sustainability

MDPI

Article

An Analysis of Irish Dairy Farmers' Participation in the Bioeconomy: Exploring Power and Knowledge Dynamics in a Multi-actor EIP-AGRI Operational Group

Kieran Harrahill [1,2,3,*], Áine Macken-Walsh [2,3], Eoin O'Neill [1,3] and Mick Lennon [1]

[1] School of Architecture, Planning & Environmental Policy, University College Dublin, D14 E099 Dublin, Ireland
[2] Teagasc-The Irish Agriculture and Food Development Authority, Rural Economy & Development Programme, Mellows Campus, Athenry, H65 A063 Galway, Ireland
[3] BiOrbic—SFI Bioeconomy Research Centre, University College Dublin, D04 V1W8 Dublin, Ireland
* Correspondence: kieran.harrahill@ucdconnect.ie

Abstract: The European Commission's European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), part of the European Commission's Europe 2020 strategy, aims to 'achieve more and better from less' by bringing together a diversity of innovation actors to harness their combined knowledges to creatively achieve sustainability goals. The creation and novel use of biomaterials remains both a significant challenge and opportunity and bringing together all the relevant actors from primary production through to refinement and processing is anticipated to make progress in bringing into practice pilot operational approaches on the ground. For the bioeconomy, a nascent sector, it is a significant challenge for it to become established; grow; innovate and engage all the relevant actors. It has been noted internationally that primary producers, among other cohorts, remain marginalised from bioeconomy activities, which significantly compromises how inclusive and innovative the bioeconomy is likely to be henceforth. In this context, an interesting case study is the *Biorefinery Glas* Operational Group (OG), located in Ireland. The OG was a 'small-scale-farmer-led green biorefinery supporting farmer diversification into the circular bioeconomy'. The central research question of this paper concerns the dynamics of farmers' participation in the OG, focusing specifically on how their knowledges shaped the operation of the OG and bioeconomy activities within it. This paper presents a social network graph illustrating the diverse actors involved in the OG, their relative degrees of connectedness to each other, and an overview of the differing levels of actors' influence in the network. Interrogating the roles of different actors further, a lens of power theory is used to explore how farmers' knowledges were used in combination with others' knowledges to shape the development of the OG and innovation within it. The overall conclusion from an analysis of interviews conducted with farmer and non-farmer participants in the *OG* is that while farmers were highly connected with other members of the OG and viewed their involvement in the OG positively, the level of influence they had in decision-making processes in some areas of the OG was relatively limited. Different types of members of the OG tended to work in a relatively segmented way, with farmers contributing as input suppliers and on the practical side at the farm level, while other members of the OG such as scientists worked on more technical aspects. This paper concludes by providing conclusions and lessons of relevance to innovation-brokers and practitioners, and for the operation of OGs involving farmers elsewhere.

Keywords: bioeconomy; primary producers; Foucault; power; knowledge

Citation: Harrahill, K.; Macken-Walsh, Á.; O'Neill, E.; Lennon, M. An Analysis of Irish Dairy Farmers' Participation in the Bioeconomy: Exploring Power and Knowledge Dynamics in a Multi-actor EIP-AGRI Operational Group. *Sustainability* **2022**, *14*, 12098. https://doi.org/10.3390/su141912098

Academic Editor: Julio Berbel

Received: 19 July 2022
Accepted: 19 September 2022
Published: 24 September 2022

1. Introduction

The European Innovation Partnership for Agriculture Productivity and Sustainability (EIP-AGRI) aims to support European agriculture become more 'resource efficient, economically viable, productive, competitive, low emission, climate friendly and resilient' [1].

An integral element of EIP-AGRI is the 'multi-actor' approach whereby diverse actors collaborate to develop solutions to common problems and exploit shared opportunities [1,2]. Within EIP-AGRI, actors from different backgrounds and sectors come together to form Operational Groups (OGs), which develop and test innovative solutions to solve agricultural problems and exploit shared opportunities [3,4]. Operational Groups are comprised of 'people who come together to work on concrete, practical solutions to a problem or innovative opportunity' [2]. OGs consist of several partners such as farmers, researchers, advisors, and agri-businesses among others. Partners hold varying forms of practical and scientific knowledge, which are expected to be creatively combined for innovation in the multi-actor process. Topics addressed by OGs range from the development and adoption of new technologies to the creation of short supply chains to environmental and biodiversity projects [2]. An advantage of the inclusion of farmers within OGs is that it ensures that farmers' knowledges are included in the innovation process and the solutions that are developed by the OG are implementable and respond to the practical issues faced by farmers [3]. The role of OGs in including farmers within innovative developments led Piñeiro et al. [4] to describe OGs as intermediaries for increasing farmers' involvement within innovation processes. OGs also have a responsibility to share the innovative solutions they have developed with other communities transnationally [1]. This is achieved using several communication channels such as websites and publications, alongside in-person demonstrations to communicate the results of their projects [3].

The importance of including a diversity of knowledges in the innovation process is highlighted across the innovation literature, particularly in the context of the development of nascent economies such as the bioeconomy [5]. In recent years, the bioeconomy has become a prevalent feature in policy documents focused on reducing society's dependence on fossil fuels [6–8]. There are contending definitions of the bioeconomy, illuminating the variety of sectors relevant to the bioeconomy and their differing approaches or visions for progressing bioeconomy development [8–10]. In essence, the bioeconomy 'represents a transition from a fossil-based society to a bio-based society that uses renewable biomass in products and energy' [11]. The bioeconomy is viewed as requiring a socio-technical transition and, inevitably, such a transition involves challenges that may hinder its advancement if not effectively addressed. Dialogue with the public on the bioeconomy is found to be lacking in some contexts and has been criticised for taking an approach that seeks to create public acceptance for how the bioeconomy is being developed rather than seeking real democratic participation in shaping the bioeconomy [12]. The presence of power imbalances and varying interests is also noted within the bioeconomy [10,13,14]. Developing the bioeconomy in a non-inclusive manner could lead to segments of society failing to view the bioeconomy 'as a desirable future' for them [11]. Furthermore, by not involving diverse actors and their knowledges in developing the bioeconomy, significant innovation potential is lost [5,15–17].

Where primary producers in particular are concerned, a growing body of evidence suggests that the failure to effectively include their knowledges and perspectives in decision-making regarding the direction and nature of bioeconomy initiatives could limit the appeal for them to become involved in the bioeconomy [18,19]. The important role of knowledges is particularly pronounced in the literature on the bioeconomy, itself defined in its early stages as the Knowledge-Based Bio-Economy (KBBE) [20–24]. Where farmers are concerned, it is argued that including their knowledges relating to natural resources could have benefits such as identifying new practical ways to reduce dependence on external inputs such as synthetic fertilisers [25]. However, despite this, some authors internationally have pointed to the marginalisation of farmers' knowledges in the development of the bioeconomy. Schmid et al. [25], for instance, found that official bioeconomy strategies include farmers as mere recipients of scientific knowledge, rather than providers of their own knowledges. The marginal role of farmers within the bioeconomy is also outlined by Scheiterle et al. [21] whose use of network analysis found that farmers are among the least connected and least influential groups within the Brazilian bioeconomy.

Internationally, there is limited research on the views and experiences of farmers in the bioeconomy [25–29] and there is currently no empirical study of primary producers' involvement in Ireland's bioeconomy. This paper seeks to address this research gap by providing an analysis of the influence of farmers involved in the *Biorefinery Glas* OG, a farmer-led, multi-actor project. The undertaking of analysis of the *Biorefinery Glas* OG in terms of identifying the level of genuine farmer participation in the development of a bioeconomy initiative can offer lessons to similar initiatives internationally which seek to address the deficit of poor farmer participation. Power theory, specifically a Foucauldian lens, is used to explore the power/knowledge dynamics at play in the OG, between the diverse actors involved.

Through an analysis of the *Biorefinery Glas* OG, the principal research question of the study presented in this paper is to what extent farmer knowledges have been influential in a multi-actor EIP-AGRI OG, which aims to support farmer-led bioeconomy development? This paper analyses qualitative interviews with actors involved in the OGs to understand the experiences of members involved in the OG and, specifically, the nature of farmers' involvement in the OG. We use a theoretical lens that is informed by power theory to analyse the qualitative interview data. We mobilise a Foucauldian sensitivity to power, which is attentive to how power is responsible for the creation of dominant/marginalised knowledge, which is critically relevant to a central aim of OGs-knowledge exchange through a multi-actor innovation process [30,31]. While previous studies have considered the role of farmers within the bioeconomy and the power imbalances which they face, a novel contribution of this study is its use of qualitative research methods to detail the experiences of farmers, their level of engagement, and the influences of power in a bioeconomy initiative which is defined as being 'farmer-led' [28,32].

This paper is structured into seven sections. Following this introductory section, Section 2 reviews how the roles of primary producers in the bioeconomy have been documented in the literature thus far. Section 3 presents the theoretical framework, based on the work of Foucault, which focuses on the connections between power and knowledge and local or practical knowledge in particular. An explanation of the methodology employed in this study is provided in Section 4. Section 5 presents the findings of this study, detailing the network structure of actors involved in the OG; and a thematic analysis of qualitative interviews identifying farmers' experiences of participating in the *Biorefinery Glas* OG. Section 6 provides a discussion of the findings of this study concerning the literature on farmer involvement in the bioeconomy and Foucault's conceptualisation of power. Section 7 presents a conclusion, limitations of the study and suggested areas for future research.

2. Positioning of Primary Producers in the Bioeconomy

A concern regarding the development of the bioeconomy heretofore is that it has typically followed a predominantly top-down development model whereby members of the bioeconomy's 'triple helix' (academia, large industries, and policy) have had an eminent role [33]. A consequence of this is that it may be unclear to the public, the citizen, and other actors in the innovation system how they may participate and contribute to the development of the bioeconomy. Primary producers are described as vital for the development of the bioeconomy, as they form the 'first link' in the bioeconomy value chain [34]. Agricultural waste is identified as a key source of biomass and energy for securing a transition to a sustainable bioeconomy [35–39]. Several studies have discussed factors that motivate farmers' involvement in the bioeconomy [27,29,40,41]. These include market pull, regulatory push, and technology push alongside farmer perceptions of the biorefinery process, farm-level financial factors, and environmental concerns. Despite the insights gained from these studies, most are limited to a focus on farmers involved in plant-based agriculture rather than farmers involved in animal-based agriculture. An important study addressing this deficit is provided by Wreford et al. [42], who evaluated the potential of the bioeconomy to transform animal-based agriculture. The bioeconomy is described in the context of animal-based agriculture as enabling solutions to intractable

environmental challenges, alongside creating new ways for farmers to earn money [42]. However, the authors refer to a survey conducted by Brown [43] that shows the preference among farmers generally is to intensify current practices rather than alter land use practices. Potential reasons for this are the inability of farmers to alter their practices due to financial pressures [44], and because of social and cultural preferences that favour conventional agricultural production [45].

Where primary producers in the agriculture sector are concerned, an emerging criticism is that the role of farmers has been confined to that of biomass providers [29,46,47]. Richardson [48] provided a detailed account of farmers' positioning at the bottom of the bioeconomy value chain, where they fail to benefit economically from its development compared to some other sectoral actors. This view is supported by Solarte-Toro and Cardona Alzate [49] who identify two key areas of improvement for bioeconomy development: increasing the payments farmers receive for the production of biomass; and greater recognition of their importance within bioeconomy value chains. In this context, Stern et al. [28] provide insights into the differences between farmers' perceptions of the bioeconomy and the perceptions of other social groups. A notable finding of the study is that farmers, by comparison to students, employees, and pensioners, are more critical of the bioeconomy. A reason for this criticism is that 'responding farmers tend to believe that the bioeconomy will lead to more inequity' [in value chains] [25]. Aligned with this finding is the study of Rossi and Hinrichs [26] which found that scepticism towards the bioeconomy among farmers is related to the structure of value chains and inequalities within them. Rossi and Hinrichs [26] outline that for local people and places to gain the most benefit, corporate dominance in the bioeconomy should be avoided or minimised. This signals a clear need for governance in how bioeconomy chains are developed and innovated.

The literature discusses a variety of areas where conflict and power dynamics are at play within bioeconomy development. The study by Goven and Pavone [50] discusses how the bioeconomy represents 'a site of struggle'. The ability of corporate actors to dominate the bioeconomy is reflected in a case profiled by Devaney and Iles [32]. Farmer cooperatives, which were instrumental in advancing the production of biofuels in the Midwest region of the United States, went into decline once larger companies entered the biofuel sector. A similar depiction of bioeconomy development is presented by Bastos Lima [51], who describes how the ability of dominant agri-businesses to dictate bioeconomy development in Brazil did not bode well for smallholder farmers, natural ecosystems, or the legitimacy of the bioeconomy. From a European perspective, Ramcilovic-Suominen [24] also describes the preeminent position of agri-business in the bioeconomy and the need to consider power relations and justice within bioeconomy development. Another study, focused on smallholder farmers, in particular, found that their non-involvement in the nascent development of the biofuels and bioenergy sectors caused the eventual poor acceptance of these sectors in the smallholder farmer community [18]. These examples underpin the call by Devaney and Iles [32] for the creation of a robust governance system in the bioeconomy, ensuring that future developments are 'more sustainable, inclusive, and evenly distributed'. The alternative to a profit-driven bio-resource vision of bioeconomy development is the bio-ecology-aligned 'agroecological approach' [52–54]. Perceived benefits of this vision include the creation of networks for cooperation alongside a fairer distribution of value to producers [20]. Opposed to acting as 'mere commodity producers', Devaney and Henchion [55] outline how the bio-ecology vision sees producers becoming 'managers of ecosystems'.

The inclusion of local and tacit knowledges has been identified as important for securing the sustainable and innovative development of the bioeconomy [25,56–60]. It has been observed that the need to incorporate local knowledge into bioeconomy policies is mentioned in the context of public relations in some EU policy documents [11]. Vainio et al. [11] argue, however, that initiatives for engaging stakeholders and the public tend to focus 'on one-way information transmission' from decision-makers and experts to the public. Where agriculture is concerned, an important concept considering the innovative develop-

ment of any agricultural industry is the Agriculture Knowledge and Innovation System (AKIS), which represents all the actors involved in the sector and how they inter-relate. An integrated AKIS, where a diversity of actors collaborate in innovation and development activities, is highly desirable as it draws from the resources and knowledges in a balanced and inclusive way [61]. In other spheres employing the multi-actor approach, such as the European Commission-funded Horizon 2020, Horizon Europe, and EIP-AGRI initiatives, the move away from top-down, scientific knowledge transfer to bottom-up interactive knowledge exchange is viewed as a way of overcoming issues related to the noted exclusivity of the bioeconomy [11,19,25]. Including farmers within bioeconomy developments can increase the 'know-how' of funded consortia about the potential for innovation on the ground and, in particular, about the necessary production of biomass for bioeconomy development [62]. Combining the various knowledges held by farmers and other actors is also viewed as a way of achieving greater levels of social and community-based innovation within bioeconomy development [63]. Despite the acknowledged importance of local and tacit knowledges for the development of the bioeconomy, there is limited research on how knowledges held by farmers has been included in bioeconomy developments. The work of the philosopher Michel Foucault supplies a useful theoretical perspective for examining the role and potential importance of such knowledges in the development of the bioeconomy.

3. Foucault, Power/Knowledge, and Local Knowledge

The literature, albeit limited, on the marginalised position of farmers and their knowledges in the bioeconomy, demonstrates the need for research on the power dynamics that shape bioeconomy development. The work of Foucault on power, knowledge, and discourse is influential in many fields of power-sensitive analysis [64]. Despite this, its application to the bioeconomy is novel. Foucault [65] explains how power 'doesn't only weigh on us as a force that says no, but . . . it traverses and produces things, it induces pleasure, forms of knowledge, produces discourse'. Furthermore, power cannot be considered as moving in a linear, top-down direction. Foucault [65] views power as being 'employed and exercised through a network like organisation'. A core theme within the work of Foucault is the responsibility of power for creating knowledge as well as the generation of power from knowledge [31]. Foucault's account of knowledge is that it is not detached from power dynamics within society [66]. Instead, new forms of knowledge are created through power. Referencing Haugaard [67], Macken-Walsh [68] discusses the connections between power and knowledge whereby those with expert knowledge generate power through their status as 'specialists in truth production'. Engstrand and Enberg [69] provide an example of the workings of power/knowledge in this regard. Those who are positioned as knowledgeable are also positioned as valued within a project, resulting in the dominance of their knowledge. Those considered not to be knowledgeable are not taken seriously, resulting in their knowledge being marginalised in the decision-making process. The process of 'rarefaction' describes how discourse is 'thinned out' through the exclusion of the knowledge of certain groups [70]. A further consequence of the connections between power, knowledge, and discourse in the work of Foucault is the creation of subjectivities. Including or excluding certain groups based on whether they are viewed as knowledgeable illustrates the creation of subjects via the use of 'dividing practices' [71]. Smart [30] describes how subjects are formed based on their location within networks of power-knowledge relations. This leads to subjects acting in a manner which aligns with social norms [72].

