

AN IMPACT OF RESOURCE PORTFOLIO ON NETWORKING TENDENCIES – EVIDENCE FROM BIOENERGY BUSINESS

Kirsi Kokkonen, Matti Lehtovaara, Petri Rousku, Tuomo Kässi

Lappeenranta University of Technology, Finland

E-mail: kirsi.kokkonen@lut.fi, matti.lehtovaara@lut.fi,
petri.rousku@lut.fi, tuomo.kassi@lut.fi

Abstract

Indisputably, networking offers many benefits in business. However, at the same time, it may also restrict the freedom of its actors. The aim of the paper is to complement the knowledge on the benefits and delimitations of networking by a two-step process. Firstly, the actors' aims for independency and associability in their business relations are examined and based on these aims, different tendencies for networking are found. Furthermore, the paper discusses the resource portfolios of actors, and searches linkages between the actors' resources and their networking tendencies. The research question of the paper is: "How the resource portfolio of an actor correlates with its tendency to form networks?" Case study research is used as the research strategy. A group of Finnish biomass heating enterprises is studied as the case, and four groups with different networking tendencies are recognized and further assessed. The results provide evidence that the actors tend to form different networks which differ from each other by the power relations and the openness of sharing social capital. In addition, it is noted that the actors differ in their resource portfolios. That creates dissimilar motives for cooperation and networking which are well-reflected with the four networking types found in the study.

Key words: *associability, bioenergy, independency, networking, resources.*

Introduction

There is a global concern about increasing greenhouse gas emissions. The amount of traditional fossil fuels is exhausting, and their prices are continuously increasing. As a consequence, the use of renewable primary energy sources and improved overall energy efficiency play an important role in future energy production and consumption (Cowie & Gardner, 2007; Tekes, 2008). One of the most promising options of renewable energy is the utilization of different biomasses. The bioenergy business offers new business opportunities increasingly, to existing actors as well as to the new ones. In addition, as in several other fields of business, also the significance of networking is becoming more evident in the bioenergy production solutions.

Links with external actors may be beneficial to a firm in a variety of ways. Networks offer access to the resources and capabilities of other actors (Chetty & Wilson, 2003), and cooperative activities can thus provide a valuable source of support and information as well as means of sharing resources (Fuller-Love & Thomas, 2004). Especially, emerging actors usually need external networks to provide a variety of resources, capabilities or legitimacy which they need for successful survival, but which they cannot produce internally (Hite & Hesterly, 2001; Mei & Nie, 2008).

However, even sharing resources is often vital for firms, they should also avoid to become too entangled in restrictive relationships (Staber, 2005), but maintain their freedom to

maneuver, bargain and even attack in order to secure their own interests. In other words, firms should be *embedded* in their relationships (Granovetter, 1985) and *independent* at the same time (De Wit & Meyer, 2005). How different firms balance between these two is an interesting field of study.

Kay (1993) argues that to understand the interaction between firms, it is highly important to gain insight into their relative power positions. Power is the ability to influence the other's behavior, and the one who has more power has also access to more resources, such as higher esteem, praise and positive attention. Since the resources of actors are rarely equal, the outcome of any particular exchange depends on the relative power of the participants (Davern, 1997; Belaya & Hanf, 2009).

Relationships can be examined in terms of mutual dependence between the parties, and power can be located at the interdependencies among the actors embedded in these relationships (Pfeffer & Salancik, 1978; Belaya & Hanf, 2009). De Wit and Meyer (2005) state that one way of measuring power in a relationship is to make a distinction between the closeness of the relationship (loose vis-à-vis tight) and the distribution of power between the two parties involved (balanced vis-à-vis unbalanced). This leads to a categorization of four specific types of inter-firm relationships which are illustrated in Figure 1.

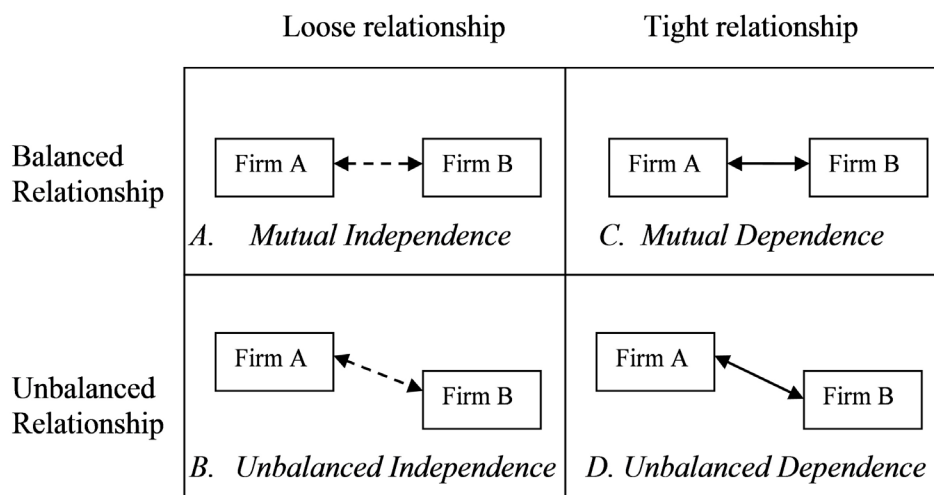


Figure 1: Relative power positions in inter-organizational relationships. (De Wit & Meyer, 2005 (adapted from Ruigrok & van Tulder, 1995)).

