

Article

Investigating the Drivers of Farmers' Engagement in a Participatory Extension Programme: The Case of Northern Ireland Business Development Groups

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Abstract: Participatory agricultural extension programmes aimed at encouraging knowledge transfer and the adoption of new technology and innovation at the farm level are a novel approach to advisory service provision. In order to drive sustainable agricultural production systems that address farm-level economic and environmental objectives, the College of Agriculture, Food and Rural Enterprise (CAFRE) in November 2015, developed a new participatory extension programme for farmers in Northern Ireland, the Business Development Groups (BDGs). The purpose of this paper is to examine and analyse the drivers of farmers' decisions in relation to joining and participating in this new approach to farm extension, learning and advisory service provision. Making use of data from both primary and secondary sources, this study employs a mixed-methods approach which involves an empirical analysis of quantitative and qualitative data to examine the factors influencing membership of the BDG programme. The results of our analyses show that larger, more intensive farmers who are keen to access information from other farmers to improve their business performance are most likely to participate in the BDG programme. The study contributes to the empirical literature by establishing the need to take into consideration the different characteristics of farmers in the design and delivery of participatory extension programmes.

Keywords: Participatory extension; mixed methods; Business Development Groups (BDG)

1. Introduction

Innovation at the farm-level, in terms of product, processes and practice, is currently a core aspect of the global agricultural policy agenda [1,2]. As farmers operate in increasingly competitive global markets, farm-level profitability is dependent on their recognition of the need to adopt new management practices and advanced technologies to underpin sustainable farming systems [3]. Extension service providers are central to increasing the innovative capacity at farm level as they play an important role in facilitating extension provision which encourages farmers to augment their skills and knowledge and embrace new technologies and best practices [4]. Alongside this, effective extension programmes should provide an avenue for better communication of relevant research findings as well as innovations in order to bring about improved diffusion and adoption at farm-level [5–7]. This dimension is especially important in the context of new technologies and practices to enhance the financial performance of farms while simultaneously moderating farming's impact on the environment.

Recent literature on technology adoption has identified the role of innovation as an interactive process, involving individuals and organisations possessing different types of knowledge within

a particular social and institutional context [8,9]. Consequently, farmers' participation in extension programmes and technology adoption efforts has been described as a 'co-creation of innovation [10,11]. The international literature commonly identifies four major strands of agricultural extension methods namely: Linear technology transfer, one-to-one advice, structured education and training and participatory extension methods [5,12,13]. National advisory programmes around the world have tended to adopt a range and combination of these methods in order to fulfil their farm-level extension remit. The most dominant extension method employed over many years has been the linear one-to-one based approach, which follows a top-down method [12]. However, this approach has its limitations in terms of both the extent of its coverage to farmers and its ability to take account of and be responsive to the current, more complex agricultural production environment. Recognising the limitations and challenges of the traditional methods, a new participatory advisory service provision for farmers namely, the Farm Business Development Groups (BDGs) was established in Northern Ireland in March 2016. The overarching goal of the programme is to increase farmers' access to agricultural extension services to help foster sustainable agricultural practices, improve farm-level productivity and ultimately increase economic performance at farm-level. The scheme focuses on facilitated 'peer-to-peer' learning, bringing farmers together to share knowledge and skills, help them improve their technical efficiency and business management skills and introduce them to new technologies and innovative ways of working. Previous research has shown that interactions and exchanges of knowledge from multiple sources, especially from actors within the production value chain, promote the adoption of new technologies and best practices which consequently improve farmers' productivity and income [5,14]

The objective of this study is to explore and analyse the reasons around farmers' decisions to join and participate in the BDG programme in Northern Ireland using a mixed-methods approach. Participatory extension approaches have previously been shown to give farmers improved access to local and expert knowledge, as well as developing well-functioning social networks which promote rural innovation [13,15,16]. This research makes a unique contribution to the existing literature by providing a comprehensive analysis of the factors influencing the decision to join a participatory extension scheme in Northern Ireland. The study examines the reasons why farmers chose to join or not join the BDG programme and identifies ways in which the programme might be improved. Our study incorporates different enterprise groups and employs a mixed-methods approach to provide an analysis of the decision of different groups of farmers to join a BDG.

The remaining sections of this paper are organised as follows: Section 2 reviews the existing literature on factors influencing membership of participatory extension programmes while Section 3 describes the methodology. Section 4 explains the results, and finally, the discussion and conclusions are presented in Section 5.