While the work of Foucault highlights the negative impacts of power such as the discrediting of the views of certain groups, it also emphasises the positive and productive nature of power [64], as power dynamics and structures evolve in (re) adjusting the positioning of different actors' knowledges, potentially accommodating new knowledges. The production of information by marginalised groups can potentially alter the status quo of embedded power/knowledge relations [64]. Changes to the power of previously marginalised knowledges can occur in the context of Grand Societal Challenges, such as climate change, where there is official acknowledgement and public awareness that 'busi-

ness as usual' (knowledge) is deficient. Alongside considering how power and knowledge work in tandem, an added layer to Foucault's work is his focus on local forms of knowledge. Local knowledge represents 'ways of thinking and doing that have been eclipsed, devalued, or rendered invisible within dominant apparatuses of power/knowledge' [73]. Local knowledge represents knowledge that is held by actors in peripheral locations within networks of power. Local knowledge is critiqued as a type of information that cannot be generalised, thus reducing its ability to be objective [74]. Regarding environmental policy, Tafon et al. [75] highlight how prioritising 'expert' ecological knowledge over local knowledge leads to socially regressive outcomes. A growing body of literature demonstrates that the local knowledges held by farmers are becoming highly valued in research, development, and innovation contexts, overcoming the subjugated status with which it has been traditionally associated [76,77].

The influence that positioning within networks has on Foucault's understanding of power leads to the need to consider how social networks develop and how they operate. Social network theory focuses on the importance that relationships between actors have on outcomes such as the development of policies and innovation compared to the attributes of individual members of a network [78]. As well as considering the structure of a network in terms of the number of groups connected to the network, social network theory also focuses on the importance of positioning within a network and how this can marginalise certain groups due to their location in the network [79,80]. This can be caused by several factors such as demographic characteristics, expertise, and the ability to provide guidance on a particular topic as well as the structural position an individual holds in a network due to their connectivity. The structure of a social network can determine who can influence how innovations are developed, who adopts them, and how widely they are adopted [79]. The focus on networks and knowledge within a Foucauldian understanding of power is also seen in the work of Clegg on power. They describe how the connections between power and knowledge are integral to the 'rules of the game' within a network which defines a subject's position in relations of power [81]. The adoption of norms, values, and practices which originate from the connections between power and knowledge can depend upon the positioning or the proximity of actors in relation to others in the network [82]. Another concept that aligns with the importance of networks is the AKIS. It represents the linkages and interactions between agricultural organizations and groups that are engaged in the transmission, integration, and utilization of knowledge and information [83]. The concept of the AKIS represents a move away from linear approaches of knowledge exchange toward a collective approach that includes all actors in agri-food chains [84]. Various studies emphasise how the AKIS supports the development and sharing of knowledge within a network [5,83,85]. As opposed to farmers simply being the recipients of technological innovations, the AKIS places farmers as actively involved in the creation of strategies and organisation, and management structures in particular spheres [86]. This has the outcome of shaping the visibility of farmer knowledges in particular ways within a network [87]. A benefit of a greater role for farmers in the development of initiatives is that their initial involvement can create legitimacy which counteracts resistance to change such as the transition to engagement in these initiatives.

The literature on power and knowledge provides a useful framework to understand the logic of why policies such as EIP-AGRI place such considerable emphasis on the need to support transdisciplinary, multi-actor knowledge exchange; and to place local, practical knowledge at the centre of this knowledge exchange: diverse knowledges are required for innovation in responding to grand societal challenges and opportunities. Where the bioeconomy is concerned, considering farmers' indispensable roles in its sustainable development, the multi-actor approach of EIP-AGRI OGs offers an opportunity to place farmers in leading roles, contributing their knowledge for innovation-which is precisely the aim of EIP-AGRI. In this context, the *Biorefinery Glas* OG provides a valuable case study in which to explore power dynamics within its multi-actor group, dynamics which, through a

Foucauldian lens, ultimately determine if and how farmers' knowledges are meaningfully included and used for innovation.

4. Methodology

Social network analysis (SNA) is used to map a social network, identifying the actors involved and the connections between them. Therefore, SNA was used as a method fit for the purpose of mapping and visualising the structure of the network of the *Biorefinery Glas* OG. The use of SNA aligns with the Foucauldian theoretical framework employed as it can illustrate the positioning of actors within the *Biorefinery Glas* OG network, and their relative degrees of connectedness and therefore influence. SNA examines how resources, goods, and information 'flow through particular configurations of social ties' [88]. A benefit of SNA is that it can identify the positioning of participants who are centrally positioned and who are marginalised within a network [89]. If actors are weakly positioned in a network or absent from a network entirely, their ability to influence the decision-making process in the network is hampered. SNA, which identifies the membership and structures of a network, is useful as an evidence base to inform the design of inclusive processes to shape institutions and for the targeting and implementation of policy instruments [90]. It can also be used for evaluation and impact assessment purposes, for instance, to assess how actors shape the environment/networks in which they operate [91].

Using semi-structured interviews conducted via phone and video (zoom) calls, *Biorefinery Glas* OG participants were asked whom they had connected with in the OG. Data were imported to Microsoft Excel. The data from Excel represented the number of ties between each individual in the network. The input '1' was used when a connection between the two individuals was present while the input '0' was used when there was no connection. Data were visualised through the creation of a sociogram using NetDraw version 2.177. This process visually mapped the relations within the OG's network.

The second methodology employed was a case-study approach using qualitative interviews, to understand further relations within the social network. A qualitative case-study approach was necessary for exploring in an open-ended way the dynamics of power/knowledge within the OG. Particularly relevant to the study of nascent and evolving contexts, such as Ireland's bioeconomy, case studies provide in-depth current understandings but also a 'forward glance' to the trajectory of what is likely to evolve, allowing for an anticipation of 'situations even before we encounter them, allowing us to envision alternative futures' [92]. Case studies can provide a detailed account of a phenomenon, and can be selected purposively to give a voice to marginalised groups [93]. They are defined by Flyvbjerg [94] as being the intensive analysis of an individual unit of research. Case studies can also be useful for communicating new ideas or enhancing awareness of a certain topic [95].

Despite these benefits, critics of the use of case studies claim that research of this nature provides little more than interesting stories and that the use of a single case study does not allow for the generalisation of findings [96,97]. While case studies are not normally statistically significant, Flyvbjerg [92] emphasises the importance of their theoretical significance. Research that uses a case study approach generates an in-depth understanding of a particular phenomenon (a social movement, a policy measure, a programme, etc.) and generates knowledges and insights that are transferable to understanding or indeed predicting other phenomena [98]. The study by Tassinari et al. [99] identifies the use of case studies as crucial for studying bioeconomy development. Case studies are also popular outside of academic research. A report published by the United Nations Food and Agriculture Organization in 2019 provides an overview of 26 successful bioeconomy case studies [100]. They are used for guidance for contexts elsewhere wishing to develop bioeconomy initiatives. While case studies such as those outlined by San Juan et al. [100] can be beneficial for increasing bioeconomy awareness regarding the workings of biotechnology, a limitation of their use arises when they do not capture information relating to behaviour, attitudes and perspectives. This research gap is discussed by Sanz-Hernández et al. [101] who describe how

most contributions to bioeconomy research come from a scientific or technical perspective in terms of evaluating novel developments such as the use of new types of biotechnology. Furthermore, despite the importance of social and economic factors for securing a transition to the bioeconomy, studies from a social science perspective are limited.

A case study of Ireland's *Biorefinery Glas* OG is presented in this paper to evaluate how the views and knowledges of farmers have been influential in the OG. Studying a pilot bioeconomy initiative also offers a forward glance at how farmers are likely to be involved in the bioeconomy as it develops. Case studies are highly beneficial for understanding initiatives in the early stages of their development and have a practical purpose in identifying any corrective actions required to support initiatives' success [102,103].

The EIP-AGRI OG scheme was launched in 2012 [104]. By November 2020, 1600 OGs across Europe had been selected for funding in a wide range of areas relating to enhancing sustainability in agriculture [104]. As of December 2021, 55 EIP-AGRI projects have taken place in Ireland [105]. To gain insight into the influence of farmers' knowledges on the OG and identify power/knowledge dynamics within the OG, semi-structured interviews were conducted with participants in the *Biorefinery Glas* OG. Semi-structured interviews are the most commonly used qualitative research method [106]. This form of interview can take the approach of providing a flexible framework whereby all participants are asked the same questions but in no defined order [107]. A benefit of using semi-structured interviews is that it provides insights into the views and experiences of individuals [106]. Participants are regarded as experts in their own experiences [108]. By interviewing people who may be marginalised within a network (i.e., farmers in the bioeconomy), insights can be gained into topics that may be absent from other documents such as official policy documents or scientific reports on the bioeconomy. The use of semi-structured interviews can also provide more in-depth insights into the perspectives of participants by asking follow-on questions as necessary, flexibly eliciting more information from participants in a customised way based on their responses to the main interview questions [106]. It is this depth rather than breadth in research that provides a key benefit of qualitative methods over other research methods [109]. For this case study, open-ended questions sought to explore the experiences of individuals who participated in the OG. The primary research question of this study was to what extent has farmer knowledge been influential in a multi-actor EIP-AGRI OG which aims to create a farmer-led bioeconomy development? Sub-research questions are presented in Table 1.

Table 1. Sub-research questions of the study on the subjective experiences of primary producers involved in the *Biorefinery Glas* OG.

What was the initial awareness of the bioeconomy among participants?
How did farmers and other actors gain entry into the bioeconomy (through the OG)?
What is the nature of the bioeconomy social network as experienced by participants?
What is the role of knowledges held by farmers in the OG?
What should the role of farmers be in the bioeconomy?

An interview guide was developed for conducting the interviews, where the questions were based on probing aspects of Foucault's power/knowledge compound. The interview guide also illustrates the rationale for the question; the question asked; probing questions used; and sub-research questions. The full interview guide is presented in Appendix A.

Semi-structured interviews with participants in the *Biorefinery Glas* OG were conducted between March and May 2021. The *Biorefinery Glas* OG began in 2019 and concluded with a presentation of results in February 2021. Ethical approval was acquired from the UCD Office of Research Ethics. Interviews lasted between 33 min and 80 min. Due to COVID-19, all interviews took place remotely via phone calls and and video (zoom). In total, fifteen participants were interviewed. Upon initial discussion with the coordinator of the OG regarding who had been involved in the OG, the coordinator acted as a gatekeeper

and assisted in establishing an initial connection with the participants. Following this, arrangements were made for the scheduling of interviews with the participants from all partners involved in the OG by contacting participants via email and text messages. Of the five farmers who participated in *Biorefinery Glas*, three were interviewed. Two of the participant farmers were male and one was female. Two participant farmers owned their farms while another was a farm manager. Two participant farmers who had participated in the OG were not interviewed. Both of these non-participants were male. One owned their farm while another was a manager on a research farm. The reasoning for their non-participation was time constraints on the part of one farmer and the personal choice of another not to participate. At the end of each interview, participants were asked if they could connect the researcher with another person involved in the OG to ensure that contact was made with every person who had been involved in the OG. Beyond the farmers who did not participate in the interviews, two other participants who had been involved in the OG did not respond to requests to participate in interviews. One was involved in the operation of the biorefinery process while another had been involved in the initial planning stage of the OG. Table 2 outlines the composition of the interview participants. Alongside participating farmers and participants from the organisations that formed the OG, a Teagasc farm advisor who assisted in the undertaking of the OG was also interviewed.

Table 2. Overview of interview participants.

Groups	Number of Interview Participants
Agri-business	2
Agricultural advisor	1
Agricultural Science researchers	3
Bioeconomy researchers	3
Farmer co-operative representative	1
Farmers	3
Technology providers	2

A limitation of conducting interviews remotely is that the lack of a physical presence and visual cues on the part of the interviewer can limit the rapport-building process [110]. The dependence on speech alone also leads to the slight possibility that the tone of interview responses may be misinterpreted [97]. However, using phone calls for conducting interviews can have benefits such as enhancing accessibility for hard-to-reach populations [111]. While the undertaking of interviews remotely may result in additional challenges for researchers such as a dependence on phone or internet connectivity, the use of phone calls for completing interviews allowed each participant to provide a detailed account of their experience as a part of the *Biorefinery Glas* OG. From this, a comprehensive account of the experiences of participants within the *Biorefinery Glas* OG was attained.

Analysis of the data generated from interviews was facilitated using coding. Data were analysed deductively whereby the interview questions developed based on Foucauldian power dynamics were also used to help organise data generated from the undertaking of interviews. Table 3 illustrates how the work of Foucault was used to analyse the findings of this study. Following the organisation of data, responses were analysed inductively [112]. There were four coding cycles within the analysis of interviews. The first cycle of coding emphasised the 'causes, contexts, contingencies, consequences, covariances and conditions' of data [113]. The second cycle assisted in creating a structure for the data. Similar codes from the first cycle were merged and redundant codes were deleted [113]. Codes were condensed into categories which led to the creation of themes. This is the final step in the analysis process as it provides a structure for the writing of results. A codebook was developed using Microsoft Excel. This included the title of the code and a description of what was included within the code. The development of a codebook can enhance the level of reliability within the analysis process [114]. Tables outlining the cycles of coding undertaken in this study are provided in Appendix B. The themes developed

following several rounds of analysis were the network of the *Biorefinery Glas* OG; the roles, contribution, and influence of farmers and their knowledges within *Biorefinery Glas* OG; and the perspectives of participants on future farmer involvement in the bioeconomy.

Table 3. Application of Foucault in the analysis of findings.

Element of Foucault's Theory of Power Applied	The Role of Networks in Power Relations	Subjectivities	Power/ Knowledge	Local Knowledge	Discourse
Focus of Application	The positioning of participants within *Biorefinery Glas* and the impact this had on the role of farmers.	Considerations for the role of farmers in *Biorefinery Glas* in terms of their contribution and influence.	Identifying the influence which different forms of knowledge held in *Biorefinery Glas*.	Examples of the inclusion and exclusion of knowledge held by farmers in the undertaking of *Biorefinery Glas.*	Data relating to the perspectives of participants on the future of the bioeconomy.

5. Results: The Influence of Farmers and Their Knowledges in the *Biorefinery Glas* OG

5.1. Network of Biorefinery Glas OG

The *Biorefinery Glas* OG was led by a consortium of five partners. Barryroe Co-operative is a farmer-owned dairy co-operative located in Co. Cork in the South of Ireland. Alongside purchasing milk from its members, the co-operative also supplies feed for pig farmers in the local area. As highlighted in Figure 1, one of the aims of the *Biorefinery Glas* OG was to identify whether the biorefinery of grass could provide an alternative feed source for monogastric animals (mammals with a single-chamber stomach), thereby reducing dependence on imported soya. Carbery Group represented the private sector within the OG. It is an agri-food manufacturer which comprises of four dairy co-operatives including Barryroe Co-operative. They are also located in Co. Cork. Institute of Technology Tralee (ITT; subsequently renamed Munster Technological University), and University College Dublin (UCD) were the academic partners in the OG. Researchers from UCD provided knowledge in the area of agricultural science in terms of the feeding quality of refined grass. Alongside including the coordinator of the OG, researchers from ITT analysed the viability of the by-products developed from the protein removed from grass. The final partner in the OG was Grassa. This was a Dutch biorefinery technology provider who had developed the small-scale biorefinery employed on the participating farms to evaluate the potential applicability of a grass-based biorefinery. A member of Teagasc, the Irish agricultural advisory service also provided logistical support in the undertaking of OG. Teagasc was not included as a member of the OG, however.

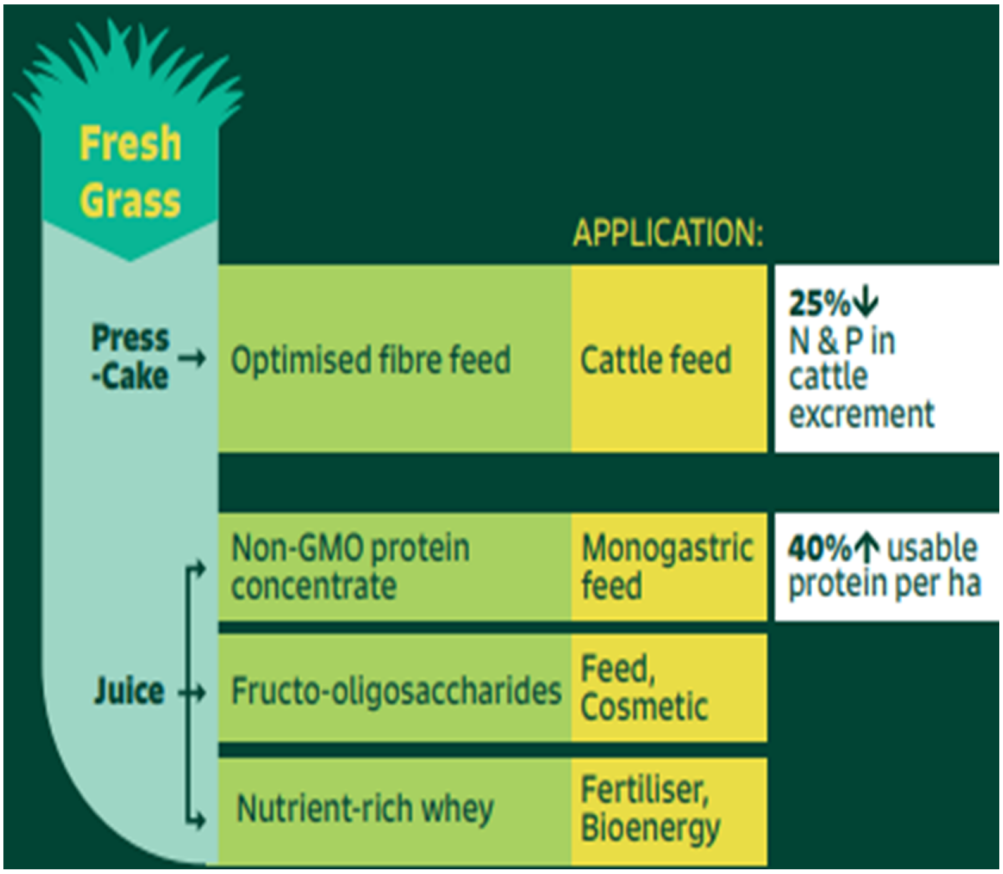

Figure 1. By-products from the biorefinery of grass. Source: *Biorefinery Glas* [115].

