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Transformation in a mature industry: The role of business and innovation strategies

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ABSTRACT

This paper investigates how business and innovation strategies explain companies' responses to transformational pressures in a mature industry. The analytical framework combines two perspectives on business and innovation strategies: competitive position and resource position. Based on an embedded case study of eight companies in the Swedish pulp and paper industry, the paper contributes to previous innovation literature by connecting companies' innovation responses to their business and innovation strategies. Most notably, it reveals a new type of ambidextrous innovation strategy, i.e. "market-driven exploitation", and shows that the responses by incumbent companies in the pulp and paper industry are the result of deliberate and justifiable strategic choices rather than path dependency and inertia. The study also confirms the value of integrating the two perspectives on strategy. On the one hand, the explanations provided by each perspective overlap with the other, so that they together provide a more nuanced understanding of the companies' choices and activities. On the other hand, the perspectives complement each other, so that one perspective explains observations that cannot be explained by the other. The results of the paper inform both managers and policy makers about the trade-offs involved in changing a strategic direction while retaining core capabilities.

1. Introduction

Technological change is an ongoing process in technology-based industries. Both industry-internal factors and changes in the external environment can cause significant pressures on an industry, which require companies to either change their technology base to be able to enter new product markets (Taylor and Helfat, 2009) or be confined to small and specialized market niches (Adner and Snow, 2010). Such transformational tensions may come with opportunities as well as challenges for incumbent companies (Novotny and Laestadius, 2014), in that they provide them with an opportunity to reconsider their strategies and reposition themselves in new and established markets (Adner and Snow, 2010; Cozzolino and Rothaermel, 2018).

A case at hand is the Swedish pulp and paper industry, a mature industry which after decades of rather stable business within established markets is under increasing pressure to transform. In the last decade, several of its established business segments have been declining (e.g. newspaper and printing paper), and at the same time increasing sustainability pressures encourage the use of forest raw materials in the development of substitutes for a number of fossil-based products, such as

plastic packaging, textiles, fuels and chemicals, which can be developed from forest-based raw materials in so-called biorefineries (Novotny and Nuur, 2013; Onufrey and Bergek, 2020; Scordato et al., 2018). While this industry has a rather good track record for responding successfully to various sustainability pressures – for example by developing and adopting chlorine-free bleaching technology in the 1960s–1980s, converting from fossil fuels to biomass fuels for energy in the 1970s, and reducing sulphur dioxide emissions in the 1970s–1980s (Bergquist and Söderholm, 2016; Bergquist et al., 2013; Söderholm et al., 2017) – several studies have noted that the transformation pace of the pulp and paper companies is now rather slow and that the industry as a whole does not meet the high political and academic expectations on their role in the realization of a bioeconomy (cf. Hansen and Coenen, 2017; Hellsmark and Söderholm, 2017; Karltorp and Sandén, 2012).

Why some established companies do not respond to internal and external transformation pressures by embracing new technologies and business opportunities has puzzled innovation researchers for some time. One common explanation is that industry incumbents can become locked in to, for example, their existing resources, assets and capabilities (Tripsas and Gavetti, 2000; Tushman and Anderson, 1986), strategic

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commitments (Rosenbloom and Christensen, 1994), value networks (Christensen and Rosenbloom, 1995) and business models (Bidmon and Knab, 2018). Such lock-in can result in a failure to recognize the emerging threat or opportunity associated with new technologies and business models (Stokes and Breetz, 2018), an inability to adopt and develop them in a timely fashion (Ansari and Krop, 2012; Barr and Huff, 1997), a pursuit of technological races to improve existing technologies (Adner and Snow, 2010), or active (political) opposition and resistance (Geels, 2014).

However, other researchers argue that companies may respond strategically to internal and external competitive and institutional pressures (Clemens and Douglas, 2005) and that there are other viable choices available for incumbents than to make a certain technological transition or fight it, for example strategic repositioning of current technologies in existing or new markets (Adner and Snow, 2010). This implies that what might present itself as unwillingness, inability or resistance due to lock-in might very well be a deliberate – and justifiable – choice based on the companies' overall business and innovation strategies. Although this explanation is not often explored in the innovation literature, the strategy literature states quite clearly that decisions to develop new technologies or diversify to new product markets are an integral part of the overall business strategy of a company (Holmes et al., 2018; Porter, 1980). Moreover, business and innovation strategies need to be taken into account simultaneously (Chester, 1994), since strategic alignment is important to realize the value of innovation (Katz et al., 2016) and achieve competitive advantage (Arasti et al., 2017; Bughin and van Zeebroeck, 2017; Khanagha et al., 2018).

Against this background, the purpose of this paper is to study how business and innovation strategies explain companies' responses to transformational pressures in a mature industry. Based on a qualitative study of eight companies in the Swedish pulp and paper industry, we show that the companies' responses are a result of conscious strategies rather than a sign of failure to adapt to the ongoing transformation. We thereby contribute to previous innovation literature by clearly connecting companies' innovation responses to both their business and innovation strategies.

The paper is outlined as follows. Section 2 contains a review of previous literature on business and innovation strategies and ends with the formulation of research questions and an analytical framework. In Section 3, the research methodology used in the empirical study is described. Section 4 describes the empirical findings, which are discussed in relation to previous literature in Section 5. The conclusions are presented in Section 6.

2. Theoretical framework

2.1. Two perspectives on strategy: competitive position vs. resource position

In general terms, strategy involves “the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals” (Chandler, 1962/1990, p. 13). A realized strategy can be deliberate (intended), emergent (a consistent pattern of behaviour) or a combination of these (Mintzberg, 1987).

According to Grant (1991, p. 114), strategy has been defined as “the match an organization makes between its internal resources and skills ... and the opportunities and risks created by its external environment.” The two aspects taken up in this definition reflect the two key perspectives on strategy, i.e. competitive position and resource position. On the one hand, companies need to find an attractive industry and position themselves well in relation to various competitive pressures in that industry. This is at the heart of Porter's (1985) view on strategy. On the other hand, companies need to build on the resources they have and exploit their unique competences and capabilities. This is a foundation of the resource-based view (Barney, 2001a) and the related literature on

core capabilities (Prahalad and Hamel, 1990).

The competitive position and the resource position perspectives have sometimes been described as competing or even incompatible. We would, however, argue that they both provide important insights into firms' business and innovation strategies and should be seen as complementary, as the value of a firm's resources can only be determined in relation to opportunities and threats in the firm's environment (Barney, 1991; Porter, 1991) and a firm's resource position influences its ability to realize a generic competitive strategy (Grant, 1991; Porter, 1991). Moreover, both perspectives are needed to understand the dynamic relationship between competitive strategy and innovation responses to transformational pressures (Zahra et al., 1999). Indeed, firms whose choices with regard to various innovation strategy dimensions are aligned with their overall competitive strategies perform better and are more likely to benefit from technological changes (Arasti et al., 2017; cf. also Zahra and Covin, 1993).

In a context of industry transformation, the relative importance of a firms' strategic position and resource position is uncertain. On the one hand, changes in the environment can change the value and importance of firm resources (Mahoney and Pandian, 1992; Porter, 1991) and the firm might have to shift strategic focus and loosen the constraints of its current resource base (Porter, 1991), exploiting its 'dynamic capability' to reconfigure existing assets and capabilities (O'Reilly III and Tushman, 2008), in order to escape path dependency and lock-in (King and Tucci, 2002). On the other hand, in turbulent times the firm's existing resources might be a more stable basis for formulating a strategy than its competitive position (Grant, 1991). This implies that the direction of growth and diversification will be influenced by the firm's current resource profile (Helfat, 1997; Mahoney and Pandian, 1992).

In the following, the business and innovation strategies will be discussed from the perspectives of both competitive position and resource position, as a basis for our theoretical framework, after which the impact of the two strategies on companies' innovation outcomes will be considered.

2.2. Business strategy

Business strategy refers to the strategy to gain and sustain competitive advantage and tends to be related to a firm's provision of goods and services (Campbell et al., 2011).