2. Literature Review

Recent literature has advanced participatory and systems thinking approaches to extension service delivery [6,9,10]. While there have been a few studies on participatory extension programmes, the majority of these studies focus on measuring the impact of membership of the programmes on parameters such as farm income and technology adoption [4,6,17–21]. For example, a study by Hennessy and Heanue [4] assessed the effect of membership of participatory extension group on technology adoption and farm profit of dairy farms in Ireland using a multiple regression technique on cross-sectional data. They concluded in their study that membership of participatory extension group increases technology adoption and farm profit. Läpple et al. [6] employed the endogenous switching regression model to quantify the benefit of membership of a dairy participatory-based extension programme in Ireland. They found a positive return to membership of dairy discussion group with an average discussion group member gaining about €310 in gross margin per hectare (or an approximate 12% increase). Läpple and Hennessy [21] also analysed the impact of incentives to participate in an extension programme in Ireland using the propensity score matching (PSM)

methodology. They found in their analysis that farmers who joined a dairy participatory extension group when no incentive was given significantly improved their farm performance in terms of gross margins and yields compared to farmers who joined the group when financial incentives were given. Similarly, Tamini [7] employed the propensity score matching (PSM) approach to evaluate the impact of agri-environmental extension activities on best management practices in relation to environmental goods by farmers in the province of Quebec, Canada. The results of the analyses showed that participation in extension services and advisory clubs have a positive impact on the probability of adopting best management practices. Only a few studies have investigated drivers of farmers' engagement in participatory extension programmes. Some of these studies include: Suvedi et al. [10] in which they examined the factors affecting farmers' participation in extension programmes and adoption of improved seed varieties in the hills of rural Nepal. They found that socioeconomic variables such as age, education, household size, and distance to the extension office were the main factors influencing participation in extension activities. L pple et al. [6] assessed the factors influencing the membership of dairy discussion group in Ireland and found that farm size and livestock density are significantly correlated with discussion group membership. Akobundu et al. [20] using a probit model analysed the factors influencing participation in Virginia State University's Small Farm Outreach, Training, and Technical Assistance programme. The results of their analysis showed that only race and prior visit by an extension agent were significant determinants of participation in the Small Farm Programme. Nahayo, et al. [22] assessed the factors that influence participation in crop intensification programme (CIP) in Rwanda employing a binary logistic regression model. They found from their analysis that gender, non-farm income, farmland size, farming experience, land acquisition means, market access, trust and agro-ecological conditions were the main factors that influence participation in the programme. Two important points can be drawn from the reviewed studies. Firstly, they reflect the promising trends and international interest in the participatory extension approach. However, some recent work has also suggested that farmers' participation in agricultural extension or training programmes remains low in many countries [23–25]. Secondly, the results from the reviewed literature show that participation in extension programmes is influenced by farm and socioeconomic characteristics of the farmers. Although this offers some insight into the drivers of farmers' engagement in participatory extension programmes, information relating to actual reasons why farmers decide to participate or not participate in the programmes remains limited. This may be due to the fact that the majority of the reviewed studies have employed quantitative techniques to undertake their analysis.

This study contributes to the literature by analysing those factors influencing membership of a participatory extension programme, in a Northern Ireland context, using a mixed-methods approach. The mixed-methods approach, combining quantitative and qualitative analytical techniques, is fast gaining popularity in the literature as it provides answers to research questions focussing on personal, social and psychological variables [26–28]. For example, Triste et al. [26] employed the mixed-methods approach to explore the influence of a sustainable farming initiatives' (SFI) design characteristics on farmer motivation to participate in *Veldleeuwerik* (a Dutch SFI programme). Charatsari et al. [23] also employed the approach using self-determination theory (SDT) technique to analyse farmers' motivation toward participation in competence development projects (CDP). They found that participation in CDP is guided by the most internal forms of human motivation (identified, integrated, and intrinsic motivation), and that deficits in the needs for autonomy and competence predict farmers' decision to participate in CDP. The exploratory analysis of the BDG programme, which is a novel approach to participatory extension practices, can provide insights that support the design of participatory extension programmes in other regions both nationally and internationally.