Biorefinery Glas was a 'small-scale farmer-led' green biorefinery demonstration project [116]. It has featured in Irish policy documents relating to bioeconomy development [117,118]. The aim of *Biorefinery Glas* was twofold. Firstly, it provided a pilot study to gain insights into real-world conditions for bioeconomy research, specifically in exploring the viability of a grass-based bioeconomy in Ireland by utilising a small-scale biorefinery on farms. Secondly, it aimed to enhance awareness of the bioeconomy in the wider population of farmers via demonstration and video-based dissemination of the experiences of participating farmers in the OG. The application of a grass-based biorefinery is described as having potential benefits for beef and dairy farms [118]. This relates to the acknowledged negative environmental impacts of dairy farming and the economic vulnerability of beef farming [119,120]. To apply a small-scale biorefinery on working farms, dairy farmers were selected to provide biomass to the OG and demonstrate the biorefinery. In total there were five participating farms including one dairy demonstration farm. The four other farmers were from the four co-operatives which form the Carbery Group. Those co-operatives are Bandon, Barryroe, Drinagh and Lisavaird. Figure 2 outlines where these co-operatives are in Ireland. The reason for the selection of these farmers to participate in *Biorefinery Glas* was their success in an awards program for sustainable farming. Each of the selected farms was located in the western region of Co. Cork. Cork has the highest number of dairy cows in Ireland and is a region renowned for dairy production [121–123].

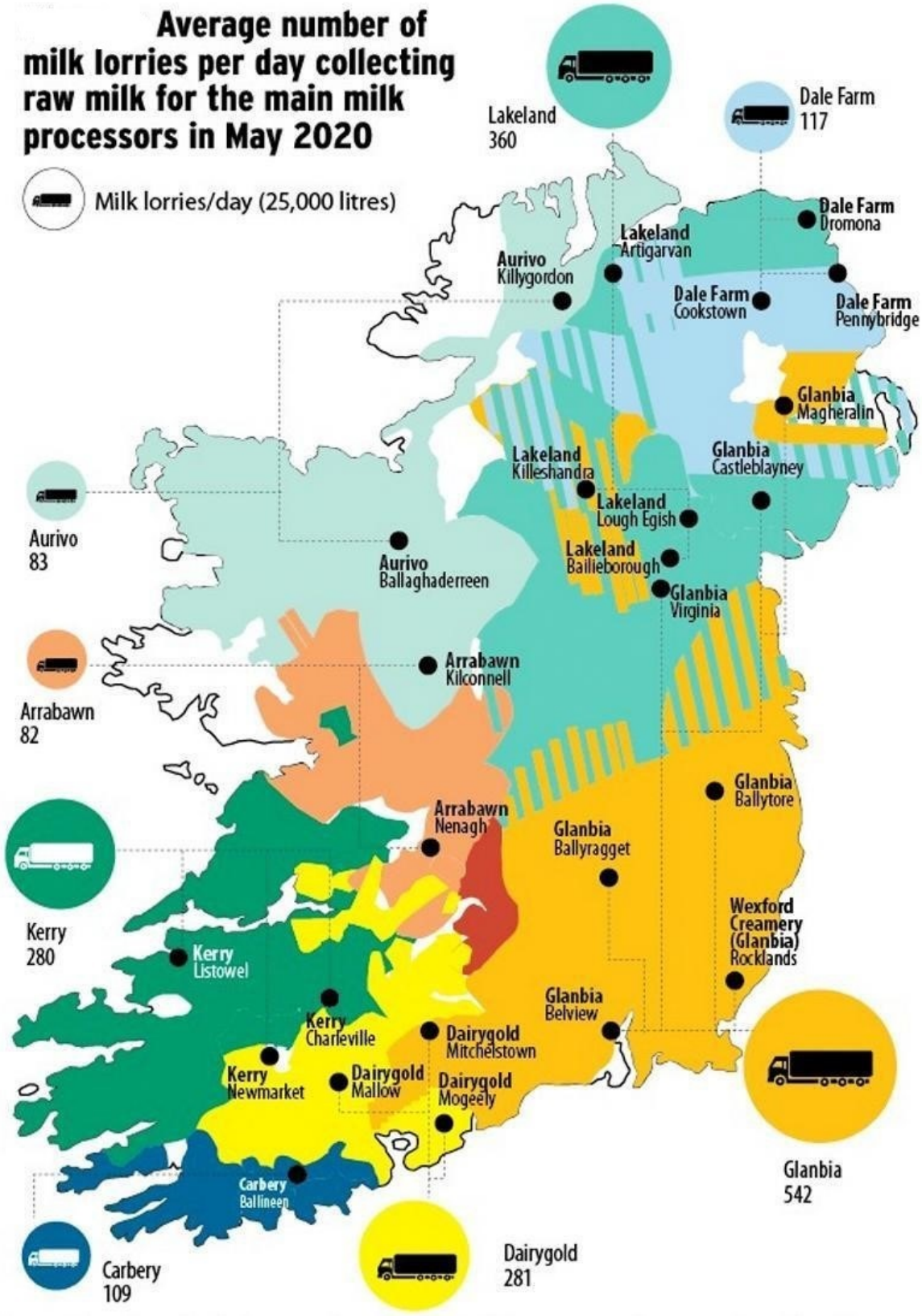

Figure 2. Map illustrating dairy co-operatives in Ireland. The four co-operatives which provide milk to Carbery Group are located in the South of Ireland. Source: Irish Farmers' Journal [124].

Figure 3 illustrates the network of the *Biorefinery Glas* OG based on the connections described by interview participants. At the centre of the network was the research coordinator of the OG and the participants representing the agri-business partner. There was a high level of connectivity among the different partners in the OG. The participating dairy farmers were connected with the researchers, technicians, and business partners in the OG. Given that they were not an active member of the OG, the Teagasc advisor was the least connected individual within the undertaking of *Biorefinery Glas*.

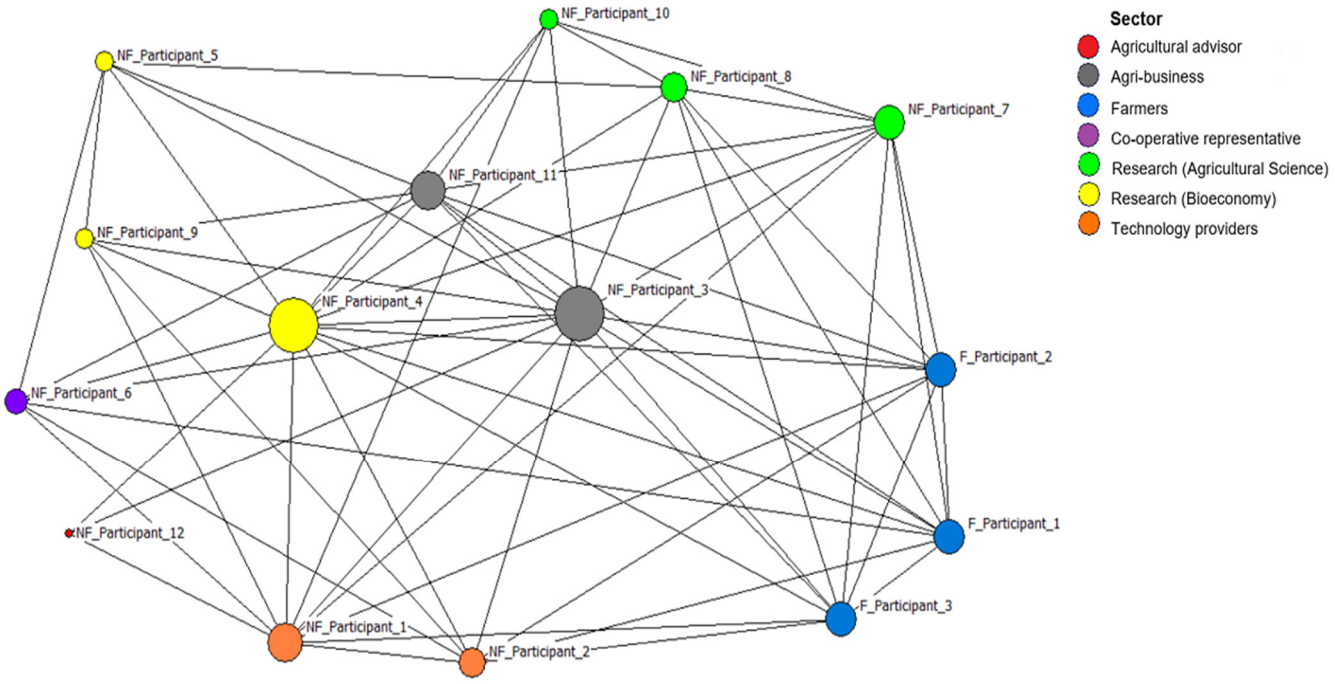

Figure 3. Connectivity of participants in the *Biorefinery Glas* OG. Node size represents degree centrality (level of connectivity). Visualised using Netdraw [125].

The involvement of participating farmers in dairy farming and their success in winning awards for sustainability in dairy farming organised by the four co-operatives which form Carbery Group was a key factor for securing their entry into this OG, as it connected them with the dairy co-operative which was a consortium member of the OG. The co-operative organisation itself was also described as a coherent entity that was suitable to facilitate farmers' participation in the OG.

> *'The reason for this with dairy farmers was just it was to do with the organisation. We needed a cohort; we needed the kind of guarantees that we would be able to get farmers to participate if we were going to get this [the EIP-AGRI OG funding]. And it was easier to envisage that with the co-op structure that exists in the dairy sector'.*
>
> (Non-Farmer Participant_4)

Within this OG, as demonstrated by the social network graph, farmers held a high level of connectivity, which meant that they had access to the various knowledges present within the OG social network as well as the opportunities to exchange the knowledges they hold. While Figure 3 illustrates how individuals in research and agri-business had the most connections in the OG and were therefore at the centre of the network, farmers and non-farm actors (excluding research and agri-business who were at the core of the network) had similar degrees of centrality within the network. Some researchers described how they had higher levels of connectivity with farmers rather than other researchers in the OG. This ensured that researchers had the opportunity to gain '*on the ground*' expertise within the OG (Non-Farmer Participant 11). An example of this was the '*liaising*' between farmers and researchers in terms of the requirements for grass supply (Non- Farmer Participant_7).

> *'The farmers brought the knowledge of how they manage grassland for cattle and what they do to grow the optimum grass'.*
>
> (Non-Farmer Participant_11)

While the social network analysis indicates that farmers were highly connected in the network, the question arises as to whether their connectivity resulted in them being able to determine the design and direction of the OG. Identifying the benefits of having farmers as members of the OG, one participant discussed how it would have been more difficult to undertake the OG '*if we were working with more research partners, to implement we may have actually run into more challenges than we did from working with farmers in terms of timelines and all that side of things*' (Non-Farmer Participant_4).

5.2. The Roles, Contributions, and Experiences of Farmers in Biorefinery Glas

The primary roles and contributions of farmers were the provision of grass and the undertaking of dissemination activities. While some participants viewed farmers as indispensable in the undertaking of the OG, others viewed the contribution of farmers primarily from a dissemination point of view, i.e., providing demonstration to other farmers. The question of whether farmers' involvement in the OG represented a box-ticking exercise on the part of leaders of the OG was raised by one farmer, who argued:

> *'It has been an opportunity to be involved in science. I like that side of it . . . whether we were just kept involved because that ticked a certain box . . . we're more than just on the ground, do the job and then leave it up to the experts'*
>
> (Farmer Participant 3)

One farmer described how other non-farmer participants were '*so enthusiastic and they made, they made us feel that we were a vital cog in the project*' (Farmer Participant_2). Contrary to this was the view that the role of farmers was based on '*small things*' and '*on the ground*' (Farmer Participant_1). These latter aspects were related to the practicalities of the OG rather than farmers having the means to influence the design and direction of the OG. Upon completion of the provision of grass, the role of farmers in the OG was viewed by some interview participants as being largely completed:

> *'The farmers were very important in the first 12 months, but their role, other than . . . putting together the story . . . I suppose their role in growing the grass and providing it for biorefinery, their role kind of finished then and so they weren't as integrally involved in the, I guess, the running of the project'.*
>
> (Non-Farmer Participant_7)

A key function of farmers within this OG stressed in the accounts of participants was their role in dissemination. Including farmers within a bioeconomy project as opposed to undertaking the biorefinery process '*behind doors*' on a research farm was viewed as beneficial (Farmer Participant_1). This was reflected in the view that when farmers '*see their own local, a local farmer in the area involved in it, it would be, you know, [they would think] less, . . . of a risk that they could get involved in that thing*' (Non-Farmer Participant_6). An advantage of farmer inclusion was that it can assist in communicating the benefits of the bioeconomy to farmers. As one participant mentioned, including farmers in the OG '*help us to keep it simple*' (Non-Farmer Participant_8).

5.3. Power/Knowledge and Farmer Participation in Biorefinery Glas

While OG members in academia and agri-business who had the most connections in the network were described as being the most influential actors within *Biorefinery Glas*, farmers were also identified as being important figures within the OG. Despite this, one farmer held the view that '*everything was laid out*' in terms of what the aim and approach of the OG were by the time farmers had begun to participate within the OG (Farmer Participant_1). This was supported by the view that the OG '*was largely scoped out*' by the time farmers became involved in the OG (Non-Farmer Participant_3).

A common perception among farmers was that the most influential people within the biorefinery initiative were those who had the highest connectivity in the network as depicted in Figure 3. In the account of one farmer, the level of knowledge held by technology providers and scientists underpinned their significant influence within the network:

> *'And that's why I was so influenced by . . . the scientists from the [Institute], they knew exactly what they were doing from the word go. And anything that was fired at them, they had the whole lot, they knew exactly what they were at'.*
>
> (Farmer Participant_2)

A reason for why these individuals were viewed as being the most influential was because they *'have a network, they have a name. And so, they tend to, they speak, they have sort of a ready-made audience, if you like, through their networks'* (Non-Farmer Participant_7). Furthermore, one participant described how *'political influence'* such as being connected with lead actors can result in it being easier for certain groups to influence decision-making processes compared to non-connected groups (Non-Farmer Participant_10).

An example where farmers held influence was in the planning of the OG in terms of the timing of work:

> *'The feedback from farmers, which we would have known is look, guys, certainly March, April, May is completely out because it's calving its breeding season there's all, it's a really busy time on farms so we certainly ain't going to have a grass refinery coming in during those months'.*
>
> (Non-Farmer Participant_3)

Despite the noted role of farmers in planning logistical elements of the OG, one participant viewed farmers as having '*effectively no influence whatsoever on the project . . . the only influence they had was [to] provide the grass*' (Non-Farmer Participant_12). One participant described how scientists were '*very dependent*' on farmers in providing the grass, yet they had no recollection of other areas where farmers could influence the undertaking of the OG (Non-Farmer Participant_8). This was echoed in the statement by one of the researchers that the function of farmers was '*just providing grass*' (Non-Farmer Participant_8). One farmer used the phrase '*facilitating'* when describing the use of their land for the biorefinery process (Farmer Participant_3). The argument was raised by one of the farmers that they '*couldn't [be] expect it to influence how they feed the stuff above it, and we couldn't be, you know, asked to influence what goes on in the science*' (Farmer Participant_3). While the official forms of knowledge held by scientists are viewed as valid within discussions on highly technical science-oriented aspects of the bioeconomy, local forms of knowledge held by farmers may not be perceived as relevant; and there was little evidence that scientific and local knowledges intersected outside of grass production. As detailed in the next section, an area where farmer knowledges could have been included to a greater degree related to how the biorefinery process would operate beyond this pilot.