The *competitive position* perspective implies that a firm's success depends partly on the attractiveness of the industry in which it competes and partly on the firm's position in that industry (Porter, 1991). Firms can influence both of these with their strategies, but we will here focus on the three generic strategies a firm can use to influence its relative position in a particular industry (Porter, 1985).¹

To achieve an attractive position, a firm must have a competitive advantage in relation to its main rivals, either in terms of lower costs or

¹ This section is based on Porter (1985) unless other references are provided. Another common approach to competitive strategy is the Miles and Snow (1978) framework. There are several indications that the two frameworks are substitutable. First, researchers seem to alternate between them or even combine them (Vázquez et al., 2001; Olson et al., 2005). Second, operationalisations of the Miles and Snow framework tend to include much the same dimensions as described in Porter's generic strategies (Zahra and Covin, 1994). However, in contrast to Porter, Miles and Snow include innovation-related aspects in their definition of the different strategies, which creates a conceptual overlap between business strategy and innovation strategy (Zahra and Covin, 1994). For the purpose of this study, we therefore consider it less useful than Porter's framework.

in terms of product differentiation.² A company that chooses a cost leadership strategy aims at becoming the low-cost producer in its industry.³ This can be achieved through exploiting, for example, economies of scale and scope, favorable access to raw materials, or proprietary technologies. Normally, a large market share and a wide scope is required. The firm's products tend to be standardized, but they have to be perceived as comparable or acceptable in comparison with rival products in order for the firm to be able to charge a close to average price and get a competitive margin.

A differentiation strategy involves trying to be unique – or at least substantially better than the competitors – in some dimension that is valued by a large share of buyers. In return, the firm can charge a higher price, sell more at a given price or gain buyer loyalty. Uniqueness is not only related to products but can be based on different steps in the value chain, from raw material to distribution and service. However, the cost of achieving uniqueness cannot be higher than the price premium the firm can charge from the buyers and it therefore has to strive to reduce all costs that do not affect its differentiation advantage in order to achieve cost parity or proximity in comparison with its rivals.

In addition to deciding on a basis for its competitive advantage, the firm has to decide on the scope of its business, i.e. how many and which product segments it should serve, which geographical locations it should be present in, how vertically integrated it should be and in how many different businesses it should be involved (Porter, 1991). A focus strategy implies that the firm makes a narrow selection of product segments etc. and dedicates itself to that particular segment, location, step in the value chain etc. A focus strategy can be based on differentiation (if rivals underperform) or cost leadership (if rivals over-perform with unnecessarily high costs as a result).

The *resource position* perspective highlights the crucial role of a firm's resources for its ability to achieve its chosen competitive position (Grant, 1991). Resources are tangible and intangible assets that are tied to or controlled by a firm and that are used in the firm's production process and enable it to improve its efficiency and effectiveness (cf. Barney, 1991; Grant, 1991). They can be categorized in different ways, but six main types are often mentioned in the literature: financial resources, physical resources, human resources, technological resources, reputation and organizational resources (e.g. Grant, 1991).

A basic assumption of the resource-based view is that resources are not distributed evenly between firms and that only resources that are valuable, rare, imperfectly imitable and non-substitutable can allow the firm to create new economic value and capture it, i.e. be competitive (Barney, 1991; Nason and Wiklund, 2018). However, in order for resources to create competitive advantage, they have to be used to perform a task or an activity (Grant, 1991; Mahoney and Pandian, 1992). The firm's ability to use bundles of resources to create competitive advantage constitutes its capabilities (Barney, 2001a; Grant, 1991). Some of these are more important than others to the firm's competitive advantage. In the literature, these are called "core" (or "central") competencies and capabilities (Grant, 1991; Prahalad and Hamel, 1990). In order to successfully exploit them, the firm also needs access to "complementary assets", located upstream (e.g. raw materials and related knowledge) or downstream (e.g. manufacturing, marketing and service assets) in the supply chain (Helfat, 1997; Teece, 1986) or the wider business ecosystem (Iansiti and Levien, 2004).

According to the resource position perspective, the main strategic task for the firm is to decide which resources to exploit in which way to create a certain level of competitive advantage (Barney, 2001b). From a more dynamic point of view, it also concerns how to put underutilized or

excess resources to use, make more efficient use of existing resources in current applications and transfer resources from one use to another, more profitable application (Grant, 1991; Nason and Wiklund, 2018). This points to the need for firms to develop the 'dynamic capability' to reconfigure their assets and capabilities (O'Reilly III and Tushman, 2008) in order to be able to respond to changing market conditions (Helfat, 1997).

2.3. Innovation strategy

Innovation strategy describes a set of decisions with regard to the development and renewal of a firm's offer, i.e. what innovations to pursue, why and how.

From the *competitive position* perspective, innovation strategy can be described in terms of two main aspects: product versus process focus and technology leadership (Pavitt, 1990; Zahra and Covin, 1993).⁴ The first of these aspects refers to whether companies focus their efforts mainly on product innovation (i.e. changes in product properties, quality or performance) or process innovation (i.e. changes in input materials, production equipment or process settings) (Onufrey and Bergeck, 2020). These two types of innovation are often assumed to be pursued for different reasons, i.e. effectiveness (product innovation) versus efficiency (process innovation) (Hollen et al., 2013; Kurkkio, 2011), and are therefore often associated with different competitive strategies (differentiation versus low cost). The other aspect, technology leadership, reflects the ambition of a company to be the industry's technology leader and stay at the edge of technological development, especially with regard to product innovation (Bergeck et al., 2008, 2009). The industry's technology leader has a reputation of being first in introducing new technologies.

The *resource position* dimension of innovation strategy is concerned with the role and use of a firm's resources for the purpose of innovation. Two opposite innovation strategies are distinguished: exploitation and exploration, which differ primarily in terms of their innovation precursors or driving forces (Onufrey and Bergeck, 2020). Exploitation is driven by the ambition to reuse existing resources and competences (Baum et al., 2000) and the resulting innovations build further on existing knowledge (Morgan and Berthon, 2008). Exploitation is often associated with innovation activities within existing product-market domains (He and Wong, 2004), although previous empirical studies have shown that the innovation outcomes of an exploitation strategy are not necessarily limited to incremental improvements (Onufrey and Bergeck, 2020). In contrast, exploration is described as experimentation driven by a pursuit of new discoveries (Baum et al., 2000; Rothaermel and Deeds, 2004), largely in new product-market domains (He and Wong, 2004). The innovation outcomes of this strategy are often described in terms of considerable technological advantages compared with previous products (Morgan and Berthon, 2008).

The differences between exploitation and exploration strategies are significant: they are rooted in different learning capabilities (Baum et al., 2000) and assume different configurations with regard to competencies, structure and culture (Koryak et al., 2018; O'Reilly III and Tushman, 2008). It is therefore difficult to achieve very high levels of exploitation and exploration simultaneously, as that would create substantial organizational tensions (He and Wong, 2004). Nevertheless, recent research highlights the advantages of combining elements of exploitation and exploration in order to mitigate each strategy's

² For the purpose of this discussion and our analysis, we treat these two options as distinct.

³ In most industries, there can only be one cost leader, but for firms in commodity industries it can be enough to be in the lowest quartile to sustain a low-cost strategy (Porter, 1985).

⁴ In addition to these, some studies include *technology scope* (broad/narrow) and *technology sourcing* (internal versus external) (cf., e.g., Bergeck et al., 2009; Goedhuys and Veugelers, 2012). However, since these dimensions are primarily related to technology strategy rather than innovation strategy they were excluded from the framework. Moreover, technology scope is most often discussed in the context of diversified multi-technology corporations (Granstrand and Sjölander, 1990).

negative consequences, i.e. elements of exploitation can establish the continuity lacking in pure exploration and elements of exploration can lower the risk of inertia and competence traps that are characteristic of pure exploitation (He and Wong, 2004; Raisch and Birkinshaw, 2008). In the literature, innovation strategies that combine exploitation and exploration are commonly discussed under the concept of ‘ambidexterity’ (Tushman, 1996). This ‘dynamic capability’ (O’Reilly III and Tushman, 2008) can be achieved to different extent and in different ways, including different degrees of integration and coordination between new and existing assets (Taylor and Helfat, 2009).

It should be noted here that companies do not pursue their innovation strategies independently from other actors. Indeed, as emphasized in the literature on ‘open innovation’, ‘innovation ecosystems’ and ‘innovation systems’ they are dependent on other complementary and competitive actors, and influenced by wider task and institutional environments, when developing, commercializing and adopting new products and processes (cf. e.g. Adner and Snow, 2010; Bonesso et al., 2011; Carlsson and Stankiewicz, 1991).

