Bioeconomy-based transformations enhanced by Business Model Innovations and effective Business Ecosystems

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Abstract

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Business Model Innovation (BMI) is recognized as an important source of a superior performance and competitive advantage (Foss and Saebi, 2018). The BMI concept extends the firm-centric activities by considering how the business model (BM) is embedded in the business ecosystem (Zott and Amit, 2010, Zott and Amit, 2013). The success of an innovating firm is to a large extent determined by other organizations in its environment (Adner and Kapoor, 2010) and business interdependence is crucial for firm effectiveness and survival (Iansiti and Levien, 2004). Taking an ecosystem perspective holds the promise to understand and manage innovations better as it links technological and organizational components and sub-systems together (Dosi, 2013). This perspective acknowledges the role of business networks as particularly critical when innovating BM (Doganova and Eyquem-Renault, 2009, Bjorkdahl and Holmon, 2013, Demil and Lecocq, 2010) and brings an evolutionary view on value creation and capture (Massa et al., 2017).

Traditionally, excessive BMI literature focuses on the design of BM (Rumble and Mangematin, 2015) and in particular the value capturing part of the design rather than on value creation architecture and the conditions under which the innovative architecture may be implemented to enhance competitive advantage and superior performance (Tidd and Bessant, 2018). Though, an equal importance from both researchers and practitioners should be given to value creation architecture (Baden-Fuller and Haefliger, 2013) and the implementation and management of the BM, which significantly depend on
the negotiations and interactions with firm stakeholders (Demil et al., 2018). Furthermore, "managing innovation is not simply business" and in that sense, the BMI should respond to some fundamental economic and social challenges (Tidd and Bessant, 2018, p.181). In that respect, some scholars defined a need to study how new BMs that enable the creation, delivery and capture of the high potential value from forest-based bioeconomy can be developed (Nabuurs et al., 2014). This is in line with the Sustainable Development Goals of the UN 2030 Agenda and the gaining greater political momentum and research interest of the bioeconomy concept (D’Amato et al., 2018).

This paper study BMI in the context of increased environmental concerns and potential network possibilities. The research responds to the call put forward by Demil et al. (2018, p.1213) and consider the firm environment non-deterministic by assuming that through BMI, an organization is selecting the relevant business ecosystem within the broader environment where the new BM is “performing the ecosystem”. The opportunities for business creativity in creating and capturing value through BMI and the performative role of the selected business ecosystem may bring new ways of managing innovation. With that said, we put our research in the context of increasing transition to a bioeconomy and observed closely the intersection of two major sectors: forest and AEC (architecture, engineering and construction) industries. The paper focus on the co-evolution of BM and business ecosystem by studying: How a co-creation of effective business ecosystem generate firm opportunities for successful implementation and management of a bioeconomy-based BM.

We selected a single case study design by researching leading forest-based manufacturer, Stora Enso and their BM of massive timber solutions on the multi-storey building market. Our data came from semi-structured interviews, workshops and secondary sources. The analysis followed the “Gioia method” (Gioia et al., 2013). The results showed how through bioeconomy-based BMI and selecting the relevant business ecosystem, Stora Enso determines its importance in the AEC value chain. The establishment of effective business ecosystem highly influence the adoption and successful management of the BM, reduce the environmental constrains such as switching costs and path dependence, and enhance BM legitimation in the system. The main implication of the article is an overall framework on how to facilitate an effective implementation of bioeconomy-based BMs through a co-creation of business ecosystem with key stakeholders.

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Bioeconomy-based transformations enhanced by Business Model Innovations and effective Business Ecosystems

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1. Introduction

Business Model Innovation (BMI) is recognized as an important source of a superior performance and competitive advantage (Foss and Saebi, 2018). The BMI concept extends the firm-centric activities by considering how the business model (BM) is embedded in the business ecosystem (Zott and Amit, 2013, Zott and Amit, 2010). The success of an innovating firm is to a large extent determined by other organizations in its environment (Adner and Kapoor, 2010) and business interdependence is crucial for firm effectiveness and survival (Iansiti and Levien, 2004). The business ecosystem (BE) in which the firm operates impacts how the focal firm actively collaborates with stakeholders to create and capture value, that is, design their BM (Zott and Amit, 2015). Inspired by Moore (1993) we define BE as a community of interconnected heterogeneous actors with complementary competences and participating in a value-creation. Taking an ecosystem perspective holds the promise to understand and manage innovations better as it links technological and organizational components and sub-systems together (Dosi, 2013). This perspective acknowledges the role of business networks as particularly critical when innovating BM (Doganova and Eyquem-Renault, 2009, Demil and Lecocq, 2010, Björkdahl and Holmén, 2013) and brings an evolutionary view on value creation and capture (Massa et al., 2017).