5.4. Local Knowledge Held by Farmers in Biorefinery Glas

There was a clear differentiation between the types of knowledge provided by farmers and non-farmer actors within the OG:

> *'The practical side of it came from the farmers. The technical side of it came from the . . . scientists really'.*
>
> (Farmer Participant_2)

When describing the types of knowledges farmers contributed to the study, the phrase '*local knowledge*' was used (Farmer Participant_2; Non-Farmer Participant_11). This type of local knowledge related to the processing of grass. There were three areas where the inclusion of the local forms of knowledge held by farmers had an impact on the undertaking of the *Biorefinery Glas* OG. The first of these related to logistics. During the biorefinery process, an important contribution of farmer knowledges was the identification of a baler to

bale the press cake by-product from grass which would be used to feed animals to identify differences in its feeding value compared to unrefined grass. This underlines the benefits of expanding the network of the bioeconomy in terms of gaining new knowledges to support an innovation which would not have been possible if local actors had not been included. As mentioned by one farmer:

> *'They did listen to us very tentatively. We'll say they were in trouble enough I suppose really about the product, how they were going to transport it to for trials and turned to bales'.*
>
> (Farmer Participant_2)

Farmers' knowledges were viewed by participants as being important in supporting the dissemination of the OG to farmers. This was beneficial for supporting peer-to-peer learning. The knowledges of farmers were utilised in providing feedback on the use of biorefinery equipment. This was demonstrated in the view that '*We need the experience of the farmers. We need them to roll out the bioeconomy*' (Non-Farmer Participant_2). Considering the *Biorefinery Glas* OG in its entirety, some farmers were satisfied with how the process was undertaken, saying that '*if they were coming again now next year, I couldn't see anything I'd change*' (Farmer Participant_2). Alternatively, another farmer spoke of limitations in consultation at the end of the OG:

> *'I suppose I've just described to you now, of the things that I felt could have improved. Nobody came back and asked me at farmer level'.*
>
> (Farmer Participant_3)

This suggests that while farmers were provided with the opportunity to have their voices heard on certain topics, their influence on other topics was by comparison limited. Limitations were also identified concerning the development of a business model for the biorefinery process as it failed to address questions on the practicalities of farmer involvement in the biorefinery process:

> *'I was kind of sitting there going, OK, so on a practical level, this grass is being taken away and being dried out. How is it coming back to me? Do I have to get it delivered? Is that going to be a cost to me? And also, the stuff that's coming out, you know, so I did feel that there was certain things that maybe weren't involved in the costings'*
>
> (Farmer Participant_3)

The lack of farmer inclusion in the development of the business model compared to the processing of grass outlines the possibility that farmers have the agency to influence certain elements of bioeconomy development and discourse while they were less involved other aspects of its development. Other aspects may be more limited whereby only certain members of the bioeconomy network, who are viewed as having relevant knowledge, can influence decision-making processes. An additional question raised by farmers which did not feature in the accounts of other OG members was the level of energy being used by the biorefinery. This could impact the overall sustainability of the biorefinery process, which was noted by the agricultural advisor connected to the initiative:

> *'It's the whole piece of kit is very energy hungry and cutting all that grass and drawing it in is energy hungry . . . I never saw an energy audit on it. This was just for our own farmer discussions, you know'.*
>
> (Non-Farmer_Participant_12)

Speaking about the presentation of findings at the end of OG, one farmer outlined their view that the leaders of the OG had '*enough of talking amongst themselves, without us farmers asking more questions*' (Farmer Participant_3). Despite the differences between official (technical) knowledges held by researchers and local (practical) knowledges held by farmers, the participant argued that farmers should have the ability to participate in and inform bioeconomy initiatives:

> *'We may not have letters after our names, but we're very much, you know useful and have a purpose and, have you know, should have input'.*
>
> (Farmer Participant_3)

5.5. Discourses on the Future Farmer Involvement in The Bioeconomy

Participants viewed it as unlikely that dairy farmers in general would be willing to reduce the level of grassland available for their stock to be used for a biorefinery. In terms of the use of grass for biorefinery processes, one farmer described opposition to a reduction in the level of grass available for the feeding of livestock:

> *'We already are stressed . . . we need to know what we have and what we have access going down the line isn't going to be taken away from the sector we're in'.*
>
> (Farmer Participant_3)

Many participants were of the view that a transition to the bioeconomy would be suitable for economically vulnerable sectors of agriculture such as beef farming. One participant explained how the biorefinery of grass could '*offer other income streams to farmers, particularly from a dry stock point of view in rural Ireland or in our case in West Cork. Because, unfortunately, cattle are, they're not even at a break-even situation*' (Non-Farmer Participant_12). The bioeconomy was regarded as a means of providing new sources of revenue to farmers working in sectors in decline. The view was held by participants that it can *'make agriculture exciting again*' by providing new opportunities to younger farmers (Farmer Participant_3). This was reiterated in the view of one farmer that '*the more I see it the more I see them, the results I see, then I think it, there's a chance it could be a game changer for farmers in different places*' (Farmer Participant_2).

6. Discussion

This study has examined whether primary producers within the *Biorefinery Glas* OG have, as has been noted in international studies, roles that were mainly limited to input suppliers of biomass, rather than roles oriented to influencing decision-making in how bioeconomy initiatives are formulated and developed [62]. A major challenge for multi-actor initiatives such as EIP-AGRI is securing authentic knowledge exchange between actors where the knowledges held by different actors may be viewed as unfamiliar, difficult to understand, or viewed as irrelevant. Taking a focus specifically on the importance of 'non-traditional' knowledges in innovation, such as farmers' knowledges, various studies argue that a greater emphasis should be placed on including the knowledges held by farmers within bioeconomy development [25,42,126,127]. This study has sought to explore to what extent have farmers' knowledges been influential in a multi-actor EIP-AGRI OG which aims to create a farmer-led bioeconomy development? In the case of *Biorefinery Glas* OG, farmers' knowledges were not 'rendered invisible' within the OG [73]. Had the OG not included farmers' knowledges, it may not have been able to address issues relating to biomass production, thereby limiting their ability to undertake the pilot. This illustrates the benefit of including farmers' knowledges within bioeconomy initiatives. Based on the accounts of participants, there was limited evidence that farmers were able to influence aspects of the OG which did not relate to the practicalities of biomass provision. Farmers noted logistical issues such as potential costs which farmers could face when providing grass to a biorefinery as well as management issues relating to energy requirements for the biorefinery process as potential issues for the bioeconomy moving forward henceforth. If farmers are unwilling to adopt bioeconomy technology or provide biomass for bioeconomy development, the ability of society to transition towards a bio-based society may be hindered.

The primary role of farmers was the provision of grass and overcoming logistical issues in ensuring there was sufficient biomass for the undertaking of the pilot. Beyond the production of biomass, farmers were significantly involved in dissemination activities that aimed to increase farmer awareness of the biorefinery process. Thirdly, they provided feedback to other OG members about the production of grass. Previous literature highlights

how groups such as farmers have been marginalised within bioeconomy developments [42]. However, in the case of the OG presented in this paper, farmers held a high level of connectivity within the OG's network. As opposed to the perception that the bioeconomy is a 'site of struggle' between competing visions and goals, the OG was described by most participants as being collaborative in nature, where some activities of the OG are concerned [50]. In certain areas of the OG's activity, some actors led and in other areas, different types of actors led. For example, scientists led research-oriented aspects and farmers were most influential in primary production-related activities. From the interviews conducted, rigorous knowledge exchange for innovation did not occur in all activities.

Given the presence of certain issues in the accounts of farmers and their absence from the accounts of other OG members, increased farmer involvement and dialogue with other OG members could have assisted in identifying solutions to practical challenges which will impact the future development of the bioeconomy. However, greater farmer involvement may not have been feasible due to limitations within multi-actor innovation. As noted by one of the participating farmers, they could not have been expected to influence the scientific aspects of the pilot. While multi-actor innovation aims to share knowledges and co-create solutions, it may be unrealistic for farmers to be able to contribute knowledge relating to the highly scientific workings of biotechnology. Similarly, non-farmer actors may not, realistically, be in a position to contribute knowledge to the workings of the bioeconomy at the farm level. While the lack of involvement of certain groups may appear to be a form of powerlessness, Shortall [128] argues that to 'self-exclude' or to resist participating in innovation processes may provide power to groups, when the processes are outside of their expertise and where they are likely to fail to exert influence for their own benefit.

Unequal access to power and resources are influential factors in the creation of economic imaginaries [20]. Sanz-Hernández et al. [101] describe how the transition to the bioeconomy is based on the transition from 'regimes of hope' to 'regimes of truth'. The use of the phrase regimes of truth connects with a Foucauldian understanding of power in the context of discourse. While farmers may be included within (limited) discourses relating to the bioeconomy, their influence on how it will be developed may be limited. This is caused by discourses and local knowledges, such as those held by farmers, being viewed as less valid or relevant to the more socially accepted forms of knowledge held by the bioeconomy's 'triple helix'. Within *Biorefinery Glas*, there was a divide between the 'scientific' knowledges held by researchers and the 'practical' knowledges held by the farmers. From a Foucauldian perspective, limited incorporation of the knowledges held by farmers regarding logistical and management issues (relevant to the scientific side of bioeconomy development) possibly reflects an example of 'rarefaction' whereby only certain groups or individuals can speak about a topic authoritatively [64,69,129].

This study has highlighted how the knowledges of farmers were incorporated into discussions on the production of biomass. Farmers did not have as much influence on discussions relating to the future direction of the development of the bioeconomy in the context of this OG. While farmers delivered feedback to other members of the OG regarding logistical aspects such as the timing in which the biorefinery process could take place, providing grass (as input suppliers) was viewed as the primary role of farmers. This is illustrated in the emphasis placed on using farmers' knowledges regarding grass harvesting as opposed to surfacing and potentially developing other knowledges that farmers have and could potentially contribute. This aligns with previous literature in terms of biomass provision being the primary role of farmers [46,130,131]. It also indicates that the provision of biomass is a social norm for farmers involved in the bioeconomy. Within a Foucauldian approach, social norms and subjectivities are the results of the combined influences of power, knowledge, and discourse [132]. The development of subjectivities occurs when actors do what is expected of them by leading actors, in terms of taking up laid-out roles rather than being in a position where they can influence the undertaking of innovation. As opposed to one form of knowledge dictating how the bioeconomy will develop, the collaboration between official and local forms of knowledge can support the

creation of shared understandings of the bioeconomy while minimising conflict, which could hinder bioeconomy development [11,20,62].

Foucault places emphasis on sites of power such as formal institutions such as clinics, hospitals, and schools for the creation of subjectivities, which inform discourse, knowledge and power [133,134]. The creation of subjectivities within the bioeconomy is an integral element of this study. If subjectivities in relation to the bioeconomy are developed in institutions where farmers' knowledges are not considered, the participation of farmers could be limited and, thus, the bioeconomy's ability to support a transition from a fossil-based to a bio-based society. As noted by Curran [135], knowledges are deployed to sustain power relations or create new subjectivities. Uncovering power/knowledge configurations in the bioeconomy can assist in producing 'novel approaches for new forms of organization toward a more sustainable and just future' [136].

Foucault [65] demonstrates how power can be productive by creating new knowledges or understanding. An example of this is increasing awareness of the bioeconomy and its potential to transform Irish agriculture by providing new opportunities to economically vulnerable sectors such as beef farming [137,138]. From this, the bioeconomy could conceivably assist in securing a *Just Transition* for farmers. Wreford et al. [42] and several Irish policy documents outline how the importance of livestock production to the rural economies of New Zealand and Ireland creates a comparative advantage for securing bioeconomy development [117,118,139].

To progress farmer involvement in the bioeconomy, several factors were described by participants in this study as being important. This includes peer-to-peer learning, the presence of co-operatives as well as the impacts of policy and legislation. Peer-to-peer learning and the sharing of 'good practice' represents a core objective of EIP-AGRI [140]. The centrality of co-operatives in providing a structure for farmers to gain access to the bioeconomy reiterates findings from other studies focused on primary producer involvement in the bioeconomy [21,62,141,142]. An additional element of exclusion within this OG was the type of farmer that could participate. While the application of a grass-based biorefinery is described as having benefits for beef and dairy farms, only dairy farmers participated in this OG. This was due to the absence of a collective structure in place for beef farmers which could facilitate the provision of grass needed for the OG.

7. Conclusions

This study sought to uncover the extent to which farmers participating in a bioeconomy OG development were able to influence its undertaking. The primary research finding of this study is that while farmers have been involved in a novel bioeconomy initiative, there were areas where their knowledges could have been included to a greater degree. This related most clearly to logistical issues such as how a biorefinery would operate once functional as well as management issues relating to energy usage. Including the local forms of knowledge held by farmers at earlier stages in the development process could ensure that practical issues relating to future bioeconomy development are overcome, thereby ensuring a more holistic approach alongside supporting bioeconomy innovation. Farmers were influential in other areas of the pilot such as identifying equipment needed for the transporting of biomass. This exemplifies the idea of dividing practices within a Foucauldian understanding of power whereby farmers were provided with the opportunity to contribute to certain elements of the OG as it ran its course based on the practical forms of knowledge they hold.

The primary responsibility of farmers was the provision of biomass. From a Foucauldian perspective, this represents a social norm regarding the involvement of farmers in the bioeconomy. In contrast to previous studies which noted the scepticism of farmers towards the bioeconomy, participating farmers in the *Biorefinery Glas* OG emphasised the opportunities that a grass-based bioeconomy could provide to farmers. Beyond these findings, this study has also demonstrated the benefits of applying the work of Foucault in analysing the connections between power and knowledge in the bioeconomy. This includes

consideration for the varying discourses at play within bioeconomy initiatives as well as the creation of subjectivities. Involving farmers in bioeconomy-focused developments can have benefits in terms of increasing farmers' awareness of the bioeconomy and their willingness to participate in new, sustainable income streams. Consideration, however, is needed in terms of ensuring that the bioeconomy does not replicate power imbalances experienced by farmers within other value chains.

In terms of limitations, the primary challenge in undertaking this study was the completion of fieldwork due to the impact of COVID-19. As noted in the methodology section, the requirement of conducting interviews remotely can lead to additional challenges in the undertaking of interviews. Furthermore, a stated limitation of mobilising Foucault is the view that his theory is not action oriented. While Foucault's work is beneficial for identifying the marginalisation of certain knowledges, it lacks insight into measures that can assist in overcoming marginalisation [143–145]. Future studies could apply theories that align with Foucault's work, yet are more action-oriented in nature, to consider how the role and knowledges of farmers in the bioeconomy can be enhanced.

Despite this, the methodology employed enabled the attainment of an understanding of the experiences of participants involved in the *Biorefinery Glas* OG and an evaluation of the influence which farmers held in this development. It is also important to acknowledge an element of selection bias concerning membership of the OG. Given that participating farmers were selected to take part in the *Biorefinery Glas* OG due to their success in sustainability initiatives, they may not be entirely representative of dairy farmers at large. Indeed, the number of participants in this study may be viewed as being small, resulting in it being difficult to generalise findings [110]. While recognizing these limitations, the benefit of using the case study methodology is that it provides depth, richness, and completeness, relative to statistical studies that offer breadth and potential to provide population-level generalisability.

Future research could be conducted whereby quantitative research methods are used to evaluate the experiences of farmers involved in other bioeconomy initiatives or EIP-AGRI OGs. An advantage of this is that a greater level of breadth could be attained. Another potential area for future research is the identification of measures that can support the creation of bioeconomy co-operatives in sectors of agriculture where co-operative organizational structures are not common. This could assist in facilitating the entry and involvement of economically vulnerable agricultural sectors into the bioeconomy. While this study provides insights into one case of farmer involvement in the bioeconomy, it can potentially spur future research which seeks to identify how influential primary producers have been within more advanced bioeconomy developments as well as other sectors of agriculture gaining entry to the bioeconomy. Given that bioeconomy development is dependent on the utilisation of a wide range of biomass sources, future research could also evaluate the experiences and positioning of farmers in sectors other than dairy farming that have begun to participate in novel bioeconomy value chains and initiatives. This includes agricultural sectors that are economically vulnerable, such as beef production. This can shed light on what supports are needed to support a *Just Transition* from dependence on polluting forms of agriculture towards the vision of sustainability envisaged by the bioeconomy.

Author Contributions: Conceptualization, Á.M.-W. and E.O.; Data curation, K.H.; Formal analysis, K.H.; Funding acquisition, Á.M.-W. and E.O.; Investigation, K.H.; Methodology, K.H.; Project administration, Á.M.-W. and E.O.; Resources, K.H.; Software, K.H.; Supervision, Á.M.-W., E.O. and M.L.; Validation, K.H.; Visualization, K.H.; Writing—original draft, K.H.; Writing—review & editing, K.H., Á.M.-W., E.O. and M.L. All authors have read and agreed to the published version of the manuscript.

Funding: This publication has emanated from research supported in part by a research grant from Science Foundation Ireland (SFI) under Grant Number 16/RC/3889 and is co-funded under the European Regional Development Fund. The APC was funded by Teagasc.

Institutional Review Board Statement: Ethical approval was acquired from the UCD Office of Research Ethics. Due to the low-risk nature of this study, the Human Research Ethics Committee for Humanities exempted this study from undertaking a full ethical review. This was received on 17 February 2021. The Research Ethics Exemption Reference Number (REERN) of this study is HS-E-21-24-Harrahill-Lennon.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data may be requested from the corresponding author. Requests will be evaluated on a case-by-case basis and will be subject to GDPR and other privacy constraints.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. *Biorefinery Glas* Interview Guides

Themes represent the sub-questions of this study. They are:

1. What was the initial awareness of the bioeconomy among participants?
2. How did farmers and other actors gain entry into the bioeconomy?
3. What is the structure of the bioeconomy social network as experienced by participants?
4. What is the role of knowledge held by farmers in the bioeconomy social network?
5. What should the role of farmers be in the bioeconomy?

Table A1. Farmer interview guide.

Theory	Reasons	Questions	Probes	Themes
	Introductory question–help to ease the participant into the interview process	How long have you been farming?	Was farming what you always wanted to do since you were young?	
	Help to capture the importance of farming as an identity–similarity to literature on how employment (i.e., coal mining) is an important aspect of an individuals' and communities' understanding of their world	What is your favourite part about being a farmer?		
	Demographic overview regarding how participants align or differ with average farm holdings and practices	Can you briefly explain what type of farm you have in terms of herd size and whether your land is used for anything other than dairy farming?		
Connection to power, knowledge, and discourse. Link to the regime of truth whereby an individual's position within a network of power signifies their ability to be heard. As Bazzul and Carter [146], referring to Foucault outline 'utterances can be understood across discursive regimes, but statements that carry the authority necessary to be deemed objective, irrespective of whether they are true or not, need to be understood against a complex set of rules, including rules informed by scientific research practices, that afford objective/'truth' statements their authority'.	Introduction of environmental policy into the conversation and identify whether farming versus the environment (similar to the concept of jobs versus the environment) influence how farmers consider environmental policy	Do you think the voices of farmers are represented when it comes government policies?	Do you think the knowledge held by farmers is valued by groups responsible for designing environmental policy? If no, what do you think they are missing? Pollution, water, good management, Bord Bia	Q.4.