2.4. The relationship between strategies and responses

As outlined in the introduction, this paper focuses on the relationship between companies’ business and innovation strategies and their responses to internal and external transformation pressures. Most previous studies of responses to external pressures focus on institutional responses, such as avoidance or manipulation (e.g. Clemens and Douglas, 2005; Oliver, 1991), rather than business- or innovation-related responses. For example, in studies in the field of sustainability transitions, industry incumbents have been shown to resist regulation (Steen and Weaver, 2017), lobby against new technologies (Geels, 2004) and capture collective innovation arenas (Voß et al., 2009). There are also many studies of companies’ responses to technological discontinuities (see Bergek et al., 2013), and some of these acknowledge the importance of existing strategies for companies’ ability to survive the emergence of new technologies and the resulting technology-based competition (Bergek et al., 2008, 2009; Rosenbloom and Christensen, 1994). However, both these perspectives are problematic in the context of the current transformation in the pulp and paper industry, where the main pressure does not come in the form of regulation or a threat of technological substitution but rather in the form of increased competition in current product markets combined with opportunities to diversify into other sectors.

Other studies look at the joint influence of business and innovation strategies on the overall performance and innovation activities of companies. For example, it has been shown that firms with different business strategies differ in their propensity to innovate (Dobni, 2010; Olson et al., 2005), their level of new product activity (Frambach et al., 2003), the types of innovation they pursue (Zahra and Covin, 1994) and succeed with (Frambach et al., 2003), and how important they find different barriers to innovation (Blumentritt and Danis, 2006). Together with other similar research, these studies have provided important insights into the relationship between business strategy, innovation strategy and firms’ innovation activities. However, from the point of view of this paper, they suffer from two shortcomings. First, they are based on cross-sectional data and therefore do not provide a detailed view of the relationship between strategies and innovation responses to transformational pressures in companies within a particular industry. Second, most of these studies take their explicit or implicit departure in the strategic positioning view on strategy, which implies that the role of various resource position dimensions remains limited. However, as we argued above, at a time of industry transformation both perspectives and the strategic dimensions they include need to be considered. This leads us to formulate our research questions:

RQ1. How does the competitive position perspective on business and innovation strategies explain the innovation responses of companies to transformation pressures?

RQ2. How does the resource position perspective on business and innovation strategies explain the innovation responses of companies to transformation pressures?

2.5. Summary and analytical framework

The analytical framework of this paper summarises the previous discussion (see Fig. 1). This framework considers two perspectives on business and innovation strategies: competitive position and resource position. The competitive position perspective includes on the one hand two business strategy dimensions, i.e. the choice between cost leadership and differentiation strategies and the choice between broad and narrow product-market scope, and on the other hand two innovation strategy dimensions, i.e. technology leadership and product versus process focus. The resource position perspective includes two business strategy dimensions, i.e. the role and use of key resources and core competences in maintaining competitive advantage, and two innovation strategy dimensions, i.e. exploitation and exploration (and combinations thereof). The research questions formulated above thus ask how these two perspectives explain the innovation responses of companies to transformation pressures (see Fig. 1).

3. Methodology

The paper is based on an embedded case study of eight companies in the Swedish pulp and paper industry. The following section presents how the cases were selected and how data was collected and analysed.

3.1. Case selection

The research questions of this study focus on companies’ responses to transformation pressures. The case therefore needed to be theoretically sampled to provide insights into this particular phenomenon (Eisenhardt and Graebner, 2007; Siggelkow, 2007). The first step was to select an industry that is undergoing a transformation process. The Swedish pulp and paper industry is one such case. Our previous research in the pulp and paper industry showed that companies in this industry have experienced transformation pressures in some of their existing markets and are now faced with opportunities related to sustainability pressures in, primarily, the transport, chemicals, energy and building sectors (Onufrey and Bergek, 2020). Therefore, our previous research of innovation strategies and innovation activities by companies in the pulp and paper industry served as an input to the current study. There is also previous evidence that companies’ business and innovation strategies have changed recently (Olander Roesse, 2014).

To select particular companies within this industry, we used a registry of all pulp and paper plants in Sweden, provided to us by the Swedish Forest Industries Federation. After removing plants that had been closed down or had distinctly different product offers than the other companies in the industry, there were 45 active plants in the registry, owned by 17 companies. We contacted these companies via email and telephone and eight of them agreed to be part of the study. These include five companies that own several plants and three companies that own one plant each (see Table 1). Two of them are small in comparison with the industry average (in terms of turnover), two are medium-sized and four are large. Since the size categories are based on turnover, they provide size indication in relation to the whole industry rather than a particular segment. However, a company that is small in relation to the whole industry can be a large player in its segment.

3.2. Data collection and analysis

Data were mainly collected through interviews. The main dataset consisted of two interviews per company – one focused on business strategies and one on innovation strategies – with the exception of Company 2, where the two interviews were combined. In most of the

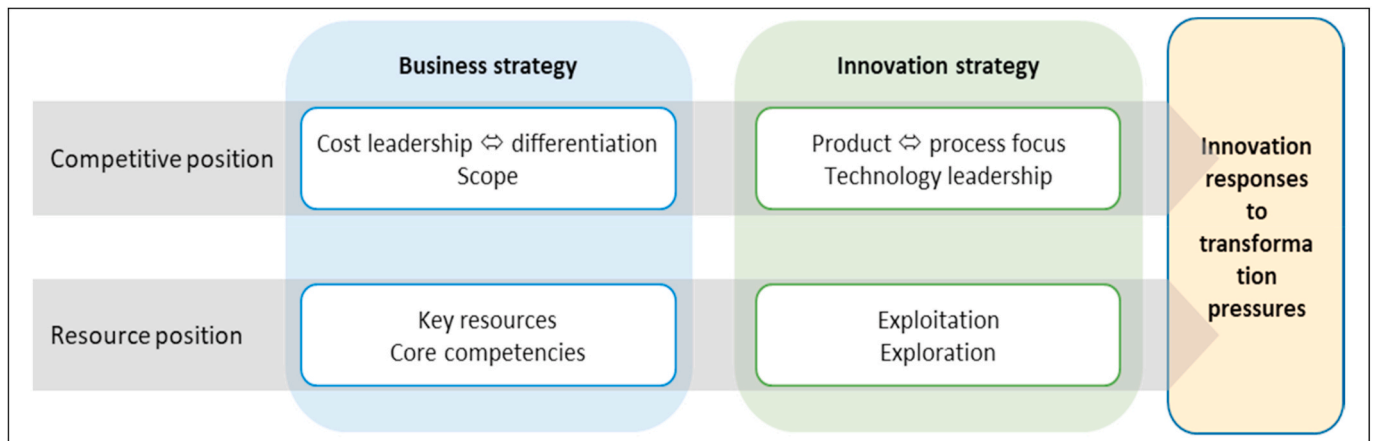


Fig. 1. Analytical framework.

cases one company representative was interviewed at a time except from the business strategy interview at Company 3 and the innovation strategy interview at Company 7 when two company representatives were interviewed together. All interviews were conducted with people in different management positions (see Table 1). When we contacted the companies, we explained the purpose of each interview and asked them to identify who would be most suited to answer questions about the company's overall business strategy and innovation strategy respectively. All interviewees also had relevant knowledge to share about the issues covered in the interviews, which indicates that the right person was indeed chosen by the companies. For both types of interviews, separate theory-based interview guides were prepared to ensure that all central concepts with regard to business and innovation strategies would be covered. Several questions were overlapping in the two interview guides. The answers to these questions by different interviewees that belong to the same company were compared in the analysis process and no major discrepancies were revealed.

In addition to the main dataset, we also conducted three in-depth interviews about specific innovation projects at three of the studied companies. We studied an improvement of an existing paper product at Company 1, an early-stage R&D project applying an innovative energy storage technology to paper-based materials at Company 2 and a bio-composite project and Company 7. The three projects were studied as illustrations of how companies' strategies were implemented.

All interviews were recorded and transcribed verbatim. The transcripts of both business and innovation strategies interviews were coded in four steps using the software NVivo 12 Pro (by QSR International). First, we coded the interviews according to the main dimensions considered in the theoretical framework, covering different aspects of business and innovation strategies (as described in Section 2). These first-order codes, which constitute an operationalisation of key strategy concepts, are listed in the fourth column in Table 2.

