9th International Scientific Conference
RURAL DEVELOPMENT 2019
RESEARCH AND INNOVATION FOR BIOECONOMY
26-28 September 2019, Vytautas Magnus University Agriculture Academy, Lithuania

VYTAUTAS MAGNUS UNIVERSITY AGRICULTURE ACADEMY

Proceedings of the 9th International Scientific Conference Rural Development 2019

Edited by prof. Asta Raupelienė

ISSN 1822-3230 (Print)
ISSN 2345-0916 (Online)

Article DOI: http://doi.org/10.15544/RD.2019.085

DECISION-MAKING PROCESS AND SOCIO-ECONOMIC DYNAMICS OF AGRICULTURAL ACTORS. THE CASE OF A METHANISATION UNIT IN THE NORTH OF FRANCE

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Currently, the agricultural sector is facing new challenges. In addition to meeting the population's food needs in sufficient quantity and quality, it must fulfill new energy and environmental functions as well as other non-food uses such as biomaterials and biomolecules. At the regional scale, there is an increase of non-food valorization projects of biomass, including the methanisation plants. In France, the methanisation sector is in full swing with a national target of 1,000 plants by 2020, as defined in the Energy Methanisation Nitrogen Energy plan (EMAA). The development of methanisation sector generates a regional dynamic involving different stakeholders and linking various business sectors. Then the regional methanisation becomes a collective process in which farmers, industrialists, waste managers and local communities are engaged. The objective of this communication consists on understanding the socio-economic conditions in which this kind of regional projects have emerged. For this purpose, the "*Centrale de Biométhane du Vermandois*", a regional methanisation plant in the north of France was studied. This analysis contributes to identify the nature of the expectations of the actors engaged, to better understand the governance in place and the decision-making processes surrounding the project. The results show the success factors but also the difficulties of implementation and development of the project. The results also highlight the main motivations of farmers to join the biogas project.

Keywords: *non-food use of biomass, methanisation, farmers 'motivations, agricultural dynamics, regional project*

INTRODUCTION

Currently, the agricultural sector is facing new challenges. In addition to meeting the population's food needs in sufficient quantity and quality, it must fulfill new energy and environmental functions as well as other non-food uses such as biomaterials and biomolecules. At the regional scale, there is an increase of non-food valorization projects of biomass, including the methanisation plants. In France, the methanisation sector is in full swing with a national target of 1,000 plants by 2020, as defined in the Energy Methanisation Nitrogen Energy plan (EMAA). With 450 operational plants in 2016, the country is redoubling efforts to target an expansion of the sector.

The development of methanisation sector generates a regional dynamic involving different stakeholders and linking various business sectors. Then the regional methanisation becomes a collective process in which farmers, industrialists, waste managers and local communities are engaged (Aissani et al., 2016). The challenge is therefore to carry out coherent actions of biomass use so that it generates favorable economic, social and environmental conditions for all stakeholders (Pacaud et al., 2013).

The objective of this communication consists on understanding the socio-economic conditions in which this kind of regional projects have emerged. For this purpose, the "*Centrale de Biométhane du Vermandois*", a regional methanisation plant in the north of France was studied. This analysis contributes to identify the nature of the expectations of the actors engaged, to better understand the governance in place and the decision-making processes surrounding the project. The northern region of France is not only an area strongly structured by agriculture, but it is also distinguished by the richness of its agricultural fabric, making it a suitable area for the development of the bioeconomy.

RESEARCH METHOD

Located in the industrial area of the municipality of Eppeville, the methanisation project focuses on the recovery of co-products and industrial waste as well as livestock and straw effluents. This project is considered to be one of the largest regional methanisation unit in the north of France. It is supplied with agricultural and agro-industrial biomass in an average radius of 30 km, at 28,000 tons per year. Nearly 85% of inputs come from agro-

industrial firms of the region and the rest are provided by 30 local farmers. The by-products of anaerobic digestion, consisting of solid and raw digestate, are then spread over 6,000 ha of farmland between straw-producing farmers. Made up of technical, scientific and economic partners and placed under the "Agro-transfert Ressources et Territoires" responsibility, the *"IAR Demonstration Sites Network*" project aims to study the conditions of biomass valorization sectors, so that they are sustainable and create added value for their host territories.

This communication is based on findings from 10 semi-structured interviews with the project leader and 9 farmers engaged in the methanisation plant supply-chain (Figure 1). This method was designed to highlight a decision or set of decisions about why they were taken, how they were adopted and what the results are (Schramm, 1971).