- A. Mutual independence: both organizations have full freedom to act according to their own objectives. Neither organization has significant influence over the other.
- B. Unbalanced independence: a loose relationship, where Firm A has more power than Firm B, i.e. Firm A is more independent. Firm A's power gives it more freedom to act, while Firm B can be influenced by the powerful Firm A.
- C. Mutual dependence (interdependence): the organizations have a tight relationship, in which they are mutually dependent on each other, having an equal amount of impact on their counterpart.
- D. Unbalanced dependence: asymmetrical dependence, where one party will be able to dominate the other. The organization with the lower level of dependence will have more freedom to maneuver and impose its conditions than its counterpart. (De Wit and Meyer, 2005)

In their studies Hite and Hesterly (2001) and Vanhaverbeke (2001) suggest that social relationships and personal ties play a crucial role in developing business networks, especially those of small and medium-sized enterprises. Building social relationships with the surrounding parties is a vital networking capability for the firms. A social network can offer a firm business growth and new business opportunities. It is seen that with the right contacts for example the level of uncertainty can be diminished, the risks reduced and critical market information provided. Personal relationships also provide security and trust (Pikka, 2007). Social networks help managers to recognize the knowledge possessed by different actors in the network and to understand the relevance of applying that information (Westerlund & Svahn, 2008). Through the actors' social networks, firms have opportunities to update their knowledge in dynamically changing markets and to detect future developments in the industry (Vanhaverbeke, 2001).

A social network will not be built by its own but it requires that the actors in the network collectively enhance the network's social capital. Social capital is the sum of actual and potential resources that are embedded in, available through and derived from the network by its actors (Nahapiet & Ghoshal, 1998; Leana & Pil, 2006). The outcome of the opportunity to engage in social ties is mediated by *associability* and trust (Leana and Van Buren, 1999; Pearse, 2009). Associability is seen to have two components: an affective component, which means the *willingness* to subordinate individual goals to collective goals, and a skill-based component, which refers to the *ability* to coordinate activities according to set goals (Van Buren, 2008). It is confessed that individuals differ in terms of associability (Van Buren, 2008; Wagner, 1995) which means that every social tie and network is always to some degree dependent on the social assets of its participants.

As stated above, partners are often vital for firms, because of the need for sharing resources. However, the resources of actors are rarely equal, which set the partners in different power positions. These power positions of partners may lead to rather different levels of tightness and independency in relationships. Furthermore, it is a confessed fact that a network cannot be fully developed without an active flow of social capital between the actors. However, level of associability differs remarkably between firms. These aims related to independency and associability create certain tendencies for networking and furthermore, for different network types in an industrial field.

The aim of the paper is to provide evidence on the different solutions the firms seem to have with balancing between the objectives for independency and embeddedness in their business relations. We aim to complement this knowledge with a two-step process. First, we look at the two aspects mentioned above, the actors' independency and associability, and examine the different networking tendencies based on them. Secondly, in order to examine the motives for networking in a fast-evolving business area, we take a look at the resource-bases of the actors, and search linkages between the actors' resources and their networking tendencies. The research question of the paper is: "How the resource portfolio of an actor correlates with its tendency to form networks?" Case study research (Creswell, 2007; Eriksson & Kovalainen, 2008) is used as the research strategy. A group of Finnish biomass heating entrepreneurs is studied as the case. The case is considered to represent well a group of actors in a fast-evolving business area.

The study confirms that each actor has a certain level of independency and associability, and based on them, a certain tendency to form networks. These tendencies lead to formation of different network types. Among the studied enterprises in the Finnish biomass heating field, four groups with different networking tendencies are recognized and further assessed. These groups are: 1) actors in local networks of equal partners, 2) actors with strong relationships with heating plant manufacturers, 3) network developers/lead firms, and 4) independent actors.

In addition, we illustrate that the actors differ remarkably in their bases of resources, and also that different aspects are highlighted in their resource portfolios. This creates different motives for cooperation and networking, which are reflected well in the four networking types found in the study. On the basis of the analysis, correlations between the actors' resources and their tendencies to form certain kinds of networks can be found.

Methodology of Research

The empirical study was conducted as a case study. Many authors state that case study is not a methodological choice, but a choice of what is to be studied (Eisenhardt, 1989). In case study research, the central feature is the construction of ‘the case’ or ‘cases’; the research questions are always related to the understanding and solving of the case: what the case is about and what can be learned by studying it (Eriksson & Kovalainen, 2008).