Second, we connected the first-order codes to different business and innovation strategy dimensions, following the theoretical framework. With regard to business strategy, we focused on three competitive position dimensions (cost leadership, differentiation and scope) and two resource position dimensions (key resources and core competences) (see Table 2, Rows 1–5). In case of large multi-national companies, we focused primarily on the Swedish part of the organization. However, if the interviewees took up the relevance of foreign resources for the Swedish facilities (e.g. shared R&D resources), these were taken into account in the analysis. With regard to innovation strategy, we focused on two competitive position dimensions (product/process focus and technology leadership) and two resource position dimensions (exploitation and exploration) (see Table 2, Rows 6–10). Each of the dimensions was associated with a number of first-order codes that reflect the theoretical understanding of the strategy (see Table 2, Columns 3–4).

In cases when companies had different strategies for one or more by-products than for their main product, we characterised the companies based on the strategies for the main product.

Third, we analysed all items within each code to identify empirical sub-categories using bottom-up coding. For example, we identified important product properties (e.g. function or high quality), resources (e.g. equipment or human capital) and restricting/enabling factors for innovation mentioned in the interviews. These were used in the analysis to make more nuanced comparisons between different strategies.

Fourth, we coded innovation responses by categorizing all innovations mentioned in the interviews according to whether they concerned product or process innovation. Product innovations were further categorized into four types: improvement of existing product to existing market (market penetration), development of existing product to new market (market development), development of new product to existing market (product development) and development of new product to new market (diversification) (cf. Ansoff, 1957). Process innovations were categorized in terms of whether they were modifications to existing processes or entirely new processes (Onufrey and Bergek, 2020).

The analysis of both strategies and innovation outcomes was performed primarily at the company level. In addition to that, cross-company comparisons were performed to identify and explain common strategic characteristics and patterns across the companies. Companies with similar strategies were grouped and discussed together in the empirical findings section (Section 4).

The results of the study were validated in discussions with industry representatives on two occasions. First, the findings with the particular focus on business strategies were presented to and discussed with the project's reference group, consisting of four industry representatives. Second, the complete results of the study were presented in an online seminar which all of the participating companies were invited to. Ten representatives from the industry and four policy officials attended the seminar. No major inconsistencies in the results were revealed in these discussions.

4. Empirical findings and analysis

This section presents the results of the analysis of business and innovation strategies of the studied companies and their influence on the innovation responses to transformation pressures. First, the competitive position perspective on business and innovation strategies is considered (see Table 3 for a summary), after which the resource position perspective is presented. Then, the innovation responses of companies are discussed in relation to both competitive position and resource position perspectives.

Table 1
Characteristics of the studied companies.

Company	Size ^a	Plants ^b	Main products	Interviewee(s)
1	Medium	2	Graphic fine paper	HR manager (business strategy) ^c Managing Director (innovation strategy) Manager (innovation project)
2	Large	6	Kraft paper; paperboard	Senior Manager Technology and Strategy (business, innovation strategies) Project Manager (innovation project)
3	Small	1	Paperboard	Marketing Manager (business strategy) Senior Manager (business, innovation strategies)
4	Medium	1	Paperboard; fine/specialty papers; pulp	Production manager pulp segment (business strategy) Senior Manager pulp segment (innovation strategy) Production Manager paperboard segment (business, innovation strategies) ^d
5	Large	3	Printing paper; paperboard	Senior Manager (business strategy) Senior Manager (innovation strategy)
6	Large	5	Pulp, printing paper; paperboard	Senior Manager Strategy (business strategy) Innovation Manager (innovation strategy)
7	Large	6	Paperboard; pulp, lignin and other biomaterials; printing paper	Senior Manager Innovation (business, innovation strategies) Senior Manager Marketing and Innovation (innovation strategy) Managers (innovation project)
8	Small	1	Dissolving cellulose; lignin; bioethanol	Managing Director (business strategy) Marketing Manager (innovation strategy)

^a Small • <3 billion SEK turnover. Medium • 3–10 billion SEK turnover. Large • >10 billion SEK turnover. Mainly includes turnover from Swedish operations, but can in some cases include internal sales of forest products from foreign subsidiaries or sales of products produced in Sweden by foreign sales companies.

^b Include pulp and paper plants, but not saw mills or converting sites.

^c Previously Vice President for one of the company's plants.

^d Follow-up telephone interview with another division of the same company.

4.1. Competitive position perspective on business and innovation strategies

4.1.1. Business strategy

Within the competitive position perspective on business strategy two main strategy types were outlined in the analytical framework, cost leadership and differentiation, each of which can be implemented within a narrow or a broad range of market segments (see Table 3).

Table 2
Operationalisation of strategy dimensions.

Type	Sub-category	Dimension	Indicator/Nvivo code
Business strategy	Competitive position	Cost leadership	Product properties: bulk, generic products, low price, scale Focus on cost reduction; important cost items What customers demand (if low price or undifferentiated offer is asked for)
		Differentiation	Product properties: function, environmental performance, high quality, unique product, unique raw material Service or other parts of offer Customer demand for differentiated offer; high switching costs Narrow/broad list of product segments (focus/broad strategy) Focus: adjustment to or focus on specific segment (e.g. niche products)
Innovation strategy	Competitive position	Scope	Resources mentioned as important: machinery and equipment, capital, complementary assets, other resources Important cost items Knowledge and experience
		Key resources	Resources mentioned as important: machinery and equipment, capital, complementary assets, other resources Important cost items Knowledge and experience
Innovation outcomes	Product innovation	Core competences	Stated focus on product innovation or process innovation.
		Product vs process focus	Expressed ambitions to be first/drive technology development or mentioned as leader by others (leader); expressed ambition to be quick but not first (fast follower); expressed ambition to wait and see (follower).
Innovation outcomes	Product innovation	Technology leadership	Internal (resource-based) precursors of innovation initiatives External precursors of innovation initiatives.
		Exploitation	Modifications of existing products for existing markets. Adaptation of existing products for new purposes/markets
Innovation outcomes	Product innovation	Market penetration	Development of new products for existing markets Development of new products for new markets
		Market development	Development of new products for existing markets Development of new products for new markets
Innovation outcomes	Product innovation	Market development	Development of new products for existing markets Development of new products for new markets
		Product development	Process innovations based on existing processes Innovations involving new process design
Innovation outcomes	Product innovation	Diversification	Process innovations based on existing processes Innovations involving new process design
		Modified process	Process innovations based on existing processes Innovations involving new process design
Innovation outcomes	Product innovation	New process	Process innovations based on existing processes Innovations involving new process design
		New process	Process innovations based on existing processes Innovations involving new process design

Seven of the eight companies have a differentiation strategy (Companies 1–7) and one a cost leadership strategy (Company 8). The dominance of the differentiation strategy among the studied companies can to some extent be an effect of the cost structure of Swedish producers (e.g. relatively high cost of raw materials) compared with their foreign

Table 3
Business and innovation strategy dimensions related to competitive position.

Strategic group	Company	Business strategy		Innovation strategy	
		Competitive strategy	Scope	Technology leadership	Innovation focus
Segment players	1	Differentiation	Focus	Niche/segment leader	Product
	2	Differentiation	Focus	Niche/segment leader	Product
	3	Differentiation	Focus	Niche/segment leader	Product
	4	Differentiation	Focus	Niche/segment leader	Product ^a
Industry giants	5	Differentiation	Broad	Fast-follower	Product
	6	Differentiation	Broad	Fast-follower	Product & process
	7	Differentiation	Broad	Technology leader	Product
Low-cost producer	8	Low cost ^b	Focus	Follower	Process

^a Product focus for cardboard plant, but process focus for the pulp plant.

^b In this case, an overall low-cost strategy is combined with elements of a differentiation strategy with regard to some by-products.

competitors.⁵ The pursuit of a differentiation strategy is evidenced by interview statements describing how the companies strive to provide non-generic or even unique products by providing features customers value, such as material strength, low weight and good optical characteristics; product quality and quality consistency; colour; and specific structural and surface properties. In addition, companies highlight service flexibility, delivery reliability and a high degree of customer adaptation as important competitive advantages. Nevertheless, the companies still emphasize the need to manage their cost levels in different ways to maintain profitability, for example by making processes more efficient or optimizing transports.

