Extended Abstract

Paper/Poster Title	**Understanding Farmers' Motivations: Exploring Behavioural Factors in the Adoption of Climate-Smart Agriculture**

Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.

Abstract	***200 words max***
Climate-smart agriculture (CSA) addresses the dual challenge of agriculture, yet the involved interplay of social-psychological and socio-economic factors in farmers' CSA adoption decisions remains understudied. This research, conducted in 2023 across five European countries, focused in combining farm business motives and socio-economic variables with the Theory of Planned Behaviour (TPB) and Innovation Diffusion Theory (IDT). A comprehensive online survey data collected from 721 farmers, employing a partial least square structural equation model to disentangle the complex relationships between behavioural and exogenous predictors. The study identifies critical influencers on farmers' intentions to adopt CSA in the future. Perceived behavioural control, pro-environmental motives, attitude towards CSA, and social norms appear as significant factors with positive effects. Conversely, farm business economic motives and age exhibit negative influences. The mediation role of perceived ease of use and compatibility in shaping attitudes towards future adoption intentions is highlighted. Notably, extent of agricultural training and advisory services use positively mediate perceived behavioural control, indirectly impacting adoption intentions. The research emphasizes the importance of recognizing indirect effects through mediation in developing targeted behavioural interventions. It concludes that behavioural factors impact different CSA categories uniquely, advocating for category-specific interventions rather than a generalized approach.	
Keywords	Adoption intention, Climate-smart agriculture, SEM, Europe
JEL Code	Agriculture: R&D; Agricultural Technology; Biofuels; Agricultural Extension Services (**Q16**)

Introduction	***100 – 250 words***
The EU has identified climate-friendly sustainable agricultural practices as a critical priority for the Common Agricultural Policy (CAP). Despite the efforts made, adoption rate is remains slow. Due to its complex multidimensional nature of adoption, it is reasonable to argue that nonpecuniary factors serve as motivation for farmers to embrace less intensive sustainable farming practices and technologies. Analysis of adoption decision of sustainable agricultural practices needs understanding of social-psychological, farm business lifestyle and socio-economic factors influencing farmer decision-making. Even though previous research on adoption behaviour determinants, most of them analyze farmers' adoption behavior at a general sample or clustering farmers based on psychological variables without disaggregating farmers based on their actual behavior. Farmers who used CSA approaches will be intent to adopt or reject due to their previous unsatisfied experience, while those unfamiliar with it had great expectations for its technologies. There is growing recognition that farmers'	

decision-making processes surrounding both climate change adaptation strategies and CSA adoption are embedded in the social, biophysical, institutional and financial that shape their behaviour. Despite the evidence, social-psychological factors and socio-economic factors influence farmer decision making including farm business lifestyle, very few studies combine these two factor groups in a theoretically rigorous way. To uncover this, this study analysed farmers' adoption behaviour by clustering farmers by their actual behaviour into adopter and non-adopter groups of CSAs. Thus, understanding farmers' adoption intention based on CSA adopters' and non-adopters' categories can fill the literature gap by suggesting predictors of adoption intention for each group of farmers.

Methodology ***100 – 250 words***

A total of 721 sample respondents from Denmark, Netherlands, Spain and Lithuania have completed the online survey through quadratics regarding CSA practices and technologies and their adoption related to crop production. The survey started with a briefing of what CSA with follow up questions for asking farmers whether they are implementing and for description of dominant CSA that they are using. There are also questions requesting farmers past for last five years regarding adoption of the described CSA. Following an inductive approach, the adopter farmers who described CSA were categorized into CSA practice adopter and technology adopter. To capture complex nature of adoption focusing on socio-psychological and practices or technology related factors, this study developed an integrated adoption prediction model based on the Theory of Planned Behaviour (TPB) and Innovation Diffusion Theory (IDT) by extending it with other behavioural factors. Behavioural constructs like farmers' attitudes, perceived behavioural control and social norms from the TPB and perceived ease of use, perceived practice or technology compatibility and extent of use of communication channels from the IDT were considered. In addition, the economic and pro-environmental motives of farm businesses were considered in the integrated model. Due to complex inter-relationships behavioural variables and heterogeneity, a Partial Least Squares Structural Equation Modelling (PLS-SEM) with multigroup analysis was applied. Including age and farm size variables, we analysed adoption intention of farmers. The mediation role of some behavioural factors was considered, and significance was tested for their indirect effect after PLS-SEM.

Results ***100 – 250 words***

The multigroup analysis regression results provide valuable insights into the nuanced factors influencing the adoption intentions of farmers across different groups—non-adopters, adopters of CSA practices, and technology adopters. The proposed constructs did not exhibit a consistent influence across all three groups, due to the different behavioural attitude of the farmers towards CSA in different groups emphasizing the need for a tailored approach in understanding adoption drivers. However, perceived behavioural control significantly and positively influence future adoption intentions within all three groups. Attitude towards CSA inference positively and significantly future adoption intention for non-adopter and technology adopter group. Moreover, pro-environmental motives associated with farm business and social norms demonstrate positive and significant effects on the future adoption intentions of both CSA practices and technology adopter groups. Conversely, economic motives related to farm business exhibit a negative and significant influence on the future adoption intentions of non-adopters and technology adopters. Despite perceived ease of use and compatibility of practices or technology having no significant direct effect on future adoption intentions, they do exert a positive and significant indirect influence

through attitude mediation. Similarly, the level of agricultural training and advisory service utilization has an insignificant direct effect on future adoption intention but exerts an indirect influence through perceived behavioural control mediation. Among the observed variables, the farmer's age negatively impacts the future adoption intention of non-adopters and the technology adopters' group. In contrast, farm size positively and significantly affects the future adoption intentions of technology adopters while negatively influencing CSA practice adopters.

Discussion and Conclusion	***100 – 250 words***

The study underscores the pivotal role of perceived behavioural control, which includes skills, knowledge, and a farmers' belief in possessing necessary resources and technical infrastructure for adopting CSA practices. Fostering positive perceptions and empowering farmers with enhanced behavioural control is crucial for increasing the likelihood of embracing sustainable agricultural practices. Pro-environmental motives in running farm businesses, emphasizing environmentally friendly production for public health and animal welfare, significantly influence future adoption intentions. Conversely, economic motives exhibit a negative influence on both non-adopters and technology adopters, revealing the complex interplay between economic considerations and sustainability practices. The findings highlight indirect effects on adoption intentions through perceived ease of use, compatibility, agricultural training, and advisory service use, emphasizing the mediating role of attitudes and perceived behavioural control. Recognizing the indirect effects underscores the importance of a nuanced, category-based approach for effective behavioural interventions. Demographic factors such as age and farm size emerge as crucial influencers of adoption intentions. The negative impact of farmer age on non-adopters and technology adopters suggests an age gap in embracing sustainable practices, with younger farmers exhibiting a greater propensity towards smart farming technologies. The positive impact of farm size on technology adopters and its negative influence on CSA adopters point to varying considerations within different farming segments. In conclusion, the study provides a nuanced understanding of factors shaping adoption intentions, emphasizing the need for group targeted behavioural interventions tailored to the specific motivating factor of diverse farmer groups regarding adoption.