environmental urgency but also reduce perceived uncertainty and accelerate confidence-building, for example through demonstration projects, peer-validated evidence, and staged implementation pathways. Without such mechanisms, the prevailing precautionary mindset is likely to continue slowing down the rate of change relative to the scale and immediacy of environmental degradation.

Exploring Respondents' Social Norms

The survey was designed to identify and analyse different types of social norms influencing the attitudes and decision-making of farmers, foresters, and their advisors regarding sustainable practices. Building on behavioural and social-norms theory, the questionnaire examined how social influence, peer interactions, trust, moral responsibility, and community identity shape the adoption of sustainable agricultural and forestry practices. See the table 4 overleaf were the methodological approach regarding the used social norms in the survey.

The survey adopted a multidimensional approach to social norms, recognising that behavioural decisions are not driven solely by economic or technical considerations, but are also strongly influenced by social context and interpersonal relationships. To capture these dynamics, the questionnaire measures several interconnected types of social norms across different thematic sections.

Descriptive norms are assessed through questions examining perceptions of what others commonly do, including the visibility of sustainable practices within local communities and the extent to which respondents observe and discuss farming decisions with peers. Injunctive or subjective norms focus on perceived social approval, expectations, and peer pressure related to adopting sustainable practices, as well as trust in information provided by neighbours, NGOs, and research institutions.

The survey also examines personal or internalised norms, which reflect moral responsibility, environmental identity, and stewardship values. These questions explore respondents' feelings of responsibility toward environmental protection, concern for future generations, and emotional responses to missed opportunities for environmental action. In addition, dynamic norms are investigated by assessing respondents' sensitivity to emerging trends and changing practices within their communities, particularly the willingness to adopt practices that become increasingly common or socially recognised.

Social comparison processes constitute another important dimension of the survey. Respondents are asked to evaluate their own environmental behaviour and farming identity relative to other farmers and foresters, allowing examination of self–other comparisons, belonging to the farming community, and perceptions of relative environmental performance.

Finally, the questionnaire explores norm transmission and legitimacy by identifying which actors are considered credible and influential sources of information. Particular emphasis is placed on trust, reciprocity, and peer learning, including the influence of neighbours and practitioners with direct experience of sustainable practices. The survey also considers resistance to conformity and the extent to which respondents value autonomy in decision-making, even when their choices differ from prevailing community practices.

This part of the analysis provides a comprehensive framework for understanding how multiple forms of social norms interact with attitudes, trust, identity, and behavioural intentions in the context of sustainable agriculture and forestry.

Table 4: Social Type and relevant question items

Social norm type	Conceptual Focus	Relevant Variables	Questionnaire section
Descriptive norms	Perceptions of what others do; visibility and prevalence of practices	I often consider my neighbours' farming practices when deciding on my own I feel more confident adopting a sustainable practice if I see others in my community doing the same I would adopt a sustainable practice if it became the most common practice in my area I often discuss farming practices with other farmers in my community I prefer to adopt practices that are common in my community	Social Comparison:
Injunctive (subjective) norms	Perceived approval, expectations, or social pressure	It is important for me that my farming practices align with those of my neighbours I would feel pressured to adopt a new practice if most of my farming peers encourage it	Social Comparison
		I trust advice from Non-Government Organizations on sustainable practice I trust advice from Research /academic centres on sustainable practices	Trust and reciprocity
Personal (internalised) norms	Moral obligation, responsibility, and environmental identity	It bothers me when I miss an opportunity to help protecting the environment	Attitudes
		It is my personal responsibility to help protect the environment. It is important to me to protect the environment even if it slows down economic growth of my farming activities.	Perceptions compared to others
		Responsible to protect the environment Proud to leave a healthy, productive farm for future generations	Emotional Motives
Dynamic norms	Sensitivity to norm change and emerging practices	I would adopt a sustainable practice if it became the most common practice in my area	Social Comparison
		I am willing to adopt a sustainable practice even without a future income increase.	Status Quo Bias
		Highlighting / Sharing collective achievements of farmer groups or cooperatives that have adopted sustainable practices	Nudges
Social comparison		It bothers me when I think that other farmers are helping protect environment more than me	Attitudes

	Self–other evaluation and relative standing	Being a farmer is an important reflection of who I am I have a strong sense of belonging to the farming community	Perceptions compared to others
Norm transmission & legitimacy	Who acts as credible norm carrier	I would adopt a sustainable practice recommended by a neighbour who has already implemented it successfully I am more likely to trust sustainable farming advice from someone who has personally benefited from it. I will recommend a sustainable practice to my neighbour only if I have already implemented it successfully	Trust and reciprocity
Resistance to conformity *(counter-norm)	Autonomy vs. social pressure	I am willing to try a sustainable practice even if no one else in my community does	Social Comparison

The following tables 5A to 5G present respondents' perceptions across different dimensions of social norms related to sustainable farming practices. Overall, the findings indicate moderate to relatively strong influence of social interaction, environmental responsibility, and peer legitimacy on behavioural intentions, while direct conformity pressure appears less influential.

Table 5A shows that descriptive norms are moderately strong (average index Mean = 3.28), suggesting that respondents are influenced by what other farmers in their community do. Farmers reported frequent discussions with peers about farming practices (Mean = 3.65) and greater confidence in adopting sustainable practices when others in the community have already adopted them (Mean = 3.48). However, respondents were less likely to prefer practices simply because they are common in the community (Mean = 3.06).

Table 5B presents injunctive (subjective) norms, with an average index of 3.27. Respondents showed relatively low agreement that their practices should align with neighbours' practices (Mean = 2.76), indicating limited direct conformity pressure. At the same time, trust in research and academic centres was high (Mean = 3.84), while trust in NGOs was more moderate (Mean = 2.91). Importantly, respondents expressed willingness to try sustainable practices even if others in the community do not (Mean = 3.61), suggesting relatively independent decision-making.

Personal (internalised) norms in Table 5C recorded some of the highest scores among all norm categories (average index Mean = 3.46). Respondents strongly agreed that protecting the environment is their personal responsibility (Mean = 3.57) and expressed particularly high agreement with leaving a healthy and productive farm for future generations (Mean = 4.20). These findings indicate strong moral and stewardship-oriented motivations underpinning sustainable behaviour.

Table 5D examines dynamic norms, reflecting sensitivity to changing practices and emerging social trends. Respondents were generally positive toward sustainability-related collective achievements and social learning processes (Mean = 3.69). The overall dynamic norms index (Mean = 3.10) suggests moderate openness to evolving community norms and practices.

Social comparison norms (Table 5E) showed comparatively lower scores (average index Mean = 2.78). While respondents reported relatively strong farming identity (Mean = 3.32) and sense of belonging to the farming community (Mean = 3.23), they were less concerned about whether other farmers protect the environment more than they do (Mean = 2.36). This suggests that environmental behaviour may be driven more by personal responsibility than by competitive comparison with peers.

Table 5F demonstrates that norm transmission and legitimacy are particularly important factors (average index Mean = 3.71). Respondents strongly trusted recommendations from neighbours or individuals who had already successfully implemented sustainable practices. The highest agreement was recorded for recommending practices to others only after successful personal implementation (Mean = 3.79), highlighting the importance of experiential knowledge, peer credibility, and reciprocity in the diffusion of sustainable practices.

Finally, Table 5G shows relatively high resistance to conformity or "counter-norm" orientation (Mean = 3.61). Respondents indicated willingness to adopt sustainable practices even if no one else in their community does so, suggesting that autonomy and independent judgement coexist alongside social influence mechanisms.