The companies that pursue a differentiation strategy can be further divided into two groups based on scope. Companies 1–4 have a focus strategy with regard to product scope, i.e. they provide niche products such as particular types of fine paper or packaging materials. In the following, they will be referred to as “segment players”. However, two of them (Company 1–2) still provide a range of different product variants within their main product area, and all four serve a broad set of different customer segments, both geographically and in terms of customer types.

Companies 5–7 have broad scope. They are very large and have a high degree of vertical integration. They own forests and produce bulk products (e.g. raw materials (wood), energy products, cellulose products, and pulp) as well as more specialized products (e.g. wood products, paper, and packaging materials). In the following, these companies are referred to as “industry giants”.

Company 8, which pursues a cost leadership strategy, provides one, rather undifferentiated main type of product in combination with a number of by-products (e.g. energy, bio-based fuels, and chemicals). The company describes its main product as a bulk product or raw material, which does not have many special characteristics and cannot be differentiated to any larger extent. Company 8 is, therefore, forced to compete mainly on cost and achieves this position through, for example, process improvements or improvements in chemical recipes. However, within this position, the company still emphasizes some unique product features, such as low weight and the uniqueness of its raw materials, as well as the importance of service features such as delivery reliability. The interviews also express an ambition to move into higher-end segments, at least in certain by-products. In terms of scope, the industry’s cost leader is active in a narrow range of product categories, which, however, belong to quite different market segments.

4.1.2. Innovation strategy

As clarified in the theoretical framework, the competitive position perspective on innovation strategy includes two main aspects:

⁵ It should be noted, though, that previous studies show a consistent decline in average costs for all paper qualities produced in Sweden up to the mid-1990s and report much higher productivity gains in this period than for other countries (Lundmark and Söderholm, 2004), which should have evened out some of these cost differences.

technology leadership and product versus process innovation focus (see Table 3).

In terms of technology leadership, all companies that pursue a differentiation strategy (Companies 1–7) show an ambition to be early movers with respect to technology development. The segment players (Companies 1–4) are not overall technology leaders, but they aim at being first or at least early in their particular segments or niches. They describe how they need to be innovative to retain and stay relevant for their customers (Companies 1, 2 and 4), compete with larger actors (Company 2), or keep up with changing regulations (Company 3). In contrast, the industry giants (Companies 5–7) express technology leadership ambitions at the level of the overall industry. Company 7 is the industry’s undisputed technology leader and is recognized as such by the other companies. The other two companies in this group are fast followers. As explained by Company 5, it is not first but big enough to catch up quickly. The industry’s low-cost producer (Company 8) can be characterised as a clear follower in terms of its technological ambition. This company is not at the edge of technological development in their product segment but still focuses on finding ways to increase the added value of its products.

In terms of product versus process innovation focus, the analysis shows that the companies pursuing a differentiation strategy (i.e. both the segment players and the industry giants) have a product innovation focus.⁶ The interviewees stress that the most relevant strategic aspect is not the production equipment but the products that companies can launch to the market (Company 2) and that money is not allocated to projects to develop new processes but to create new products (Company 7). Nevertheless, process development remains important for all companies, since products and processes are tightly interconnected so that product innovations require process changes and vice versa. The majority of all innovation projects are driven primarily by product development needs, although there are also development projects that are process driven (Company 5, 6). The low-cost producer (Company 8) has a process innovation focus. The interviewees stress that the company is constrained by the existing process; since it is very expensive to upgrade the process, product improvements are driven by the process development potential.

4.2. Resource position perspective on business and innovation strategies

4.2.1. Business strategy

Within the resource position perspective on business strategy, two main aspects were outlined in the analytical framework: key resources and core capabilities. With regard to key resources, the respondents primarily highlighted physical resources in the form of raw materials and production equipment, financial resources, and complementary

⁶ A partial exception is Company 6 which focuses on both product and process innovation. As explained in the interviews, the process focus was stronger historically, whereas the product focus has increased recently.

assets in the form of collaborations with external partners. With regard to core competences, technological capabilities were referred to the most, although market competences were also discussed.

All the studied companies share some resource advantages with each other and with other companies located in Sweden and Scandinavia: access to high-quality raw materials (long wood fibres⁷) and relatively cheap energy. The companies' existing process equipment (pulp and paper production machines), is also an important resource for all groups, although it (as will be discussed later) influences them in slightly different ways.

At the same time, there are also differences between companies' resources. These differences mirror differences with regard to the competitive position dimensions, i.e. companies that have different competitive positions also have different sets of resources. Segment players (Companies 1–4) all stress the importance of their existing plants, which are a source of competitive advantage (Companies 1, 2, 4) but also limits what the companies can do (Companies 1, 3, 4). They have limited access to capital, which makes it difficult for them to make large-scale investments in new equipment. With regard to competences and capabilities, Companies 1, 3 and 4 all have the capability to successfully produce and develop their existing products. They have engineering knowledge and market knowledge related to their existing products and customers and although Company 4 entered the current cardboard segment relatively recently, it has managed to learn the requirements of this product market. However, they do not have in-house research and development resources. This is reflected in their complementary assets, where contracts, relationships and collaborations with suppliers of raw materials and chemicals as well as existing customers are of special importance. Most notably, Companies 1 and 3 mention that they use their customers' plants for test runs of modified or new products. Company 2 similarly emphasizes the importance of understanding how to produce products, which is difficult for competitors to imitate. However, in contrast to the other companies in the group, it seems to have a wider competence base. For example, it highlights the importance of understanding "the whole chain of different types of knowledge, from research results to upscaling to industrial production to marketing", including how the materials it produces can be converted into end products by its customers. In terms of complementary assets, it primarily emphasizes its R&D collaborations.

The three industry giants (Companies 5, 6 and 7) are all very capable actors. Similar to the other groups, they emphasize the importance of raw materials in terms of both quality and cost, but in contrast to the others they all have large forest holdings that are at the heart of their strategies. Similar to the other groups, process equipment is considered an important asset. However, the companies in this group seem to focus more on the knowledge embedded in the process, for example related to chemicals and recipes, than on the production facilities as such. As explained by one of the companies in this group, "the products are easy for an imitator to understand, but the craftsmanship involved in producing them is difficult". In relation to this, they emphasize the knowledge and experience base they have built up over time, which is both broad and deep and spans past, existing and new business areas. With regard to capital, they have much larger assets than the other groups. They also have much more human resources, related to R&D (e.g. development engineers and researchers), operations (e.g. process engineers), and marketing. With regard to complementary assets, they have long-term relationships with their suppliers and customers – just as the other groups. However, compared with the other groups they seem to go further downstream to access application knowledge or even collaborate with end customers (brand owners). They also collaborate directly with research institutes and universities and sometimes also

with entrepreneurial companies.

The low-cost producer (Company 8) also discusses the importance of having access to raw materials (wood) and considers it a weakness that it does not have any forest holdings. The company has been in the industry for a long time and has built competence and credibility because of that, especially with regard to engineering and process competence. In terms of complementary assets, it stresses the importance of contracts and relationships with suppliers of wood, chemicals and process equipment as well as collaborations with customers. The company also highlights the regional and national research infrastructure.

4.2.2. Resource position perspective on innovation strategy

The resource position perspective on the innovation strategy addresses two main aspects: exploitation and exploration.

All companies that pursue a differentiation strategy show signs of both exploitation and exploration. However, the segment players and the industry giants emphasize different types of resources. For the segment players (Companies 1–4), the main innovation precursor is an ambition to exploit existing machinery and infrastructure (Companies 1–4), brand name and customer relations (Company 1), or knowledge and competences throughout the entire value chain from understanding the results of early research to marketing (Company 2). At the same time, all segment players also show signs of an exploration strategy, by following market- and policy-related precursors for product development and innovation. For example, for Company 1 the development of new markets and products is part of the formal company strategy and has resulted in an active search for new, growing market areas to enter while continuing to use existing machinery.

The analysis of two innovation projects by segment players confirmed the combination of exploration and exploitation innovation precursors. In one such example, Company 2 engaged in an early stage R&D project aiming to apply an energy storage technology to paper-based materials. The project had an ambition to enter a new market (explorative precursors), while at the same time building on existing production processes, machinery, as well as raw materials (exploitative precursors). In another innovation project, Company 1 adjusted the properties of their existing paper products to fit a new printing technology. The project was initiated by customers who adopted the new printing technology (explorative precursors), while project implementation was driven by the ambition to build on existing product portfolios and production processes (exploitative precursors). Therefore, rather than developing a single new product recipe for this technology (as some other companies did), Company 1 developed a new surface treatment which could be integrated into an existing process and enabled adopting any of many company's products to the new printing technology.

