



From opportunities to action - An integrated model of small actors' engagement in bioenergy business

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ABSTRACT

The promotion of entrepreneurial activities and establishment of SMEs to strengthen national competitiveness has accelerated the examination of the business opportunities offered by cleaner technologies, such as bioenergy solutions. Finland is one of the countries which seek new ways for economic growth by boosting e.g. the growth of bioeconomy, and the rural areas in the country are considered as fertile ground for the growth of grassroot-level innovations related to bioenergy. However, the growth does not happen without suitable incentives for bioenergy business development. Thus, it is reasonable to examine the factors which have an influence on the decisions the actors in these rural regions make. In the paper, an integrated model is constructed to widen the knowledge of the process from the discovery of an entrepreneurial opportunity to actual business engagement. This is done by introducing the entrepreneurial process and utilizing the process in conjunction with two widely used theories: the Technology Acceptance Model and the Theory of Planned Behavior. The model offers an opportunity to observe the impact of different enablers and barriers on new business engagement, as they can be related to certain phases of the entrepreneurial process and certain environmental levels surrounding the individual actors. In the empirical study, an integrated model is reasoned in the context of small actors' engagement in bioenergy by examining the business opportunities offered by biogas production from animal manure. The constructed model is meant to assist in the promotion of entrepreneurial intentions, and that way also to advance the fulfillment of national targets for bio-based economy and SME development.

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1. Introduction

Many countries have recently put remarkable efforts to promoting entrepreneurial activities and establishment of new start-up firms in order to develop national competitive advantage. In Finland, notable expectations for the development of new small and medium-sized firms are related to national focus areas where e.g. cleaner technologies and the bioeconomy sector play a significant role. In general, national bioeconomy strategies have also been developed around Europe (McCormick and Kautto, 2013), and the number of research papers around the keywords of bioeconomy or bio-based economy has increased significantly in recent years (Bugge et al., 2016; Staffas et al., 2013). In the Finnish Bioeconomy Strategy (Ministry of Employment and Economy,

2014), the target is to push the bioeconomy output up to 100 billion euros by 2025. One of the strategic goals is to promote new business development in the sector. In the broad area of bioeconomy, one of the focus areas where Finland has pioneered is the development and production of bioenergy. Most renewable bioenergy is based on wood-based raw materials and side streams of wood-processing industries (e.g. Kröger and Raitio, 2017), but also the side streams from agriculture are expected to play an increasingly important role in the future (Huttunen, 2013; Ministry of Employment and Economy, 2014). From the national viewpoint, so-called grassroots innovations (e.g. Hossain, 2016) related to bioenergy have a meaningful role in strengthening the bioeconomy and building more sustainable energy solutions.

Despite of the vast biomass reserves in forest and fields, the opportunities of rural energy production have not been traditionally effectively exploited in Finland, as the bioenergy field has been characterized by large-scale centralized production with restricted opportunities for local diversification (Huttunen, 2013). However, during the last decade, there has been a paradigm shift in the

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renewable energy sector from centralized, large-scale production towards distributed, small-scale production with flexible business models. This way, the entrepreneurial opportunities of bioenergy production have become more tempting for smaller actors as well (IEA, 2012; Jernström et al., 2017). New business opportunities have already emerged e.g. around the utilization of solid wood fuels in heating, biogas and liquid biofuels, as well as small-scale combustion of wood in small buildings (Huttunen, 2013). However, the development of energy production and related business in alternative biomass, such as that coming from agriculture for biogas production, has received less attention.

Because of the rich reserves of biomasses, the rural areas are in a key position in boosting the diversification of bioenergy production, and farm-related bioenergy business has raised as an interesting business opportunity to consider (Alm, 2011; Huttunen, 2013; Jokinen et al., 2008). Moreover, the agricultural sector has faced a remarkable structural change in recent years, in which the number of farms has decreased but the sizes of farms have grown significantly. Many farms are facing the challenge of gaining adequate income from traditional sources of living, and are actively seeking auxiliary production lines. Bioenergy production offers them a notable option, as it brings about several opportunities for conducting new business (Guenther-Lübbers et al., 2016; Huttunen, 2012).

However, engagement in new business is not straightforward, and there are several issues to be weighed up. The future success of bioeconomy targets is seen to be dependent on such issues as the availability and price of raw material, industrial infrastructure, competence base, willingness and ability to build partnerships and seek new businesses, product markets, availability of funding, and political will (Aalto, 2015; Johnson and Altman, 2014). Basically, the challenges in Finland have not been in the existence of raw material, although, due to the long geographical distances in the country, supply costs and prices may play a significant role in some cases. In addition, the scalability of the technologies of production plants to serve the needs of distributed and small-scale systems is an influencing issue in bioenergy business development. The study of Lehtonen and Okkonen (2016) also demonstrates the need for understanding regional factors, such as knowledge about the industrial traditions, resources, actors and cooperators, in addition to access to external technology and capital. Furthermore, one of the issues related to effective bioenergy business development in Finland has been a lack of systemic support to pilot innovative bioenergy solutions, and developing collaborative platforms (Ministry of Employment and Economy, 2014).