These results indicate that farmers, foresters, and their advisors are influenced by peer visibility, trusted experience, and internalised environmental responsibility, while remaining relatively resistant to direct social pressure and conformity.

Table 5A: Descriptive norms

	N	Min	Max	Mean	Std. Dev
I often consider my neighbors' farming practices when deciding on my own	420	1	5	3.23	1.072
I feel more confident adopting sustainable practice if I see others in my community doing the same	418	1	5	3.48	0.957
I would adopt a sustainable practice if it became the most common practice in my area	416	1	5	3.08	1.012
I often discuss farming practices with other farmers in my community	414	1	5	3.65	0.961
I prefer to adopt practices that are common in my community	414	1	5	3.06	0.969
Descriptive norms (average index)	**422**	**1.33**	**5.00**	**3.28**	**0.695**

Table 5B: Injunctive (subjective) norms

	N	Min	Max	Mean	Std. Dev
It is important for me that my farming practices align with those of my neighbours	417	1	5	2.76	0.976
I am willing to try a sustainable practice even if no one else in my community does	416	1	5	3.61	0.963
I trust advice from Non-Government Organizations on sustainable practices	417	1	5	2.91	1.019
I trust advice from Research /academic centres on sustainable practices	416	1	5	3.84	0.883
Injunctive (subjective) norms (average index)	**424**	**1.0**	**5.0**	**3.27**	**0.615**

Table 5C: Personal (internalised) norms

	N	Min	Max	Mean	Std. Dev
It bothers me when I miss an opportunity to help protecting the environment	427	1	5	3.50	1.219
It is my personal responsibility to help protect the environment.	420	1	5	3.57	0.936
It is important to me to protect the environment even if it slows down economic growth of my farming activities.	419	1	5	3.32	0.968
Responsible to protect the environment	403	1	5	3.92	1.139
Proud to leave a healthy, productive farm for future generations	403	1	5	4.20	1.045
Personal (internalised) norms (average index)	**430**	**1.00**	**5.00**	**3.457**	**0.958**

Table 5D: Dynamic norms

	N	Min	Max	Mean	Std. Dev
I am willing to try a sustainable practice even if no one else in my community does	416	1	5	3.61	0.963
Highlighting / Sharing collective achievements of farmer groups or cooperatives that have adopted sustainable practices (Nudge that could work for me)	402	1	5	3.69	1.279
Dynamic norms (average index)	**420**	**1.00**	**5.00**	**3.10**	**0.8179**

Table 5E: Social comparison norms

	N	Min	Max	Mean	Std. Dev
It bothers me when I think that other farmers are helping protect environment more than me	426	1	5	2.36	1.252
Being a farmer is an important reflection of who I am	424	1	5	3.32	0.896
I have a strong sense of belonging to the farming community	421	1	5	3.23	0.998
Social comparison (average index)	**430**	**1.00**	**5.00**	**2.783**	**0.941**

Table 5F: Norm transmission & legitimacy

	N	Min	Max	Mean	Std. Dev
I would adopt a sustainable practice recommended by a neighbour who has already implemented it successfully	416	1	5	3.63	0.902
I am more likely to trust sustainable farming advice from someone who has personally benefited from it.	415	1	5	3.72	0.892
I will recommend a sustainable practice to my neighbour only if I have already implemented it successfully	416	1	5	3.79	0.893
Norm transmission & legitimacy (average index)	**418**	**1.67**	**5.00**	**3.71**	**0.679**

Table 5G: Resistance to conformity - counter norm

	N	Min	Max	Mean	Std. Dev
I am willing to try a sustainable practice even if no one else in my community does **Resistance to conformity (average index)**	**416**	**1.00**	**5.00**	**3.61**	**0.962**

Table 6 presents the results of the ANOVA analysis examining differences in social norm dimensions among four respondent groups: farmers, farm advisors, foresters, and forest advisors. The analysis reveals statistically significant differences across all social norm categories, indicating that perceptions and attitudes toward sustainability-related social norms vary according to respondent type. More specifically, the results indicate that farmers and advisors generally exhibit stronger social norm influences, environmental responsibility, and peer-related interactions than foresters, who consistently reported lower scores across most norm dimensions. The findings also suggest that advisors, particularly forest advisors, are highly responsive to social and normative processes related to sustainable practices.

Table 6: Social Norms Anova Analysis by type of Respondents

		N	Mean	Std. Error	Min	Max	Anova F	Sig.
Descriptive norms	Farmers	162	3.25	0.06	1.33	5	6.766	0.000
	Farm Advisors	131	3.43	0.05	1.5	5		
	Foresters	94	3.06	0.07	1.5	5		
	Forest Advisors	35	3.52	0.10	2.17	5		
	Total	422	3.28	0.03	1.33	5		
Injunctive (subjective) norms	Farmers	162	3.33	0.05	1.3	4.8	7.712	0.000
	Farm Advisors	132	3.32	0.05	1.8	5		
	Foresters	95	3.02	0.07	1	4.5		
	Forest Advisors	35	3.49	0.09	2.3	4.8		
	Total	424	3.27	0.03	1	5		
Personal (internalised) norms	Farmers	164	3.58	0.07	1.33	5	7.682	0.000
	Farm Advisors	131	3.57	0.06	1	5		
	Foresters	99	3.06	0.13	1	5		
	Forest Advisors	36	3.57	0.12	1.67	5		
	Total	430	3.46	0.05	1	5		
Dynamic norms	Farmers	161	3.27	0.06	1	5	13.492	0.000
	Farm Advisors	131	3.25	0.06	1.5	5		
	Foresters	93	2.71	0.08	1	5		
	Forest Advisors	35	2.80	0.15	1	4		
	Total	420	3.10	0.04	1	5		
Social comparison	Farmers	165	3.02	0.06	1.33	5	44.080	0.000
	Farm Advisors	131	3.09	0.06	1.67	5		
	Foresters	98	1.95	0.11	1	5		
	Forest Advisors	36	2.86	0.11	1.67	4.67		
	Total	430	2.78	0.05	1	5		
Norm transmission & legitimacy	Farmers	160	3.74	0.06	1.67	5	3.694	0.012
	Farm Advisors	130	3.81	0.06	1.67	5		
	Foresters	94	3.51	0.06	2	5		
	Forest Advisors	34	3.73	0.10	2.33	5		
	Total	418	3.71	0.03	1.67	5		
Resistance to conformity	Farmers	160	3.79	0.07	1	5	3.809	0.010
	Farm Advisors	129	3.46	0.08	1	5		
	Foresters	92	3.48	0.11	1	5		
	Forest Advisors	35	3.71	0.13	2	5		
	Total	416	3.61	0.05	1	5		

For descriptive norms, significant differences were identified among groups ($F = 6.766$, $p < 0.001$). Forest advisors (Mean = 3.52) and farm advisors (Mean = 3.43) reported the highest levels of influence

from peer practices and community behaviour, whereas foresters reported the lowest scores (Mean = 3.06). Farmers showed moderate levels of descriptive norm influence (Mean = 3.25).

Similarly, injunctive (subjective) norms differed significantly across respondent groups ($F = 7.712$, $p < 0.001$). Forest advisors recorded the highest mean score (Mean = 3.49), followed by farmers and farm advisors (Means = 3.33 and 3.32 respectively), while foresters again reported the lowest score (Mean = 3.02). These findings suggest that foresters perceive lower levels of social approval or peer expectations regarding sustainable practices.