Traditionally, excessive BMI literature focuses on the design of BM (Rumble and Mangematin, 2015) and in particular the value capturing part of the design rather than on value creation architecture and the conditions under which the innovative architecture may be implemented to enhance competitive advantage and superior performance (Tidd and Bessant, 2018). Though, an equal importance from both researchers and practitioners should be given to value creation architecture (Baden-Fuller and Haefliger, 2013) and the implementation and management of the BM, which significantly depend on the negotiations and interactions with firm stakeholders (Demil et al., 2018). Furthermore, "managing innovation is not simply business" and in that sense, the BMI should respond to some fundamental economic and social challenges (Tidd and Bessant, 2018, p. 181). In that respect, some scholars defined a need to study how new BMs that enable the creation, delivery and capture of the high potential value from forest-based bioeconomy can be developed (Nabuurs et al., 2014). This is in line with the Sustainable Development Goals of the UN 2030 Agenda and the gaining greater political momentum and research interest of the bioeconomy concept (D'Amato et al., 2018).

The aim of the paper is to explore the prospects of having an ecosystems approach to business model innovation as a vehicle for improved business performance and competitive advantage. The research responds to the call put forward by Demil et al. (2018, p. 1213) and consider the firm environment non-deterministic by assuming that through BMI, an organization is selecting the relevant business ecosystem within the broader environment where the new BM is "performing the ecosystem". The opportunities for business creativity in creating and capturing value through BMI and the performative role of the selected business ecosystem may bring new
ways of managing innovation. With that sad, we put our research in the context of increasing transition to a bioeconomy and observed closely the intersection of two major sectors: Forest-based and AEC (architecture, engineering and construction) industries. The paper focus on the co-evolution of BM and business ecosystem by studying: How a co-creation of effective business ecosystem generate firm opportunities for successful implementation of a bioeconomy-based BMI?

We selected a single case study design by researching leading forest-based manufacturer, Stora Enso and their BM of engineered massive timber solutions on the multi-storey building market. Our data came from semi-structured interviews, workshops and secondary sources. The results showed how through selecting the relevant business ecosystem, Stora Enso determines its bioeconomy-based BMI and the importance in the AEC value chain. The establishment of effective business ecosystem highly influences the adoption and successful management of the BM, reduce the environmental constrains such as switching costs and path dependence, and enhance BM legitimation in the system. The main implication of the article is an overall framework on how to facilitate an effective implementation of bioeconomy-based BMs through a co-creation of business ecosystem with key stakeholders.

2. Theory building

2.1. Business models and business model innovation

Business models as a concept has existed since pre-classical time with sporadic academic presence (Teece, 2010). Not until the beginning of a new millennium, when scholars and practitioners showed growing interest and relevant contributions to the field (Wirtz et al., 2016). The increased attention apparently concurred with the hype of information and communication technology, which challenged the traditional business paradigms (Amit and Zott, 2001). Despite the growing academic interest and the practical relevance, BM research remains fragmented, theoretically underdeveloped (Zott et al., 2011, Foss and Saebi, 2018) and lacking established scientific foundation (Teece, 2010). An overall theory to explain the phenomenon of BMs is missing (Gassmann et al., 2016), since the core constructs are not framed in a way that facilitate theory-building and empirical testing (Foss and Saebi, 2018). On the other hand, the disciplinary pluralism is seen as advantage. Although the concept of BM is not belonging to a single research stream, the different boundary-spanning perspectives might enrich and leverage the knowledge creation process in academia and practice (Gassmann et al., 2016).