3. Materials and Methods

3.1. The Northern Ireland Business Development Groups (BDGs)

In November 2015, Northern Ireland's College of Agriculture, Food and Rural Enterprise (CAFRE) launched a new approach to their farm advisory services provision namely, Business Development Groups (BDGs), with the first groups commencing in March 2016. The BDG is a knowledge transfer scheme which forms part of a wider programme, the Farm Business Improvement Scheme (FBIS), part-funded by the EU through Pillar II of the Northern Ireland Rural Development Programme 2014–2020 [29]. BDGs provide a training forum for around 3000 farmers in 143 groups (allocation to groups is by main farm enterprise and farm location) that allows sharing knowledge with the aim of improving technical efficiency and profitability of businesses while protecting the environment. The average group size is around twenty. Farmers participating in the scheme have their farm key performance indicators recorded and benchmarked to identify areas for potential improvement. They also maintain an active business development plan, attend training events, and share benchmarking information with other group members. Each farmer hosts a group training event annually on their own farm and discussions take place under the guidance of a facilitator who brings in new ideas and fosters innovation, particularly around the adoption of new technologies, methods and practices. The scheme provides a forum for peer-to-peer learning, sharing ideas and an opportunity to keep up-to-date with new technology. The implementation of the BDG programme in Northern Ireland aimed to emphasise relational processes including co-learning and reflexivity and to provide members with the opportunity to discuss farm business challenges, actively engaging in a shared problem-solving process. The farmers meet formally at least eight times a year, providing them with an opportunity to talk about issues relating to their own farm business, including responses to wider market, policy and technology drivers. Where farmers attended all eight meetings they qualified for a payment of up to £490 per year. They also were paid an allowance of up to £600 for hosting a training event.

3.2. Data

Data for this study were obtained from both primary and secondary sources. The secondary data were sourced from the College of Agriculture, Food and Rural Enterprise (CAFRE) farm benchmarking data for those farmers who were members of a BDG. The Northern Ireland Farm Business Survey (FBS) was used as the data source for non-BDG members. The benchmarking data are collected annually from the members of the BDG programme. The FBS data, on the other hand, are collected by the Statistics and Analytical Services Branch, Department of Agriculture, Environment and Rural Affairs in Northern Ireland (DAERA) [3,30]. The variables captured in both data sources are directly comparable for the baseline 2015/2016 production year.

The primary data involved the completion of an "entry level" survey which was undertaken for BDG participants and non-participants at the initial establishment of the programme. The survey questionnaire captured those factors which might influence a farmer's decision to join or not join a group and included closed and open-ended questions. The questionnaire was administered separately for members and non-members of the BDG program. For the members of the BDG group, it was launched in July 2017 with the intention that it would be completed by all group members. The questionnaire was completed by the farmers using an online system (the majority of respondents used a smartphone to respond to the survey). The research team liaised with the programme stakeholders in order to remind and encourage group members to complete the survey. Reminders were sent only to those farmers that were yet to respond to the survey. The survey was concluded in November 2017, when the number of completed questionnaires had reached a satisfactory level, and the rate of completion had slowed down significantly. In total, 719 farmers completed the questionnaire over the three-month period with a response rate of 24 per cent. A matching questionnaire was sent to members of the Northern Ireland Farm Business Survey (FBS,) who were not in a BDG, as

a means of establishing the same data for a control group non-participants. The FBS data are collected annually as part of the European Union (EU) Farm Accountancy Data Network (FADN) requirements and are a representative sample of farms in Northern Ireland. The questionnaire for the non-BDG members asked the same questions as the BDG members' questionnaire, with the exception of details on participation in the scheme. The questionnaire was sent via email to this group of farmers in October 2017 and completed online employing the same method for members of the BDGs. The sample size for the non-BDG members was 222 farmers, and 52 responses were obtained, giving a response rate of 23 per cent. The questionnaire and the resulting data management provisions were in line with General Data Protection Regulation (EU) 2016/679 (GDPR) requirements, that is, privacy statements were incorporated, giving reassurances around the use of the data and participant anonymity for the individual farmers. All the participating farmers granted consent for the use of their data for the defined purpose of evaluating the impact of the BDG scheme.

3.3. Analytical Techniques

The analysis was conducted in two stages using a mixed-methods approach that involved a combination of quantitative and qualitative analytical techniques. In the first stage, we estimated a logistic regression model to analyse the factors influencing the decision to join the BDG programme. In the second stage the primary data obtained from the farmers' surveys were analysed quantitatively and qualitatively. The combined analysis provides insight into the farmers' motives to participate in the BDG programme. The second stage of the analysis explores the personal attitudes and opinions of farmers concerning the BDG scheme, thereby complementing the results of the quantitative analysis undertaken in the first stages.