Creswell (2007) sees a case study as an exploration of a bounded system which can be defined in terms of time and place, over time and through detailed, in-depth data collection, involving multiple sources of information which are rich in context. Case studies thus typically combine several data collection methods, such as archives, interviews, questionnaires and observations (Barton Cunningham, 1997; Eisenhardt, 1989).

Case research is particularly welcome in new situations where only little is known about the studied phenomenon, and in situations where current theories seem inadequate (Eisenhardt, 1989; Yin, 2009). According to Halinen and Törnroos (2005) the advantage of case studies over other research strategies is that case research allows the study of a contemporary phenomenon which is difficult to separate from its context, but which is necessary to study within the context to understand the dynamics involved in the setting.

The research data consists of 52 semi-structured theme interviews: 26 of them with biomass heating entrepreneurs and 26 with the biomass heating system manufacturers. Mainly the data concerning the biomass heating entrepreneurs is utilized in this study, but the main ideas of the interviews with system manufacturers are taken into account. The group of the chosen 26 heating enterprises consists of heating plants in different parts of Finland, with different plant sizes and ownership bases.

Heat energy production is mainly considered as a local activity. Wood chips, which are the main fuel in the plants, are typically procured in the surrounding area. In addition, the plants may use supplementary fuels, such as peat, agrobiomass and oil. The heating enterprise may take care of all the steps from fuel procurement to the delivery of heat to real estates or the district heating network, as well as the maintenance of the plant, or it may concentrate on the actual business activities of the plant, or something between these (Okkonen & Suhonen, 2010). Typically, a heating entrepreneur or enterprise is a single entrepreneur, an entrepreneur consortium, a company or a cooperative (Okkonen & Suhonen, 2010; TTS, 2010). In this study, the terms ‘heating entrepreneur’ and ‘heating enterprise’ are used interchangeably, referring to all these possible forms of ownership. In Finland, the number of heating plants operated by heating entrepreneurs was 455 in 2009. The number of heating enterprises was a bit lower, because some enterprises operated in several heating plants. The average size of the plants was 550kW, and 90 percent of the solid fuel used in the plants was wood chips (TTS, 2010). As in many other countries, the possibilities for small-scale combined heat and power production (CHP) have been discussed widely in Finland as well, also among the heating entrepreneurs. However, many of small-scale implementations still require significant research and development investments before they are feasible for possible commercialization (Lehtovaara, 2011; Motiva, 2011).

Results of Research

The results of the study are introduced in this section. Based on the interview data, the differences in independency and development activeness of the studied biomass heating enterprises are first analyzed, and the firms are divided in four groups with different networking tendencies. Secondly, a look at the resource portfolios of the firms is taken, and their correlations with the networking tendencies are examined.

The question of power relations and dependency on networks was examined by the “*independency*” dimension, which depicts the heating enterprises’ tendency to lean on the other actors. Simply put, the more independent the heating enterprise is, the less its partners are involved in its activities. Secondly, the questions concerning the actors’ associability were combined to a dimension called “*development activeness*”. This dimension depicts the enterprises’ tendency to develop their business and network - the more active the firm is, the more positively it responds to the development, plans the future and engages its partners. The dimension thus indicates the firms’ tendency to share social capital with others which is considered as associability.

Independency was examined through the following interview questions:

- Ownership base: the plant and the heating network.
- Nature of business activities of the enterprise (was independency highlighted?).
- Fuel procurement: procurement, delivery, and the enterprise’s own forest property and its impact on procurement.
- Structure of the network and the enterprise’s role in the network.
- Independence from the heating system manufacturer (HSM).
- Distribution of work in maintenance and repair.
- Other questions where independency was discussed.

There are clear differences in the ownership base of the plants and district heating networks. Some heating enterprises own the plant and the heating network, but in many cases, the heating network is owned by the municipality. Differences can also be found between the plants of a certain enterprise – some plants and district heating networks can be completely owned, whereas in others the enterprise only maintains the plant.

Clear differences were also found in the ways the fuel is procured. In some cases, the enterprise seems to take care of the whole procurement chain, whereas in some other cases, the procurement is far outsourced. As regards the maintenance of the plants, some enterprises maintain their plants nearly completely on their own, whereas some have outsourced the maintaining activities.

The business activities and some other questions were also taken into account if aspects related to independency were mentioned by the interviewee. In addition, the network structure and the heating enterprises’ roles in their networks, as well as their relationships with the heating system manufacturers were analyzed regarding their dependency on the partners.

Development activeness was examined through the following interview questions:

- Nature of business activities of the enterprise (were developmental activities highlighted?).
- Willingness to cooperate with heating system manufacturers.
- Attitude towards opportunities and challenges of the development of cooperative networks.
- Planning of new heating plants or other activities.
- Future views.
- Other questions where development activeness was discussed.