The sky under which the concept develop has not been cloudless, since BMs was torn between usefulness and uselessness (Doganova and Eyquem-Renault, 2009). Nevertheless, the popularity has grown increasing in several research disciplines including strategic management (e.g. Teece, 2010, Casadesus-Masanell and Ricart, 2010); technology & innovation management (e.g. Chesbrough and Rosenbloom, 2002), marketing (e.g. Storbacka et al., 2013; Wieland et al., 2017), entrepreneurship (e.g. George and Bock, 2011) and sustainability (e.g. Bocken et al., 2013) to point a few. Accordingly, BMs have been described in various dimensions, depending on the research stream. The strategic management literature agreed upon the conceptualization of BMs as activities that create, deliver and capture value (Amit and Zott, 2001). In the entrepreneurship studies, BMs are seen more as strategic decisions for business opportunities (e.g. Morris et al., 2005), which encompasses activities for convincing and enrolling other actors to gain support (Doganova and Eyquem-Renault, 2009). Marketing research is tending to extend the BM analysis with external resources and network of
relationships (Nenonen and Storbacka, 2010). Hence, triggered by the various theoretical approaches, generally accepted definition of the term has not yet been established (Wirtz et al., 2016). Instead, the variety of conceptualizations have taken different construct shapes, associated with activity system (Zott and Amit, 2010), architecture (Teece, 2010), market device (Doganova and Eyquem-Renault, 2009), logic (Magretta, 2002), recipe (Baden-Fuller and Morgan, 2010), conceptual tool (Osterwalder and Pigneur, 2010), etc.

The classification of the key BM components in the literature is as diverse as the BM definitions. However, the central elements, on which many of the authors agreed are value creation, capture, and proposition (e.g. Amit and Zott, 2001, Baden-Fuller and Morgan, 2010, Chesbrough, 2010, Teece, 2010). The literature mainly handle elements or building blocks to construct a BM (e.g. Osterwalder and Pigneur, 2010, Chesbrough, 2007).

In this paper, we rely on the BM construct of Gärtner and Schön (2016), which adopt a building blocks schema, further compiled upon the idea of Baden-Fuller and Haefliger (2013) that BMs are “cognitive configurations”. Gärtner and Schön (2016) suggest a framework (Fig. 1) that encompasses the three core dimensions: value proposition, value creation, value delivery and capture. All dimensions focus on the targeted customers and their needs. The value proposition consists of the offered product/service-mix and the intended prices. Firm’s core assets and capabilities, complemented by the partner network, define the value creation dimension. The value delivery and capture dimension includes the different channels and the pricing structure.

Gärtner and Schön (2016) build the framework similarly to other studies that rested on a configurational approach (e.g. Osterwalder and Pigneur, 2010, Demil and Lecocq, 2010, Zott and Amit, 2010). However, rather than focusing on the descriptive horizontal, they add the dimension of BM Modularity or the notion of building a complex BM system from smaller subsystems or modules. Thus, the modular BM framework represents a specific set of choices about elements and their combination and coordination, and gives a powerful lens for analyzing and managing the dynamic of BM.

![Fig. 1 Business model framework adopted from Gärtner and Schön (2016)](image)

Within the last decade, the business model research has evolved from static descriptions to a more dynamic approach, focusing on the development and innovation of business models (see, e.g., Chesbrough 2010; Demil and Lecocq 2010; Teece 2010). The dynamism of BM become
a highly discussed stream in academia, but analogues to BM concept, BMI remains a slippery construct for research (Casadesus-Masanell and Zhu, 2013). Despite its conceptual instability, BMI is recognized in both entrepreneurial practice and research (Zott et al., 2011, Spieth et al., 2014, IBM Global Services, 2006). The researchers have recognized the importance of BMI for firm performance and competitive advantage (Chesbrough and Rosenbloom, 2002, Teece, 2010). The link between business model and innovation can be examined from two perspectives: BM as a vehicle for innovation, and BM as an independent source of innovation (Massa and Tucci, 2013). On the other hand, the BMI can be considered as revitalization (or replacing) of existing BM (Demil and Lecocq, 2010) or introducing a new BM in parallel with the existing one (Markides and Charitou, 2004).

Analogous to BMs, capturing BMI as a construct requires evaluation of changes in the three primary dimensions: value creation, capture and proposition (Clauss, 2017). Furthermore, BMI relates to the innovation of a system of products, services, technology, and/or information flows that goes beyond the focal firm (Baden-Fuller and Haefliger, 2013). Demil et al. (2018) go further by promoting a selection of a relevant environment, beyond the firm boundaries. Depending on the selection of the BM modules, the firm might orchestrate a new business ecosystem, or insert its activities into an existing one (Demil et al., 2018).