Significant differences were also observed for personal (internalised) norms ($F = 7.682$, $p < 0.001$). Farmers, farm advisors, and forest advisors all reported similarly high levels of moral responsibility and environmental stewardship (Means ≈ 3.57–3.58), whereas foresters showed substantially lower scores (Mean = 3.06).

The strongest group differences emerged for dynamic norms ($F = 13.492$, $p < 0.001$) and social comparison norms ($F = 44.080$, $p < 0.001$). Farmers and farm advisors showed relatively high openness to changing community practices and sustainability-related social trends (Means ≈ 3.25–3.27), while foresters and forest advisors reported lower scores. In terms of social comparison, farmers and farm advisors again reported the highest scores (Means = 3.02 and 3.09 respectively), whereas foresters reported notably lower levels (Mean = 1.95), indicating weaker tendencies toward self-evaluation relative to peers.

Norm transmission and legitimacy also differed significantly across groups ($F = 3.694$, $p = 0.012$). Farm advisors recorded the highest trust in peer recommendations and experiential knowledge (Mean = 3.81), followed closely by farmers and forest advisors, while foresters again reported comparatively lower scores (Mean = 3.51).

Finally, resistance to conformity showed significant variation among groups ($F = 3.809$, $p = 0.010$). Farmers demonstrated the strongest willingness to adopt sustainable practices independently of peer behaviour (Mean = 3.79), whereas farm advisors and foresters showed slightly lower levels of independent decision-making.

Capturing Dynamic Social Norms

While traditional measures of social norms often focus on static perceptions of peer behaviour or perceived social approval, recent behavioural research highlights the importance of dynamic social norms—that is, perceptions of how behaviours are changing over time and which practices are likely to become dominant in the future. Dynamic norms are particularly relevant in the context of sustainability transitions, where adoption decisions are shaped not only by current practices but also by expectations about emerging trends and future sectoral trajectories.

To capture these dynamics more effectively, the present analysis complements direct survey items with two constructed indicators derived from multiple questionnaire variables: the Perceived Norm Momentum Index and the Early-Adopter Readiness Score. These indices move beyond single-item measures and allow a more nuanced assessment of how farmers relate to evolving social norms, distinguishing between those who respond primarily to emerging collective trends and those who are willing to act ahead of established norms.

The Perceived Norm Momentum Index reflects farmers' perceptions that sustainable practices are gaining ground and are likely to represent the future mainstream of agricultural practice. By combining indicators related to sensitivity to collective uptake, openness to future adoption, and responsiveness to collective achievements, this index captures the extent to which farmers view sustainability as an expanding social norm rather than a marginal or temporary deviation. High values on this index indicate alignment with perceived sectoral momentum and suggest receptiveness to interventions that emphasise trend growth, diffusion, and collective progress.

In contrast, the Early-Adopter Readiness Score captures a complementary but distinct aspect of dynamic norms: the willingness to adopt sustainable practices before they become widely established. This index identifies farmers who are less dependent on social proof and more strongly motivated by internalised norms, autonomy, and innovation orientation. Rather than following emerging norms, these actors contribute to their formation by acting as pioneers and potential demonstration farmers. High scores on this index indicate readiness to engage in early adoption and to play an active role in norm diffusion within local farming communities.

Together, these two indices allow the analysis to distinguish between trend followers and trend setters within the farming population. This distinction is analytically important, as it enables a more targeted interpretation of adoption intentions and supports the design of differentiated nudging strategies—ranging from dynamic-norm messaging that highlights growing uptake to peer-led interventions that leverage early adopters as credible exemplars. By operationalising dynamic social norms in this way, the report provides a more forward-looking understanding of how social change unfolds in agricultural sustainability transitions.

Methodological Approach for Constructing Dynamic Social Norm Indices

Dynamic social norms refer to perceptions and expectations regarding how behaviours are evolving over time, rather than static assessments of what others currently do or approve of. In the context of sustainability transitions, such norms are particularly important, as adoption decisions are often influenced by beliefs about future trajectories, emerging mainstream practices, and the role of early adopters in shaping change. Given that dynamic norms are not directly observable through single survey items, they were operationalised in this study through the construction of two composite indicators: the Perceived Norm Momentum Index and the Early-Adopter Readiness Score.

Both indices were derived analytically from existing questionnaire variables, following a theory-driven approach grounded in behavioural and social-norms literature. This approach allows dynamic norms to be captured as latent constructs reflecting patterns across multiple items, rather than relying on isolated questions, which may inadequately represent the temporal and forward-looking nature of norm change.

Perceived Norm Momentum Index

The Perceived Norm Momentum Index captures the extent to which farmers perceive sustainable practices as increasingly prevalent and likely to become the dominant norm in the near future. (See more details Lee, & Liu, 2023; Chung & Lapinski, 2024). Methodologically, this index was constructed by combining variables that reflect sensitivity to collective uptake, openness to future adoption, and responsiveness to signals of collective progress. Specifically, the index integrates (i) agreement with statements indicating willingness to adopt practices once they become common in the local context, (ii) stated adoption intentions even without a future income increase, and (iii) positive evaluation of nudges that highlight collective achievements of farmer groups or cooperatives.

To ensure conceptual coherence, all constituent items were measured on compatible Likert-type scales and standardised prior to aggregation. Where appropriate, items reflecting resistance to change (e.g. strong satisfaction with current practices) were reverse-coded so that higher index values consistently represent stronger perceived momentum toward sustainability. This index operationalises dynamic norms as perceived directional change, capturing whether farmers interpret sustainability as an emerging mainstream trajectory rather than a marginal or temporary phenomenon.

Table 7: Perceived Norm Momentum Index

Relevant Variables	Conceptual contribution to index
I would adopt a sustainable practice if it became the most common practice in my area	Sensitivity to emerging majority behaviour
I am willing to adopt a sustainable practice even without a future income increase.	Forward-looking openness to transition
Highlighting / sharing collective achievements of farmer groups or cooperatives	Responsiveness to collective momentum
I am satisfied with my current farming practices	Resistance to change (reverse-coded)
I avoid trying new farming practices	Inertia / status quo orientation (reverse-coded)

Early-Adopter Readiness Score

The Early-Adopter Readiness Score captures a complementary dimension of dynamic norms by identifying farmers who are willing to adopt sustainable practices before such practices become socially dominant. Methodologically, this index focuses on autonomy from social proof and the presence of strong internal motivations that enable individuals to act ahead of collective norms.

The score was constructed by aggregating items that reflect (i) willingness to adopt sustainable practices even in the absence of peer uptake, (ii) lower hesitation to experiment with new methods, and (iii) strong personal norms related to environmental responsibility and stewardship. Items indicating reliance on social proof or fear of standing out were reverse-coded, ensuring that higher values represent greater readiness to act independently of prevailing norms. As with the momentum index, all items were standardised prior to aggregation, and internal consistency checks were performed. The

resulting score identifies farmers who are potential norm pioneers, capable of initiating behavioural change that later diffuses through descriptive and dynamic norm mechanisms.