The enterprises seem to differ in their willingness to cooperate with the system manufacturers and also in the amount of support they are willing to receive from them. Attention was also paid to the interviewees’ emphasis on opportunities/challenges of cooperative development and their views on the importance of cooperation. Clear differences were found in the emphasis of the future – some entrepreneurs seem to be satisfied with the current situation, whereas others are constantly finding new business and cooperation opportunities, for example in combined heat and power production (CHP). The business activities and some other questions

were also taken into account if aspects related to development activeness were mentioned by the interviewee.

In Tables 1 and 2, the heating enterprises are assessed by the above-mentioned dimensions. The sub-questions of both dimensions are assessed with the scale 1-5. The higher the number in the questions related to independency, the more independent the enterprise is. Correspondingly, the higher the number in the questions related to development activeness, the more actively the enterprise develops its network(s) and thus the higher its level of associability. The scores for the dimensions are averages of the scores of the used sub-questions, and in order to clarify the differences between the groups better (Figure 2), the averages have been weighted by 2. As can be seen, the level of independency varies from 5.13 to 8.96. Thus, the differences in this dimension are notable between the groups. Similarly, there are clear differences between the levels of development activeness, as the highest number is 8.49 and the lowest 5.83. The meaning of these differences is further discussed below.

Table 1. Assessment of the independency of the biomass heating enterprises.

HEATING FIRM	GROUP	Ownership base: plant and heating network	Nature of business activities	Fuel procurement	The structure of the net-work and the enterprise's role in it	Independence from the HSM	Distribution of work in maintenance and repair	Other questions	AVERAGE	INDEPENDENCY (Weighted by 2)
1	Group 1	5		1	3		1		2.50	5.00
2	Group 1	2		3	3			1	2.25	4.50
6	Group 1	3	4	4	3	4	2		3.33	6.67
13	Group 1	3	2	1	2	2	5		2.50	5.00
14	Group 1	1	2	1	3	5	3		2.50	5.00
15	Group 1	3	3	1	4	2	4		2.83	5.67
21	Group 1	4		3		2	3		3.00	6.00
22	Group 1	1		2	3	3	4		2.60	5.20
24	Group 1	5		1	3	3	4		3.20	6.40
26	Group 1	4		3	3	2	4		3.20	6.40
									2.79	5.58
10	Group 2	5		2	2	1	3		2.60	5.20
12	Group 2	3		3	2	1	4		2.60	5.20
19	Group 2			5	1	1	3		2.50	5.00
									2.57	5.13
3	Group 3	4	4	2	5	4	5		4.00	8.00
5	Group 3	3	3	2	4	4	2		3.00	6.00
7	Group 3	3		5	4	3	4		3.80	7.60
11	Group 3	5		2	5	3	3		3.60	7.20
18	Group 3	4		2	5	3	4		3.60	7.20
20	Group 3	3	4	1	4	5	3	4	3.43	6.86

23	Group 3	5	4	2	5	4	4.00	8.00
							3.63	7.27
4	Group 4	3		4	5	5	4.20	8.40
8	Group 4	5		5	5	4	4.80	9.60
9	Group 4	3	5	4	4	4	4.00	8.00
16	Group 4	4		5	5	4	4.60	9.20
25	Group 4	4		5	5	5	4.80	9.60
							4.48	8.96

Table 2. Assessment of the development activeness of the biomass heating enterprises.

HEATING FIRM	GROUP	Nature of business activities	Willingness to cooperate with HSMs	Attitude towards opportunities and challenges	Planning of new heating plants or other activities	Future views	Other questions	AVERAGE	DEVELOPMENT ACTIVE-NESS (Weighted by 2)
1	Group 1		3		2			2.50	5.00
2	Group 1		3	2	3	2		2.50	5.00
6	Group 1	4	2	4	3			3.25	6.50
13	Group 1		4	4	3	3		3.50	7.00
14	Group 1		1	2	3	4		2.50	5.00
15	Group 1		4	2	4	3		3.25	6.50
21	Group 1		3	2	2			2.33	4.66
22	Group 1		4	2	4			3.33	6.66
24	Group 1		3	4	3			3.33	6.66
26	Group 1		3		2	3		2.67	5.34
							2.92	5.83	
10	Group 2		5	2	4			3.67	7.34
12	Group 2		5	3	4			4.00	8.00
19	Group 2		5	5			4	4.67	9.34
							4.11	8.23	
3	Group 3	5	5	5	5	4		4.80	9.60
5	Group 3		4	5	3	4		4.00	8.00
7	Group 3		4	4	4	5		4.25	8.50
11	Group 3		4	5	3			4.00	8.00
18	Group 3		4	4	4	5		4.25	8.50
20	Group 3	4	5	4	4	4		4.20	8.40
23	Group 3	4	5	3	4	5		4.20	8.40