A firm’s ability to design a new BM or reconfigure its existing BM (Massa and Tucci, 2013) is considered an important factor to create profitable and sustainable innovations (Baden-Fuller and Haefliger, 2013, Teece, 2010). BMI is also acknowledged as a new type of innovation, along with product, process and positioning innovation, in which firms adopt novel ways to create and capture value (Tidd and Bessant, 2018). Pure product and service innovation strategies are still important but insufficient as the firm can only capture the latent value of the resulting novel technologies and ideas to the extent that their business models leverage their potential value (Chesbrough and Rosenbloom, 2002). Accordingly, sustained value creation and value capture relies on the firm’s continuous and dynamic shaping, adaption and renewal of its BM (Osterwalder and Pigneur, 2010).

In this article, we focus on a BM design for a new activity of an incumbent and describe BMI in terms of transforming and reconfiguring an existing BM. In our study, we also distinguishing between degrees of BMI or novelty, based on the topology of Foss and Saebi (2017). Typically, the BM studies take the focal firm standpoint, but this article attempt to enlarge the analysis of BMs by exploring the external resources to co-create, deliver and capture value within the business ecosystem. We adopt a pragmatic approach of some scholars (e.g. Doganova and Eyquem-Renault, 2009, Demil et al., 2018) and instead of prompt the BM concept as realistic picture of an objective reality, we perspective it as a cognitive instrument for performing collective actions. In that sense, we study the role of BMs in the innovation process through a single case study of an existing large organization. The BM concept take into account that value creation occurs in a business ecosystem beyond firm boundaries, which incorporates customers and partners (Teece, 2010, Chesbrough, 2007, Zott and Amit, 2013). We embrace the BM definition of Teece (2010), who states that the concept of BM is about the architecture of the firm's value creation, delivery and capture mechanisms. We also adopt the idea for the performative role of BMs in constructing the business ecosystem, which foster collective knowledge and behaviors of partners (Doganova and Eyquem-Renault, 2009). While there are multiple definitions of BMI concept, in this paper we employ the definition of (Casadesus-
Masanell and Zhu, 2013) which described it as search of new integrated logic for how the firm creates and captures value for its stakeholders.

2.2. “Ecosystems” as changing perspective on the environment in business studies

Two decades after Moore (1993), (1996) presented the biological metaphors of “ecosystems” into the management arena, the concept has gained sufficient prominence. Ever since, business scholars and practitioners are increasingly applying the term in different contexts, although the construct has been developed without robust theoretical consistency and clear definition (Inoue and Tsujimoto, 2018, Jacobides et al., 2015). The growing interest in this topic is fostered by the highly dynamic business, technological and social changes such as fast technology development, organizational openness and growing customer expectations (Frow et al., 2014). The changes are encouraging management and innovation literature to go beyond the single entrepreneurs focus and understand firms in their environment (Jacobides et al., 2015). This goes into labour multiple lines of reasoning, bundling around the idea of co-evolution as a systemic process by which organizations are involved in an ongoing interdependency (Teece, 2018). The academic proliferation of the “ecosystem” term further multiplies in broad range of eco-concepts such as “business ecosystem” (e.g. Iansiti and Levien, 2004, Moore, 1993, Teece, 2007), “innovation ecosystem” (e.g. Adner and Kapoor, 2010, Adner, 2006), “platform ecosystem” (e.g Gawer and Cusumano, 2014), “technology-based ecosystem” (e.g. Santos and Eisenhardt, 2005), “service ecosystem” (e.g. Akaka and Vargo, 2015), “entrepreneurial ecosystem” (e.g. Prahalad, 2009), "industrial ecosystems" (e.g. Desrochers and Leppälä, 2010), "product ecosystems" (e.g. Frels et al., 2003), and “knowledge ecosystem” (Clarysse et al., 2014). These multiple variations reflect on the diverse focus of studies in strategic management, marketing and technology management, respectively.

While researchers have used different angles to encompass the nature of the ecosystem approach, in this article we employ the construct of “business ecosystems”, which highlight the interdependence and co-evolution, characterized by contemporary activities in a business context.

The term “Business Ecosystem” become a buzzword of the management world, stretching the vertical industry boundaries and incorporating the complex networks of producers, suppliers, innovators, customers and regulators (Jacobides et al., 2018). Iansiti and Levien (2004, p.2) further extend the definition to: “Loose networks – of suppliers, distributors, outsourcing firms, makers of related products or services, technology providers, and a host of other organizations – affect, and are affected by, the creation and delivery of a company's own offerings”. Anchored in the notion of value networks (Normann and Ramirez, 1993), business ecosystem is also described by several scholars (e.g. Moore, 1993, Moore, 1996, Eisenhardt and Galunic, 2000) as an economic community where numerous inter-related actors co-evolve and simultaneously create value by combining their skills and assets. Such ecosystems are organized as complex networks of firms whose integrated efforts are focused on addressing the needs of the end customer.