Table 8: Early-Adopter Readiness Score

Relevant Variables	Conceptual contribution to index
I am willing to try a sustainable practice even if no one else in my community does	Independence from social proof
It is my personal responsibility to help protect the environment	Internalised moral obligation
Responsible to protect the environment	Moral motivation
I am willing to try a new farming practice to protect the environment	Readiness to act despite risk
I am hesitant to try a sustainable practice even if no one else in my community does	Reduced reliance on peer validation (willing to try / reversed coded)
It bothers me when I think that other farmers are helping protect environment more than me	Lower fear based comparison (reversed coded)

Methodologically, the two indices were designed to be analytically distinct yet complementary. The Perceived Norm Momentum Index captures responsiveness to emerging collective trends ("following the curve"), whereas the Early-Adopter Readiness Score captures willingness to shape those trends ("creating the curve").

By constructing these indices, the analysis could be moved beyond static norm measures and provides a forward-looking understanding of how farmers position themselves within sustainability transitions. This approach supports more targeted interpretation of results and enables the design of differentiated nudging strategies—such as dynamic-norm messaging for trend-responsive farmers and peer-led demonstration approaches for early adopters—while remaining consistent with established behavioural science principles.

Table 9: Perceived Norm Momentum Index (PNMI) and Early-Adopter Readiness Score (EARS) indexes

Dynamic Social Indexes	N	Min	Max	Mean	Std. Dev
PNMI	430	1.60	4.80	3.36	0.527
EARS	432	1.80	5.00	3.59	0.590

In the next part of the analysis two one-way Anova analyses were performed on the calculated indexes by the type of respondents.

The Perceived Norm Momentum Index (PNMI) shows moderate to relatively high values across all respondent groups, indicating an overall perception that sustainable practices are gaining momentum within the agriculture and forestry sectors (see Table 10).

Farm advisors report the highest average PNMI score (Mean = 3.49, SD = 0.43), followed closely by farmers (Mean = 3.43, SD = 0.55). Forest advisors also display relatively high momentum perceptions (Mean = 3.34, SD = 0.43). In contrast, foresters exhibit a noticeably lower mean PNMI score (Mean = 3.09, SD = 0.54), suggesting weaker perceptions of sustainability as an emerging mainstream norm in the forestry context. Confidence intervals further support these differences. The 95% confidence

interval for foresters (2.99–3.20) does not overlap substantially with those of farmers or farm advisors, indicating a systematically lower perception of norm momentum in this group. Overall PNMI values range from 1.60 to 4.80, reflecting meaningful heterogeneity in perceptions across individuals.

A one-way analysis of variance (ANOVA) was conducted to test whether PNMI differs significantly across the four respondent groups (farmers, farm advisors, foresters, and forest advisors). The results indicate a statistically significant difference in PNMI scores between groups. This finding confirms that perceptions of emerging social norms around sustainability are not uniform across actor groups. The magnitude of between-group variance (SS = 9.99) relative to within-group variance (SS = 109.06) suggests that professional role and sectoral context play an important role in shaping perceptions of norm momentum.

Table 10: Descriptive statistics and one-way ANOVA results for the Perceived Norm Momentum Index (PNMI) across respondent groups

		N	Mean	Std. Error	Min	Max	Anova F	Sig.
Perceived Norm Momentum Index (PNMI)	Farmers	164	3.42	0.043	1.60	4.80	13.006	0.000
	Farm Advisors	132	3.49	0.037	2.20	4.40		
	Foresters	99	3.09	0.054	1.60	4.50		
	Forest Advisors	35	3.34	0.073	2.40	4.00		
	Total	430	3.36	0.025	1.60	4.80		

Taken together, these results indicate that actors closer to advisory and agricultural innovation systems (farm advisors and farmers) perceive stronger momentum toward sustainable practices, whereas foresters exhibit weaker perceptions of such momentum. This pattern is consistent with the idea that exposure to policy signals, peer adoption, and collective initiatives differs across sectors and professional roles. From a behavioural perspective, the findings imply that dynamic-norm-based interventions—such as messages emphasising increasing uptake or collective progress—may resonate more strongly with farmers and farm advisors than with foresters. In the latter group, additional efforts may be required to strengthen perceptions of sectoral transition and emerging mainstream practices.

The Early-Adopter Readiness Score (EARS) exhibits relatively high mean values across all respondent groups, indicating a generally strong willingness to adopt sustainable practices independently of prevailing social norms (Table 11). Overall, the mean EARS score across the full sample is 3.59 (SD = 0.59), with observed values ranging from 1.80 to 5.00, suggesting substantial individual-level heterogeneity.

Forest advisors report the highest average EARS score (Mean = 3.76, SD = 0.45), followed by foresters (Mean = 3.61, SD = 0.74) and farmers (Mean = 3.58, SD = 0.59). Farm advisors display a slightly lower mean (Mean = 3.53, SD = 0.48), though differences between groups are modest. Confidence intervals across all groups show considerable overlap, indicating broadly similar levels of early-adopter readiness among farmers, foresters, and advisory actors. Notably, foresters show the largest dispersion in scores, as reflected in the highest standard deviation, pointing to greater diversity in early-adopter orientations within this group.

The ANOVA conducted to examine whether EARS differs significantly across the four respondent groups. The analysis indicates no statistically significant differences in early-adopter readiness between groups The relatively small between-group sum of squares (SS = 1.53) compared to within-group

variation (SS = 148.50) suggests that early-adopter readiness is largely an individual-level characteristic rather than a role- or sector-specific attribute.

The absence of statistically significant group differences indicates that early-adopter readiness is broadly shared across farmers, foresters, and advisors, regardless of professional role. This contrasts with the PNMI results, which showed clear group differences in perceptions of emerging norm momentum. Together, these findings suggest that while actors differ in how strongly they perceive sustainability as an emerging mainstream norm, their capacity and willingness to act ahead of norms is comparatively uniform.

From a behavioural perspective, this pattern implies that potential norm pioneers exist across all groups, including among foresters who otherwise perceive weaker sectoral momentum. Consequently, interventions aiming to leverage early adopters—such as demonstration farms, peer-to-peer learning, or pilot programmes—can be designed cross-sectorally, without being restricted to specific professional categories.

Table 11: Descriptive statistics and one-way ANOVA results for the Early-Adopter Readiness Score (EARS) across respondent groups

		N	Mean	Std. Error	Min	Max	Anova F	Sig.
Early-Adopter Readiness Score (EARS)	Farmers	164	3.58	0.046	2.00	5.00	1.471	0.222
	Farm Advisors	132	3.53	0.042	2.50	5.00		
	Foresters	100	3.61	0.074	1.80	5.00		
	Forest Advisors	36	3.76	0.075	2.83	4.83		
	Total	432	3.59	0.029	1.80	5.00		

As part of the analysis, a cluster analysis was conducted based on the dynamic social indices calculated in the previous stage. A two-cluster solution was identified based on the Perceived Norm Momentum Index (PNMI) and the Early-Adopter Readiness Score (EARS). These two indices were used as input variables to classify respondents according to their orientation toward dynamic social norms related to the adoption of sustainable practices. Cluster 1 comprises 68.5% of the sample (n = 293), while cluster 2 comprises 31.5% of the sample (n = 135) (See table 12). The clustering results highlight a structural distinction within the population between respondents who are ready to engage proactively in sustainability transitions and those who remain dependent on stronger social or institutional signals. Importantly, this distinction is not driven by a single dimension of social norms but by the joint configuration of perceived norm momentum and early-adopter readiness.