Table A1. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Link to discourse and power As highlighted by Townley [66], Foucault did not 'acknowledge a neutral concept of knowledge formation'. For Foucault, it is impossible for knowledge not to engender power [65]. On this basis, the development of the *Biorefinery Glas* will be based on some level of power relations whereby certain actors will play a central role in its development while others will be marginalised. The question this research study aims to identify is to what extent have farmers been on the margins as has been the case internationally. Alternatively, given that *Biorefinery Glas* aims is to develop small scale 'farmer-led' green biorefineries, to what extent has the knowledge of farmers been placed centrally in this project.	Introduction of bioeconomy into conversation–Identification of initial views prior to active involvement	When did you first hear about the *Biorefinery Glas* project?	What were your initial thoughts on it?	Q.1
Link to networks and the importance of connections in order to gain power in the form of knowledge. Within Foucault's work no knowledge or truth exists outside of a network of power relations [147].	Identification of how farmers became aware of the bioeconomy and the extent to which this was based on peer learning or a more top-down approach	How did you hear about it?	Did this come from talking to farmers or involvement in a co-operative or did you hear about it another way?	Q.1
Discourse as an important form of power in the work of Foucault Referring to Foucault [148], Motion and Leitch [31] discuss how discourse embodies power through the creation of 'systems of thought' that 'determined what could be said, who could speak, the positions from which they could speak, the viewpoints that could be presented, and the interests, stakes and institutional domains that were represented'.	Link to discourse and how the definition of the bioeconomy differs from the perspective of a farmer compared to what is present in official bioeconomy strategies	How would you describe this project? What are its aims and how does it relate to farming?	If you were explaining the project to someone who hadn't heard of it is there any label you would use like a two- or three-word phrase that describes what it does?	Q.1.
Connections with discourse and power. Mills [64] purports that 'we must be very suspicious of any information which is produced'. In making this argument, she argues that even the most basic forms of knowledge 'may at the same time play a role in the maintenance of the status quo and the affirming of current power relations'. This leads to the question of whether the bioeconomy is an example of maintaining the status quo with regards to the role of primary producers as providers?	Link to the common theme in literature as to whether the bioeconomy is a solely economic development or whether it can support rural development and environmental sustainability	What do you think is the main motivation for the development of this project?	Is bioeconomy success based solely on economic performances or are considerations provided for benefits that it creates for communities and the environment? What do these benefits look like?	Q.1.

Table A1. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Link to power in networks and the benefits of using social network analysis with the work of Foucault. An example of the benefits which this can have for researchers is provided by Jackson [149] who identifies how spatial mapping can identify 'the multiplicity of discourses, institutions, power relations, knowledges, strategic conditions, and other social-cultural-material practices that occur simultaneously and operate through complex networks'	Identification of intermediaries who supported the introduction of farmers into the bioeconomy	At the beginning of your involvement in this project, who were the first people you spoke to about becoming involved?	How did you come into contact with these actors/groups? Beyond other farmers, who have been the groups who you have been most connected to in the project? —Are there any other groups who are involved who you or other farmers have not engaged with? Why do you think you have had more contact with one group rather than another? (Networks–inclusion/exclusion)	Q.2.
Connection how power imbalances are based on other imbalanced within a network regarding resources and connections. As Christiaens [150] outlines, however, 'the aim is not to deny membership to the 'excluded', but to engender the behavioural conditions of possibility for neoliberal subjectivity'.	Core aspect of this research study is identifying the barriers which hinder the involvement of farmers in the bioeconomy as well as identifying the ways in which these barriers can be minimised.	What challenges or barriers did farmers face when they wanted to gain access to this project?	How did you and other farmers overcome these issues? Were challenges overcome through connections? How were these (through the inclusion of like-minded people or people from a certain locality or people already known to each other through other networks) etc.	Q.2.
Identification of entry point into the bioeconomy and into power relations. For Foucault, power is not a top-down phenomenon but one that flows through the body and network. As noted by Hanna et al. [151], for Foucault power does not flow in a unilateral sense but is circular and not the 'property' of any individual or group, rather power is constitutive, it creates subjects.	Identification of intermediaries who assist in connecting primary producers to the bioeconomy–core aspect of overall PhD study.	Was there anyone who acted as a broker who helped to connect you with the leading people in the project?	Do you think you would have been able to participate in the bioeconomy had it not been for these groups?—How has having connections with these actors influenced your understanding of the project and your role within the project?	Q.3.
Focus on power Using the work of Foucault to evaluate participation, Gallagher [152] identifies how 'power always involves a relationship between at least two entities . . . it will vary according to the nature of these relationships, the personal characteristics of the actors involved, the resources (social, cultural, material) available within these relationships'.	Outline of what is needed to become involved in the bioeconomy–this acts as an introduction to the consideration of who are the actors that farmers are connected with which assists in their entry into the bioeconomy	Do you think certain connections or resources were needed to become involved in the project?	Why do you think you were selected to be involved? Was this based on farm size threshold, where you live, the connections you have etc.?	Q.2.

Table A1. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Consideration of more bottom-up aspects of power. 'The actions of the peripheral agents in these networks are often what establish or enforce the connections between what a dominant agent does and the fulfilment or frustration of a subordinate agent's desires' [147]. One aspect to consider within this research study is the possibility that co-operatives have the potential to enhance the level of power and decision-making ability of primary producers in the bioeconomy.	This question seeks to identify the role of co-operatives in supporting the entry of farmers into the bioeconomy by taking a collective approach. A core research study relating to this question is Tregear and Cooper [153] which identify the benefits of co-operatives for primary producers compared to taking an individualistic approach. Within just transition, the role of trade unions is also highly relevant. Moving beyond this chapter, the role of producer organisations will also be an aspect to consider for sectors of agriculture where collective approaches are not as prevalent (e.g., dry stock)	What role do you see co-operatives as having in the bioeconomy?	Is this something that can increase the influence of primary producers in the bioeconomy? Could this lead to challenges regarding companies being unwilling to interact with cooperatives and look to import biomass instead?	Q.2.
Core aspect of research study regarding the connections between power and position within a social network. 'Power must be analysed as something which circulates, or as something which only functions in the form of a chain . . . power is employed and exercised through a network like organisation . . . Individuals are the vehicles of power, not is points of application [65].	Depiction of social network ranging from most influential in bioeconomy development to least	From your experience, who has been involved in this project?	How would you structure this from the most influential to the least influential?	Q.3.
Consideration of what is the social network of the bioeconomy in terms of who are the actors with the greatest level of power. Crucial aspect in the work of Foucault whereby power is viewed as being 'enacted in every interaction and hence as subject to residence in each of those interactions' [64].	Outline of why certain groups have power in the bioeconomy while others do not.	Do you think certain groups or people have had more influence compared to others in this project?	What impact do you think the level of influence held by certain groups has on the way the bioeconomy is developing?	Q.3
Connection to the definition of power by participants. Clearest example of the use of power in Foucault is the statement by Mills [64] that power should be viewed as a verb rather than a noun as it is something which does something rather than something which is, or which can be held onto. The emphasis on power within Foucault's genealogical analysis focuses on 'how power is exercised' and the associated issue of the relationships between power and knowledge [30].	Introduction of concept of power into interview	From considering those who have influence or don't have influence in the project, what do you think makes someone influential?		Q.3.
Linkage to power with regards to how those who are not dominant still have the potential ability to influence how decisions are made within a network.	Identification of the extent to which farmers can resist.—Form of power in itself	Were there any aspects of this project which farmers were not entirely supportive?	What were the causes of this, and did it result in communication with the leaders of the bioeconomy development? How did resolution come about?	Q.3.

Table A1. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Inclusion of the resistance in the work of Foucault. 'The task if [a Foucauldian] analysis . . . is to describe the way in which resistance operates as a part of power, not to seek or promote or oppose it' [64,154].	Identification of the extent to which farmers can resist.—Form of power in itself	Were there any aspects which farmers sought to resist?	Identification of whether the issue was actually resolved or simply suspended, avoided or remains a point of contention.	Q.3
Link to discourse and power in terms of excluding marginalised actors in order to support the aims of dominant actors (i.e., developing the bioeconomy to rather than ensuring an inclusive approach is achieved).	Rationale for exclusion of certain groups in order to hasten bioeconomy development. Potential issue by developing the bioeconomy without considering the views of people on the ground	What impact do you think including farmers had on the timescale of this project in terms of the time it took to complete?	Did it result in delays due to having to consider their views and working practice?	Q.3.
The ability to influence and make decisions as an example of the extent to which farmers hold power within the bioeconomy. As Mills [64] notes it is the 'mundane power relations at a local level' which embed the constitution of institutional power relations in Foucauldian analysis. This leads to the question of what are the mundane aspects of the projects which can shed light on how the overall project has been developed and undertaken regarding the position of primary producers.	Introduction for consideration of how the bioeconomy is planned and is it already designed in a way which results in primary producers being resource providers rather than having a means to influence its development?	What would you say has been your role in the project? Were you responsible for just providing grass or were you able to influence how decisions were made in the project?	Was enough of a role provided to farmers in this project or do you think that you and other farmers could have done more in the decision-making process had you been given the chance?	Q.4.
Link to power and knowledge with regards to whether primary producers have been able to influence how the bioeconomy has been developing. Within the work of Foucault, knowledge is viewed as something which works in the interests of particular groups. (Mills) [64] as well as human beings becoming subjects 'by virtue of their location within a network of positive and productive power-knowledge relations' [30].	Introduction for considerations of knowledge in the bioeconomy. Is it the case that powerful actors have already create a regime of truth for the bioeconomy which weaker actors cannot alter?	Do you think there was much scope/room for farmer influence on the project's agenda in the initial phases of the project and throughout?	Probe as to how so.	Q.4.
Core aspect in Foucault's genealogical analysis whereby a greater emphasis is placed on considering local and subjugated forms of knowledge (e.g., the knowledge held by farmers in the bioeconomy that has been largely excluded from official bioeconomy documents. This is outlined by Smart [30] when he discusses the emphasis Foucault places on the need 'to entertain the claims to attention of local, discontinuous disqualified, illegitimate knowledges' against global theories and functionalist or systematising modes of thought had direct implications for the nature of intellectual work and for the role or function of the intellectual in modern societies.	Link to the broad question of to what extent is the bioeconomy being based on biotechnology which does not consider the knowledge of primary producers–link to weak versus strong sustainability and the need for inclusion within environmental policy more generally?	What types of information have farmers contributed to this project?	What would you say are the important forms of knowledge held by farmers that has assisted this project and should be included in similar developments?	Q.4.

Table A1. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Link to knowledge with regards to the 'disqualification and prohibition of local forms of knowledge' [30]. As one of the leading examples of a bioeconomy project which emphasises taking a farmer-led approach, to what extent has it been the case that the forms of knowledge held by farmers have been included. If this has not been the case, can the claim still be made that it is a farmer-led approach if their views and forms of knowledge are not included?	What impact do farmers believe the exclusion of their views will have on the success of the bioeconomy?	If the views of farmers aren't included in decision-making in projects such as the one you were involved in, do you think this will limit their success?	If yes, what issues will this raise and how should they be overcome? If no, is providing biomass the only element of involvement farmers would want?	Q.4.
Link to power and knowledge in terms of certain actors being viewed as having greater levels of authority due to their position within a social network. Not everyone is able to make statements, or to have statements taken seriously by others. Some statements are more authorised than others, in that they are more associated with those in positions of power or with institutions. What Foucault wants to analyse is 'the law of existence of statements, that which rendered them possible . . . the conditions of their singular emergence' [64,155].	This will identify what the challenges are in bringing together leading actors in the bioeconomy with the groups who will be responsible for enacting the bioeconomy's development at the local level	Has it been a challenge to combine the views of people in business and research with the views of farmers?	Has this changed overtime? Were the views of farmers taken onboard more so when the project was up and running or were farmers' views considered when the project was being developed?	Q.4.
Link to power, knowledge, and discourse in terms of whether a regime of truth has been developed within the bioeconomy. 'Those in positions of authority who are seen to be 'experts' are those who can speak the truth. Those who make statements who are not in positions of power will be considered not to be speaking the truth [64].	Link to regime of truth and the role of primary producers in the bioeconomy	Were there any aspects of the project from starting off to when the project was up and running that you felt farmers had to follow in order to participate?	What made these parts of the project so important?	Q.4.
Link to power. Is it a case that the bioeconomy represents only a change of practice and not a change power on the part of primary producers with regards to their ability to influence decision-making? 'Foucault argued that humanity has not progressed from war, combat, and force to a more humane system of the rule of law, but from one form of domination to another [29]. 'Revolution is a different type of codification of the same relations' [65].	Outline of how this differs from the views of farmers	What do you think the role of farmers should be in projects such as the one you were a part of?	Is it a case where they provide resources only or should they have a greater role in how the bioeconomy is defined and how it is managed when operational?	Q.5.
Connection to knowledge and networks with regards to the extent that a group who is broadly marginalised in the bioeconomy has been able to partake in this project. Criticism regarding a lack of participation in the bioeconomy supports the questions raised by Gallagher [152] regarding participation from a Foucauldian viewpoint: 'we might ask, of a participatory process, is it operating as part of a strategy that divides or incorporates, legitimises or de-legitimises decisions, homogenises views or increases their diversity?'	Beginning of concluding section of the interview–outline of benefits for primary producers to be involved in the bioeconomy	What have been the positive parts of your involvement in the project?	Is there anything you think could have been done better in terms of the role of farmers? Has there been a degree of risk involved in becoming involved in the bioeconomy?	Q.5.

Table A1. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Connection to knowledge and networks with regards to the extent that a group who is broadly marginalised in the bioeconomy has been able to partake in this project. Criticism regarding a lack of participation in the bioeconomy supports the questions raised by Gallagher [152] regarding participation from a Foucauldian viewpoint: 'we might ask, of a participatory process, is it operating as part of a strategy that divides or incorporates, legitimises or de-legitimises decisions, homogenises views or increases their diversity?'	Is this seen as new revenue streams or is there the possibility that farmers can gain new skills as well as new contacts–economic and social benefits of the bioeconomy	From your experience in being a part of a (phrase used by interviewee) development; do you think this is something that can create new opportunities for farmers in sectors such as dairy and drystock farming?	Is there anything you think could have been done better in terms of the role of farmers? Is there a degree of risk in becoming involved in the bioeconomy for farmers? What supports are need for primary producers to become involved in other bioeconomy projects in a manner that includes their views and knowledge?	Q.5.
Connection to the inclusion of local and subjugated forms of knowledge A Foucauldian analysis illustrates the 'situatedness and partiality of all knowledge', thus providing a framework for 'delegitimated knowledge' such as that held by environmental activists or in the bioeconomy, primary producers, to be included [135]. It is through the inclusion of these forms of knowledge that the collaborative production of new forms of knowledge can occur with the result being alterations in the position of subjects as well as the creation of new 'micro and macro power relationships' [148].	Link to overall aim of this chapter in terms of identifying what has been achieved in this bioeconomy project and how can it be applied to other regions and also other sectors of agriculture which require new revenue streams.	What do you think have been the main lessons you have learned from participating in a bioeconomy project which involves farmers?	What can be done to create bioeconomy developments which place farmers centrally rather than on the margins? What can be done to make sure the views and knowledge of farmers are included in developments similar to the one you have been involved in?	Q.5.
	Conclusion of interview	These questions have been asked to better understand the role of farmers in the bioeconomy and how they can play a greater part in its development. Is there anything else you would like to add or suggest that you have not already mentioned?	Any additional aspects which could be beneficial as identified by the interviewee.	
	Snowball	Would you be able to recommend other people I could talk to about this?	Identification of potential further interviewees.	

Table A2. Non-Farmer interview guide.

Theory	Reasons	Questions	Probes	Themes
	Introductory question–help to ease the participant into the interview process	How long have you been working with (agency/company/university)?		
	Introductory question–potential link of organisation moving more towards the bioeconomy over recent years	What is your current position with (agency/company/university)?	Did you hold any other positions in the organisation before taking this role?	
	Introductory question	What is your favourite part of the role you currently work in?		