Since co-evolution of business ecosystems is defined as key characteristic, Moore (1993) suggest four phases through which the ecosystem sequentially co-evolves: birth, expansion, leadership and renewal or death. Teece (2018) underline the importance of rules for ecosystem participants as the interdependence of organizational roles determinate excessive potential
conflicts to allow a completely self-organizing approach. This opens a discussion on ecosystem governance since some scholars propose that ecosystems are manageable to some extent (e.g. Iansiti & Levien, 2004), although other see the ecosystem as a self-organizing construct (e.g. Clarysse et al., 2014). Ecosystem governance underline the role of a central firm (“lead firm” or “keystone”) for providing system stability and shaping its structure (Moore 1993, Teece 2007). Other ecosystem roles are described as “niche player”, “dominator”, and “hub landlord” (Iansiti and Levien, 2004). Moore (2013) and Kaartemo et al. (2017) further extend the group by including non-business stakeholders as governments, industry associations, institutions and institutional arrangements.

Yet it is often difficult to frame a common goal of an ecosystem with heterogeneous actors, scholars draw attention to value creation and capturing through innovation (Basole, 2009) and achievement of competitive advantage (Iansiti and Levien, 2004) as potential aims of business ecosystems. The heterogeneous actors perform within a particular structure, which Moore (1993) describe as “coopetition” structure or inter-organizational networks of collaborative and competitive relationships. The structure deliver value as an interrelated system of interdependent organizations rather than as individual firms (Clarysse et al., 2014).

In summary, business scholars from different fields have taken the “business ecosystem” approach to study the interdependence and co-evolution of firm business activities and the external surrounding. Indeed, in-depth reflection on the growing number of management studies using the “business ecosystem” concept reveals that it is applied with different conceptual meanings, ranging from a synonym for business networks to an analogy for interconnected environments. Yet, the cumulative research on this topic summarize the ecosystem approach by outlining a pivotal group of actors as a part of a broad and interdependent systems environment.

### 2.3. Business models intersecting the ecosystem perspective

The success of innovating firms is strongly determined by the other organizations in its environment (Adner and Kapoor, 2010) where business interdependency is crucial for their effectiveness and survival (Iansiti and Levien, 2004). Denicolai et al. (2014) underline the importance of external and internal knowledge for creating and capturing value in new ways. Still, the exploitation of external and internal knowledge combinations requires robust links of the firm with the surrounding ecosystem and larger collaborative space for innovations, where novel business models flourish (Baden-Fuller and Haefliger, 2013).

The business model research is relative silent with regard to industry dynamics relationships and the resulting large choice set of different business model approaches (Hacklin et al., 2018). Only a handful number of studies, unified around the systemic nature of the business models, outline the intersection with the ecosystems. For instance, Timmers (1998) includes in his business model definition a description of the various business actors, their roles, and their potential benefits. Casadesus-Masanell and Ricart (2010) also bring dynamism in their definition by framing a business model as “set of managerial choices and their consequences”, where each choice may result in different outcome. Doganova and Eyquem-Renault (2009) furthermore conceptualize the business models from a network perspective by emphasizing on systems and institutions. Keupp et al. (2012) likewise supports the holistic view of the business model by positioning the firm’s business model in a surrounding ecosystem, where Björkdahl and Holmén (2013) further add that the business model and the business ecosystem of actors
co-evolve together. Westerlund et al. (2014) propose an ecosystem business model, composed of value pillars anchored in ecosystems and combines both the firm and ecosystem method of creating and capturing value. Serrat (2012) claims that to be able to outperform competitors on the market, organizations needs to make choices that optimize their business ecosystem. Voelpel et al. (2004) do not support the outperforming role of the firms within an ecosystem and argue that the strategy focus of an individual organization is to co-shape and co-perform their business models together with other key players in the business community. Westerlund et al. (2014) also agree that for successful ecosystem development, the business models of different actors and the entire ecosystem should resonate and fit together. Consistent with the systemic view of the environment, Zott and Amit (2013) closely link the ecosystem and business model perspectives by outlining that both concepts emphasize on interdependencies and complementarities between a firm and third parties. This bridging view was partially constructed in their earlier works (Zott and Amit, 2010, Zott et al., 2011), where the authors adopt the systemic perspective of business model and recognize the need to go beyond firm’s borders in order to properly understand how value is created. Teece (2010) and Massa et al. (2017) view value creation and value capture into a broader ecosystem perspective in which the business model operates. This perspective, according to Baden-Fuller and Mangematin (2015), helps firms to unfold the market and provides room for novel business models to succeed. Sorescu et al. (2011) highlight the importance of the orchestrator role of the firm in the ecosystem where value is created and delivered to customers and, subsequently, appropriated by the business partners.

