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Business models of heat entrepreneurship in Finland

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ABSTRACT

This paper presents the business models of small-scale heat energy production in Finland. Firstly, the development of heat entrepreneurship in the country is presented, including the remarkable growth of small and medium size enterprises (SMEs) in the last 15 years. Secondly, the concept of business model (business architecture of product/service flows and earning logics) is modified to the framework of wood heat production. The business model concept, and its sub-concepts, is applied in a brief review of current heat energy businesses in Finland. We arrive at a business model of heat entrepreneurships that are public companies/utilities, public–private partnerships, private companies and cooperatives, Energy Saving Company (ESCO), network model of large enterprise and franchising. Descriptive cases of these models are presented. Finally, the paper concludes with a discussion on the applicability of the business models in different operational environments and geographical contexts.

1. Introduction

Renewable energy producers face challenges in designing business models that enable the cost-efficient and competitive production for substituting fossil fuel based energy systems. The capital invested in existing infrastructures of oil and gas, for instance, also results in the incumbent firms possessing significant market power causing lock-in effects in energy markets (Wüstenhagen and Boehnke, 2008). In addition, the switching from fossil fuels to renewable energy forms may mean lower costs for society, but not necessarily for the end-user of energy. Ready-made examples of applicable technologies and business models of renewable energy are needed because both technological and organisational developments in this sector are time and resource consuming (Wüstenhagen and Boehnke, 2008).

Transferring of know-how and technologies between regions is not easy as processes are affected by several factors, such as operational and demand environments, transferred objects, stakeholders involved in the processes as well as the transfer media. However, the business models have several factors that are globally valid, (such as economies of scale and risk allocation), and the transfer and application of models is possible with certain preconditions.

This paper is inspired by the existing business model ontologies, especially BMO ontology (Osterwalder, 2004), and constructs the heat energy business model concept based on existing business cases in Finland. The objective of the paper is firstly to construct a business model concept for heat energy business, and secondly, to apply the concept in a brief review of Finnish heat energy businesses. The results are case-derived heat energy business models including both descriptions of the business architecture and earning logics. The relevance of the presented business models is in increasing the understanding of heat energy businesses, and providing a framework in the design of new heat energy businesses in other contexts. As a future challenge, the authors also recognise the need to evaluate the economic performance of the presented business models.

2. Heat entrepreneurship in Finland

A heat entrepreneur or enterprise can be a single entrepreneur, entrepreneur consortium, company or cooperative providing heating for a community. At the end of 2006 the number of energy entrepreneurship based heating plants in Finland was 330, with the boiler capacity for solid fuels being 176.7 MW (Alanen, 2007). The number is growing rapidly and according to the Finnish TTS Institute[2] the estimated potential is about 900 plants with a total output of 300 MW (Nikkola and Solmio, 2004; Alanen, 2007).

The average size of these heating plants was relatively small, 530 kW, of which only about 25% is connected to the district heating network. Since 2004, about 100 new heating plants have

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been established; in addition the average size of the plants has been rising. Nowadays, the typical new woodfuel heating plant has a production capacity of 1–2 MW (Alanen, 2007). Heat entrepreneurs operate locally, at a municipal level, producing heat from locally sourced wood fuels. In 2006 heat entrepreneurs used approximately 510 000 bulk cubic meters of forest chips, among other fuels (pellets, briquettes and peat) producing 350 000 MWh of heat, which is equivalent to the demand of approximately 14 000 medium-sized private homes (Helynen et al., 2007).

In Finland, municipalities have played a key role in the establishment of enterprises that have taken the responsibility for heating public buildings, such as hospitals, schools, offices and libraries, as well as private houses and industrial estates.

Finnish municipalities have been privatizing the municipal heating service since the early 1990s (Okkonen et al., 2005). Privatization of heating provides mutual benefits: for heat entrepreneurs (e.g. forest owners, local farmers and contractors) entrepreneurship provides extra income, benefits of improved forest management, use for under-utilized harvesting equipment and increased employment (Alakangas et al., 2004). While for the municipality, a well-established heat entrepreneurship provides increased security of heat supply, savings in operational and investment costs of energy production when fuel oil is replaced with cheaper wood fuels, increased use of local labor and creation of new business opportunities, support for existing employment (e.g. contractors), environmental benefits and local direct, indirect and induced economic impacts of local spending (Madlener and Myles, 2000).