Table 12: Respondents' clusters created on indexes of the Perceived Norm Momentum Index (PNMI) Early-Adopter Readiness Score (EARS)

Cluster	Label	Size (%)	PNMI (Mean)	EARS (Mean)
1	Norm-Responsive Followers / Early Movers	68.5	3.56	3.87
2	Cautious / Norm-Dependent Adopters	31.5	2.92	2.99

The relatively large size of Cluster 1 indicates that the majority of respondents share a common normative profile, while Cluster 2 represents a substantial minority with a distinct orientation toward dynamic norms.

Respondents in Cluster 1 exhibit high scores on both dynamic norm indices, with particularly strong values on the Early-Adopter Readiness Score. This profile indicates individuals who are not only sensitive to emerging social trends toward sustainability but are also willing to adopt sustainable practices even before they become widespread. The combination of high PNMI and high EARS suggests that this group perceives sustainability as an emerging mainstream trajectory and is simultaneously ready to act ahead of established norms. These respondents can therefore be characterised as norm-responsive actors with early-adopter tendencies, who are likely to both follow and reinforce dynamic norm change. From a policy and behavioural perspective, this cluster represents a strategic leverage group: its members are receptive to dynamic-norm messaging (e.g. highlighting increasing uptake) and are also suitable candidates for demonstration activities, peer-to-peer diffusion, and pilot programmes.

Cluster 2 is characterised by consistently lower scores on both PNMI and EARS. Respondents in this group perceive weaker momentum toward sustainability and display lower readiness to adopt practices ahead of their peers. This profile suggests a more cautious and norm-dependent orientation, where adoption decisions are likely to depend on stronger evidence of widespread uptake, institutional endorsement, or economic reassurance. These respondents are less inclined to act as early adopters and may require clearer signals that sustainable practices are becoming socially and economically safe choices. For this group, interventions based solely on dynamic-norm messaging may be insufficient. Instead, combined approaches - integrating economic incentives, risk-reduction tools, advisory support, and simplification nudges - are likely to be more effective.

These findings reinforce the analytical value of treating dynamic social norms as a two-dimensional construct, distinguishing between perceptions of collective change and individual willingness to act ahead of that change.

The next step of the analysis was to perform a crosstabulation among the two clusters created and the types of respondents. The distribution of respondents across the two dynamic social norm clusters varies by respondents' type (Table 13). Overall, Cluster 1—characterised by higher levels of perceived norm momentum and early-adopter readiness—includes 68.5% of respondents, while 31.5% belong to Cluster 2, which exhibits lower scores on both indices. Among farmers, 71.2% are classified in Cluster 1 and 28.8% in Cluster 2, indicating that a clear majority of farmers belong to the norm-responsive and early-moving group. A similar pattern is observed among farm advisors, though with a slightly smaller share in Cluster 1 (64.4%) and a larger proportion in Cluster 2 (35.6%).

Foresters show a more balanced distribution, with 63.3% in Cluster 1 and 36.7% in Cluster 2. This aligns with earlier findings indicating weaker perceptions of norm momentum among foresters, despite comparable levels of early-adopter readiness. In contrast, forest advisors are overwhelmingly concentrated in Cluster 1 (85.7%), with only 14.3% assigned to Cluster 2, suggesting a particularly strong orientation toward dynamic social norms within this group.

To formally assess whether cluster membership differs by respondents type, a Pearson chi-square test was conducted. The results indicate a marginally non-significant association between actor type and cluster membership ($\chi 2(3)=7.61, p=.055$). The absence of a strong and unequivocal statistical association suggests that dynamic social norm profiles are not strictly determined by professional role, although certain tendencies are evident. In particular, advisory actors—especially forest advisors—are

more likely to belong to the high-momentum, early-adopter cluster, whereas foresters and farm advisors display greater heterogeneity.

These findings reinforce the conclusion that dynamic social norm orientations cut across respondents types, rather than being confined to specific professional categories. While advisory roles are somewhat more strongly represented in the norm-responsive cluster, a substantial share of farmers and foresters also exhibit high readiness to engage in sustainability transitions.

Table 13: Distribution of dynamic social norm clusters by respondents.

Type of respondents	Count	Cluster 1 Norm Responsive Followers / Early Movers	Cluster 1 Cautious / Norm Dependent Adopters	Total
Farmers	Count	**116**	**47**	163
	% within farmers	71.2%	28.8%	100.0%
Farm Advisors	Count	**85**	**47**	132
	% within Farm Advisors	64.4%	35.6%	100.0%
Foresters	Count	**62**	**36**	98
	% within Foresters	63.3%	36.7%	100.0%
Forest Advisors	Count	**30**	**5**	35
	% within Forest Advisors	85.7%	14.3%	100.0%
Total	Count	293	135	428
	% within respondents	68.5%	31.5%	100.0%

Note: $\chi 2(3)=7.61$, $p=.055$

From a behavioural perspective, this pattern underscores the importance of segmentation based on normative profiles rather than actor categories alone. Dynamic-norm-based interventions—such as peer demonstrations, collective achievement messaging, or early-adopter recognition—can therefore be designed to operate across sectors, while still recognising that advisory actors may play a particularly influential role as norm amplifiers and credible messengers.

The distribution of respondents across the two dynamic social norm clusters is highly similar across gender groups (Table 14). Among male respondents, 67.5% belong to Cluster 1 and 32.5% to Cluster 2. Female respondents show an almost identical pattern, with 69.2% classified in Cluster 1 and 30.8% in Cluster 2. Overall, Cluster 1 includes 68.1% of the sample, while 31.9% are assigned to Cluster 2, confirming that the relative size of the clusters is consistent across genders. A Pearson chi-square test was conducted to assess whether cluster membership differs by gender ($\chi 2(1)=0.13, p=.720$). The results indicate no statistically significant association between gender and cluster membership

These findings indicate that dynamic social norm orientations are not gender-specific. Both male and female respondents are equally likely to belong to the cluster characterised by higher perceived norm

momentum and early-adopter readiness, as well as to the more cautious, norm-dependent cluster. From a behavioural perspective, this result reinforces the conclusion that dynamic social norms operate across demographic lines, rather than being driven by gender differences. Consequently, segmentation strategies based on dynamic norm profiles should prioritize normative orientation and behavioural readiness over demographic characteristics such as gender.

Table 14: Distribution of dynamic social norm clusters by gender.

Gender	Count	Cluster 1 Norm Responsive Followers / Early Movers	Cluster 2 Cautious / Norm Dependent Adopters	Total
Male	Count	**187**	**90**	277
	% within Male	67.5%	32.5%	100.0%
Female	Count	**99**	**44**	143
	% within Female	69.2%	30.8%	100.0%
Total	Count	**286**	**134**	420
	% within Gender	68.1%	31.9%	100.0%

Note: $\chi 2(1)=0.129$, $p=.720$

Taken together, the absence of gender differences in cluster membership contrasts with the marginal variation observed across actor types, suggesting that professional context may matter more than demographic characteristics in shaping dynamic social norm perceptions. However, even across actor types, dynamic norm profiles remain broadly distributed, underscoring the cross-cutting nature of social norms in sustainability transitions.

Table 15 presents descriptive statistics for age and farming experience across the two dynamic social norm clusters. The mean age of respondents in Cluster 1 is 47.21 years (SD = 13.87), compared to 47.85 years (SD = 15.33) in Cluster 2. Confidence intervals for the two clusters largely overlap (Cluster 1: 45.60–48.82; Cluster 2: 45.21–50.49), indicating very similar age distributions. Overall, the sample has a mean age of 47.41 years, suggesting that both clusters represent comparable life-cycle stages. Similarly, farming experience shows only minor differences between clusters. Respondents in Cluster 1 report an average of 19.56 years of experience (SD = 14.02), while those in Cluster 2 report 20.61 years (SD = 16.15). Confidence intervals again overlap substantially, and the overall mean experience is approximately 19.9 years.