Within the group of industry giants, the combination of exploitation and exploration is somewhat different. Similar to the other groups, they emphasize the ambition to reuse existing facilities and infrastructure (Companies 5, 6, 7), customer relations and market knowledge (Company 5). In addition to that, industry giants also highlight the important of such resources as the specific properties of Swedish raw materials, product and technology competence (Companies 6, 7), and the capability to learn new areas (Company 7). In terms of exploration, the industry giants highlight market-related innovation precursors such as customer need and market requirements (Companies 5, 6, 7). Importantly, they discuss such precursors in connection to exploitation precursors, emphasizing that they not only need to find a profitable market or satisfy a particular customer need but also have to do it smarter than competitors (Company 6) and make sure that a potentially new product can be integrated in the existing value chain (Companies 5, 7).

Such combination of exploitation and exploration innovation precursors was also observed in the analysis of an innovation project by Company 7. When one of the company's facilities experienced a decline of traditional paper segments, they engaged in an explorative search for new business areas. Among several options, a bio-composite material

⁷ One of the companies' businesses is based on recycled fibres, but the Swedish system for collection and pre-treatment of such fibres is also well developed compared with other countries.

was pursued due to a promising market potential. Other reasons to pursue this particular product were more exploitative, e.g. the ambition to build on the properties of existing raw materials as well as the ambition to ensure continued operation of the production site. In addition, process knowledge and fiber competences were necessary during project implementation.

As for the low-cost producer (Company 8), it primarily seems to pursue an exploitation strategy centred on the existing production process as well as other resources such as market and distribution channels. Its innovation focus is defined in terms of improving existing products based on the existing process. However, in a more historical perspective, Company 8 switched from the non-profitable pulp product market to dissolving cellulose in the beginning of the 2000s. This implied searching for an alternative, growing market (exploration) that was sufficiently compatible with the existing process (exploitation). Table 4 summarized key characteristics of companies' business and innovation strategies related to resource position.

4.3. Explaining innovation responses with the help of competitive position and resource position perspectives

4.3.1. Innovation responses to transformation pressures

As explained in the methodology section, the analysis of the companies' innovation responses to transformation pressures considers all innovations mentioned in the interviews. Product innovations are analysed in terms of both product and market newness and process innovations are analysed in terms of their degree of newness (modified versus new). A summary of the companies' innovation outcomes is presented in Table 5.

With regard to product innovations, all three groups are involved in a continued development of existing products for existing markets, i.e. market penetration. The examples include product modifications for the purpose of reducing the amount of raw materials needed as well as improving the functionality and performance of the products.

In addition, the segment players engage in product development. This tends to occur within existing product categories (e.g. fine paper or packaging materials) and to build on changes in existing materials or processes (e.g. chemical recipes) (Companies 1, 2, 4). One exception to this pattern is the diversification of Company 1 from book, design and graphic paper to packaging paper and packaging materials.

The industry giants are also involved in new product development activities in existing markets, but they are also active in market development and diversification. Market development implies entering new applications with existing products, such as e-commerce packaging (Company 7). As for diversification, all three industry giants develop new products for new markets, e.g. soil components (Company 5), green

chemicals, project management services for wind turbines, and IT services for forest owners (Company 6), or dissolving cellulose and dry lignin (Company 7). It is here important to note that some of these new products are based on residual streams from the pulping process and, thus, dependent on the continued existence and success of the current business.

The low-cost producer (Company 8) complements its market penetration activities with market development. The company has two main product categories (dissolving cellulose and lignin) for which new market applications are continuously added. Furthermore, the company has a relatively recent history of diversifying into both these product markets.

When it comes to process innovations, all companies are engaged in modifications of existing processes aimed at supporting product modifications and improvements or at increasing efficiency and improving profitability. In addition to that, the industry giants redesign existing processes or develop entirely new process technologies to be able to produce new products.

4.3.2. Influence from strategies on innovation responses

The competitive position perspective on both business and innovation strategies provides a partial explanation to the pulp and paper companies' innovation responses. First, the companies' scope explains their range of innovation activities, for both products and processes. The segment players, which are active in niche markets, are limited to innovations within existing or closely related markets. For example, Company 2 positions itself as a packaging company (as opposed to a pulp and paper company) and focuses its innovation efforts on product qualities that can make it successful in the competition with other packaging producers, including plastic and aluminium packaging, such as water resistance or bendability. In contrast, the industry giants, which are characterised by great breadth in terms of product markets, market segments and product portfolios, cover a variety of innovation types, from existing business areas to new product markets. For example, the innovation portfolio of Company 7 includes both product development in the segment for e-commerce packaging and diversification into new product markets such as dissolving cellulose and lignin.

Second, the clear product focus, which implies that innovation activities are mainly driven by product development needs, also explains a general process innovation pattern where process improvements either aim to support product development activities or are restricted to efficiency improvements. In line with that, the segment players, which for the most part stay within existing product markets, limit their process innovations to modifications of existing processes, while industry giants, which introduce new products to new markets, also need to develop entirely new processes to accommodate for that.

Both these explanations can, however, be further nuanced by the resource position perspective, which provides related explanations of the observed innovation patterns. First, with regard to the observed differences in innovation scope, where some companies are more eager than others to innovate along a broad range of products and processes (including innovations outside existing product categories), an analysis of resource position dimensions shows that these differences are not only a consequence of having different competitive business strategy positions, but also of uneven resource holdings and market-driven exploitation innovation strategies. As described above, the industry giants are characterised by strong and varied capabilities (both broad and deep and spanning across several business areas), an emphasis on competence with regard to existing facilities and strong internal R&D resources. This is reflected in the development of both incremental and radical innovations, which to a large extent is driven by existing resources. This includes both smaller innovations within existing product segments (Companies 5, 6, 7) and more radical technologies (e.g. nanocellulose) to be applied in existing businesses (Companies 5, 7). Further, two companies in the group also discuss more long-term, explorative innovation ambitions, which include looking beyond existing resources

Table 4
Business and innovation strategy dimensions related to resource position.

Strategic group	Company	Business strategy: key resources and core capabilities	Innovation strategy
Segment players	1	Physical resources as both assets and limitations; Knowledge related to existing products; Relations with suppliers and customers	Market-driven exploitation
	2		
	3		
	4		
Industry giants	5	Forest raw materials; Process competence; Broad and deep knowledge base; Financial resources; Human resources; Partnerships	Market-driven exploitation
	6		
	7		
Low-cost producer	8	Technological competence and reputation; Contracts and relations with suppliers and customers	Exploitation

Table 5
Companies' innovation responses to transformation pressures.

Strategic group	Company	Product innovation				Process innovation	
		Market penetration	Market development	Product development	Diversification	Modified process	New process
Segment players	1	X	–	–	X	X	–
	2	X	X	–	– ^a	X	–
	3	X	–	–	–	X	–
	4	X	X	–	–	X	X
Industry giants	5	X	X	–	X	X	X
	6	X	X	X	X	X	X
	7	X	X	X	X	X	X
Low-cost producer	8	X	–	X	– ^b	X	–

^a One of the company's projects related to energy storage technology can potentially be applied outside the company's traditional business areas. However, at the time of this study this project was at the early research stage.

^b The company diversified into new product markets 15–20 years ago.

towards green chemicals (Company 6) or working with technological breakthroughs in general and spending a substantial share of the development costs on new products for new markets (Company 7).

In contrast, both the low-cost producer and the segment players (with an exception of Company 2) are restricted by their existing production facilities, limited access to capital and limited internal R&D resources. As a result, their innovation focus is limited to activities that allow them to build on existing resources, which in many cases implies developments within existing product segments through the introduction of new and improved product qualities and development of more resource-efficient processes. Further, the adoption of a market-driven exploitation innovation strategy by the segment players results in innovations where existing resources can be utilized in new and growing markets. For example, market-driven exploitation explains the choice of the paper board segment by Company 4: this segment was at the overlap of exploration and exploitation innovation precursors as it represented a growing market where existing production resources could be reused.