In this study our focus is on heating plants with 100–5000 kW of heating power. We construct a theory on the business models of heat production based on wood fuels and apply it to descriptive cases from Finland. The business models of fuel supply are not included in this study. However, the authors recognise the need for such investigation in further studies.

3. Heat energy business model

3.1. Definition of a business model

Magretta (2002, 86–87) notes that "a good business model remains essential to every successful organisation". In spite of this, business model is a concept with various user dependent definitions and contents. To increase understanding of the business model ontologies and their interrelationships, Andersson et al., (2006) utilize the concepts of the resource-event-actor (REA) ontology, the e^3-value ontology and the business model ontology (BMO) for constructing the reference ontology for business models.[3]

Stähler (2001) defines business model as description of a planned or existing business including the elements of value proposition, configuration of value creation and revenue model. Value proposition describes how products and services generate value for the customer or stakeholders (i.e. private benefit). Configuration of value creation means definitions of core parts of the value chain, in which business can be focused and company can be distinguished from its competitors. Revenue model describes how the business generates its sales revenue (e.g. selling of certain products or leasing contracts).[4]

Our conceptualisation for heat energy business models is much inspired by the BMO conceptualisation (Osterwalder, 2004). Osterwalder defines a business model as a conceptual tool containing a set of elements and their relationships, with these relationships allowing the expression of a company's earning logics. In other words, business model describes the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital in order to generate profitable and sustainable revenue streams.

According to Timmers (1998) and Selz (1999) business model is an architecture for the product, service and information flows. It also describes the potential benefits and sources of revenues for different business actors. Amit and Zott (2000, 2001) consider a business model as an architectural configuration of the components of transactions that are designed to utilize business opportunities. Amit and Zott (2000, 2001) describe transaction components as specific information, service or product that is exchanged, and/or parties that engage in the process. The architectural configuration describes and characterises the linkages of components and also their sequencing. Hamel (2000) presents business model simply as a business concept put into practice.[5]

A heat energy business model is defined here as a model for:

1. Business architecture for product/service flows (see Fig. 1), including:
   (a) Establishing the heating plant and district heating network.
   (b) Organising the wood fuel supply chains.
   (c) Defining ownership and responsibilities between all stakeholders involved, such as sellers and buyers of the service, subcontractors and fuel producers.
2. Establishing the earning logics, i.e. strategies to generate and maintain profitable and sustainable business operations.

The business model involves many stakeholders, such as entrepreneurs, subcontractors, financiers and clients. The parts presented above are interrelated, not necessarily chronologically, and will have an impact on the overall business performance. Heat energy business differs from many other businesses because, in many cases, it is an external actor or customer who has invested in the unit of entrepreneurship, and therefore various ownership relations and overlapping responsibilities are possible.

On the basis of heat energy production contracts (NKUAS, 2005), three main categories in organising municipal heat production in Finland can be identified: public companies, public–private partnerships and private companies/cooperatives. The business models presented later on will follow and detail these main categories.

[3] The REA ontology describes business transactions as processes where actors exchange resources (McCarthy, 1982). In these processes duality (both processes of increase and decrease of money and goods), changes of control of resources, and conversions of resources (to produce other resources) will take place. The e^3-value ontology focuses on the identification of exchange processes of value objects between the actors in a certain business case (See e.g. Gordijn et al., 2000). The BMO provides an ontology enabling the detailed description of business model of an enterprise, and highlights its operational environment and meeting customer's demands (Osterwalder, 2004; Andersson et al., 2006).

[4] For application of Stähler's (2001) business model description in sustainable energy, see Wüstenhagen and Boehnke (2008, 70–79).

[5] According to Hamel (2000) business concept comprises components of core strategy, strategic resources, customer interface and value network. Core strategy includes business mission, product/market scope and differentiation. Strategic resources are core competencies, assets and resources of a firm. Hamel calls intermediating between core strategy and resources as configuration: it is a unique way in which competencies, assets and resources are combined and interrelated to support a company's strategy. The value network surrounds the firm and complements its own resources. A firm's boundaries are between strategic resources and value network: the company needs to decide what it does and what is contracted out to the value network. (Ibid.)