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Opening up new strategic options in the pulp and paper industry: Case biorefineries

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ABSTRACT

Due to the global climate change discussion and drastic challenges within the external operational environment, many traditional pulp and paper industry (PPI) companies are forced to search for new value creating business opportunities. This paper discusses this development in the PPI and offers some illustrative examples to demonstrate the vital need for opening up new strategic options. To address these challenges, we launch a dynamic strategic framework for a PPI firm. This dynamic capabilities- and strategic options-based framework comprises of (i) sensing the weak signals of the operational environment, (ii) formulating them as strategic options in order to capture their upside potential, (iii) hedging against the downside risks of the options, (iv) exercising these options in often thin (i.e., imperfect) intangible knowledge assets markets, and (v) reconfiguring the existing knowledge base and capabilities to sustain competitive advantage obtained. The framework will be illustrated with strategic options possible for the PPI the main focus being on the interface between the PPI and energy industry by means of a forest biorefinery case.

1. Introduction

Pulp and paper industry (PPI) gives an interesting context for the business analysis, since the industry carries a reputation of a relatively conservative, path dependent and mature industry (on the conservative vs. innovative characterizations in case of the industries, see Autio et al., 1997; Christensen and Caves, 1997; Perks and Jeffery, 2006; Pesendorfer, 2003; Stanturf et al., 2003). Large economies of scale-based consolidations have characterized the industry (see e.g., Toivanen, 2004), because traditionally the competitive advantage (CA) has largely been based on the use of existing technological capabilities (i.e., competence enhancing innovations). Nowadays, however, this focus seems to face difficulties as many PPI companies are continually reporting closures of mills and persistent profitability problems (see e.g., Sorenson et al., 2007; Toland, 2007; Van Horne et al., 2006). At the same time, the global climate change discussion calls for increased use of renewable sources of energy (see e.g., Dorian et al., 2006; McCormick and Kåberger, 2007; Soliño et al., 2009). In our view, it seems to be so that traditional sources of competitive advantage are losing their strengths in many PPI firms that are still relying on traditional ways of doing business. We are inclined to think that traditional sources of Porterian monopoly profits based on the economies of scale are decreasing due to globalization and keen competition, whereas Schumpeterian innovation profits based on new combinations of ideas and (often science-based) capabilities are becoming more and more important. From this perspective, the utilization of forest-based biomass into bioenergy or biofuels offers an interesting example of a new strategic option that can make it possible for the PPI firms not only to survive but even become much more competitive (Ericsson et al., 2004; van Heiningen, 2007; Rodden, 2008; Sorenson et al., 2007; Thorp, 2005).

Thus, the setting for this research is the PPI in which many traditional companies are struggling with value creation. This article has two objectives. First, we aim to provide a strategic options-based framework for creating and managing dynamic capabilities within the PPI. The idea of creating competitive advantage will be opened up by means of the Porterian five forces model (Porter, 1985), followed by the resource-based view (Barney, 1991; Peteraf, 1993) and especially by its dynamized extension, the dynamic capability view (Eisenhardt and Martin, 2000; Pitelis and Teece, 2009; Teece, 2007; Teece et al., 1997). Especially the *economies of scope* as explainers of the firms' diversification strategies will be emphasized following the lead of Edith Penrose in her much cited but little red book called "The Theory of the Growth of the Firm" (Penrose, 1959). This view was brought into strategic management discussions by Teece (1980, 1982). The main idea was to emphasize that instead of targeting to the *economies of scale* (based on decreasing average total costs due to improved technological or organizational efficiency) the companies should strive for CA by means of *economies of scope* based on the ability to use firm-specific specialized bits of knowledge and other resources and related capabilities for creating new products and processes in a new way. Recently, the Penrosian view has successfully been connected with the ideas of dynamic capabilities by Pitelis (2005) and Augier and Teece (2008). In this view the proactive role of entrepreneurs is of great importance as a main catalyst of putting new ideas into motion (Foss et al., 2008). Our strategy framework will be complemented by

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means of the ideas related to strategic options (Kyläheiko and Sandström, 2007). With the help of this framework we are able to identify capabilities that enable to sense weak signals and open up new strategic options vital for those traditional PPI companies that are struggling with value creation. Although these themes relating to the influence of firms on sustainable competitive advantage in environments of rapid technological change have been of great interest within strategic management literature, they have been rather under-researched topics within the research pertaining to the PPI (see e.g., Bull and Ferguson, 2006).

The second goal of our article is to present examples of strategic options and dynamic capabilities related to the PPI. We assume that the PPI companies possess resources and capabilities useful for implementing economies of scope-focused manufacturing within the overall forest industry. The options presented comprise of (i) innovations deriving from forests, (ii) innovations deriving from the technological process knowledge related to pulp mills and forest-based raw materials, and (iii) innovations deriving from the innovations related to traditional fiber-based products and end uses of PPI. This discussion of the various strategic options is deepened with a case focusing on forest biorefineries.

The article will be organized as follows. As an introduction in Section 2 we will briefly illustrate the role of the PPI in terms of the overall global forest industry. Then the focus shifts to the PPI with a brief discussion of the value creation of the largest PPI companies during the last decade and the reasons behind the performance of the industry in general and selected companies in particular. Section 3 will present our theoretical framework, and Section 4 will illustrate the economies of scope-related strategic options of the PPI. Finally, we will deepen our analysis in terms of the case of biorefineries and conclude our paper with discussions and suggestions for future research.