One-way ANOVA tests were conducted to assess whether age and farming experience differ significantly between the two clusters. For age, the analysis reveals no statistically significant difference between clusters ($F(1,418)=0.18$, $p=.673$) Similarly, no statistically significant difference is observed for farming experience ($F(1,414)=0.46$, $p=.497$). In both cases, the between-group variance is negligible compared to within-group variance, indicating that cluster membership is not associated with respondents' age or length of farming experience.

These results indicate that dynamic social norm profiles are independent of age and farming experience. Both younger and older farmers, as well as less and more experienced practitioners, are equally likely to belong to the cluster characterised by higher perceived norm momentum and early-adopter readiness, or to the more cautious, norm-dependent cluster.

Together with the absence of significant differences by gender and the only marginal association with actor type, these findings reinforce the conclusion that dynamic social norm orientations cut across demographic and career-stage characteristics. Adoption-relevant norm profiles therefore reflect behavioural and perceptual differences rather than structural or life-cycle factors.

From a policy and intervention perspective, this implies that age- or experience-based targeting is unlikely to be effective for norm-based nudging strategies. Instead, segmentation should prioritise normative orientation and readiness for change, as captured by PNMI and EARS, rather than demographic characteristics.

Table 15: Descriptive statistics and one-way ANOVA results for the Early-Adopter Readiness Score (EARS) across respondent groups

		N	Mean	Std. Error	Min	Max	Anova F	Sig.
Age	Cluster 1 Norm Responsive Followers / Early Movers	288	47.21	0.817	21	84	0.178	0.673
	Cluster 2 Cautious / Norm Dependent Adopters	132	47.85	1.334	21	93		
	Total	420	47.41	0.699	21	93		
Farming experience (in years)	Cluster 1 Norm Responsive Followers / Early Movers	282	19.555	0.835	0	60	0.462	0.497
	Cluster 2 Cautious / Norm Dependent Adopters	134	20.606	1.395	0	80		
	Total	416	19.894	0.722	0	80		

Summary and practical Recommendations

The combined analysis of the Perceived Norm Momentum Index (PNMI), the Early-Adopter Readiness Score (EARS), and the cluster results provides a nuanced understanding of how social norms shape the adoption of sustainable practices. The results clearly indicate that perceptions of emerging social norms (PNMI) and readiness to act ahead of those norms (EARS) capture distinct but complementary dimensions of behavioural change.

PNMI varies significantly across actor groups, with farmers and advisory actors perceiving stronger momentum toward sustainability than foresters. This suggests that exposure to policy signals, peer adoption, and collective initiatives influences how strongly sustainability is perceived as an emerging mainstream norm. In contrast, EARS does not differ significantly across groups, gender, age, or farming experience, indicating that the capacity and willingness to act as an early adopter is broadly distributed across the population rather than concentrated in specific demographic or professional categories.

The cluster analysis reinforces this distinction. A majority of respondents belong to a cluster characterised by both high perceived norm momentum and high early-adopter readiness, while a substantial minority exhibits lower scores on both dimensions. Importantly, cluster membership is only weakly associated with actor type and not associated with gender, age, or experience, underscoring that dynamic social norm orientations are behavioural profiles rather than demographic traits. Taken together, these findings highlight that sustainability transitions are shaped not simply by who actors are, but by how they perceive social change and position themselves within it.

The results suggest that policy and nudging strategies should be segmented according to dynamic social norm profiles rather than demographic characteristics:

- **Leverage the norm-responsive and early-moving majority**

The largest cluster combines strong perceptions of emerging norm momentum with high early-adopter readiness. This group is particularly receptive to interventions that highlight increasing uptake, collective achievements, and positive peer examples. Policies that make progress visible—such as showcasing adoption rates, demonstration farms, or cooperative success stories—can both reinforce existing momentum and accelerate diffusion through peer-to-peer mechanisms.

- **Support the cautious, norm-dependent minority with combined instruments**

The smaller cluster displays weaker perceptions of momentum and lower readiness to act ahead of peers. For this group, norm-based messaging alone is unlikely to be sufficient. More effective strategies combine clear economic incentives, risk-reduction tools, advisory support, and simplified decision aids with gradual norm reinforcement, reducing uncertainty while signalling that change is becoming socially and institutionally supported.

- **Avoid demographic targeting; prioritise behavioural segmentation**

Given the absence of significant differences by gender, age, and farming experience, targeting interventions based on demographic characteristics is unlikely to yield strong results. Instead, behavioural segmentation using PNMI and EARS offers a more precise and policy-relevant approach, enabling differentiated strategies that align with how actors perceive and engage with social change.

- **Early adopters as norm amplifiers across sectors**

Since early-adopter readiness is present across all actor groups, early adopters can be mobilised as credible messengers and demonstration actors in both agriculture and forestry. Peer-led initiatives that empower these actors can help transform individual readiness into collective norm shifts.

In summary, the findings demonstrate that social norms influence adoption not as uniform pressures, but through differentiated perceptions of momentum and readiness to act. Recognising and leveraging these dynamic norm profiles allows policy makers to design more targeted, efficient, and socially grounded interventions to support sustainability transitions.

Conclusions

This report provides a comprehensive behavioural analysis of how social norms shape the adoption of sustainable practices in agriculture and forestry, drawing on a large, multi-country survey of farmers, foresters, and their advisors. Moving beyond purely economic or technical explanations, the analysis demonstrates that adoption-relevant behaviour is strongly influenced by socially embedded perceptions, moral responsibility, peer legitimacy, and dynamic expectations about change.

Across the sample, respondents exhibit generally strong environmental awareness and a high degree of internalised responsibility for sustainable land management. Personal (internalised) norms emerge as one of the most robust normative dimensions, indicating that moral obligation, stewardship values, and concern for future generations constitute a key motivational foundation for sustainability-oriented behaviour. In contrast, direct conformity pressure and competitive social comparison play a more limited role, suggesting that adoption decisions are not driven by fear of social sanctions but by confidence, legitimacy, and internal commitment.

The analysis of different social norm types reveals clear differences across professional roles. Farmers and advisors tend to report stronger descriptive, injunctive, and personal norm influences than foresters, who consistently display lower norm scores—particularly for dynamic norms and social comparison. These differences reflect variation in institutional context, visibility of practices, and exposure to peer learning rather than fundamental differences in environmental concern. Importantly, despite these group-level differences, substantial within-group heterogeneity persists, underscoring the limitations of role-based generalisations.

A key contribution of the report is the operationalisation of dynamic social norms through two composite indicators: the Perceived Norm Momentum Index (PNMI) and the Early-Adopter Readiness Score (EARS). The results show that while perceptions of emerging momentum toward sustainability differ significantly across respondent types—being weakest among foresters—early-adopter readiness is remarkably consistent across groups. This indicates that the capacity to act ahead of prevailing norms is widely distributed, even in contexts where perceptions of sectoral transition remain weak.

The cluster analysis reinforces this insight by identifying two distinct dynamic norm profiles: a majority group characterised by both high perceived momentum and high early-adopter readiness, and a substantial minority displaying lower scores on both dimensions. Cluster membership is not significantly associated with gender, age, or farming experience and only weakly related to professional role. This finding demonstrates that dynamic social norm orientations are behavioural profiles rather than demographic or life-cycle traits.