3.3.1. Logistic Regression Model

The choice of the farmers' participation in the BDG programme was analysed using the logistic regression modelling framework. A binary choice model is appropriate for the analysis given that participation in the BDG programme fits into a dichotomous choice (i.e., whether a farmer participates or does not participate in the BDG programme) essentially taking on values of zero and one [31,32]. The dependent variable is coded 1 if the farmer is a member of a BDG group and coded 0 otherwise, contingent upon a set of explanatory variables which are hypothesized to influence membership of the BDG programme. The explanatory variables included in the model comprised: The utilised agricultural area measured in hectares, age of the farmers measured in years, herd size measured in cow equivalent and herd size squared also measured in cow equivalents. These variables were selected taking into account previous literature [4,10,22]. Due to data limitation, we were unable to include more variables, such as the educational level of the farmer, household size and off-farm employment in the model. The empirical specification of the logistic regression model is presented in Equation (1). The binary logistic regression model used in this study has also been applied in similar studies by Suvedi et al. [10] and Nahayo et al. [22].

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_i X_i \quad (1)$$

where p indicates the probability of joining the BDG programme, β_i are the regression coefficients associated with the membership of the BDG programme and X_i represents a vector of explanatory variables hypothesised to influence membership of the BDG programme.

3.3.2. Procedure for Attitudinal Analysis

The primary data from the entry level survey were analysed to provide more insight into why farmers had chosen to join or not join the BDG programme. The survey comprised both open-ended and closed-ended questions and included two main sections. The first section focused on the awareness and views of the farmers about the BDGs. Information was collected on how they found out about the

programme, the farmers' main agricultural enterprise, their motives for participation, and their level of satisfaction with the programme. The second section obtained data about each farmer's principal enterprise, as well as details on their goals and future plans. Information was collected on the decision-making role of the farmer in the overall farming enterprise and the farmers' attitudes towards different aspects of farming. The survey also included questions on farmers' use of various sources of information about the BDG scheme, their attendance rate and their opinions about ways of improving the programme.

To obtain quantifiable data on farmers' attitudes and motivational processes to participate in the BDG programme, we developed four specific constructs from a set of theory-grounded questions based on the literature in order to measure the attitudes of BDG and non-BDG members [33,34]. There were four motive categories: (i) farm performance improvement, (ii) approach to risk (iii) finding and using information, and (iv) self-motivation. Information on farmer and farm household characteristics, farm structure characteristics, motivations and incentives for farming was obtained. The farmers were required to attribute a degree of importance to the motive categories by asking them to rate elements of the four motive categories using Likert scales according to the importance they attributed to them. For each item, respondents indicated how much they agreed with an assertion (the options were 1 = not important, 2 = of little importance, 3 = moderately important, 4 = important and 5 = very important). In constructing the items, we were inspired by previously built and tested attitudinal surveys [33–36]. The mean scores, standard deviations and Cronbach's alpha were then estimated using STATA 15.0.

The same approach used for the BDG members were used for the non-BDG members. This involved providing answers to a set of closed-ended questions related to the reasons for non-participation in the programme. The data were then analysed using descriptive statistics. As part of the entry survey, an open-ended question elicited respondents' opinions on areas of potential improvement for the BDG programme. The individual responses from the entry survey were subsequently grouped into fifteen areas of suggested improvements.

4. Results

4.1. Descriptive Statistics

An overview of the farm characteristics of the members and non-members of the BDG programme is presented in Table 1. The analysis was undertaken using Stata 15.0. The results of the analyses showed a statistically significant ($p < 0.01$) difference in key farm characteristics between farmers participating in the BDG programme and non-participants. Considering the combined sample of farmers for members and non-members of the BDG group, it can be observed that farmers in the BDG groups have larger land areas (54.8 hectares versus 31.2 hectares), larger herd size (108.6 versus 50.5), are younger (47.7 years versus 54.6 years) and are the more profitable farmers (£901.4. versus £456 per hectare). The higher profitability of the BDG farmers may be associated with the fact that farmers who join participatory extension programmes are more motivated to improve farm-level profitability, and therefore, are more likely to adopt new technologies and best farm management practices. This observation supports previous studies in the literature, for example [6,18], which also found notable differences in the characteristics of participants and non-participants of participatory extension programmes.

Table 1. Descriptive statistics on characteristics of the Business Development Group (BDG) farmers and Non-BDG farmers, 2015.