However, other patterns cannot be explained by the competitive position perspective. This includes development paths that companies pursue as well as paths they do not pursue. With regard to paths taken, the competitive position perspective cannot explain why one of the segment players (Company 1) has diversified from the book, graphic and design paper niche into the packaging paper and materials (e.g. pizza boxes) segment. For a segment player, this does not seem the most obvious choice. However, a resource-centred analysis shows that this move was well motivated by the ambition to reuse existing facilities and competences in a profitable market segment. In spite of different market conditions, the packaging paper and materials segment allowed Company 1 to reuse its machines and technological knowledge. Another similar example is found among the industry giants, where Company 6 has diversified into new product markets, such as wind turbine service management and IT services to forest owners. The competitive position perspective does not explain why these diversifications were prioritized over the development of biorefineries, in spite of the clear external pressures in favor of the latter. From a resource perspective, however, they are part of a strategy which is built around the company's forest holdings. As was explained in one of the interviews, forest is the company's key resource and the aim of these innovation responses was to maximize its value. The resource position perspective also explains some process innovation examples that are not explained by the competitive position perspective. For example, Company 6 has developed and licensed a new process technology for producing a bendable cardboard, although this neither supports its product innovation activities (since it sold out its cardboard business a few years ago) nor provides any efficiency improvements. From a resource position perspective this can be explained by the company's technological competences and internal R&D resources, which were retained even after the cardboard business ended and which allowed for continued technology development in that area.

With regard to paths not taken, the resource position perspective

provides a more detailed understanding of why the studied companies have not yet prioritized opportunities with regard to biorefineries. For the segment players and the low-cost producer, moving into biorefineries is not a viable choice from a resource perspective, as it would require resources that they do not have, for example other production processes, new technological competences, and high capital investments. As described above, these companies carefully match their available resources with the market potential of different options and choose the opportunities that satisfy both requirements. For industry giants, biorefineries is a more realistic option, but they have so far been able to find new profitable businesses that are less demanding in terms of resource repositioning. Although their breadth provides them with much more alternative paths to consider than the segment players, their overall selection process is quite similar, i.e. they pursue the best matches between their current resources and profitable market opportunities. For example, Company 7 has prioritized intelligent packaging and packaging for e-commerce products, which match its resource portfolio and at the same time provide considerable growth potential.

5. Discussion and implications

The research questions of this paper concerned how competitive position and resource position perspectives on business and innovation strategies explain the innovation responses of companies to transformation pressures.

With regard to the competitive position perspective, the empirical findings show that the overall focus on market penetration and product development is in line with the dominating differentiation strategy and that the competitive scope of companies largely explains their range of innovation activities for both product and process innovation. However, these empirical findings can be further explained by the resource position perspective, which shows that the companies' resources condition their innovation responses to transformation pressures in that large companies with strong and varied competences are more likely to be able to pursue all types of innovation outcomes, from market penetration to diversification, whereas focused companies have much more limited possibilities and focus mainly on market penetration and product development.

In addition, some of the diversification activities companies have engaged in and not engaged in (most notably biorefineries) are better explained by the resource position perspective than the competitive position perspective. Diversification opportunities tend to be driven by an ambition to utilize existing raw materials, facilities and competences in (more) profitable product-markets and some of the "paths not taken" have not provided as good a match between existing resources and market opportunities as those chosen instead.

In the following we discuss the main implications of these findings for theory, practice and policy.

5.1. Implications for theory

The analysis of the business and innovation strategies of companies in the Swedish pulp and paper industry shows that both competitive positions and resource positions are relevant to explaining innovation responses to transformation pressures. On the one hand, the explanations provided by the two perspectives overlap and together provide a more nuanced understanding of the companies' choices and activities. On the other hand, they complement each other, so that observations that cannot be explained by one perspective are explained by the other. This confirms the value of integrating both these perspectives, not only for managers (as already noted by, e.g., Arasti et al., 2017; Bughin and van Zeebroeck, 2017; Holmes et al., 2018; Katz et al., 2016; Khanagha et al., 2018), but also for researchers.

More specifically, with regard to the first research questions, i.e. *how competitive position perspective explains innovation responses to transformation pressures*, the analysis shows that the business strategy dimensions differentiation and scope and the innovation strategy dimension technology leadership together provide a partial explanation of innovation outcomes. Differentiation is associated with the development of new and improved products, which supports earlier quantitative studies that found a positive relationship between differentiation and new product development (Blumentritt and Danis, 2006; Frambach et al., 2003; Zahra and Covin, 1993, 1994). Differentiation also explains why many of the companies are engaged in process innovation for the purpose of supporting product development rather than to increase efficiency and reduce costs (as conventional wisdom would suggest (Hollen et al., 2013; Kurkkio, 2011; Reichstein and Salter, 2006)). While this innovation pattern has been observed in some earlier studies (Storm et al., 2013), its connection to the companies' overall business strategy has, to our knowledge, not been made previously.

Considering scope, the analysis shows that companies that have a broad range of products pursue a more varied set of innovations. Thus, focused companies are engaged in continued product development within existing product segments, while companies with a broad scope develop improved and new products for both existing and new markets. This finding is in line with a Schumpeterian (1934) view of innovation as resource recombination, where a broader scope provides a higher recombination potential (Granstrand, 1998). We also contribute with a deeper understanding of a previously established positive relation between the product line breadth and new product development activities (Zahra and Covin, 1993) by providing empirical evidence of what types of different innovation responses (from market penetration and product development to market development and diversification) companies with a broad product scope can use in a time of industry transformation.

Finally, considering technology leadership, our results showed that companies with a leader or fast-follower strategy and a product innovation focus develop new products to existing and new markets at the same time as they are engaged in process development to improve the quality of existing products and support the development of new ones. In contrast, the only company that has a follower strategy and a process innovation focus continues to develop its existing products for existing and new markets and is engaged in minor process development to improve profitability and the quality of its products. This finding contributes to the discussion of the role of innovation strategy for both product and process innovations and the complicated relation between product and process innovations (cf. Onufrey and Bergeck, 2020; Reichstein and Salter, 2006).

With regard to the second research question, i.e. *how resource position perspective explains innovation responses to transformation pressures*, the analysis shows that key resources and core competences provide more nuances to the explanations discussed above and that the existence of a specific type of innovation strategy – the market-driven exploitation strategy – complements the explanation of observed innovation outcomes.

More specifically, the business strategy dimensions key resources

and core competences together condition the latitude of companies when it comes to what innovation responses they choose. This provides a more nuanced explanation of the observations made above that only industry leaders with broad scope engage in diversification and new product development. At closer scrutiny, their wide base of physical resources and intangible competences is what allows for their high innovation ambitions. This shows how a resource position can serve as a means for realizing a competitive position (cf. Grant, 1991; Porter, 1991), not only with regard to business strategy but also with regard to innovation strategy. Indeed, companies with a broad range of resources are able to pursue technology leadership (or fast follower) strategies at the level of the overall industry, while companies with more limited resources either have technology leadership ambitions within their narrowly defined product segments or pursue a follower strategy.

The innovation strategy dimensions exploitation and exploration provide new insights on the role of ambidexterity (Tushman, 1996) for innovation.⁸ All but one of the companies employ a previously unidentified ambidextrous innovation strategy, which in this paper is called “market-driven exploitation”. This implies that new market (or in one case policy) opportunities are identified in an explorative way, while the possibility to exploit existing resources determines which opportunities the companies eventually will pursue.⁹ Exploration and exploitation are, thus, both present and for the most part highly integrated with existing assets (cf. Taylor and Helfat, 2009), but exploitation dominates over exploration. This finding confirms and clarifies the previously noted importance of existing resources in the development of products that are new to the companies and to the industry (Onufrey and Bergeck, 2020). More importantly, it challenges some previous writings on ambidexterity, which argue that in order for ambidexterity to be a successful strategy, exploitation and exploration need to receive relatively equal emphasis (He and Wong, 2004; Raisch and Birkinshaw, 2008). Considering that previous research has mainly focused on how ambidexterity can be addressed within companies (Raisch et al., 2009), the fact that innovation in process industries often involves several parts of the value chain (Frishammar et al., 2012; Onufrey and Bergeck, 2020) as well as other actors in regional, national and sectoral innovation systems (Bergeck, 2002; Bergquist and Söderholm, 2011) could provide opportunities for further research on how to achieve inter-organizational ambidexterity.