The commonality all scholars shares is the understanding that the business model concept not only address firm-centric activities, but also underline the importance of firm anchoring in its business ecosystem. The reviewed studies also expand the narrow industry view of an individual business model, by connecting all related interacting organizations and individuals in common business ecosystem. Following the line of thoughts where firms are constantly challenged by and disturb at the same time the dynamic ecosystem, potentially explains the highly complex discourse of business model innovation.

3. Methodology

In this section, we present and motivate for the systematic approach we employed with the data gathering and their analyses. Business model and business ecosystem dynamics can be view as complex business processes. Qualitative case study research is suitable for rich, process-oriented analysis (Yin, 2018), which allow researchers to gain deep insights into rather new and by now still underresearched and complex topics (Eisenhardt and Graebner, 2007). We rely on a single case-study approach to deeper our understanding and retain a holistic perspective of the complex firm and market processes. We avoided developing propositions based on prior research. Instead, we followed abductive case study approach (Gioia et al., 2013) and took less ignorant course towards the previous research, known as ‘prior informed’ approach (Strauss and Corbin, 1990).

3.1. Data collection and sampling

Our data came from semi-structured interviews, workshops and secondary sources. In selecting our interview candidates, we followed the procedures of snowball and theoretical sampling. With the snowball sampling, we initially used our limited pool of contacts in Stora Enso to
nominate, through their networks, other participants who meet the eligibility criteria and could potentially contribute to our study (Morgan, 2008). Guided by the theoretical sampling, our sample was not determined in advance. The data collection and analysis continues until theoretical saturation was reached and adding more material does not result in illuminating and extending relationships and logic among constructs (Eisenhardt and Graebner, 2007). Thus, we had enlarged our sample of interviewees, until further interviews yielded no substantial new information. We interviewed eight senior managers from Stora Enso. In addition, we participated in one round-table where the different aspects of industrial wood construction along the whole value chain where discussed. We also took part in eight workshops where Stora Enso and multiple companies and organizations discussed the challenges and opportunities for the wood construction, which covers building design, production and management phases. This resulted in 18 hours of recorded material. The managers from Stora Enso, which we interviewed, were responsible for production, sales, marketing and digitalizing of massive wood construction products in multiple international markets. In addition, the round table-style format was held with multiple companies and public organizations, to explore the current industry challenges. The workshop meetings, which we had access to record, where with construction companies, and different municipality and industry organizations. The interviews took place between December 2018 and October 2019 and where partly conducted face to face (in the HQ of Stora Enso) and partly via telephone by a single researcher. The round-table and the workshops where organized during an industry event organized in Karlstad (Sweden) between 11th and 12th of September 2019. The interview questions were semi-structured, focused on the dynamic of the business model behind the engineering construction wood solutions and its reflection to the surrounded business ecosystem. The interviews lasted around 60 min in average; the round table was 120 min. and the workshops where 120 min. in average. The interviews where in English and the round table and part of the workshops in Swedish. All interview sessions where audio recorded and carefully transcribed into written protocols. Meeting notes where taken in parallel.

3.2. Analytical approach

In our analysis, we developed inductive abstract analysis categories through systematic data analysis (Charmaz, 2014). Although we followed the inductive principles of avoiding early proposition development, based on prior research (Yin, 2018), we acknowledge that our knowledge and experience with the business model and business ecosystem literatures supported the research process. Thus, our study did not clearly followed the classic grounded theory guidelines (Glaser and Strauss, 1967, Charmaz, 2014) who advocate that the new insights are limited by previous knowledge.

