

Extended Abstract

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Paper/Poster Title	Evaluating the position of Irish farmers towards their Greenhouse Gas emissions; a typology analysis
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Abstract prepared for presentation at the 97th Annual Conference of the Agricultural Economics Society, The University of Warwick, United Kingdom

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Abstract	200 words max
<p>It is widely acknowledged that the global agricultural sector has an important role in mitigating GHG emissions (Lipper et al., 2014). This is especially true in Ireland where the agricultural sector accounted for over 37% of all GHG emissions in 2021 (EPA, 2022). Achieving widespread adoption of GHG mitigating technologies amongst farmers is vital to successfully reducing agricultural GHG emissions while maintaining production levels (Kreft and Finger, 2021) and decisions taken at individual farm level are of huge importance for effective mitigation of emissions (Henriksson et al., 2011). Thus, there is an extreme focus within Ireland to better understand the views, opinions and thoughts of farmers who are tasked with adopting GHG mitigating technologies. These technologies have been researched and developed by Teagasc (often in alliance with other industry shareholders) and are outlined through the Marginal Abatement Cost Curve (MACC). The objective of this study was to investigate the viewpoint of Irish farmers towards their own farm emissions and gather attitudinal insight in order to complete a typology analysis which is representative of all farmers across Ireland (inclusive of farm system, location, management type, etc).</p>	
Keywords	greenhouse gas emissions, adoption, typology, mitigation
JEL Code	e.g. Energy: Demand and Supply Q41 see: www.aeaweb.org/jel/guide/jel.php?class=Q
Introduction	100 – 250 words
<p>Global temperatures have increased by more than 1°C since pre-industrial times. Scientists warn that without increases in both ambition and action, warming will exceed 2°C by the end of the century, possibly by a considerable margin. These changes have the potential to have a devastating impact on the world's environment and food security. Urgent action is needed in all countries and sectors including agriculture to reduce emissions, increase carbon removals/sequestration and prepare to adapt to the changing climate. The world also faces food and nutrition, energy, and biodiversity crises, and countries must deal with all these challenges in a co-ordinated manner. Nationally, agriculture in Ireland accounts for 37.1% of GHG emissions and within the EU, Irish agriculture accounts for 12.4% of GHG emissions</p>	

(DECC, 2021). Methane is the biggest agricultural GHG in Ireland. It is a potent gas with a global warming potential 28 times that of carbon dioxide and it alone accounts for between 40 and 46% of global agricultural emissions (Searchinger et al., 2021). Ruminant livestock is very much so correlated to methane levels as the majority of methane derived from food production is created during the ruminal fermentation of cattle and sheep.

With the need for behavioural change apparent it is very important to be aware that the probability of adoption on farms varies greatly according to a number of factors such as; socio-economic attributes (Ingram, 2014) and farm size (Stringer et al, 2020) with knowledge also seen to be a driving force for decision making and climate action among farmers (Nguyen et al. 2019). Furthermore, the role of behavioural factors in farmers' adoption of sustainable practises has gained increasing interest over the past decade (Dessert et al., 2019) and non-cognitive skills such as perceived control have been linked to the actual adoption behaviour of farmers (Lapple and Kelley, 2015). This paper explores the power of these behavioural factors and non-cognitive skills within an Irish context and uses the Theory of Planned Behaviour (TPB) to guide a typology analysis on farmers across all agricultural sectors in Ireland through the National Farm Survey (NFS). The TPB is often used within agricultural research to define farmer segments or typologies based on attitudes to predict behaviour and to analyse farmer attitudes towards adopting environmental practises (Vanclay et al, 2006). Ajzen (1991) noted that TPB is essentially open to including any explanatory constructs that can be used to explain a significant portion of the variance in intention and behaviour. Based on that theoretical ground, this study merges the TPB with typology models.

Methodology

100 – 250 words

This study merges the TPB with typology models. The use of TPB means that this study can explain farmer's intentions towards agricultural practises in a variety of contexts and the use of typology means that this study can be used to gauge farmer motivations and perceptions (Gorton et al., 2008; Dalogu et al., 2014) while grouping them by their focuses and making knowledge exchange ultimately more efficient and valuable for all involved.

The methodology applied follows two steps; data collection through questionnaire, data analysis through SPSS, data reduction techniques (factor analysis) and profiling of farmer types thereafter.

A survey was administrated to participants in the 2021 National Farm Survey (NFS) in Ireland. The main purpose of the survey was to gather in-debt information around a farmer's position on their own farm GHG emissions. The survey aimed to stratify against farm size, gender and income indicators across each sector. The form of data collection used was face to face interaction completed by the NFS data collectors. The questionnaire consisted of nine statements that covered attitudinal, emotional and opinion-based questions that were administrated using a standard Likert scale. The survey once developed, was piloted among Irish farmers and data collectors to test the appropriateness of questions and understanding. Numerous alterations were made around clarity of statements and phrases. The survey was

conducted from September 2021 until January 2022 across the Republic of Ireland. Extensive data cleaning and coding was then performed.

Results

100 – 250 words

Once Principal Component Analysis is conducted, 4 components are extracted and therefore, four viewpoints are identified from the nine statements:

The first component groups statement A and B together meaning that the respondents answered similarly on the likert scale with these two questions. The component clearly refers to one's perceived knowledge and understanding of GHG emissions and the actions needed to reduce their own agricultural GHG emissions.

For the use of this study, we have called this component; **the perceived capable farmer.**

The second component groups statement C and H together. Statement C asked farmers whether their farm's environmental impact was a constant worry of theirs and Statement H asked them if they thought the future economic success of their farm was dependant on their willingness to reduce GHG emissions. Farmers answered similarly to these two statements and both reflect consciousness towards their own GHG emissions and the emotional impact of this.

For the use of this study, we have called this component; **the emotionally concerned farmer**

The third component groups three statements together; D, E and F. Within the nine statements, these three focused on other people's opinions and external factors imposing onto farmers. All other statements reflected inwards, whereas these three statements (about representation within the climate change debate, society's trust towards farmers producing food sustainably and thoughts on whether they feel farmers are doing enough to mitigate GHG emissions) were the only statements that reflected outwards and concerned matters outside of one's own farm gate. Therefore, it is significant that all three statements created their own component one factor analysis conducted.

For the use of this study, we have called this component; **the externally conscious farmer.**

The fourth and final component identified showed that statements I and G were answered similarly and hence, grouped them together. Statement I looked at the level of optimism a farmer had towards themselves and/or their family farming the land in future years and statement IG differentiated between those who prioritise economic sustainability more than environmental and social sustainability. These statements were answered similar so for example, those who agreed that there was a future in farming the land thought that producing food and income was more important than lowering GHG emissions. Likewise, those who felt they couldn't see a future farming felt generating income and producing food was not more important

than lowering GHG emissions. Hence, the statements look at optimism towards farming and then correlate this to those who prioritise productivity.

For the purpose of this study, we have called this component; **future economically focused farmer**.

Discussion and Conclusion	<i>100 – 250 words</i>
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The typology analysis conducted in this study allows for types of Irish farmers to be identified, categorised and most importantly understood so that those communicating with farmers at the grassroots level are better informed and equipped to bring about an increase in GHG mitigation technology uptake. Understanding personal characteristics that drive on-farm adoption of GHG mitigation technologies is crucial to the development and implementation of effective climate policy in the food and agricultural sector (Wreford et al, 2017). In considering the need for a reduction in Ireland's GHG emissions and the substantial contribution of the agricultural sector to Irish GHG emissions, the findings and potential future impact from this study are hugely significant.