In addition to these findings that are directly related to the research question, the study also provides some insights on strategic alignment. First, it confirms the results of earlier, quantitative studies, which have demonstrated the importance of alignment between business and innovation strategies for improving firm performance (Zahra and Covin, 1993, 1994) and argued that such alignment is beneficial for a firm's ability to benefit from technological change (Arasti et al., 2017). While previous studies only considered the competitive position perspective, this study combines both competitive position and resource position perspectives and therefore contributes with a more nuanced understanding of how business and innovation strategies can be aligned. Second, the study sheds new light on the alignment between business and innovation strategies. The findings show that the companies that have a differentiation strategy strive to be technology leaders or fast followers, in contrast to the company that pursues a cost leadership strategy, which does not have any technology leadership ambitions. The results of this study also showed similar resource related patterns for

⁸ In this context, ambidexterity refers to an “ability to exploit existing assets and positions in a profit producing way and simultaneously to explore new technologies and markets; to configure and reconfigure organizational resources to capture existing as well as new opportunities” (O'Reilly III and Tushman, 2008, p. 189).

⁹ The only exception, Company 8, is leaning more towards a pure exploitation strategy, but has gone through a market-driven exploitation phase over the past decade.

both business and innovation strategies in that all the studied companies are characterised by quite strong dependencies on resources such as raw materials, existing plants and the knowledge related to them. Third, the study shows that the competitive position perspective and the resource position perspective are mutually aligned within both business and innovation strategies. With regard to business strategy, companies with a differentiation strategy emphasize the importance of having access to high-quality input materials as well as relevant knowledge and experience, whereas the company with a cost leadership strategy emphasizes its process equipment and is concerned about its lack of forest holdings and the resulting high cost of input materials. Moreover, companies with a large resources base and access to complementary assets tend to have broader scope than companies with small or specialized resources. With regard to innovation strategy the alignment of competitive position and resource position perspectives can be observed in terms of how different groups of companies are positioned in relation to each other. Thus, within the competitive position dimension, the findings show that readiness to step outside traditional business areas and the degree of technological leadership are the highest for industry giants and the lowest for the low-cost producer, with the segment players in between. This is reflected in the richness of the companies' resources and their tendency to rely on internal technological capabilities.

5.2. Implications for practice and policy

Managers in companies facing transformational pressures need to assess different potential response alternatives from the perspective of their fit with the companies' business and innovation strategies, i.e. to what extent different alternatives are aligned with the companies' competitive and resource positions. As the results of this study show, both competitive position and resource position need to be considered simultaneously. On the one hand, this implies that the chosen alternatives need to be in line with overall competitive strategies, but also supported by available resources. On the other hand, in situations where the competitive position perspective suggests several alternative responses, adding the resource position perspective may help managers to prioritize between these alternatives. Another implication for managers concerns the possibility to combine elements of exploitation and exploration in innovation strategies. As the findings with regard to the new market-driven exploitation strategy suggested, managers can adopt this strategy to utilize existing resources in new markets. However, this will require them to identify and manage additional intra- and inter-organizational ambidexterity mechanisms, as discussed above. Moreover, they might have to consider opening up their current 'innovation ecosystems' to include new partners – complementary actors as well as competitors (Granstrand and Holgersson, 2020) – especially as far as more explorative initiatives are concerned (Aarikka-Stenroos and Ritala, 2017). The findings of this paper also have implications for policy aiming at stimulating a transformation of mature industries and sectors. As noted in the introduction, the innovation literature tends to explain incumbents' responses to external transformation pressures with a lock-in to existing resources, or business models (Bidmon and Knab, 2018). This is also a common view in the field of sustainability transitions, where incumbent actors for the most part are described as defendants of the established regime (Geels and Kemp, 2007). While several previous studies of sustainability transitions processes have shown that companies in mature industries can and do innovate (cf. e.g., Berggren et al., 2015; Hansen and Coenen, 2017), this study provides more specific insights into how strategic considerations condition their willingness and ability to engage in product-market diversification and industry transformation. In addition, it provides a more nuanced explanation of the observed slow transformation pace of pulp and paper companies into biorefineries (cf. Hansen and Coenen, 2017; Hellmark and Söderholm, 2017; Novotny and Nuur, 2013), highlighting the strains such a transformation puts on the involved companies in terms of the trade-offs involved in changing strategic direction while retaining

core capabilities associated with the exploitation of existing assets. Policy makers aiming at realizing a transition to a bioeconomy or other major industrial transformation processes therefore need to consider the importance of companies' business and innovation strategies and understand the rationale behind those strategies.

5.3. Limitations

Several limitations of the study need to be considered. First, the study does not cover all the companies in the Swedish pulp and paper industry. This implies that other companies in this industry might have other business and innovation strategies and respond in other ways to the same transformation pressures. The companies that chose not to participate have similar main products as the studied companies. However, they are smaller on average, although there are also some large companies in that group. This might imply that the companies included in the study have more favorable resource conditions than the industry as a whole. However, as there are also some small and medium-sized companies in the studied group, this should not interfere in any major way with the results.

The second limitation is the resource-intensive character of the pulp and paper industry, which implies that some of the findings can be less relevant for other types of industries. This limitation was mitigated by making industry specificities and their implications for the analysis explicit and by not only considering physical resources but also knowledge and capabilities to improve the generalizability of the findings. Further, the study's analytical generalizability was enhanced by focusing on the operationalisation of the theoretical constructs and showing how the findings relate to the existing theoretical understanding of business and innovation strategies (Eisenhardt, 1989). At the same time, there are other mature, resource-intensive industries, such as iron, steel, and aluminium. This suggests that the insights on strategies and innovation responses gained from this study of companies in the pulp and paper industry can be valuable to companies in other process industries facing similar transformation pressure. However, further research is needed to establish the strategic patterns in those industries from both a competitive position and a resource position perspective.

Further, the current study considered a wide range of companies in the chosen industry and therefore provided a broad understanding of different existing strategies. However, as a consequence of such research design, the study did not provide a longitudinal view of strategic development over time. Therefore, future studies could benefit from a longitudinal research design with a focus on one or two companies where the development of strategic choices as well as the dynamic interrelations between business and innovation strategies could be considered over time.

Finally, the study did not go into detail regarding the business and innovation ecosystems around each company and its different value propositions. While our findings indicate that the mature pulp and paper industry is currently probably better described in more traditional supply chain and innovation system terms, considering that the existing networks seem to be rather stable and well aligned (Adner, 2017), an ecosystem perspective could provide additional insights into the importance of resource inter-dependencies and inter-organizational ambidexterity, possibly highlighting the need for opening up and (re-)aligning current innovation ecosystems to realize new biorefinery-related value propositions and business models.

6. Conclusions

The purpose of this paper was to investigate how business and innovation strategies explain companies' responses to transformational pressures in a mature industry. The empirical case studied was the Swedish pulp and paper industry, which currently faces transformation pressures in the form of declines in established business segments and increasing demand from other industries in need of more sustainable

input materials.

A detailed analysis of eight companies' business and innovation strategies showed that the companies' competitive position explains part of their responses, most notably their focus on market penetration and product development and their range of product and process innovation activities. The companies' resource position explains why they choose to diversify into some new product markets and not others, highlighting a new type of organizational ambidexterity: market-driven exploitation. The resource position also conditions the companies' responses, in that resources limit their available options.

These findings contribute to theory in several ways. First, by showing complementarities between the competitive position and the resource position perspectives, the results of this study justify the need to consider both perspectives simultaneously in the analysis of business and innovation strategies. Second, the study contributes to the innovation management literature by clearly connecting companies' innovation responses to their business strategies. Third, the results of the study contribute with highlighting and explaining a new type of ambidexterity, i.e. market-driven exploitation (Raisch and Birkinshaw, 2008; Raisch et al., 2009). Fourth, the study contributes to the literature on strategic alignment by providing a more nuanced understanding of how, in which particular aspects the business and innovation strategies can be aligned (cf. Zahra and Covin, 1993, 1994). Further studies of organizational prerequisites for market-driven exploitation and cross-organizational ambidexterity within innovation value chains are some possible avenues for future research.

All in all, by combining the competitive position and resource position perspectives on strategy and by showing how the business and innovations strategies explain companies' responses to transformation pressures, the results of this study demonstrate that the responses by incumbent companies in the pulp and paper industry are the result of deliberate and justifiable strategic choices rather than a consequence of lock-in or a failure to recognize emerging opportunities and threats (Ansari and Krop, 2012).

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