						4.24	8.49
4	Group 4	4	4	3	3	3.50	7.00
8	Group 4	4	2	2	4	3.00	6.00
9	Group 4	4	4	3		3.67	7.34
16	Group 4	4	3	2		3.00	6.00
25	Group 4	5	3	3		3.67	7.36
						3.37	6.74

Four groups of enterprises with different networking tendencies can be recognized on the basis of the analysis. For clarity, the enterprises have already been sorted by the below-presented categorization and indicated with group numbers in Tables 1 and 2. The four recognized groups are:

Group 1: Actors in local networks of equal partners

The actors in this group tend to build networks locally, and form tight relationships with other local actors with a certain role in the network. The meaning of locality in the networks is emphasized, and all actors are rather equal in the power relations. In addition, the employment of local people and supporting of small actors are seen as important.

If the power positions of the firms are looked at more thoroughly with the framework of De Wit and Meyer (2005), this group can be located in the “Mutual Dependence” box (Figure 3). None of the actors in these networks has remarkable power over others. However, each actor in the network is highly important, because each of them has certain, and probably unique, know-how or resources to share in the network.

Furthermore, the actors in the group share some of their social capital in their networks and the operability of the networks is highly based on the unique know-how and assets of different actors. However, the firms in group 1 are moderate with developing the business or the network from its present scale and scope, or setting cooperative goals for the future. Thus, the total level of associability is rather low.

Group 2: Actors with strong relationships with Heating System Manufacturers (HSMs)

These actors tend to build strong relationships with the heating system manufacturers (HSMs). The plants actively exploit the HSMs’ networks in the maintenance activities of the plants. In addition, these enterprises have common research and development interests with the HSMs, and they may operate as lead users for them.

This group can be apparently located in the “Unbalanced Dependence” box in de Wit and Meyer’s (2005) framework (Figure 3). The networking activities of these actors are mainly targeted at the utilization of the existing relationships of the HSMs. Thus, these firms are not eager to build networks of their own, but they are willing to develop the business in cooperation with the manufacturer and its partners.

At the first glance, the sharing of social capital by the firms of this group may appear as open but rather one-way, as the heating enterprises utilize the know-how and social ties of the heating system manufacturers. However, the HSMs have their own objectives in the cooperation as well: they can gain valuable information straight from their customers (biomass heating plants), which the heating plants share quite openly. In addition, both parties have interests in common development activities. Thus, the level of associability of firms in group 2 is rather high.

Group 3: Network developers/lead firms

These actors are willing to extend the existing networks and build new ones. The networking activities also reach beyond the everyday business and maintenance, as these actors invest in research and development in cooperation with different instances, such as other entrepreneurs, different organizations and educational institutes.

The actors in this group can be located in the “Mutual Dependence” box (Figure 3), because the firms build lively networks which are actively developing business for the common good. Although the networks may include partners rather big in size (such as educational institutes), these actors do not have power over the others, but they are considered as equal research and development partners. The actors are, however, clearly dependent on each other, because none of them is willing or able to develop the business and the network on their own. Furthermore, associability can be seen as a prerequisite for the networks.

Group 4: Independent actors

These actors tend to be quite cautious in building relationships with external actors. That is mainly because these actors are usually co-operatives or family firms which already have a lot of know-how and expertise on their own. The spheres of responsibilities are clearly divided between the partners and the meaning of personal ties in the formation phase is highly important.

The relationships of the firms in this group can be characterized as “Mutual Independence” (Figure 3), as these firms do not generally form tight relationships, but their cooperation with the surrounding actors is rather free-form; they occasionally use partners when they need to procure some additional know-how or resources. No partner in these loose networks has power over the others. The firms do not tend to share their social capital with others constantly. However, they plan the future and interact with suitable partners (for example the heating system manufacturers) if needed. Thus, their associability can be characterized as moderate.

In Figure 2, the enterprises are located in a coordinates where x-axis depicts the independency dimension and the y-axis the development activeness dimension. As can be seen, the four above-discussed groups can be easily separated as clusters in the coordinates. Thus, it can be confirmed that each of the researched biomass heating enterprises mainly follows one of the above-discussed networking tendencies. Furthermore, in Figure 3, the groups are located in the framework of De Wit and Meyer (2005) based on their relative power positions.