Table A2. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Link to discourse and power As highlighted by Townley [66], Foucault did not 'acknowledge a neutral concept of knowledge formation'. For Foucault, it is impossible for knowledge not to engender power [65]. On this basis, the development of the *Biorefinery Glas* will be based on some level of power relations whereby certain actors will play a central role in its development while others will be marginalised. The question this research study aims to identify is to what extent have farmers been on the margins as has been the case internationally. Alternatively, given that *Biorefinery Glas* aims is to develop small scale 'farmer-led' green biorefineries, to what extent has the knowledge of farmers been placed centrally in this project.	Introduction of bioeconomy into conversation–Identification of initial views prior to active involvement	When did you first become aware or involved in the *Biorefinery Glas* project? What were your initial thoughts on it?		Q.1
Link to networks and the importance of connections in order to gain power in the form of knowledge. Within Foucault's work no knowledge or truth exists outside of a network of power relations [147].	Link to understanding of bioeconomy from official bioeconomy documents or alternatively through an actor's social network	How did you hear about it?	Where did the information come from? Was this through reading documents from academia or government bodies or was it from people you were in contact with?	Q.1.
Discourse as an important form of power in the work of Foucault Referring to Foucault [148], Motion and Leitch [31] discuss how discourse embodies power through the creation of 'systems of thought' that 'determined what could be said, who could speak, the positions from which they could speak, the viewpoints that could be presented, and the interests, stakes and institutional domains that were represented'.	Link to discourse and how the definition of the bioeconomy differs from the perspective of a farmer compared to what is present in official bioeconomy strategies	How would you describe this project? What are its aims and how does it relate to farming?	If you were explaining the project to someone who hadn't heard of it is there any label you would use like a two- or three-word phrase that describes what it does?	Q.1.
Connections with discourse and power. Mills [64] purports that 'we must be very suspicious of any information which is produced'. In making this argument, she argues that even the most basic forms of knowledge 'may at the same time play a role in the maintenance of the status quo and the affirming of current power relations. This leads to the question of whether the bioeconomy is an example of maintaining the status quo with regards to the role of primary producers as providers?	Link to the common theme in literature as to whether the bioeconomy is a solely economic development or whether it can support rural development and environmental sustainability	What do you think is the main motivation for the development of this project?	Is bioeconomy success based solely on economic performances or are considerations provided for benefits that it creates for communities and the environment? What do these benefits look like?	Q.1.
Link to power in networks and the benefits of using social network analysis with the work of Foucault. An example of the benefits which this can have for researchers is provided by Jackson [149] who identifies how spatial mapping can identify 'the multiplicity of discourses, institutions, power relations, knowledges, strategic conditions, and other social-cultural-material practices that occur simultaneously and operate through complex networks'	Identification of connected actors and potential intermediaries who support the introduction of farmers into the bioeconomy	At the beginning of your involvement in this project, who were the first people you spoke to about becoming involved?	How did you come into contact with these actors/groups? Who have been the groups who you have been most connected to in the project?—Are there any other groups who are involved who you or other researchers and people in business have not engaged with? Why do you think you have had more contact with one group rather than another? *(Networks–inclusion/exclusion)*	Q.2.

Table A2. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Focus on power Using the work of Foucault to evaluate participation, Gallagher [152] identifies how 'power always involves a relationship between at least two entities . . . it will vary according to the nature of these relationships, the personal characteristics of the actors involved, the resources (social, cultural, material) available within these relationships'.	Outline of what is needed to become involved in the bioeconomy–this acts as an introduction to the consideration of how connections assist actor entry into the bioeconomy	Do you think certain resources or certain connections are needed to become involved in the bioeconomy?	What are the resources which are needed for involvement? What do you think is needed for groups outside of research, business and policy making to participate in bioeconomy projects?	Q.2.
Connection how power imbalances are based on other imbalanced within a network regarding resources and connections. As Christiaens [150] outlines however, 'the aim is not to deny membership to the 'excluded', but to engender the behavioural conditions of possibility for neoliberal subjectivity'.	Introduction of specific emphasis on the role of farmers in the bioeconomy	What challenges or barriers did groups such as farmers face when they wanted to gain access to the project and how did they overcome these issues?	How can these issues be overcome? Were challenges overcome through connections? (e.g., through the inclusion of like-minded people, people from a certain locality or people already known to each other through other networks)	Q.2.
Identification of entry point into the bioeconomy and into power relations. For Foucault, power is not a top-down phenomenon but one that flows through the body and network. As noted by Hanna et al. [151], for Foucault power does not flow in a unilateral sense but is circular and not the 'property' of any individual or group, rather power is constitutive, it creates subjects.	Identification of intermediaries who assist in connecting primary producers to the bioeconomy–core aspect of overall PhD study.	Who do you think are the groups who can act as intermediaries or brokers in terms of increasing farmer involvement in projects such as this?	Are there groups who would have been unable to participate in the bioeconomy had it not been for these groups? –How has having connections with these actors influenced your understanding of the project and your role within the project?	Q.2.
Core aspect of research study regarding the connections between power and position within a social network. 'Power must be analysed as something which circulates, or as something which only functions in the form of a chain . . . power is employed and exercised through a network like organisation . . . Individuals are the vehicles of power, not is points of application [65].	Depiction of social network ranging from most influential in bioeconomy development to least	From your experience, who has been involved in this project?	How would you structure this from the most influential to the least influential?	Q.3.
Consideration of what is the social network of the bioeconomy in terms of who are the actors with the greatest level of power. Crucial aspect in the work of Foucault whereby power is viewed as being 'enacted in every interaction and hence as subject to residence in each of those interactions' [64].	Outline of why certain groups have power in the bioeconomy while others do not.	Do you think certain groups or people have had more influence compared to others in this project?	What impact do you think the level of influence held by certain groups has on the way the bioeconomy is developed?	Q.3
Connection to the definition of power by participants. Clearest example of the use of power in Foucault is the statement by Mills [64] that power should be viewed as a verb rather than a noun as it is something which does something rather than something which is, or which can be held onto. The emphasis on power within Foucault's genealogical analysis focuses on 'how power is exercised' and the associated issue of the relationships between power and knowledge [30].	Introduction of concept of power into interview	From considering those who have influence or don't have influence in the project, what do you think makes someone influential?		Q.3

Table A2. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Linkage to power with regards to how those who are not dominant still have the potential ability to influence how decisions are made within a network.	Identification of the extent to which farmers can resist. —Form of power in itself	Were there any aspects of this project which farmers were not entirely supportive?	What were the causes of this, and did it result in communication with the leaders of the bioeconomy development? How did resolution come about?	Q.3.
Inclusion of the resistance in the work of Foucault. 'The task if [a Foucauldian] analysis . . . is to describe the way in which resistance operates as a part of power, not to seek or promote or oppose it' [64,154].	Identification of the extent to which farmers can resist. —Form of power in itself	Were there any aspects which farmers sought to resist?	Identification of whether the issue was actually resolved or simply suspended, avoided or remains a point of contention.	Q.3
Link to discourse and power in terms of excluding marginalised actors in order to support the aims of dominant actors (i.e., developing the bioeconomy to rather than ensuring an inclusive approach is achieved).	Rationale for exclusion of certain groups in order to hasten bioeconomy development. Potential issue by developing the bioeconomy without considering the views of people on the ground	What impact do you think including farmers had on the timescale of this project in terms of the time it took to complete?	Did it result in delays due to having to consider their views and working practice? What would have changed within this project if farmers had not been consulted and involved?	Q.3.
Link to power and network in terms of farmers being included within the social network yet being unable to meaningfully influence how the development of the bioeconomy is taking place. Drawing on the work of Foucault, Christiaens [150] outlines how 'what in everyday discourse passes for 'exclusion' can, in their view, more accurately be described as an assemblage of strategies that allot different sections of the population to variegated regimes of practices'.	Identification of the extent to which farmers have been able to influence the decision-making process	Are there any examples of occasions when farmers have been able to meaningfully influence decision which are central to this project?	If yes, why did they have the opportunity to influence this aspect of the project and not others? If no, do you think the exclusion of farmers from decision-making processes would weaken the project?	Q.3.
Core aspect of considering accepted and subjugated forms of knowledge. As Bazzul and Carter [146] referring to Foucault [133] illustrate, 'the "meanings" of scientific knowledge and skill are deeply embedded in issues of power, risk, trust, legitimacy, and in-group/out-group distinction and ranking'.	Introduction to considerations of knowledge in the bioeconomy	What information did the different groups bring to the *Biorefinery Glas* project?		Q.4.
Link to power and knowledge with regards to whether primary producers have been able to influence how the bioeconomy has been developing. Within the work of Foucault, knowledge is viewed as something which works in the interests of particular groups. Mills [64] as well as human beings becoming subjects 'by virtue of their location within a network of positive and productive power-knowledge relations' [30].	Identification of link between knowledge and power–core aspect of theoretical framework	Do you think the views and knowledge of certain groups had more influence throughout the project?	Why do you think this was the case? Alternatively, whose views were considered the least?	Q.4.

Table A2. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Core aspect in Foucault's genealogical analysis whereby a greater emphasis is placed on considering local and subjugated forms of knowledge (e.g., the knowledge held by farmers in the bioeconomy that has been largely excluded from official bioeconomy documents. This is outlined by Smart [30] when he discusses the emphasis Foucault places on the need 'to entertain the claims to attention of local, discontinuous disqualified, illegitimate knowledges' against global theories and functionalist or systematising modes of thought had direct implications for the nature of intellectual work and for the role or function of the intellectual in modern societies.	Link to the broad question of to what extent is the bioeconomy being based on biotechnology which does not consider the knowledge of primary producers–link to weak versus strong sustainability and the need for inclusion within environmental policy more generally?	What types of information have farmers contributed to this project?	What would you class as the important forms of knowledge held by farmers that has assisted this project and should be included in similar developments? How does this differ from scientific and technical forms of knowledge provided by researchers?	Q.4.
Link to knowledge with regards to the 'disqualification and prohibition of local forms of knowledge' [30]. As one of the leading examples of a bioeconomy project which emphasises taking a farmer-led approach, to what extent has it been the case that the forms of knowledge held by farmers have been included. If this has not been the case, can the claim still be made that it is a farmer-led approach if their views and forms of knowledge are not included?	Identification of the extent to which the inclusion of farmers' knowledge and working practices are viewed as a prerequisite of bioeconomy success	Do you think that it is possible that only relying on expertise in business and academia and excluding the views of farmers could limit the success of the (interviewee definition) bioeconomy?		Q.4.
Link to power and knowledge in terms of certain actors being viewed as having greater levels of authority due to their position within a social network. Not everyone is able to make statements, or to have statements taken seriously by others. Some statements are more authorised than others, in that they are more associated with those in positions of power or with institutions. What Foucault wants to analyse is 'the law of existence of statements, that which rendered them possible . . . the conditions of their singular emergence [64,155].	This will identify what the challenges are in bringing together leading actors in the bioeconomy with the groups who will be responsible for enacting the bioeconomy's development at the local level	Has it been a challenge to combine the views of people in business and research with the views of farmers?	Has this changed overtime? Were farmers viewers were taken onboard more so when the project was up and running or were farmers' views considered when the project was being developed?	Q.4.
Link to power, knowledge, and discourse in terms of whether a regime of truth has been developed within the bioeconomy. 'Those in positions of authority who are seen to be 'experts' are those who can speak the truth. Those who make statements who are not in positions of power will be considered not to be speaking the truth [64].	Link to regime of truth and the role of primary producers in the bioeconomy	Were there any aspects of the project from starting off to when the project was up and running that you felt farmers had to follow in order to participate?	What made these parts of the project so important?	Q.4.
Link to power. Is it a case that the bioeconomy represents only a change of practice and not a change power on the part of primary producers with regards to their ability to influence decision-making? 'Foucault argued that humanity has not progressed from war, combat, and force to a more humane system of the rule of law, but from one form of domination to another [30,32]. 'Revolution is a different type of codification of the same relations' [65].	Outline of how this differs from the views of farmers	What do you think the role of farmers should be in projects such as the one you were a part of?	Is it a case where they provide resources only or should they have a greater role in how the bioeconomy is defined and how it is managed when operational?	Q.5.

Table A2. *Cont.*

Theory	Reasons	Questions	Probes	Themes
Connection to knowledge and networks with regards to the extent that a group who is broadly marginalised in the bioeconomy has been able to partake in this project. Criticism regarding a lack of participation in the bioeconomy supports the questions raised by Gallagher [152] regarding participation from a Foucauldian viewpoint: 'we might ask, of a participatory process, is it operating as part of a strategy that divides or incorporates, legitimises or de-legitimises decisions, homogenises views or increases their diversity?'	Is this seen as new revenue streams or is there the possibility that farmers can gain new skills as well as new contacts–economic and social benefits of the bioeconomy	From your experience in being a part of a (phrase used by interviewee) development; do you think this is something that can create new opportunities for farmers in sectors such as dairy and drystock farming?	Is there anything you think could have been done better in terms of the role of farmers? Is there a degree of risk in becoming involved in the bioeconomy for farmers? What supports are need for primary producers to become involved in other bioeconomy projects in a manner that includes their views and knowledge?	Q.5.
Connection to the inclusion of local and subjugated forms of knowledge A Foucauldian analysis illustrates the 'situatedness and partiality of all knowledge', thus providing a framework for 'delegitimated knowledge' such as that held by environmental activists or in the bioeconomy, primary producers, to be included [135]. It is through the inclusion of these forms of knowledge that the collaborative production of new forms of knowledge can occur with the result being alterations in the position of subjects as well as the creation of new 'micro and macro power relationships' [135].	Link to overall aim of this chapter in terms of identifying what has been achieved in this bioeconomy project and how can it be applied to other regions and also other sectors of agriculture which require new revenue streams.	What do you think have been the main lessons you have learned from participating in a bioeconomy project which involves farmers?	What can be done to create bioeconomy developments which place farmers centrally rather than on the margins?	Q.5.
	Conclusion of interview	These questions have been asked to better understand the role of farmers in the bioeconomy and how they can play a greater part in its development. Is there anything else you would like to add or suggest that you have not already mentioned?	Any additional aspects which could be beneficial as identified by the interviewee.	
	Snowball	Would you be able to recommend other people I could talk to about this?	Identification of potential further interviewees.	

Appendix B. Tables Illustrating Cycles of Coding

Table A3. First coding cycle.

'A bit of a burning'	Competition or collaboration with other forms of sustainability	Entry into the bioeconomy	Grass use	Land use conflict	'Nose out of joint'	Respect	Value of the project
Admired	Connection with co-operative	'Everything else seemed to be laid on'	'Grassroots level'	Link agriculture to society	Novelty of the project	Role and contribution of farmer in the project	Viability

Table A3. *Cont.*

Aim of the project	Connections between farmers and other participants	Family farming	'Hadn't a clue'	Link agriculture to the environment	Other examples of bioeconomy develop-ments	Scale of the project	'Vital cog'
'Bad press'	Considerations for the future	Farm enterprise	Honoured	'Logistics'	Performance of the cow	Scepticism	Willingness of farmers to adapt
'Behind doors'	Difference greater farmer involvement could have made	Farmer identity	Impact of policy on farming practices	'Main guy'	Planning of the project	Social norms	'Winners'
Benefits of biorefinery for wider agriculture and rural development	Different perspectives	Farmer knowledge	Inclusion and exclusion in the bioeconomy	'Money matters'	Policy impacts	'Structure'	Work done
'Better lifestyle'	Dissemination	Farmer type	'Income stream'	Move away from beef farming	Project as 'political'	Substitution	'Worked out ok in the end'
Bioeconomy as a win	Dividing practices	Farmers to transition into the bioeconomy	Influence	National scale impacts	Positioning in the bioeconomy project	'Sustainability'	
Bioeconomy description	Drivers	'Farming can be challenging'	Infrastructure	Nature in farming	Positives and negatives of the project	Technology for dissemi-nation	
Broker	Emotional response to involvement	Fear	Interested	Need for a transition	Project as innovative	'They did everything they possibly could'	
Challenges in the project	Engagement	Finance	Involvement	Need for non-farm actors to support bioeconomy development	Public response	Timing of the project	
Climate	'Enjoyable'	Findings from the study	Knowledge as influence	Network in the bioeconomy project	Publicity	'Together in harmony'	
Communication	Enthusiastic	Funding	Knowledge Transfer	New under-standings	Resistance	Uncertainty of biorefinery	

Table A4. Second coding cycle.

Aim of the project	Dissemination	Findings	Planning of the project
Benefits of biorefinery for wider agriculture and rural development	Dividing practices	Inclusion in the bioeconomy	Policy impacts
Bioeconomy description	Emotional response to involvement	Influence	Positives and negatives of the project
Challenges in the project	Entry into the bioeconomy	Knowledge as influence	Role and contribution of farmer in the project
Connection with co-operatives	Farmer Characteristics	'Money matters'	'Structure'
Connections with other participants	Farmer knowledge	Network in the bioeconomy project	'Sustainability'
Considerations for the future	Farmers to transition into the bioeconomy	Novelty of the project	Uncertainty

Table A5. Categories developed from codes.

Entry into the bioeconomy	Role and Contribution of farmers	Consideration for the future
Bioeconomy description	Influence	Bioeconomy as a transition
Network of the bioeconomy	Knowledge	Structure of the bioeconomy

Table A6. Themes developed from categories.