2. Challenges forcing the PPI to exploit economies of scope instead of economies of scale

The total gross value-added (GVA) of the forestry sector in the world economy was 468 billion USD in 2006,[1] which accounted for 1% of the world's gross domestic product (GDP). The pulp and paper industry made the largest contribution to GDP, with a 43% share of the total GVA. The share of the wood industry was 32%, and 25% of the total GVA came from the forestry activities. For the period 1990 to 2006, the PPI has accounted on an average for almost half of the total GVA in the forestry sector, but after 2000 the contribution of the PPI has declined from nearly 50% to little over 40%. The division of the total value-added differs also at the regional level as three developed regions (i.e. Northern America, Western Europe and the Developed Asia-Pacific region) contribute the majority of the global value-added in the forestry sector. As regards the PPI, for example, the three developed regions account for about 70% of the value-added in this sub-sector. However, the share of these developed regions has fallen in recent years at the same time when the value-added has increased in the Latin America and the Caribbean and Developing Asia-Pacific regions (Lebedys, 2008; see also Ojala et al., 2006).

The global forest industry is a good example of the change taking place in the competitive landscapes of many mature industries. Main factors driving this change include globalization, the emergence of new players and markets, increasing factor prices of most important input factors, higher shareholder expectations, changing customer preferences, novel substitutes (especially Internet), and a lack of capital to confront these challenges (Shaw, 2005, 2006a). Besides the above-mentioned challenges, the Kyoto Agreement has put more pressures on renewable energy sources and world forest resources have become an even more strategic resource (Hillring, 2006). At the same time, however, responsible forestry and renewable forest raw materials which cover about 30% of the world land area (FAO, 2006) offer a new platform for innovative business models in the PPI. During the recent decades South America has taken an option for this valuable resource (Monteiro de Carvalho et al., 2004) as Brazil, for instance, has laid the foundation for economies of scope by investing heavily in the research and development of eucalyptus fiber. This effort has shown results both at the national and at the firm level as Brazil has attracted PPI investments and the Brazilian PPI companies have increased their performance.

As regards the largest sub-sector of the overall forestry sector, i.e. the PPI, it is by definition a strongly segmented industry in which a large number of activities are involved in the production and distribution of a great number of paper and other cellulose based fiber products, such as newsprint, coated and uncoated paper, sanitary and household paper, wrappings, container board, and industrial papers (Carlsson et al., 2009; Romme, 1994). In 2007 the world production of paper and paperboard amounted to about 384 million tons. Of this about 10% was newsprint, 30% printing and writing paper, and 60% other paper and paperboard. During the same year, wood pulp was produced about 177 million tons of which 20% was mechanical pulp, 6% semi-chemical pulp and 73% was chemical wood pulp (Finnish Forest Research Institute, 2009).

The recent development of the PPI companies is summarized in Fig. 1 where the largest PPI companies are grouped according to their value creation capability. This analysis includes 49 companies operating in the PPI, based on Pulp & Paper Magazine's listing of the Top 100 companies (Toland, 2005). The selected companies covered the whole world geographically.[2] In Fig. 1 the horizontal axis tells whether the value is created or destroyed and the vertical axis shows how efficiently the value has been created or destroyed. Interestingly, most of the companies have lower return on invested capital (ROIC) than weighted average cost of capital (WACC), and can therefore be interpreted as value destroyers.

Fig. 1 shows clearly the shift in value creation due to the change in industry dynamics. In 1996 the South American companies (e.g., Aracruz Celulose and Votorantim Celulose e Papel) were destroying value whereas the North American companies (e.g., Cascades and Weyerhaeuser Company) were successful in value creation. The reason for the South American companies' value destruction in 1996 was the relatively high cost of debt capital. Coming to 2005 the things have, however, changed. The South American companies, whose competitive advantage rests on the availability of dramatically cost efficient pulp raw material, eucalyptus, are now creating the most value. Characteristically, also the other companies' pulp mill investments now go to South America and especially to Brazil.

At the same time, the North American companies have become value destroyers in 2005 even though they were value creators in 1996. However, there are also exceptions like Georgia Pacific and especially Kimberly Clark that have been able to get rid of the traditional technology and economies of scale based business model. The most successful North American company Kimberly Clark (not at all in Fig. 1 as an extreme efficient outlier) creates value with a strictly

[1] During the period of 1990 to 2006, the total GVA in the forestry sector has been on an average 438 billion USD per year (Lebedys, 2008).

[2] Companies whose sales came mainly from other operations than pulp, paper and consolidated products (i.e., Procter & Gamble) were excluded in order to achieve more comparable and reliable results. Also converting companies with no pulp or paper production capacity at all, and firms whose market values in the beginning and at the end of the research period were unknown, were ignored. The research data was collected from the World Scope database and the analyses were based on public financial statement information. ROIC is calculated by dividing earnings before income taxes by total capital. The total capital is a sum of total common equity and total debt. For WACC, the cost of equity is calculated according to the capital asset pricing model (CAPM) (Brealey et al., 2006) and betas were calculated in relation to company's home market index.