Variables		BDG Farmers		Non-BDG Farmers		
All Enterprises	Description and Unit	Mean	SD	Mean	SD	Mean Difference
Allocated Land area	Hectares of area	54.8	44.4	31.2 ***	24.2	23.6 ***
Age of farmer	Years	47.7	13.6	54.6	12.1	−6.9 ***
Size of herd	Cow equivalent	108.6	81.3	50.5	48.2	58.1 ***
Gross margin	£/hectare	901.4	688.9	456.51	415.80	444.89 ***

*** Significant at the 1% level.

4.2. Determinants of Farmers' Decisions to Join the BDG Programme

The results of the logistic regression analysis showing the parameter estimates and their respective marginal effects (the effect of a unit change in each explanatory variable on the probability of participation in the BDG programme) are presented in Table 2. The likelihood ratio statistic suggests that the model is significant ($p < 0.01$). We found herd size and its squared term to be statistically significant ($p < 0.01$) with positive and negative signs, respectively. Variables with a positive coefficient increased the probability of participation while those with a negative coefficient decrease the probability of participation. Specifically, the results imply that farmers with larger herd sizes were more likely to participate in the BDG programme although at a declining rate as per the results for the herd size squared variable. The increase of herd size by one cow equivalent unit increased the probability of participation in the BDG programme by 0.7 per cent. We found land area to be negatively associated ($p < 0.1$) with participation, indicating that farmers with larger land area were less likely to join the BDG group. An increase in land area by one hectare decreased the probability of participation by 0.2 per cent. Similar results were obtained by Läßle et al. [6] and Hennessy and Heanue [4], where their findings indicated herd size to be statistically significant determinants of the decision to join a dairy discussion group. However, our result contrasts with Akobundu et al. [20] who found no effect of farm characteristics on participation in an extension programme. On the other hand, we found a negative and statistically significant relationship between farmer's age and the decision to participate in the BDG programme. This indicates that the younger farmers had a higher probability of joining the BDG group compared to older farmers. A one-year increase in the age of the farmer decreased the probability of participation in the BDG programme by 0.6 per cent. This result is similar to that obtained by Suvedi et al. [10] who, in their study of the factors determining extension participation in Nepal, found younger farmers have a higher probability of participation in agricultural extension activities compared to older farmers. This is, however, in contrast to Läßle et al. [6] who found age not to be a statistically significant factor influencing membership of a dairy discussion group.

Table 2. Logit regression model results.

Variable (N = 703)	Coefficient	Std. Err.	Z-Statistic	Marginal Effect
Constant	0.28602	0.40326	0.71	
Herd Size	0.03078 ***	0.0039	7.99	0.0071
Age	-0.0278 ***	0.0069	-4.04	-0.0064
Land Area	-0.01 *	0.0057	-1.72	-0.0023
Herd Size ²	-0.00004 ***	7.72×10^{-6}	-5.08	-9.10×10^{-6}
Log likelihood	-386.2046			
LR chi2(4)	178.35			
Prob > chi2	0.0000			
Pseudo R2	0.1876			

***, **, * Significant at the 1%, 5%, 10% level, respectively.

4.3. Results of Qualitative Analysis of the Decision to Join or not to Join the BDG Groups

In this section, an analysis of the attitudes and motivational process of the farmers that are members and non-members of the BDG is undertaken. The results of the analysis showing the items used to calculate the means of the constructs (explained in Section 3.3.2) are presented in Table 3, suggesting a relative difference in attitudes between farmers that choose to join or not to join the BDG programme. The results show that the Cronbach's alpha scores, which are a measure of internal consistency of the set of items for each construct, were deemed adequate at >0.60 for three of the four constructs for the BDG members and two of the four constructs for the non-BDG members [26]. The Cronbach's alpha in relation to the farm's performance construct was particularly low for the farmers in the BDGs ($\alpha = 0.29$), and for the non-BDG farmers ($\alpha = 0.48$) and this was taken into consideration in the discussion of the results. The overall means of each of the constructs were also estimated and compared

for both groups. The main difference between both groups was in their attitude towards finding and using information. The Cronbach's alphas for these constructs were also high at ($\alpha = 0.79$) for the BDG members group and ($\alpha = 0.73$) for the non-BDG members contributing to the validity of the results. The implication of this result is that access to information played an important role in influencing farmers' decisions. In other words, farmers who were more open to finding and using information were also more likely to join the BDG programme. They were also more open to discussing farming options with other farmers and their family and indicated a greater interest in reading about and improving their farming practices. This result complemented that of the logistic regression in that the younger farmers and farmers with larger herd size are more likely to also possess these characteristics. Although little difference can be found between both groups in the self-motivation construct and the approach to risk construct, on average, the results showed that the non-members were seemingly more risk-averse than BDG members. This may reflect the fact that the BDG members, on average, were younger than the non-BDG members and this also supports results from the logistic regression analysis which found farmer age to be a statistically significant factor influencing the decision to join the BGD programme. Moreover, farmers that are members of a BDG group have a relatively higher level of motivation compared to non-BDG members.