Social Network of the *Biorefinery Glas* project: entry, involvement and understandings of the bioeconomy.	Considering the influence farmers and the local knowledge they hold had in the *Biorefinery Glas* project	'Make agriculture exciting again': Future considerations for farmer involvement in the Irish bioeconomy

References

1. Giarè, F.; Vagnozzi, A. Governance's Effects on Innovation Processes: The Experience of EIP AGRI's Operational Groups (OGs) in Italy. *Ital. Rev. Agric. Econ.* **2021**, *76*, 41–52. [CrossRef]
2. EIP-AGRI. *EIP-AGRI Brochure on Operational Groups—Turning Your Idea into Innovation*; EIP-AGRI: Luxembourg, 2014.
3. Knotter, S.; Kretz, D.; Zeqo, K. *Operational Groups Assessment 2018*; EIP-AGRI: Brussels, Belgium, 2019.
4. Piñeiro, V.; Nieto-Alemán, P.; Marín-Corbí, J.; Garcia-Alvarez-coque, J.M. Collaboration through EIP-AGRI Operational Groups and Their Role as Innovation Intermediaries'. *New Medit* **2021**, *20*, 17–32. [CrossRef]
5. Gava, O.; Favilli, E.; Bartolini, F.; Brunori, G. Knowledge Networks and Their Role in Shaping the Relations within the Agricultural Knowledge and Innovation System in the Agroenergy Sector. The Case of Biogas in Tuscany (Italy). *J. Rural Stud.* **2017**, *56*, 100–113. [CrossRef]
6. European Investment Bank. *Agriculture and Bioeconomy: Unlocking Production Potential in a Sustainable and Resource-Efficient Way*; European Investment Bank: Luxembourg, 2018.
7. Government of Ireland. *Climate Action Plan 2019*; Government of Ireland: Dublin, Ireland, 2019.
8. Kuosmanen, T.; Kuosmanen, N.; El-Meligi, A.; Ronzon, T.; Gurria, P.; Iost, S.; M'Barek, R.; Kuosmanen, T.; Kuosmanen, N.; El-Meligi, A.; et al. *How Big Is the Bioeconomy?* Publications Office of the European Union: Luxembourg, 2020; ISBN 9789276178583.
9. Bugge, M.M.; Hansen, T.; Klitkou, A. What Is the Bioeconomy? A Review of the Literature. *Sustainability* **2016**, *8*, 691. [CrossRef]
10. Kleinschmit, D.; Lindstad, B.H.; Thorsen, B.J.; Toppinen, A.; Roos, A.; Baardsen, S. Shades of Green: A Social Scientific View on Bioeconomy in the Forest Sector. *Scand. J. For. Res.* **2014**, *29*, 402–410. [CrossRef]
11. Vainio, A.; Ovaska, U.; Varho, V. Not so Sustainable? Images of Bioeconomy by Future Environmental Professionals and Citizens. *J. Clean. Prod.* **2019**, *210*, 1396–1405. [CrossRef]
12. Priefer, C.; Jörissen, J.; Frör, O. Pathways to Shape the Bioeconomy. *Resources* **2017**, *6*, 10. [CrossRef]
13. Devaney, L.A.; Henchion, M. If Opportunity Doesn't Knock, Build a Door: Reflecting on a Bioeconomy Policy Agenda for Ireland. *Econ. Soc. Rev.* **2017**, *48*, 207–229.
14. Giurca, A. Unpacking the Network Discourse: Actors and Storylines in Germany's Wood-Based Bioeconomy. *For. Policy Econ.* **2020**, *110*, 101754. [CrossRef]

15. Fieldsend, A.F.; Cronin, E.; Varga, E.; Biró, S.; Rogge, E. Organisational Innovation Systems for Multi-Actor Co-Innovation in European Agriculture, Forestry and Related Sectors: Diversity and Common Attributes. *NJAS-Wagening. J. Life Sci.* **2020**, *92*, 100335. [CrossRef]
16. Macken-Walsh, Á. Multi-Actor Co-Design of Extension Interventions: Paradoxes Arising in Three Cases in the Republic of Ireland. *J. Agric. Educ. Ext.* **2019**, *25*, 245–265. [CrossRef]
17. Woźniak, E.; Tyczewska, A.; Twardowski, T. Bioeconomy Development Factors in the European Union and Poland. *N. Biotechnol.* **2021**, *60*, 2–8. [CrossRef] [PubMed]
18. Lewandowski, I. Securing a Sustainable Biomass Supply in a Growing Bioeconomy. *Glob. Food Sec.* **2015**, *6*, 34–42. [CrossRef]
19. Colmorgen, F.; Khawaja, C.; Rutz, D.; Gerdes, H.; Kiresiewa, Z.; Anzaldúa, G.; Tarpey, J.; Tröltzsch, J.; Davies, S.; Kah, S.; et al. Bio-Based Strategies and Roadmaps for Enhanced Rural and Regional Development in the EU. *Eur. Biomass Conf. Exhib. Proc.* **2020**, 982–986. [CrossRef]
20. Levidow, L.; Birch, K.; Papaioannou, T. EU Agri-Innovation Policy: Two Contending Visions of the Bio-Economy. *Crit. Policy Stud.* **2012**, *6*, 40–65. [CrossRef]
21. Scheiterle, L.; Ulmer, A.; Birner, R.; Pyka, A. From Commodity-Based Value Chains to Biomass-Based Value Webs: The Case of Sugarcane in Brazil's Bioeconomy. *J. Clean. Prod.* **2018**, *172*, 3851–3863. [CrossRef]
22. Papadopoulou, C.I.; Loizou, E.; Melfou, K.; Chatzitheodoridis, F. The Knowledge Based Agricultural Bioeconomy: A Bibliometric Network Analysis. *Energies* **2021**, *14*, 6823. [CrossRef]
23. Dieken, S.; Dallendörfer, M.; Henseleit, M.; Siekmann, F.; Venghaus, S. The Multitudes of Bioeconomies: A Systematic Review of Stakeholders' Bioeconomy Perceptions. *Sustain. Prod. Consum.* **2021**, *27*, 1703–1717. [CrossRef]
24. Ramcilovic-Suominen, S. Envisioning Just Transformations in and beyond the EU Bioeconomy: Inspirations from Decolonial Environmental Justice and Degrowth. *Sustain. Sci.* **2022**, 1–16. [CrossRef]
25. Schmid, O.; Padel, S.; Levidow, L. The Bio-Economy Concept and Knowledge Base in a Public Goods and Farmer Perspective. *Biobased Appl. Econ.* **2012**, *1*, 47–63. [CrossRef]
26. Rossi, A.M.; Hinrichs, C.C. Hope and Skepticism: Farmer and Local Community Views on the Socio-Economic Benefits of Agricultural Bioenergy. *Biomass Bioenergy* **2011**, *35*, 1418–1428. [CrossRef]
27. Tyndall, J.C.; Berg, E.J.; Colletti, J.P. Corn Stover as a Biofuel Feedstock in Iowa's Bio-Economy: An Iowa Farmer Survey. *Biomass Bioenergy* **2011**, *35*, 1485–1495. [CrossRef]
28. Stern, T.; Ploll, U.; Spies, R.; Schwarzbauer, P.; Hesser, F.; Ranacher, L. Understanding Perceptions of the Bioeconomy in Austria-An Explorative Case Study. *Sustainability* **2018**, *10*, 4142. [CrossRef]
29. Wensing, J.; Carraresi, L.; Bröring, S. Do Pro-Environmental Values, Beliefs and Norms Drive Farmers' Interest in Novel Practices Fostering the Bioeconomy? *J. Environ. Manag.* **2019**, *232*, 858–867. [CrossRef]
30. Smart, B. *Michel Foucault*, 1st ed.; Routledge: New York, NY, USA, 2002.
31. Motion, J.; Leitch, S. A Toolbox for Public Relations: The Oeuvre of Michel Foucault. *Public Relat. Rev.* **2007**, *33*, 263–268. [CrossRef]
32. Devaney, L.; Iles, A. Scales of Progress, Power and Potential in the US Bioeconomy. *J. Clean. Prod.* **2019**, *233*, 379–389. [CrossRef]
33. Zeug, W.; Bezama, A.; Moesenfechtel, U.; Jähkel, A.; Thrän, D. Stakeholders' Interests and Perceptions of Bioeconomy Monitoring Using a Sustainable Development Goal Framework. *Sustainability* **2019**, *11*, 1511. [CrossRef]
34. Guo, M.; Song, W. The Growing U.S. Bioeconomy: Drivers, Development and Constraints. *N. Biotechnol.* **2019**, *49*, 48–57. [CrossRef]
35. Yaashikaa, P.R.; Senthil Kumar, P.; Varjani, S. Valorization of Agro-Industrial Wastes for Biorefinery Process and Circular Bioeconomy: A Critical Review. *Bioresour. Technol.* **2022**, *343*, 126126. [CrossRef]
36. Hamelin, L.; Møller, H.B.; Jørgensen, U. Harnessing the Full Potential of Biomethane towards Tomorrow's Bioeconomy: A National Case Study Coupling Sustainable Agricultural Intensification, Emerging Biogas Technologies and Energy System Analysis. *Renew. Sustain. Energy Rev.* **2021**, *138*, 110506. [CrossRef]
37. Chodkowska-Miszczuk, J.; Martinát, S.; van der Horst, D. Changes in Feedstocks of Rural Anaerobic Digestion Plants: External Drivers towards a Circular Bioeconomy. *Renew. Sustain. Energy Rev.* **2021**, *148*, 111344. [CrossRef]
38. Pan, S.Y.; Tsai, C.Y.; Liu, C.W.; Wang, S.W.; Kim, H.; Fan, C. Anaerobic Co-Digestion of Agricultural Wastes toward Circular Bioeconomy. *iScience* **2021**, *24*, 102704. [CrossRef] [PubMed]
39. Stolarski, M.J. Industrial and Bioenergy Crops for Bioeconomy Development. *Agriculture* **2021**, *11*, 852. [CrossRef]
40. Jansen, S.; Foster, W.; Anríquez, G.; Ortega, J. Understanding Farm-Level Incentives within the Bioeconomy Framework: Prices, Product Quality, Losses, and Bio-Based Alternatives. *Sustainability* **2021**, *13*, 450. [CrossRef]
41. Kuckertz, A.; Berger, E.S.C.; Brändle, L. Entrepreneurship and the Sustainable Bioeconomy Transformation. *Environ. Innov. Soc. Transit.* **2020**, *37*, 332–344. [CrossRef]
42. Wreford, A.; Bayne, K.; Edwards, P.; Renwick, A. Enabling a Transformation to a Bioeconomy in New Zealand. *Environ. Innov. Soc. Transit.* **2019**, *31*, 184–199. [CrossRef]
43. Brown, P. *Survey of Rural Decision Makers*; Lincoln: Lockport, NY, USA, 2015.
44. Houser, M.; Gunderson, R.; Stuart, D. Farmers' Perceptions of Climate Change in Context: Toward a Political Economy of Relevance. *Sociol. Rural.* **2019**, *59*, 789–809. [CrossRef]
45. Macken-Walsh, Á. *Barriers to Change: A Sociological Study of Rural Development in Ireland*; Teagasc: Athenry, Ireland, 2009.

46. Heimann, T. Bioeconomy and SDGs: Does the Bioeconomy Support the Achievement of the SDGs? *Earth's Future* **2019**, *7*, 43–57. [CrossRef]
47. Nowak, A.; Kobiałka, A.; Krukowski, A. Significance of Agriculture for Bioeconomy in the Member States of the European Union. *Sustainability* **2021**, *13*, 8709. [CrossRef]
48. Richardson, B. From a Fossil-Fuel to a Biobased Economy: The Politics of Industrial Biotechnology. *Environ. Plan. C Gov. Policy* **2012**, *30*, 282–296. [CrossRef]
49. Solarte-Toro, J.C.; Cardona Alzate, C.A. Biorefineries as the Base for Accomplishing the Sustainable Development Goals (SDGs) and the Transition to Bioeconomy: Technical Aspects, Challenges and Perspectives. *Bioresour. Technol.* **2021**, *340*, 125626. [CrossRef] [PubMed]
50. Goven, J.; Pavone, V. The Bioeconomy as Political Project: A Polanyian Analysis. *Sci. Technol. Hum. Values* **2015**, *40*, 302–337. [CrossRef]
51. Bastos Lima, M.G. Corporate Power in the Bioeconomy Transition: The Policies and Politics of Conservative Ecological Modernization in Brazil. *Sustainability* **2021**, *13*, 6952. [CrossRef]
52. Meyer, R. Bioeconomy Strategies: Contexts, Visions, Guiding Implementation Principles and Resulting Debates. *Sustainability* **2017**, *9*, 1031. [CrossRef]
53. Cidón, C.F.; Figueiró, P.S.; Schreiber, D. Benefits of Organic Agriculture under the Perspective of the Bioeconomy: A Systematic Review. *Sustainability* **2021**, *13*, 6852. [CrossRef]
54. Frisvold, G.B.; Moss, S.M.; Hodgson, A.; Maxon, M.E. Understanding the U.S. Bioeconomy: A New Definition and Landscape. *Sustainability* **2021**, *13*, 1627. [CrossRef]
55. Devaney, L.; Henchion, M. Consensus, Caveats and Conditions: International Learnings for Bioeconomy Development. *J. Clean. Prod.* **2018**, *174*, 1400–1411. [CrossRef]
56. Sleenhoff, S.; Landeweerd, L.; Osseweijer, P. Bio-Basing Society by Including Emotions. *Ecol. Econ.* **2015**, *116*, 78–83. [CrossRef]
57. D'Amato, D.; Droste, N.; Allen, B.; Kettunen, M.; Lähtinen, K.; Korhonen, J.; Leskinen, P.; Matthies, B.D.; Toppinen, A. Green, Circular, Bio Economy: A Comparative Analysis of Sustainability Avenues. *J. Clean. Prod.* **2017**, *168*, 716–734. [CrossRef]
58. Ehrenfeld, W.; Kropfhäußer, F. Plant-Based Bioeconomy in Central Germany—A Mapping of Actors, Industries and Places. *Technol. Anal. Strateg. Manag.* **2017**, *29*, 514–527. [CrossRef]
59. Spies, M.; Zuberi, M.; Mählis, M.; Zakirova, A.; Alff, H.; Raab, C. Towards a Participatory Systems Approach to Managing Complex Bioeconomy Interventions in the Agrarian Sector. *Sustain. Prod. Consum.* **2022**, *31*, 557–568. [CrossRef]
60. Kumari, M.; Pandey, S.; Giri, V.P.; Chauhan, P.; Mishra, N.; Verma, P.; Tripathi, A.; Singh, S.P.; Bajpai, R.; Mishra, A. *Integrated Approach for Technology Transfer Awareness of Traditional Knowledge for Upliftment of Circular Bioeconomy*; INC: New York, NY, USA, 2022; ISBN 9780323898553.
61. Prager, K.; Thomson, K. *AKIS and Advisory Services in the Republic of Ireland: Report for the AKIS Inventory (WP3) of the PRO AKIS Project*; Aberdeen: Oliver, BC, Canada, 2014.
62. Folkeson-Lillo, C.; Paredes Diaz, I.; Hernando Calvo, M. *Study on the Participation of the Agricultural Sector in the BBI JU: Business Models, Challenges and Recommendations to Enhance the Impact on Rural Development*; Innovarum: Madrid, Spain, 2019.
63. De Besi, M.; McCormick, K. Towards a Bioeconomy in Europe: National, Regional and Industrial Strategies. *Sustainability* **2015**, *7*, 10461–10478. [CrossRef]
64. Mills, S. *Michel Foucault*, 1st ed.; Routledge: Oxon, NY, USA, 2003.
65. Foucault, M. *Power/Knowledge: Selected Interviews and Other Writings 1972–1977*, 5th ed.; Pantheon Books: New York, NY, USA, 1980.
66. Townley, B. Foucault, Power/Knowledge, and Its Relevance for Human Resource Management. In *The Academy of Management Review*; Academy of Management: Briarcliff Manor, NY, USA, 1993; Volume 18, pp. 518–545.
67. Haugaard, M. Rethinking Power. *SSRN Electron. J.* **2012**. [CrossRef]
68. Macken-Walsh, Á. Governance, Partnerships and Power. In *International Handbook of Rural Studies*; Shucksmith, M., Brown, D.L., Eds.; Routledge: London, UK, 2016; pp. 615–625.
69. Engstrand, Å.K.; Enberg, C. The Power in Positionings: A Foucauldian Approach to Knowledge Integration Processes. *Manag. Learn.* **2020**, *51*, 336–352. [CrossRef]
70. Bruns, G.L. Foucault's Modernism. In *The Cambridge Companion to Foucault*; Kelly, M., Ed.; MIT Press: Cambridge, MA, USA, 1996; p. 359.
71. Rabinow, P. *The Foucault Reader*; Pantheon Books: New York, NY, USA, 1984.
72. O'Riordan, M.; McDonagh, J.; Mahon, M. Local Knowledge and Environmentality in Legitimacy Discourses on Irish Peatlands Regulation. *Land Use Policy* **2016**, *59*, 423–433. [CrossRef]
73. Sawicki, J. Queering Foucault and the Subject of Feminism. In *The Cambridge Companion to Foucault*; Kelly, M., Ed.; MIT Press: Cambridge, MA, USA, 1996; pp. 381–382.
74. Ludwig, D. The Objectivity of Local Knowledge. Lessons from Ethnobiology. *Synthese* **2017**, *194*, 4705–4720. [CrossRef]
75. Tafon, R.; Saunders, F.; Gilek, M. Re-Reading Marine Spatial Planning through Foucault, Haugaard and Others: An Analysis of Domination, Empowerment and Freedom. *J. Environ. Policy Plan.* **2019**, *21*, 754–768. [CrossRef]