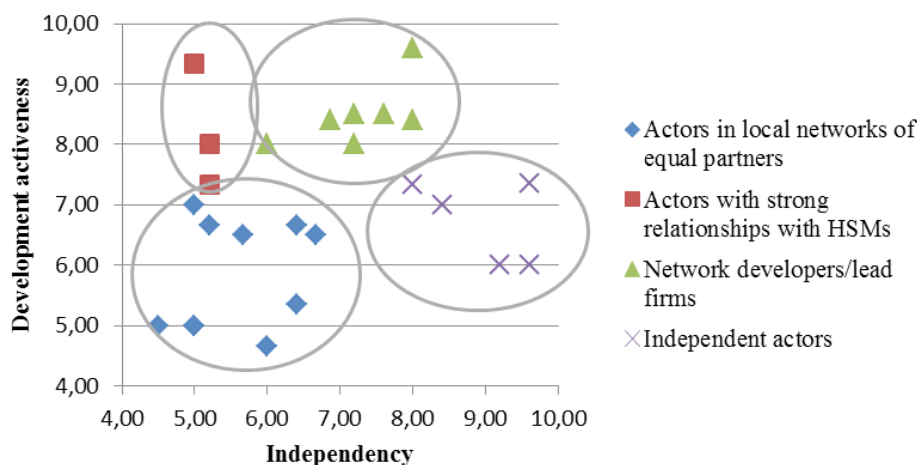


Figure 2: Grouping of biomass heating enterprises according to their networking tendencies.

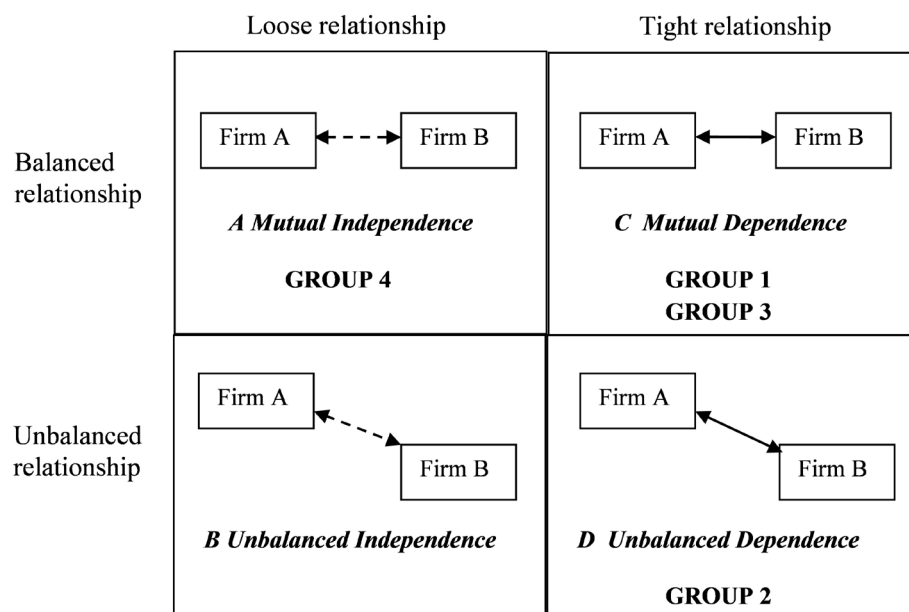


Figure 3: Relative power positions of biomass heating enterprises.

Next, the resource portfolios of the biomass heating enterprises are discussed. Each enterprise was assessed by the six categories of resources:

- *Human resources*: The number of associates and workforce in relation to the number of plants and their capacity. In addition, the division of active and passive associates is taken into account: how many participants are really involved with the operational activities of the enterprise.
- *Former experience and know-how*: Former experience on heating entrepreneurship, entrepreneurship on the whole, or on working in a similar field. Education and theoretical know-how of the entrepreneur/associates.
- *The functionality of the network (s)*: The number and activeness of the partners, division of work in the networks. Functionality of cooperation on the whole. The strengths and weaknesses of the network(s).
- *Relationships with HSMs*: Amount and regularity of relationships and satisfaction with the cooperation with HSMs.
- *Interest and readiness for CHP*: Interest on the whole, readiness of the enterprises' plants for CHP, cooperative activities related to the development of CHP.
- *Physical resources*: Number of plants and their capacities.

The assessment of the resources of the biomass heating enterprises is presented in Table 3.

Table 3. Assessment of the resources of the biomass heating enterprises.