Table 3. Items, mean scores, standard deviations and Cronbach's alpha for constructs measuring the attitudes of BDG members.

Construct	Items	BDG Members		Non-BDG Members	
		Mean Score (SD)	Cronbach's α	Mean Score (SD)	Cronbach's α
Farm Performance	Starting with "Thinking about the 'performance' of your farm,		0.29		0.48
	Good farming is about maximising profits from the farm business	4.35 (0.72)		4.13 (0.60)	
	Farming is more rewarding in terms of quality of life and lifestyle than it is in terms of money	3.76 (0.94)		3.67 (0.94)	
	Good farming is about expanding the business	3.14 (0.93)		3.13 (0.99)	
	It is important to try new ways to increase profit	4.26 (0.66)		4.10 (0.72)	
	A satisfactory income is more important than maximising profit	3.36 (1.00)		3.79 (0.75)	
	Overall Mean	3.77(0.53)		3.76(0.41)	
Approach to 'risk	Starting with "Thinking about your approach to 'risk' in farming,		0.66		0.57
	It is important to be cautious about adopting new ideas	3.82 (0.88)		3.69 (0.73)	
	It is important to avoid risky options in farm decision making	3.88 (0.90)		4.10 (0.82)	
	It is important to keep debt as low as possible	3.98 (0.98)		4.17 (0.81)	
	Overall Mean	3.89 (0.08)		3.99 (0.26)	
Finding and using information	Thinking about 'finding and using information', in relation to your farm		0.79		0.73
	It is important to discuss farming options with other farmers	4.16 (0.68)		3.82 (0.79)	
	It is important to visit other farms to look at their farming methods	4.46 (0.56)		3.69 (0.70)	
	It is important to read about farming practices	4.41 (0.58)		4.21 (0.57)	
	It is important to discuss farming options with family	4.47 (0.63)		4.26 (0.53)	
	Overall Mean	4.38 (0.15)		3.99 (0.28) *	
Self-motivation	How important were each of the following to you in your decision to farm		0.62		0.73
	The enjoyment I get from farm work	4.46 (0.70)		4.23 (0.72)	
	The quality of life gained through farming	4.20 (0.81)		4.00 (0.77)	
	The opportunity to be my own boss	4.14 (0.91)		3.98 (0.80)	
	Keeping the farm in the family name	4.11 (1.02)		4.13 (0.86)	
	The financial rewards from farming	3.81 (0.92)		3.69 (0.73)	
	Overall Mean	4.14(0.23)		4.01 (0.20)	

* Significant at the 10% level.

4.4. Reasons for Joining the BDG Programme

The results of the analysis of the five-point Likert scales for factors that influence the decisions of the farmers to join the BDG programme are presented in Table 4. The results show that the most important reason why farmers decided to join the BDG programme was that they wanted to learn from other farmers. This supports earlier results obtained in Sections 3.1 and 3.2 and confirms that farmers placed value on the opportunity to draw on the knowledge and experience of other farmers. BDG members also indicated that they decided to join the BDG programme to ensure access to other future government schemes. This finding reflects an initial perception amongst farmers at the beginning of the BDG programme that BDG membership would be a pre-requisite for accessing other government-funded schemes and supports. This is understandable as participation in the scheme gives the farmers greater access to information through the facilitators and other farmers which enables them to more easily access other programmes such as the “capital grant” scheme compared to farmers that are non-members of the BDG programme. This buttresses the results of the quantitative analysis, which showed that farmers with larger farm sizes and probably those who are more commercially oriented are more likely to join the BDG programme. ‘Access to annual payment’ was regarded as least important by the farmers when the average of the degree of importance is considered. However, given the average value of 3.85 in a scale of 1 to 5, the annual payment may be regarded as being relatively important, although not as important as the other four identified reasons.

Table 4. Reasons for joining the BDG programme.

Reasons	Degree of Importance
To learn from other farmers	4.55
To access other schemes/future schemes	4.29
Opportunity to engage socially with like-minded farmers	4.24
Accessing CAFRE advice/information	4.15
The annual payment	3.85

Key: 1 = not important 2 = of little importance; 3 = less important; 4 = important and 5 = very important.