From a policy and intervention perspective, these findings have important implications. First, they show that norm-based strategies should not rely on uniform messaging or demographic targeting. Instead, behavioural segmentation based on normative orientation provides a more effective and equitable basis for intervention design. Second, the presence of early adopters across all groups suggests strong potential for peer-led diffusion mechanisms, such as demonstration activities, mentoring, and experiential knowledge exchange. Third, for more cautious and norm-dependent actors, norm-based nudges should be combined with economic incentives, risk-reduction instruments, and advisory support to lower perceived uncertainty and reinforce legitimacy.

Overall, the findings demonstrate that social norms influence the adoption of sustainable practices not as uniform pressures but through differentiated perceptions of momentum, legitimacy, and readiness

to act. By explicitly accounting for these dynamic norm profiles, policy makers and practitioners can design more targeted, credible, and socially grounded interventions. This evidence base directly supports the next stages of the ForestAgriGreenNudge project, informing the development and testing of green nudges that are sensitive to behavioural diversity and capable of accelerating sustainability transitions in agriculture and forestry.

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Appendix 1

Table A1: Perception descriptives by respondent type

Perceptions compared to others		N	Mean	Std. Error	Min	Max
Being a farmer is an important reflection of who I am	Farmers	164	0.159	0.1091	-3.00	3.00
	Farm Advisors	129	0.721	0.0914	-1.00	3.00
	Foresters	95	0.221	0.1091	-3.00	3.00
	Forest Advisors	36	0.583	0.1457	.00	3.00
	Total	424	0.380	0.0586	-3.00	3.00
I have a strong sense of belonging to the farming community	Farmers	162	0.315	0.1045	-3.00	3.00
	Farm Advisors	129	0.426	0.1116	-3.00	3.00
	Foresters	95	0.105	0.1292	-3.00	3.00
	Forest Advisors	35	0.057	0.2748	-3.00	3.00
	Total	421	0.280	0.0646	-3.00	3.00
I perceive that the ecology of the farm is what farming is about	Farmers	162	0.833	0.1133	-3.00	3.00
	Farm Advisors	129	0.457	0.1015	-3.00	3.00
	Foresters	94	0.617	0.1153	-3.00	3.00
	Forest Advisors	35	0.600	0.2290	-3.00	3.00
	Total	420	0.650	0.0628	-3.00	3.00
I see myself as a farmer who prioritises the environment	Farmers	162	0.796	0.0995	-3.00	3.00
	Farm Advisors	128	0.586	0.0958	-3.00	3.00
	Foresters	95	0.326	0.1470	-3.00	3.00
	Forest Advisors	36	0.556	0.1929	-3.00	3.00
	Total	421	0.606	0.0611	-3.00	3.00
My farming practices have an impact on the environment	Farmers	160	0.600	0.1164	-3.00	3.00
	Farm Advisors	129	0.581	0.1037	-3.00	3.00
	Foresters	96	0.438	0.1126	-3.00	3.00
	Forest Advisors	36	0.639	0.1789	-3.00	3.00
	Total	421	0.561	0.0620	-3.00	3.00
It is my personal responsibility to help protect the environment.	Farmers	162	0.994	0.1096	-3.00	3.00
	Farm Advisors	128	0.773	0.1030	-3.00	3.00
	Foresters	94	0.319	0.1267	-3.00	3.00
	Forest Advisors	36	0.639	0.2294	-3.00	3.00
	Total	420	0.745	0.0640	-3.00	3.00
It is important to me to protect the environment even if it slows down economic growth of my farming activities.	Farmers	162	0.654	0.1091	-3.00	3.00
	Farm Advisors	127	0.347	0.0983	-3.00	3.00
	Foresters	94	0.128	0.1437	-3.00	3.00
	Forest Advisors	36	0.389	0.2042	-3.00	3.00
	Total	419	0.420	0.0639	-3.00	3.00
The well-being of the community depends on the preservation of the environment	Farmers	161	0.721	0.1017	-3.00	3.00
	Farm Advisors	129	0.767	0.1081	-3.00	3.00
	Foresters	94	0.202	0.1479	-3.00	3.00
	Forest Advisors	35	0.457	0.2403	-3.00	3.00
	Total	419	0.597	0.0650	-3.00	3.00
It is important to continuously assess the environmental and social impact of my farm	Farmers	162	0.747	0.1074	-3.00	3.00
	Farm Advisors	128	0.852	0.1047	-3.00	3.00
	Foresters	95	0.263	0.1307	-3.00	3.00
	Forest Advisors	35	0.686	0.2237	-3.00	3.00
	Total	420	0.664	0.0636	-3.00	3.00
	Farmers	162	0.877	0.0998	-3.00	3.00

I perceive that my farm is an agricultural ecosystem that interacts with neighbouring landscapes.	Farm Advisors	129	1.039	0.1081	-1.00	3.00
	Foresters	95	0.621	0.1323	-3.00	3.00
	Forest Advisors	35	0.857	0.2096	-3.00	3.00
	Total	421	0.867	0.0616	-3.00	3.00
I perceive that biodiversity should be managed to enable its protection and enhancement	Farmers	162	0.920	0.1072	-3.00	3.00
	Farm Advisors	128	1.008	0.1084	-1.00	3.00
	Foresters	92	0.391	0.1365	-3.00	3.00
	Forest Advisors	36	0.778	0.2186	-3.00	3.00
	Total	418	0.818	0.0647	-3.00	3.00
I perceive that I should manage energy consumption of my farming activities	Farmers	161	0.770	0.1062	-3.00	3.00
	Farm Advisors	129	1.000	0.1050	-1.00	3.00
	Foresters	93	0.183	0.1426	-3.00	3.00
	Forest Advisors	36	0.111	0.2137	-3.00	3.00
	Total	419	0.654	0.0656	-3.00	3.00
I perceive that I should enable the formation of organic carbon in soils and in biomass	Farmers	159	1.076	0.1073	-3.00	3.00
	Farm Advisors	129	0.938	0.1116	-3.00	3.00
	Foresters	93	0.258	0.1314	-3.00	3.00
	Forest Advisors	36	0.472	0.1889	-3.00	3.00
	Total	417	0.799	0.0650	-3.00	3.00
I perceive that I should apply a soil management plan to improve and optimize soil health	Farmers	162	0.994	0.0997	-3.00	3.00
	Farm Advisors	129	1.062	0.1043	-1.00	3.00
	Foresters	93	-0.022	0.1194	-3.00	3.00
	Forest Advisors	35	0.286	0.2113	-3.00	3.00
	Total	419	0.730	0.0632	-3.00	3.00
I perceive that I should apply a water management plan to improve and optimize water use and quality	Farmers	160	0.919	0.1030	-3.00	3.00
	Farm Advisors	128	0.883	0.1020	-1.00	3.00
	Foresters	91	-0.011	0.1255	-3.00	3.00
	Forest Advisors	35	0.543	0.1938	-3.00	3.00
	Total	414	0.672	0.0627	-3.00	3.00
I perceive that plant protection products and other treatments should be applied appropriately and as recommended.	Farmers	163	0.951	0.1127	-3.00	3.00
	Farm Advisors	125	1.128	0.1142	-1.00	3.00
	Foresters	95	0.484	0.1295	-3.00	3.00
	Forest Advisors	36	0.389	0.1963	-3.00	3.00
	Total	419	0.159	0.1091	-3.00	3.00