With the aim of demonstrating rigor in the qualitative study, we followed the well-established Gioia et al. (2013) methodology. We developed our research process from inductive to abductive, and did not unfold the literature too early to avoid bias. However, we considered data and literature in tandem, while allowing for discovery without reinventing the wheel (Gioia et al., 2013). We used NVivo software to analyse our data. The analysis went through three distinguishing phases where we first identified and categorized “first-order concepts”, which evolved through “themes” to “aggregated dimensions” (Gioia et al., 2013).
4. Case study of Stora Enso

Stora Enso is a global leading provider of renewable solutions in packaging, biomaterials, wooden constructions, and paper. The company employs over 26,000 people in multiple countries and generated sales in 2018 were above 10 billion euros, with an increase of 4.4% from 2017 (Stora Enso, 2019). Wood production has 15% share of group operational and the share of value-added wood solutions (wood products that have been further processed into secondary products) is constantly growing. Due to external and internal drivers, Stora Enso is discovering new market opportunities and seeking innovative ways of doing business in order to sustain and compete. Innovation work at Stora Enso is concentrating on finding renewable solutions to replace fossil-based materials and step further is the engineered massive wooden building components that have allowed wood to enter into new markets traditionally dominated by concrete and steel (Stora Enso, 2019).

Key player in the group of engineered wood product is so called “cross-laminated timber” (CLT), a massive wood-based construction material in which cross-laminated solid wood panels, glued together in layers in a crosswise pattern, serve as vertical or horizontal elements (Fig 3).

![Fig. 3: Engineered massive wood: Cross-laminated timber – CLT (image from Stora Enso)](image)

Not itself an innovative material, but rather a new building technology applied to new markets (multi-storey buildings) and revolutionized the use of timber in construction (UNECE, 2018), CLT is believed to be one of the most promising innovations of the century in the field of construction (Vatanen et al., 2017). CLT production is a young business and Stora Enso as one of the world’s biggest wood processors began to manufacture CLT only in 2010. Most other companies have just a few years’ more experience (UNECE, 2016). However, interest in and use of, CLT is constantly growing and the global CLT production exceed 1 million m³ by end 2018, due to the greater demand and market trends, closely linked to drivers such as economic growth, urbanization, family income, trends in housing and construction, demographics as well as structural changes including paradigm changes in consumer preferences. (UNECE, 2018). Nevertheless, CLT has a positive image and it is seen to have a great deal of potential to serve as an ecological alternative for future sustainable construction (Vatanen et al., 2017).

For the construction industry, the introduction of renewable engineering wood solutions as CLT represents a radical innovation that revolutionize and challenge core assumptions within the industry. It represent a substituting technology for constructing multi-storey buildings, previously built by concrete and steel. The multi-storey building market is highly promising, not least because of their environmental impact (Lilja and Moen, 2017). The introduction of this new technology involves and build on collaboration between multiple organizations across and outside the traditional industry boundaries (Takey and Carvalho, 2016) meaning that the
5. Data Analysis

We first analysed the novel BM of engineered massive wood at Stora Enso. The analysis aims to deepen our understanding of the BM innovation processes and explicit the conditions under which the businesses operates. As a next step of our data analysis, we compared the BM of engineered wood with the BM of classic construction wood and examined how the selection of a BM perform the ecosystem.

The BM analysis approach was built on the framework of Gärtner and Schön (2016), which highlights the systemic nature of BM and provide a more holistic overview, which can easily zoom in and out, due to the scalable origin. In order to observe the BM dynamics of Stora Enso, we study in depth 6 sub-systems of the three business model dimensions (Value Creation, Value Proposition and Value capture), which are shown in Fig. 4 and further discussed below.

Fig. 4: BM of Engineered wood at Stora Enso. Template adapted from Gärtner and Schön (2016)

5.1. Accepts and capabilities

Wood production is a core business for Stora Enso with more than 20 production units in Europe. The traditional sawmills, which are part of their wood products business area, provide the raw material - the wood elements - for production of engineered massive wood. Thus, one of the biggest assets of Stora Enso are the production units of the raw materials, the sawmills.