The distribution of responses to the reasons for joining the BDG in terms of degree of importance is presented in Figure 1, where it can be observed that the number of farmers who rate the annual payment as very important is lower when compared to the other four reasons. This may indicate that the majority of farmers who joined the newly initiated BDG programme did so more from the attitude and motivation to improve their farm performance rather than the motivation for obtaining government subsidy through a payment they will receive for attending and contributing to the programme. This is in line with those of previous studies, for example [23], which stated that participation in competence development projects (CDP) is influenced by farmers’ willingness to cover their needs for autonomy and competence, rather than external factors. Previous research [37] that evaluated dairy discussion group membership in the Republic of Ireland has also shown that farmers who did not receive financial incentive to join a dairy discussion group had better farm performance compared to those farmers who received financial incentives.

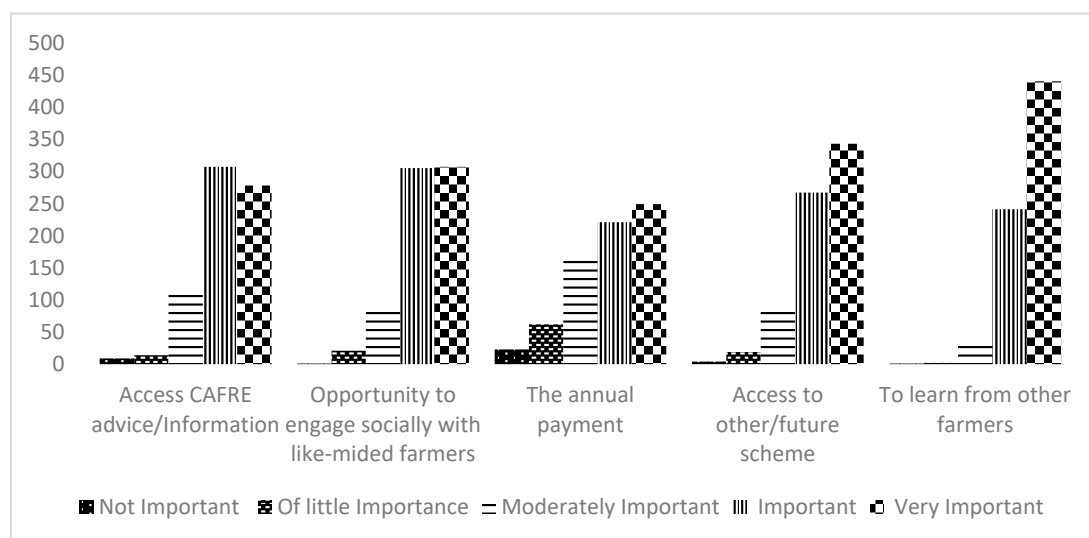


Figure 1. The distribution of responses to the reasons for joining BDGs.

4.5. Reasons for not Joining the BDG Programme

The results presented in Table 5 provide a summary of the main reasons provided by non-members of the BDG programme for not joining a BDG group. Twenty-seven per cent of the surveyed respondents reported that they did not participate in the BDG programme because they were not aware of it at the time. Twenty-five per cent of respondents indicated that they did not participate in the programme because they did not see it as being relevant to their farm business. The findings highlight that the method of communication to promote the BDG programme and its membership requires careful consideration to establish a good level of uptake. This finding also corroborates the results of the quantitative analysis where it is noted that farmers with larger herd size and who are more commercially oriented have a higher probability of participating in the BDG programme.

Table 5. Reasons for not joining BDG.

Reason	Frequency	Percentage
I was not aware of it at the time	14	26.92
Did not see it as relevant to my farm	13	25
I didn't like the idea of sharing farm business/financial information with other farmers	7	13.46
Would not have been able to take time away from the farm	6	11.54
I am already involved in the Farm Business Survey	4	7.69
I thought it would involve too much work	3	5.77
Other	3	5.77
I did not apply on time	2	3.85
Total	52	100

4.6. Sources of Information

Our analysis of the sources of information regarding the programme showed that newspapers/press/media were from the farmers' perspective, the most popular means of finding out about the programme (Table 6). Again, this reflects the importance of this source of information for the newly initiated programme. However, its effectiveness may diminish as more farmers become aware of the programme, and there is potentially increased direct farmer-to-farmer communication. The local (CAFRE) farm advisors were also an important source in conveying the purposes and details of the scheme to farmers with twenty-nine per cent acknowledging that they received information about the programme from a CAFRE advisor.

Table 6. Sources of information about the BDG scheme.