BIOENERGY HEATING FIRM	GROUP	Human resources	Former experience and know-how of the field	The functionality of the network(s)	Relationships with HSMs	Interest and readiness for CHP	Physical resources	AVERAGE	RESOURCES (Weighted by 2)
1	Group 1	3	2	3	3		2	2.60	5.20
2	Group 1	3	2	3	3	2	2	2.50	5.00
6	Group 1	5	2	3	2	1	1	2.33	4.67
13	Group 1	1	3	4	4	3	2	2.83	5.67
14	Group 1	4	4	4	1	3	1	2.83	5.67
15	Group 1	3	2	4	2	3	1	2.50	5.00
21	Group 1	2	3	3	3	2	2	2.50	5.00
22	Group 1	3	4	3	2	3	1	2.67	5.33
24	Group 1	3	2	3	3	2	2	2.50	5.00
26	Group 1	3	2	3	2	3	2	2.50	5.00
		3.00	2.60	3.30	2.50	2.44	1.60	2.58	5.15
10	Group 2	3	4	3	5	2	1	3.00	6.00
12	Group 2	1	4	3	5	3	3	3.17	6.33
19	Group 2	3	3	2	5	3	1	2.83	5.67
		2.33	3.67	2.67	5.00	2.67	1.67	3.00	6.00
3	Group 3	3	5	5	5	4	5	4.50	9.00
5	Group 3	3	3	4	2	3	4	3.17	6.33
7	Group 3	1	4	5	5	4	3	3.67	7.33
11	Group 3	3	3	5	3	4	3	3.50	7.00
18	Group 3	3	4	4	4	3	3	3.50	7.00
20	Group 3	1	4	3	3	3	4	3.00	6.00
23	Group 3	3	4	4	4	3	2	3.33	6.67
		2.43	3.86	4.29	3.71	3.43	3.43	3.52	7.05
4	Group 4	4	4	3	3	3	3	3.33	6.67
8	Group 4	4	3	3	3		2	3.00	6.00
9	Group 4	4	5	4	4	3	2	3.67	7.33
16	Group 4	5	5	4	4	3	3	4.00	8.00
25	Group 4	5	5	4	4	4	3	4.17	8.33
		4.40	4.40	3.60	3.60	3.25	2.60	3.63	7.27

Differences can be found in the averages, and especially, the groups seem to highlight different aspects and resource categories in their resource portfolios. For clarity, these are highlighted with darker colour in Table 3.

Group 1 (*Actors in local networks of equal partners*) has a rather moderate level of resources in all categories. A notable fact is that their physical resources are rather small, which is explained by their tendency to form rather small local networks with several other smaller actors. The meaning of these local networks is to provide energy for communities and municipalities, and thus the required capacity is rather low. In relation to physical resources, the group has a strong base of human resources. This is because each participant in the networks has its special and meaningful role in the business, and the activities are thus highly chained. In all, however, the level of resources is lowest in this group.

The levels of the human and physical resources of Group 2 (*Actors with strong relationships with HSMs*) are low. This is because these enterprises are rather small in size and they lean strongly on the bigger HSMs and their business relationships. However, the level of experience and know-how in this group is high, which is explained by the fact that these actors gain and develop their know-how together with the HSMs, for example by common research and development activities. Naturally, the relationships with the HSMs are considered as extremely valuable in the group.

Firms in Group 3 (*Network developers/lead firms*) have quite strong resource bases. However, their own human resources are not very large, because their activities are well-networked and thus they utilize a lot of external human resources in their business. The functionality of the networks is naturally experienced as high, although the actors are well-committed to further development of their relationships and building new networks. The interest and readiness for combined heat and power production (CHP) is rather high, and especially the strong physical resources support the development of new technologies – for example, many plants driven by these enterprises are rather big in size and thus have more potential to CHP production than the plants of Groups 1 and 2.

Firms in Group 4 (*Independent actors*) have a high level of human resources – a majority of the business is driven by own resources, and thus these enterprises also need a large amount of active personnel. In addition, their experience and know-how is notably high – their utilization of external forces is much lower than in the other groups. Because the enterprises in this group do not tend to form long-lasting relationships with external parties, the functionality of the networks and the relationships with HSMs could not be assessed as thoroughly as in the other groups. However, according to the answers, the actors seem to be quite satisfied with the contracts they have had with external parties. In all, the level of resources is highest in this group.

Table 4 sums up the results. As can be seen, the resource analysis supports rather well the above-discussed characteristics of the four biomass heating enterprise groups with different networking tendencies. It can thus be stated that the resource-base of an actor correlates rather strongly with its networking tendency. In Group 1, the actors lean on each other and form a tight network via which they can operate locally. The resource-bases of the actors are rather low, which makes the actors equal – none of the participants in the network has significant power over the others. Enterprises in Group 2 are rather small in size and they are thus dependent on the stronger partners, especially HSMs. However, they are also desirable partners for HSMs because of their strong experience and know-how in the field, and their willingness for cooperative R&D. Group 3 consists of enterprises with a rather strong resource portfolio, which they also eagerly share with their partners. As the partners in their networks are mutually dependent on each other, they both give and gain a lot of their relationships. Enterprises in Group 4 stand strongly on their own feet, which is also shown in their resource portfolios – they possess a sufficient amount and combination of inner resources and do not thus have a need to form tight relationships. Although both the Group 3 and Group 4 have rather strong resource bases, their philosophy to do business is rather different, and this is also reflected in the aspects they high-

light in their resource portfolios: firms in Group 3 lean much on external experts whereas firms in Group 4 trusts on inner experience and know-how.

Table 4. Summary of the results.