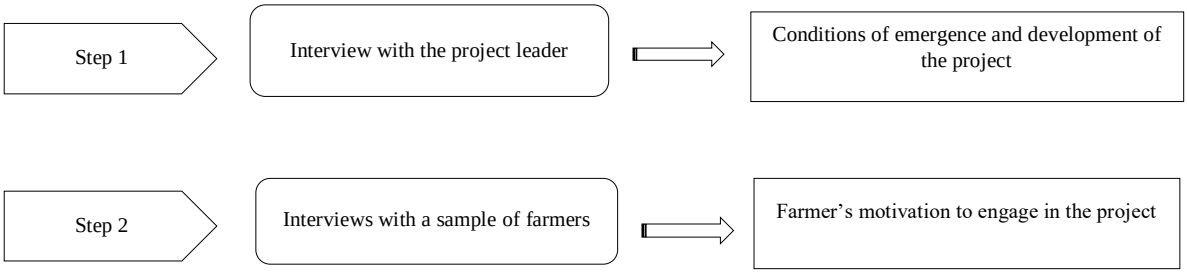

Figure 1. Research method

RESULTS

Socio-economic characteristics of farmers

Some characteristics related to the socio-economic trajectory of the farmers were detected. Diversity is one of the dominant traits of these farmers. In other words the biogas project brings together farmers with different motivations and features (table 1). Age does not represent a distinguishing criterion. The project gathers both farmers at the beginning of their careers and experienced farmers. In the majority of cases, however, all have a university education and professional experience before taking over the family business. This conclusion is shared by other studies on farmer engagement in renewable energy projects (Sutherland et al., 2016). In addition, most of farmers have other functions. For many of them, the takeover of the family farm was not the first project but was imposed "naturally", due to a lack of buyer. Beyond these criteria, the accountability is another characteristic shared by the farmers interviewed, whether in professional organizations or outside the agricultural world. This characteristic is an element that explains the greater facilities of these farmers to engage in new and diversified projects.

"*I always looked a little bit what was happening outside ... I'm not a farmer ... I have my feet in the ground but I do not have either the head in the ground, I look a little bit what's going on around. So I'm engaged in a lot of things.*"

These farmers pay particular attention to innovations and alternatives, especially since they are essentially cereal farms and therefore seeking new outlets to anticipate and respond to new demands for diversification. The pursuit of innovation also aims to achieve a higher economic profitability while meeting the societal requirements that weigh on the farming profession.

Table 1. Socio-economic characteristics of farmers

Farmers	Farms
Age varying from 32 to 65 University degree (two-year university degree – Agronomic engineering)	Family / non-family farms, cereals and vegetables Little diversified
Professional experience outside the farm Pluri activity	Agricultural area: 150 – 1000 ha Will to expand Will to diversify
High union involvement – Multiple responsibilities (cooperatives, banks, etc.) – Political responsibilities	Research of innovative techniques (tillage, phytosanitary reduction, biomass projects, etc.)
Participation in working groups, interest in innovations, research of alternatives	Seeking maximum economic profitability combined with new challenges (social responsibility, crop diversification, etc.)

Success factors of the methanisation project

The project leader stated that the methanisation project was built in a pragmatic way following an industrial logic of development. "*Our job, I do not know if it's a job but our main interest in the work is development, it's a little what pulls us forward actually. And in the wind project, we had completed the loop. We arrived in the early 2000s it was the start, we had tariffs etc. We lived all that, we built, we put in service and after? After, it was necessary to start again, to enter an industrialized process with full of competitors.*"(The project leader).

Thus the methanisation project represents a diversification of their activity that mainly focuses on the development of energy projects. Biomass constitutes a new alternative to get out of "more industrial, competitive, commercial" wind turbines and allows new positioning on the market. Although this initiative was driven by a desire to change, it nevertheless remained in a global approach of renewable energies promotion. As a consequence it combines both a strategy of diversification and specialization.

Among the sources of motivation, we also retain the interest of the project leader for risky and new projects where others have not yet invested. "*Our starting line, our capacity is to carry projects, there must be a challenge* ".

Hence, the successful implementation of the project falls within the entrepreneurial logic of its promoter, driven by the desire to innovate and "*to implement new combinations*". It is through his capacity to perceive market conditions and to cultivate them to draw value that the project was initiated. In doing so, the project leader demonstrated his initiative and ambition in the face of an innovation still in its infancy at the industrial level. However as risk is an auxiliary to innovation (Peretti-Watel, 2003), the project leader has adopted a vigilant attitude to manage the contingencies associated with the project based on past experiences and achievements.

As a factor in the success of the project, the project leader also identified proximity and cooperation as the basis for commercial and operational relationships. The methanisation projects have the distinction of associating a large number of actors. This is expressed through the existence of a variety of individuals and groups of individuals from different territorial grid with diverse aspirations and motivations (Glon et Pecqueur, 2016). Instead of being a brake on the project, this multiplicity of interlocutors, on the contrary, allows the activation and development of close links with the actors of the region, and constitutes a factor of learning and motivation for the project leader. To set up their project and involve the actors, the promoter and his collaborators rely on a working method based on the principle of "*going directly to see everyone*" rather than applying a ready-made recipe, because "*we work with humans*". Each project is specific to each territory and its actors, adaptability is the law. This non-reproducibility of the project comes from the specificity of its development, according to the organizational and institutional arrangements of the host territory. We will thus talk about a specific territorialized resource (Torre, 2000). Indeed, the establishment of a biomass valorization project on a territory requires a good study of its integration in the territorial context, thus facilitating its social acceptance. The more the project is shared and built with the local actors (farmers, industrialists, local authorities, etc.), the more likely he will succeed in good conditions and will be remunerative (Pellecuer et Bal, 2015).