Source	Frequency	Percentage
Newspapers/Press/Media	294	40.83
CAFRE advisors	210	29.17
DAERA website	89	12.36
Other farmers	62	8.61
Through involvement in another scheme	24	3.33
Through the farming unions	19	2.64
Family member	14	1.94
Others	8	1.11

The farmers participating in the BDG programmes are expected to attend at least eight meetings within a year. The results presented in Table 7 show that the average attendance of farmers at meetings for the first and second year of BDG membership was relatively high.

Table 7. Attendance rate.

BDG Groups	2016/2017 (%)	2017/2018 (%)
Dairy	86.9	82.0
Sheep	89.6	85.0
Cattle	91.9	84.0
Beef	90.0	84.1

4.7. Areas of Improvement for the BDG Programme

As part of the entry survey, respondents were asked to identify areas of improvement for the BDG programme and the categorised responses are shown in Table 8. Approximately 24 per cent of the farmers believe that no change is required as they are satisfied with the current operation of the programme. However, close to 20 per cent of group members believe more in-depth, diverse and technical information should be provided at BDG meetings. Nine per cent of the farmers also indicated that more meetings and farm visits per year would enhance the benefits gained from BDG membership.

Table 8. Identified areas of improvement of the BDG programme.

Areas of Improvement	Frequency	Percentage
No change is needed	173	23.99
More in-depth, diverse and technical information	142	19.69
More Farm Visits and Meetings per year	65	9.02
Improved social interaction among members and between groups	57	7.91
Continue attendance payment	37	5.13
Improved diversity in group composition and meeting schedule	31	4.3
Review progress made by members/Revisit issues raised on farm visits	26	3.61
Group winter meetings off farm	26	3.61
Flexibility in group rules	21	2.91
More outside speakers and workshops	19	2.61
UK/Ireland trips	20	2.77
More members	18	2.49
Get qualification for attendance	8	1.11
Link membership to grants	6	0.83
N/A	72	9.99

5. Discussion and Conclusions

In this study, we employed a mixed-methods approach to determine the key drivers of farmers' participation in a newly developed extension programme in Northern Ireland, namely the BDG programme. The approach has provided comprehensive evidence of farmers' attitudes towards joining or not joining a specific peer-to-peer learning extension service. The role of farmers' attitude in relation to joining or not joining the BDG programme was also analysed. In doing so, we complemented the results of the quantitative analysis with behavioural constructs that have indicated the likelihood of an individual farmer participating or not participating in the BDG programme. Such an approach allows for a more comprehensive understanding of the factors that stimulate farmers to acquire knowledge and skills aimed at improving their productivity, and consequently, farm income. From the results of the analysis, it can be concluded that herd size, land area and age of the farmer are significant factors affecting farmers' enrolment in the BDG programme. Those farmers with larger farms (land area farmed) and who are younger demonstrated a greater willingness to join and participate in the BDG programme, motivated by the aim of improving farm performance. The results also show that farmers value the opportunity to obtain and share relevant information and discuss their farm business performance with other farmers, this ranks first in their reasons for joining. Although farmers were being paid for participating in the BDG programme, for most of the farmers, being paid was less important compared to the opportunity to share farming information with other farmers.

A key insight from our study is increased engagement in a participatory extension programme depends not only a high level of facilitation expertise through efficient communication of the programme, but also the provision of adequate, in-depth, diverse and technical information to the farmers. This may be linked to the role of the facilitator in creating the right learning environment within the group [38]. As a result, it is required that regular training is provided to facilitators so they can better lead discussions relating to farm technicalities. Studies by King et al. [5], Turner, et al. [39] and Fielke, et al. [40] have all demonstrated the critical role of experienced and engaged facilitators in achieving farm groups' objectives. As intermediaries, the facilitators' commitment and skillful coordination are essential to encourage farmers' engagement and intensity of participation [13,16,41]. The results have practical implications for the establishment of participatory extension programmes as they show that, in designing and delivering of farmer participatory extension programmes, the organisations involved should take into consideration the different characteristics of the farmers.

It is important to stress that, like other studies, this paper is not without limitations. The decision of farmers to participate in a new government programme is usually a complex process that is subject to unobservable and idiosyncratic behavioural factors outside those considered in this study. These omitted variables, together with the inherent heterogeneity of the farming population, attenuate the explanatory power of the logistic regression model. It should also be acknowledged that this study focused primarily on the factors influencing farmers' decisions to join a participatory extension programme with more limited insights concerning how participation in the programme may be widened. An analysis of methods to widen participation in extension programmes of this type is a subject that may be explored in greater detail in future studies. Further research could also involve measuring the impact of the programme on farm income and technical efficiency.

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