Group	Power relations	Level of associability	Level of resources	Specialities in resource portfolios
1: <i>Actors in local networks of equal partners</i>	Mutual dependence	Low	Low	Small physical resources
				Small human and physical resources
2: <i>Actors with strong relationships with HSMs</i>	Unbalanced dependence	Rather high	Moderate	Strong experience and know-how
				Strong relationships with HSMs
3: <i>Network developers/ lead firms</i>	Mutual dependence	High	Rather high	Rather small human resources High functionality of networks
				High interest and readiness for CHP
4: <i>Independent actors</i>	Mutual independence	Moderate	Rather high	Strong human resources
				Strong experience and know-how

Discussion

Balancing between independency and embeddedness is not an easy task for firms, and the results of the study indicate that firms can solve this problem in many different ways. Every firm has its own objectives related to its independency and associability, which means that every firm tends to maintain a certain level of independency in its relationships, and that it also has a certain willingness and ability to share its social capital with its partners. These objectives may lead to formation of different network types. In the researched group of Finnish biomass heating enterprises, four groups with different networking tendencies based on these objectives could be found. These objectives may be useful to be taken into account when planning networked businesses – even though some firms might seem as perfect partners because of their business fields or technical prospects, they may have totally different aims related to their networking tendencies.

Furthermore, the results indicate that there is certain correlation between the actors' resources and their tendencies to form networks. For example, a rather small resource-base of a firm seems to lead easily to the formation of tight relationships with other small actors - the actors lean on each other, but none of the participants in the network gains significant power over the others. In addition, because of the limited amount of resources, the networks do not have ambitions for wider development, and thus the level of associability in these networks is low. On the other hand, with a higher level of associability, a small firm can also network with

a more powerful firm (in this study with a heating system manufacturer) and concentrate on strengthening its experience, know-how and negotiation power through cooperative activities.

Actors with stronger resource portfolios seem to have two, rather diverging networking strategies, depending on their objectives of the independency-level, and their associability. In the network developers/lead firms' case, the activities are well-networked. The firms utilize a lot of external human resources in their business and do not thus have a remarkable number of human resources of their own. As the partners in the networks are mutually dependent on each other, they both give and gain a lot in their relationships, and thus the level of associability is high. In the independent actors' case, the situation is rather the opposite – these firms possess a sufficient amount and a suitable combination of inner resources. Because of their objective for a high level of independency, they do not tend to build long-lasting relationships with other actors.

Conclusions

The business environments are becoming more and more complex entities, and the study supports the fact that networking is an increasing phenomenon in these environments. Especially fast developing business fields, such as bioenergy, offer numerous opportunities for growth, but at the same time also require cooperation from firms – no firm can possess all the needed resources and know-how on its own. It thus can be said that success in any business field demands a certain level of cooperation. However, as the study indicates, the firms in the same industry may follow rather different networking strategies which may all lead to success.

Every firm aims for certain level of power. However, this power can be provided and shared in many different ways. Based on the conducted study, a firm with basically small negotiation power has two diverging strategies – to lean on a more powerful firm or to ally oneself with other smaller actors and thus ways gain negotiation power together. Correspondingly, firms with stronger negotiation position may lean on own resources or aim to further strengthen their position by active network development.

Inter-firm collaboration has been widely discussed in the literature from different perspectives. According to Varamäki and Vesalainen (2003), these perspectives can be classified into five groups: resources and specialization, intensity of objectives and investments, formality of cooperation, uncertainty and the use of power, and socio-psychological concepts. This study can be seen to settle between the resource-based views, power relation examination and socio-psychological aspects by offering a practical view on the motives behind cooperative activities. As the study indicates, aiming for wider resources draw firms into cooperative activities, but at the same time they have certain aims for independency and associability between which they need to balance. As a consequence, the firms in the same industry seem to end up in building rather different actor networks around themselves.

Although the focus of the study was on biomass heating entrepreneurs, the results can be expected to reflect the situation in many fast-evolving business fields, and that way to offer fresh and wider knowledge on the issues under scope. For the actors themselves, the study offers a clear view on their tendencies to form relations and networks and thus helps them to develop their business better according to their objectives. The study does not, however, consider much on the actual structure of the networks nor the actual resource exchange between the actors. A more thorough examination on these aspects would thus be an interesting field for further studies.

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Advised by Stephen Nzuve, University of Nairobi, Kenya

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Kirsi Kokkonen	M.Sc. (Tech.), Researcher, Department of Industrial Management, Lappeenranta University of Technology, P.O. Box 20 (Skinnarilankatu 34), FIN-53851 Lappeenranta, Finland. E-mail: kirsi.kokkonen@lut.fi Website: http://www.lut.fi/web/en
Matti Lehtovaara	Researcher, Department of Industrial Management, Lappeenranta University of Technology, P.O. Box 20 (Skinnarilankatu 34), FIN-53851 Lappeenranta, Finland. E-mail: matti.lehtovaara@lut.fi
Petri Rousku	Researcher, Department of Energy and Environmental Technology, Lappeenranta University of Technology, Finland. E-mail: petri.rousku@lut.fi
Tuomo Kässi	Professor, Department of Industrial Management, Lappeenranta University of Technology, Finland. E-mail: tuomo.kassi@lut.fi