That apart the project leader describes the host territory as a receptive agricultural region, "*economically and intellectually willing*" to engage in this kind of project. In other words, In other words, the receptiveness of the territory is an important element of the success of the project, especially in the case of an innovative project such as methanisation or, more generally, for non-food exploitation of agricultural resources. This openness of the territories is reflected in their ability to absorb influences, techniques and cultures from outside (Godet et al., 2010).

Obstacles and implementation difficulties of the project

Although, generally, the territory has accepted the project, the project leader has nevertheless been confronted with mistrust, even refusals on the ground. The industrialization of agriculture is not always well received by the natives and many farmers express their aversion to the industrial identity of innovation projects. The challenge for the new project leader is to focus efforts to restore the confidence of farmers by creating an economic and institutional context that promotes the adoption of the project, including the establishment of a locking device (Berkhout, 2002). Indeed, trust is a decisive condition for the success of territorial renewable energy projects (Walker et al., 2010).

Local innovations of a technical and organizational nature such as renewable energy projects in general and new valorizations of agricultural resources in particular, are often subject to resistance and controversy (Torre et Beuret, 2012). Conflict is one of the difficulties and obstacles that will punctuate the process of setting up and development of the project. The project leader mentioned the controversies surrounding the management of farmers' waste and the valorization of the added value of this waste. To overcome this, the establishment of an Economic Interest Group (EIG) was necessary. The EIG has made it possible both to manage the distribution of deposits and to create a stable working environment. Its purpose is to secure the supply of local methanisers through the setting of a predefined deposit and the establishment of a contractual system. The contracting system then appears as a device of local governance (Bertrand et Moquay, 2004) which aims to establish the respective responsibilities of the stakeholders, to organize their relations of cooperation and the conditions of their intervention.

The motivations of farmers to engage with the methanisation project

By definition, motivation is the set of reasons that determine the behavior of an individual (Herath, 2010). The interviews made it possible to isolate three types of farmers' motivations justifying their commitment to the methanisation project: "individual" motivations, "cognitive" motivations and “societal and territorial motivations”.

Individual motivations

Individual motivations are found throughout the interviews. At first glance, farmers expect economic gains from their commitment to the project. Indeed, the economic motivation is one of the most frequently encountered in the scientific literature concerning the farmers’ decision making to engage or not in a project (Greiner et Gregg,

2011, Sutherland et al., 2016). In this case, as the biogas project involves a straw-digestate exchange, farmers want to reduce the costs of buying fertilizer, especially nitrogen.
In addition to economic motivations, there are agronomic benefits from methanisation plants. Farmers argue that thanks to the digestate, they have a better fertilizer. Indeed, they know the composition of this fertilizer as well as its process of manufacture as it comes from their straw. The same applies to the waste of the agro-food industries to which they entrust their materials.

Cognitive motivations

Curiosity and the desire to contribute to new agricultural issues and "technological" projects is one of the important motivations. Farmers are particularly interested in innovations in new biomass valorization. The waste valuation mode is also part of the motivations of these farmers. They wanted to develop a circular economy model that permit them to control the production of the organic component while allowing a return to the exploitation of the waste produced via a local agro-food processing.

Societal and territorial motivations

The motivations of society appear in the speeches of some farmers, especially the most motivated and group leaders. They see this project as a means to contribute to the provision of citizen energy, to communicate on the role of agriculture and to improve its image. To these social motivations are added territorial motivations. The methanisation project has created a short circuit of waste recovery between the farm and the methanizer. As a result, the waste is treated locally and transport is limited. In addition, the added value benefits the region.

CONCLUSION

This communication, produced as part of the "IAR Demonstration Sites Networks" project, highlights complex decision-making processes. First, it emphasizes the determinants of the implementation of a biomass valorization project, through the case of the "*Vermandois" biométhane plant*", a methanisation unit located in the North of France. In addition, it stresses the decision-making elements of farmers and their apprehensions regarding this kind of project. The purposes of this approach consist on preparing the project promoters, but also the scientific and technical structures involved in the promotion of these projects and providing appropriate support tools for the implementation of these biomass valorization projects.

Acknowledgements. This research leading these results has received funding from the FEDER program, FNADT as part of the "*Territoires catalyseurs d'innovation*" project and the region Hauts-de-France.

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