Table A2: Anova analysis for Perception descriptives by respondent type

Perceptions compared to others:		Sum of Squares	df	Mean Square	F	Sig.
Being a farmer is an important reflection of who I am	Between Groups	26.926	3	8.975	6.401	<.001
	Within Groups	588.939	420	1.402		
	Total	615.866	423			
I have a strong sense of belonging to the farming community	Between Groups	7.598	3	2.533	1.448	.228
	Within Groups	729.328	417	1.749		
	Total	736.926	420			
I perceive that the ecology of the farm is what farming is about	Between Groups	10.422	3	3.474	2.115	.098
	Within Groups	683.128	416	1.642		
	Total	693.550	419			
I see myself as a farmer who prioritises the environment	Between Groups	13.441	3	4.480	2.887	.035
	Within Groups	647.106	417	1.552		
	Total	660.546	420			
My farming practices have an impact on the environment	Between Groups	1.980	3	.660	.406	.749
	Within Groups	677.726	417	1.625		
	Total	679.705	420			
It is my personal responsibility to help protect the environment.	Between Groups	27.586	3	9.195	5.527	<.001
	Within Groups	692.155	416	1.664		
	Total	719.740	419			
It is important to me to protect the environment even if it slows down economic growth of my farming activities.	Between Groups	17.650	3	5.883	3.496	.016
	Within Groups	698.422	415	1.683		
	Total	716.072	418			
The well-being of the community depends on the preservation of the environment	Between Groups	21.544	3	7.181	4.143	.007
	Within Groups	719.291	415	1.733		
	Total	740.835	418			
It is important to continuously assess the environmental and social impact of my farm	Between Groups	20.897	3	6.966	4.195	.006
	Within Groups	690.767	416	1.660		
	Total	711.664	419			
I perceive that my farm is an agricultural ecosystem that interacts with neighbouring landscapes.	Between Groups	9.570	3	3.190	2.013	.112
	Within Groups	660.981	417	1.585		
	Total	670.551	420			
I perceive that biodiversity should be managed to enable its protection and enhancement	Between Groups	23.098	3	7.699	4.508	.004
	Within Groups	707.084	414	1.708		
	Total	730.182	417			
I perceive that I should manage energy consumption of my farming activities	Between Groups	48.876	3	16.292	9.605	<.001
	Within Groups	703.945	415	1.696		
	Total	752.821	418			
I perceive that I should enable the formation of organic carbon in soils and in biomass	Between Groups	45.702	3	15.234	9.153	<.001
	Within Groups	687.377	413	1.664		
	Total	733.079	416			
I perceive that I should apply a soil management plan to improve and optimize soil health	Between Groups	84.928	3	28.309	19.147	<.001
	Within Groups	613.598	415	1.479		
	Total	698.525	418			
I perceive that I should apply a water management plan to improve and optimize water use and quality	Between Groups	58.463	3	19.488	13.037	<.001
	Within Groups	612.861	410	1.495		
	Total	671.324	413			
I perceive that plant protection products and other treatments should be applied appropriately and as recommended.	Between Groups	31.686	3	10.562	5.957	<.001
	Within Groups	735.841	415	1.773		
	Total	767.527	418			

Table A3: Attitudes descriptives by respondent type

Attitudes:		N	Mean	Std. Error	Min	Max
Although good management requires some training, experience and reading, the ability to manage is mainly determined by genes.	Farmers	162	2.51	.103	1	5
	Farm Advisors	131	2.31	.100	1	5
	Foresters	98	2.18	.133	1	5
	Forest Advisors	36	2.08	.171	1	4
	Total	427	2.33	.060	1	5
When the farm has shown poor yield, this is due to circumstances totally out of my control.	Farmers	160	2.88	.099	1	5
	Farm Advisors	131	2.65	.100	1	5
	Foresters	99	2.37	.118	1	5
	Forest Advisors	35	2.66	.164	1	5
	Total	425	2.67	.058	1	5
In local communities it's easy for a hard-working and dedicated individual to have an impact in getting changes for the better.	Farmers	161	3.29	.094	1	5
	Farm Advisors	130	3.43	.089	1	5
	Foresters	97	3.36	.122	1	5
	Forest Advisors	36	3.56	.166	2	5
	Total	424	3.37	.055	1	5
I seldom change my management and production systems unless I'm sure the change will be positive.	Farmers	160	3.28	.096	1	5
	Farm Advisors	130	3.15	.097	1	5
	Foresters	99	3.42	.109	1	5
	Forest Advisors	36	2.97	.180	1	5
	Total	425	3.24	.056	1	5
When things go wrong this is often due to events beyond my control (e.g. bad weather).	Farmers	161	3.09	.090	1	5
	Farm Advisors	130	3.02	.099	1	5
	Foresters	99	3.08	.117	1	5
	Forest Advisors	35	2.51	.166	1	5
	Total	425	3.02	.055	1	5
It bothers me when I think that other farmers are helping protect environment more than me	Farmers	161	2.67	.103	1	5
	Farm Advisors	131	2.37	.105	1	5
	Foresters	98	1.95	.114	1	5
	Forest Advisors	36	2.03	.197	1	5
	Total	426	2.36	.061	1	5
It is important that I understand sustainable practices	Farmers	161	3.99	.082	1	5
	Farm Advisors	128	4.24	.083	1	5
	Foresters	98	4.09	.103	1	5
	Forest Advisors	36	4.58	.101	3	5
	Total	423	4.14	.048	1	5
It bothers me when I miss an opportunity to help protecting the environment	Farmers	162	3.60	.096	1	5
	Farm Advisors	130	3.68	.096	1	5
	Foresters	99	3.06	.129	1	5
	Forest Advisors	36	3.67	.199	1	5
	Total	427	3.50	.059	1	5

Table A4 : Anova analysis for Attitudes descriptives by respondent type

Attitudes:		Sum of Squares	df	Mean Square	F	Sig.
Although good management requires some training, experience and reading, the ability to manage is mainly determined by genes.	Between Groups	9.386	3	3.129	2.018	.111
	Within Groups	655.724	423	1.550		
	Total	665.110	426			
When the farm has shown poor yield, this is due to circumstances totally out of my control.	Between Groups	15.478	3	5.159	3.691	.012
	Within Groups	588.405	421	1.398		
	Total	603.882	424			
In local communities it's easy for a hard-working and dedicated individual to have an impact in getting changes for the better.	Between Groups	2.706	3	.902	.709	.547
	Within Groups	534.416	420	1.272		
	Total	537.123	423			
I seldom change my management and production systems unless I'm sure the change will be positive.	Between Groups	7.273	3	2.424	1.858	.136
	Within Groups	549.277	421	1.305		
	Total	556.551	424			
When things go wrong this is often due to events beyond my control (e.g. bad weather).	Between Groups	10.181	3	3.394	2.648	.049
	Within Groups	539.668	421	1.282		
	Total	549.849	424			
It bothers me when I think that other farmers are helping protect environment more than me	Between Groups	36.083	3	12.028	8.061	<.001
	Within Groups	629.682	422	1.492		
	Total	665.765	425			
It is important that I understand sustainable practices	Between Groups	12.380	3	4.127	4.340	.005
	Within Groups	398.391	419	.951		
	Total	410.771	422			
It bothers me when I miss an opportunity to help protecting the environment	Between Groups	25.758	3	8.586	5.983	<.001
	Within Groups	606.987	423	1.435		
	Total	632.745	426			