76. van Dijk, L.; Buller, H.J.; Blokhuis, H.J.; van Niekerk, T.; Voslarova, E.; Manteca, X.; Weeks, C.A.; Main, D.C.J. HENNOVATION: Learnings from Promoting Practice-Led Multi-Actor Innovation Networks to Address Complex Animal Welfare Challenges within the Laying Hen Industry. *Animals* **2019**, *9*, 24. [CrossRef]
77. Adamsone-Fiskovica, A.; Grivins, M. Knowledge Production and Communication in On-Farm Demonstrations: Putting Farmer Participatory Research and Extension into Practice. *J. Agric. Educ. Ext.* **2021**, *28*, 479–502. [CrossRef]
78. Yamin, M.; Kurt, Y. Revisiting the Uppsala Internationalization Model: Social Network Theory and Overcoming the Liability of Outsidership. *Int. Mark. Rev.* **2018**, *35*, 2–17. [CrossRef]
79. Liu, W.; Sidhu, A.; Beacom, A.M.; Valente, T.W. Social Network Theory. *Int. Encycl. Media Eff.* **2017**, 1–12. [CrossRef]
80. Dania, A.; Griffin, L.L. Using Social Network Theory to Explore a Participatory Action Research Collaboration through Social Media. *Qual. Res. Sport. Exerc. Health* **2021**, *13*, 41–58. [CrossRef]
81. Clegg, S. Circuits of Power/Knowledge. *J. Polit. Power* **2014**, *7*, 383–392. [CrossRef]
82. Clegg, S.; Josserand, E.; Mehra, A.; Pitsis, T.S. The Transformative Power of Network Dynamics: A Research Agenda. *Organ. Stud.* **2016**, *37*, 277–291. [CrossRef]
83. Adolwa, I.S.; Schwarze, S.; Bellwood-Howard, I.; Schareika, N.; Buerkert, A. A Comparative Analysis of Agricultural Knowledge and Innovation Systems in Kenya and Ghana: Sustainable Agricultural Intensification in the Rural–Urban Interface. *Agric. Human Values* **2017**, *34*, 453–472. [CrossRef]
84. Zahran, Y.; Kassem, H.S.; Naba, S.M.; Alotaibi, B.A. Shifting from Fragmentation to Integration: A Proposed Framework for Strengthening Agricultural Knowledge and Innovation System in Egypt. *Sustainability* **2020**, *12*, 5131. [CrossRef]
85. Hermans, F.; Klerkx, L.; Roep, D. Structural Conditions for Collaboration and Learning in Innovation Networks: Using an Innovation System Performance Lens to Analyse Agricultural Knowledge Systems. *J. Agric. Educ. Ext.* **2015**, *21*, 35–54. [CrossRef]
86. Pascucci, S.; de-Magistris, T. The Effects of Changing Regional Agricultural Knowledge and Innovation System on Italian Farmers' Strategies. *Agric. Syst.* **2011**, *104*, 746–754. [CrossRef]
87. Cruz, J.L.; Albisu, L.M.; Zamorano, J.P.; Sayadi, S. Agricultural Interactive Knowledge Models: Researchers' Perceptions about Farmers' Knowledges and Information Sources in Spain. *J. Agric. Educ. Ext.* **2021**, *28*, 325–340. [CrossRef]
88. Alexandrescu, F.M.; Pizzol, L.; Zabeo, A.; Rizzo, E.; Giubilato, E.; Critto, A. Identifying Sustainability Communicators in Urban Regeneration: Integrating Individual and Relational Attributes. *J. Clean. Prod.* **2018**, *173*, 278–291. [CrossRef]
89. Parise, S. Knowledge Management and Human Resource Development: An Application in Social Network Analysis Methods. *Adv. Dev. Hum. Resour.* **2007**, *9*, 359–383. [CrossRef]
90. Schröter, B.; Hauck, J.; Hackenberg, I.; Matzdorf, B. Bringing Transparency into the Process: Social Network Analysis as a Tool to Support the Participatory Design and Implementation Process of Payments for Ecosystem Services. *Ecosyst. Serv.* **2018**, *34*, 206–217. [CrossRef]
91. Giurca, A.; Metz, T. A Social Network Analysis of Germany's Wood-Based Bioeconomy: Social Capital and Shared Beliefs. *Environ. Innov. Soc. Transit.* **2018**, *26*, 1–14. [CrossRef]
92. Flyvbjerg, B. Five Misunderstandings about Case-Study Research. *Qual. Inq.* **2006**, *12*, 219–245. [CrossRef]
93. Schwandt, T.A.; Gates, E.F. Case Study Methodology. In *The SAGE Handbook of Qualitative Research*; Denzin, K.N., Lincoln, Y.S., Eds.; Sage: London, UK, 2018; pp. 600–631.
94. Flyvbjerg, B. Case Study. In *The SAGE Handbook of Qualitative Research*; Denzin, N.K., Lincoln, Y.S., Eds.; Sage: Thousand Oaks, CA, USA, 2011; pp. 301–316.
95. Kirkeby, I.M. Transferable Knowledge: An Interview with Bent Flyvbjerg. *Archit. Res. Q.* **2011**, *15*, 9–14. [CrossRef]
96. Diefenbach, T. Are Case Studies More than Sophisticated Storytelling?: Methodological Problems of Qualitative Empirical Research Mainly Based on Semi-Structured Interviews. *Qual. Quant.* **2009**, *43*, 875–894. [CrossRef]
97. Irvine, A.; Drew, P.; Sainsbury, R. 'Am I Not Answering Your Questions Properly?' Clarification, Adequacy and Responsiveness in Semi-Structured Telephone and Face-to-Face Interviews. *Qual. Res.* **2013**, *13*, 87–106. [CrossRef]
98. Simons, H. *Case Study Research in Practice*, 1st ed.; Sage: Thousand Oaks, CA, USA, 2009.
99. Tassinari, G.; Drabik, D.; Boccaletti, S.; Soregaroli, C. Case Studies Research in the Bioeconomy: A Systematic Literature Review. *Agric. Econ.* **2021**, *67*, 286–303. [CrossRef]
100. Gomez San Juan, M.; Bogdanski, A.; Dubois, O. *Towards Sustainable Bioeconomy: Lessons Learned from Case Studies*; The Food and Agriculture Organization (FAO): Rome, Italy, 2019; ISBN 9789251314241.
101. Sanz-Hernández, A.; Esteban, E.; Garrido, P. Transition to a Bioeconomy: Perspectives from Social Sciences. *J. Clean. Prod.* **2019**, *224*, 107–119. [CrossRef]
102. Shahab, S.; Clinch, J.P.; O'Neill, E. An Analysis of the Factors Influencing Transaction Costs in Transferable Development Rights Programmes. *Ecol. Econ.* **2019**, *156*, 409–419. [CrossRef]
103. Garcia, D.; Gluesing, J.C.; Santos, A.; Powell, J.A.; Hinks, J.; Andriopoulos, C.; Slater, S.; Valtakoski, A.; Suryani, A.; Morgan, S.J.; et al. Introduction of Case Study. *Manag. Res. News* **2013**, *25*, 423–444.
104. EIP-AGRI. *EIP-AGRI: 7 Years of Innovation*; European Commission: Luxembourg, 2020.
105. Department of Agriculture, Food and the Marine. Minister Hackett Announces Extension to EIP-AGRI Projects. Available online: https://www.gov.ie/en/press-release/96bd0-minister-hackett-announces-extension-to-eip-agri-projects/ (accessed on 18 July 2022).

106. Kallio, H.; Pietilä, A.M.; Johnson, M.; Kangasniemi, M. Systematic Methodological Review: Developing a Framework for a Qualitative Semi-Structured Interview Guide. *J. Adv. Nurs.* **2016**, *72*, 2954–2965. [CrossRef] [PubMed]
107. Dearnley, C. A Reflection on the Use of Semi-Structured Interviews. *Nurse Res.* **2005**, *13*, 23. [CrossRef] [PubMed]
108. O'Keeffe, J.; Buytaert, W.; Mijic, A.; Brozovic, N.; Sinha, R. The Use of Semi-Structured Interviews for the Characterisation of Farmer Irrigation Practices. *Hydrol. Earth Syst. Sci.* **2016**, *20*, 1911–1924. [CrossRef]
109. Choy, L.T. The Strengths and Weaknesses of Research Methodology: Comparison and Complimentary between Qualitative and Quantitative Approaches. *IOSR J. Humanit. Soc. Sci.* **2014**, *19*, 99–104. [CrossRef]
110. Cachia, M.; Millward, L. The Telephone Medium and Semi-Structured Interviews: A Complementary Fit. *Qual. Res. Organ. Manag. An Int. J.* **2011**, *6*, 265–277. [CrossRef]
111. McIntosh, M.J.; Morse, J.M. Situating and Constructing Diversity in Semi-Structured Interviews. *Glob. Qual. Nurs. Res.* **2015**, *2*, 2333393615597674. [CrossRef]
112. Devitt, C.; O'Neill, E.; Waldron, R. Drivers and Barriers among Householders to Managing Domestic Wastewater Treatment Systems in the Republic of Ireland Implications for Risk Prevention Behaviour. *J. Hydrol.* **2016**, *535*, 534–546. [CrossRef]
113. Saldaña, J. *The Coding Manual for Qualitative Researchers*, 2nd ed.; Sage: London, UK, 2013.
114. Campbell, J.L.; Quincy, C.; Osserman, J.; Pedersen, O.K. Coding In-Depth Semistructured Interviews: Problems of Unitization and Intercoder Reliability and Agreement. *Sociol. Methods Res.* **2013**, *42*, 294–320. [CrossRef]
115. Biorefinery Glas Biorefinery Glas Brochure. Available online: https://biorefineryglas.eu/wp-content/uploads/2019/12/Biorefinery-Glas-Brochure.pdf (accessed on 26 April 2022).
116. EIP-AGRI Biorefinery Glas -Small-Scale Farmer-Led Green Biorefineries. Available online: https://ec.europa.eu/eip/agriculture/en/find-connect/projects/biorefinery-glas-small-scale-farmer-led-green (accessed on 28 December 2020).
117. DBEI. *Realising the Opportunities for Enterprise in the Bioeconomy and Circular Economy in Ireland*; Department of Enterprise, Trade and Employment: Dublin, Ireland, 2019.
118. Government of Ireland. *Bioeconomy Implementation Group: First Progress Report*; Government of Ireland: Dublin, Ireland, 2019.
119. Emmet-Booth, J.P.; Dekker, S.; O'Brien, P. *Climate Change Mitigation and the Irish Agriculture and Land Use Sector*; Climate Change Advisory Council: Dublin, Ireland, 2019; pp. 1–159.
120. Donnellan, T.; Moran, B.; Lennon, J.; Dillon, E. Teagasc National Farm Survey 2019 Results. Carlow. 2020. Available online: https://www.teagasc.ie/media/website/publications/2020/Teagasc-National-Farm-Survey-2019.pdf (accessed on 27 April 2022).
121. Gilsenan, E. Dairy Cow Numbers: Map Reveals County by County. Available online: https://www.agriland.ie/farming-news/dairy-cow-numbers-map-reveals-county-by-county/ (accessed on 5 April 2022).
122. Hoare, P.; Raleigh, D. Cork Has Largest Dairy Herd in State. Available online: https://www.irishexaminer.com/news/arid-40727655.html (accessed on 5 April 2022).
123. Teagasc Cork West Advisory Region. Available online: https://www.teagasc.ie/about/farm-advisory/advisory-regions/cork-west/ (accessed on 5 April 2022).
124. Kennedy, J. Peak Milk Processing Dilemma Moves Closer. Available online: https://www.farmersjournal.ie/peak-milk-processing-dilemma-moves-closer-540334 (accessed on 7 April 2022).
125. Borgatti, S.P. *Netdraw Network Visualisation*; Analytic Technologies: Lexington, KY, USA, 2002.
126. McDonagh, J. Rural Geography III: Do We Really Have a Choice? The Bioeconomy and Future Rural Pathways. *Prog. Hum. Geogr.* **2015**, *39*, 658–665. [CrossRef]
127. Mustalahti, I. The Responsive Bioeconomy: The Need for Inclusion of Citizens and Environmental Capability in the Forest Based Bioeconomy. *J. Clean. Prod.* **2018**, *172*, 3781–3790. [CrossRef]
128. Shortall, S. Are Rural Development Programmes Socially Inclusive? Social Inclusion, Civic Engagement, Participation, and Social Capital: Exploring the Differences. *J. Rural Stud.* **2008**, *24*, 450–457. [CrossRef]
129. Jentoft, S. Small-Scale Fisheries within Maritime Spatial Planning: Knowledge Integration and Power. *J. Environ. Policy Plan.* **2017**, *19*, 266–278. [CrossRef]
130. Mukhtarov, F.; Gerlak, A.; Pierce, R. Away from Fossil-Fuels and toward a Bioeconomy: Knowledge Versatility for Public Policy? *Environ. Plan. C Polit. Sp.* **2017**, *35*, 1010–1028. [CrossRef]
131. Wohlfahrt, J.; Ferchaud, F.; Gabrielle, B.; Godard, C.; Kurek, B.; Loyce, C.; Therond, O. Characteristics of Bioeconomy Systems and Sustainability Issues at the Territorial Scale. A Review. *J. Clean. Prod.* **2019**, *232*, 898–909. [CrossRef]
132. Maesse, J.; Nicoletta, G.C. Economics as Ideological Discourse Practice: A Gramsci-Foucault-Lacan Approach to Analysing Power/Knowledge Regimes of Subjectivation. *J. Multicult. Discourses* **2021**, *16*, 107–126. [CrossRef]
133. Foucault, M. *Discipline and Punish: The Birth of the Prison*, 1st ed.; Pantheon Books: New York, NY, USA, 1977.
134. Foucault, M. *The Birth of the Clinic: An Archaeology of Medical Perception*; Tavistock: London, UK, 1973.
135. Curran, M.E. Foucault on the Farm: Producing Swine and Subjects Foucault on the Farm—Curran. *South. Rural Sociol.* **2001**, *17*, 12–36.
136. Van Assche, K.; Beunen, R.; Duineveld, M.; Gruezmacher, M. Power/Knowledge and Natural Resource Management: Foucaultian Foundations in the Analysis of Adaptive Governance. *J. Environ. Policy Plan.* **2017**, *19*, 308–322. [CrossRef]
137. Anderson, T.; Ron Balsera, M. Principles for a Just Transition in Agriculture. ActionAid. 2019. Available online: https://actionaid.org/sites/default/files/publications/Principles%20for%20a%20just%20transition%20in%20agriculture_0.pdf (accessed on 1 May 2021).

138. Blattner, C. Just Transition for Agriculture? A Critical Step in Tackling Climate Change. *J. Agric. Food Syst. Community Dev.* **2020**, *9*, 53–58. [CrossRef]
139. Government of Ireland. *National Policy Statement on the Bioeconomy*; Government of Ireland: Dublin, Ireland, 2018; pp. 1–20.
140. EIP-AGRI Agricultural Knowledge and Innovation Systems: Stimulating Creativity and Learning. Available online: https://ec.europa.eu/eip/agriculture/sites/default/files/eip-agri_brochure_knowledge_systems_2018_en_web.pdf (accessed on 9 November 2021).
141. Mertens, A.; Van Lancker, J.; Buysse, J.; Lauwers, L.; Van Meensel, J. Overcoming Non-Technical Challenges in Bioeconomy Value-Chain Development: Learning from Practice. *J. Clean. Prod.* **2019**, *231*, 10–20. [CrossRef]
142. Salgado, M.A.H.; Säumel, I.; Cianferoni, A.; Tarelho, L.A.C. Potential for Farmers' Cooperatives to Convert Coffee Husks into Biochar and Promote the Bioeconomy in the North Ecuadorian Amazon. *Appl. Sci.* **2021**, *11*, 4747. [CrossRef]
143. Armstrong, P. The Discourse of Michel Foucault: A Sociological Encounter. *Crit. Perspect. Account.* **2015**, *27*, 29–42. [CrossRef]
144. Haugaard, M. Power, Emotion, Cognitive Bias and Legitimacy: An Editorial. *J. Polit. Power* **2019**, *12*, 1–3. [CrossRef]
145. Brown, J.; Tregidga, H. Re-Politicizing Social and Environmental Accounting through Rancière: On the Value of Dissensus. *Account. Organ. Soc.* **2017**, *61*, 1–21. [CrossRef]
146. Bazzul, J.; Carter, L. (Re)Considering Foucault for Science Education Research: Considerations of Truth, Power and Governance. *Cult. Stud. Sci. Educ.* **2017**, *12*, 435–452. [CrossRef]
147. Rouse, J. Power/Knowledge. In *The Cambridge Companion to Foucault*; Kelly, M., Ed.; MIT Press: Cambridge, MA, USA, 1996; p. 112.
148. Foucault, M. *The Archaeology of Knowledge*, 1st ed.; Pantheon Books: New York, NY, USA, 1972.
149. Jackson, A.Y. Spaces of Power/Knowledge: A Foucauldian Methodology for Qualitative Inquiry. *Qual. Inq.* **2013**, *19*, 839–847. [CrossRef]
150. Christiaens, T. Financial Neoliberalism and Exclusion with and beyond Foucault. *Theory Cult. Soc.* **2019**, *36*, 95–116. [CrossRef]
151. Hanna, P.; Johnson, K.; Stenner, P.; Adams, M. Foucault, Sustainable Tourism, and Relationships with the Environment (Human and Nonhuman). *GeoJournal* **2015**, *80*, 301–314. [CrossRef]
152. Gallagher, M. Foucault, Power and Participation. *Int. J. Child. Rights* **2008**, *16*, 395–406. [CrossRef]
153. Tregear, A.; Cooper, S. Embeddedness, Social Capital and Learning in Rural Areas: The Case of Producer Cooperatives. *J. Rural Stud.* **2016**, *44*, 101–110. [CrossRef]
154. Kendall, G.; Wickham, G. *Using Foucault's Methods*, 1st ed.; Sage: London, UK, 1999.
155. Foucault, M. *Discipline and Punish: The Birth of the Prison*, 2nd ed.; Random House: New York, NY, USA, 1991.