Leaning on some earlier studies (e.g. Rikkonen and Tapio, 2009; Lehtonen and Okkonen (2016), one of the assumptions related to this paper is also that there has not been enough information on alternative technologies and their benefits, which might be problematic in technology adoption among potential new entrepreneurs in agriculture-related bioenergy. Another general assumption is related to general attitudes towards small-scale bioenergy business development and a missing entrepreneurial mindset and collective support towards new business models. All this makes it necessary to clarify the explaining factors in closer detail, giving us a solid ground to base our work on the integrated areas in the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), in order to formulate a framework of bioenergy business engagement and related measures to boost bioenergy entrepreneurship.

In the paper we first construct a model for examining the process from the discovery of an entrepreneurial opportunity to actual business engagement. This is done by integrating three different theoretical frameworks: the entrepreneurial process (e.g. Baron and Shane, 2005), the Technology Acceptance Model (TAM) by

Davis (1986), and the Theory of Planned Behavior (TPB) by Ajzen (1985). With the constructed model we aim to clarify the path from an entrepreneurial opportunity to actual business engagement by widening the knowledge on the inner and outer factors that have an influence on an actor's decision to exploit the business opportunity, their progress in the entrepreneurial process or their withdrawal from it. In the empirical part, we reason the constructed model by examining the business opportunities offered by farming-related bioenergy production, and more precisely, biogas production from animal manure. The central research question is: "How can the enablers and barriers via small actors' entrepreneurial process be studied by the constructed model and reasoned in the bioenergy business context?"

The Theory of Planned Behavior (TPB) has been a popular theory in investigating entrepreneurial intentions. However, the research focus has mainly been on university students and their future plans of becoming entrepreneurs (Sieger et al., 2014; Tegtmeier, 2012; van Gelderen et al., 2008). TPB is not a new framework in the renewable energy context either, as it has been used e.g. for investigating forestry and renewable energy deployment (e.g. Karppinen, 2005; Liu et al., 2013; Leitch et al., 2013). Thus, using TPB in these two contexts has already proved to be reasonable. This paper widens the examination by combining these two contexts into the same model and completing the model with the Technology Acceptance Model (TAM). Integrating TAM and TPB is not a new phenomenon in academic writing, either (see e.g. Awa et al., 2014; Chen and Chao, 2011; Yang, 2013). Both theories originate from the Theory of Reasoned Action, TRA (Fishbein and Ajzen, 1975), and are widely used models for investigating an individual's behavior. However, especially TAM has been criticized for its biased viewpoint (e.g. Legris et al., 2003; Marangunic and Granic, 2013), because significant factors are not included in the model. That is why it has been suggested to be integrated into a broader view with variables related to human and social aspects (Legris et al., 2003). Moreover, the view of TPB is seen to be limited, as the theory is based on the assumption that human beings are rational and make systematic decisions based on the available information (Mathieson, 1991; Marangunic and Granic, 2013). This paper notifies these limitations and indicates that the decisions that an individual makes are always influenced by the different contexts he is embedded in (e.g. Baron and Shane, 2005; Hung, 2005).

By integrating the entrepreneurial process with TPB and TAM, we thus aim to offer a new approach for investigating the process of an actor's engagement in a new business. TAM is used for illustrating the formation of an attitude towards a business opportunity via its perceived usefulness and ease of use, and this investigation is complemented by utilizing TPB to investigate how behavioral intentions are shaped by the subjective norm and an individual's perceived behavioral control, together with the individual's attitude towards the behavior. As the core process for these two theoretical models, the entrepreneurial process illustrates the influence of individual factors and different surrounding contexts on the observation and exploitation of a business opportunity, and the progress from behavioral intention to actual engagement in business. As stated above, the development of bioenergy technologies and supporting business initiatives in bioenergy is a topical issue nationally as well internationally. Thus, it offers a rational field for examining the constructed model in action.

The literature on entrepreneurship has a growing consensus on the fact that viewing entrepreneurship as a process is useful and accurate (Moroz and Hindle, 2012; McMullen and Dimov, 2013), although the authors have different views on how this process should be presented (Moroz and Hindle, 2012). It has been found challenging to create common understanding on the

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