The raw material from the sawmills is included in further production of a range of engineered wood-based solutions (e.g. CLT), covering almost all areas of urban construction. CLT itself is a capital-intense production, which require heavy investment in manufacturing facilities and machines. Stora Enso recently launched their third CLT factory at Gruvön sawmill in Sweden with the investment amounts to 45 million Euro. The company already has two production units in Austria (Stora Enso, 2019). As one senior manager said: ‘Capital costs are very high, the investments in CLT factories are much higher than to traditional products.’ Since this type of production did not exist before to such extend, Stora Enso went through a few prototyping stages together with their machinery suppliers in developing the production technology. The
strong R&D activities on the supply side where summed-up by one member of the management team:

‘In those days it was quite challenging to find the equipment, the machines, the production for producing CLT. We have our ideas and together with our machinery suppliers, we have developed our concept with a lot of prototypes.’

The design, investments and development of own CLT production was ‘challenging, but definitely manageable’, as one executive put it. Stora Enso already had the experience with complex manufacturing lines as the company have solid production traditions and the financial muscles. Thus, manufacturing CLT was the easier step for them. The bigger challenge was ‘…to develop the market’. A senior product manager said: ‘The hardest step was to develop a market and to develop an ecosystem for the new product. It was obvious for us that we need to have strong partnership from the very beginning onwards.’ Stora Enso established Business development units in key markets with network-related and matchmaking activities beyond the value chain. Business development become one of the most important capabilities Stora Enso cultivate to develop the market, establish customer relationships and operate successfully. As one manager described: ‘I think with all those steps, we initiate intense collaboration with other players in the value chain, and together we develop the market.’

The human resources and knowledge are prominent for both production and business. Due to the specific nature of the offering, technical, engineering and business expertise are combined for providing customized solutions. One executive explained: ‘This is practically not only selling the final product but also the services and linking our partners to different actors and markets. It contains elements of Business Development, creating demand first of all, and then it involves in the process of creating a solution, which involves different Technical and Engineering teams inside Store Enso.

As discussed above, Stora Enso utilize and develop new production and business development capabilities that allow them to benefit from opportunities that arise in the internal and external environment. The capability for foreseeing environmental opportunities was mentioned by one of the managers: ‘We have been able to see opportunities on the market someone might call these needs over something that does not exist. On the other hand, we had internal forces on how to create barriers for competitors.’ Thus, for successful design and implementation of the CLT business model, Stora Enso developed “business model change capability”, which are defined by Saebi (2014) as the firm’s capacity to adjust, adapt and innovate its business model in face of environmental dynamics.

5.2. Partnership

Establishing partnership is crustal for Stora Enso in order to deliver complete customer solutions. It involves the cooperation of multiple actors, including suppliers, distributors and customers in addition to research institutes and regulatory authorities. CLT is a novel solution, enabling new building technology processes and revolutionizing the use of timber in construction. In order to establish these innovative solutions to the marketplace, Stora Enso is taking a central role of providing vision, financial resources, technological assets, common standards and coordinating mechanisms to the supporting institutions and enterprises that build the foundations of the new business ecosystem. This new role involves establishment of a
network of suppliers and partners in both supply and demand-side, determined by the selected business model.

On the supply side, the partnership began very early in the value chain with the ‘forest owners’. As one of the managers said: ‘…Stora Enso has very close relationship with the forest owners…we have our own organization called wood supply, which is engage with the wood buying…’ Other key partnerships on the supply side is with the ‘machinery suppliers’, which provide the CNC (Computer Numerical Control) machines for precise cuts of the massive wood panels. This technology is a key for providing customized solutions and tailoring the massive wood panels. Another group of partners, marked by some of the managers with high importance, is with the ‘Glue producers’ which contribute with ‘…developing further the glue, so it become more efficient in the production lines’. Key partnership role on the supply side are also having the ‘companies producing steel connection materials’. Stora Enso work closely with them for developing different solution on ‘how to connect different CLT elements with steel elements’. Furthermore, Stora Enso extend their capabilities by relying on partnership with ‘logistic providers’ to perform the transportation of the production. The logistic services are an important element of their value proposition and the partnership has critical contribution to the value creation process.

Stora Enso put a lot of effort to improve the collaboration and to develop efficient business ecosystem on the demand side. With solutions like CLT, Stora Enso have a chance to establish deep connection with key players of the AEC industry (e.g. architects, engineers and constructors) in an early stage of a construction project. The company also work closely ‘with the construction companies, so they build efficient with wood’. They also work further with legal authorities ‘for covering the requirements of the different countries that allow multi-storey wooden buildings’ and all related organizations for making ongoing ‘fire tests, moisture tests that we can prove the concept of wooden buildings’. Stora Enso devote many resources ‘to keep the whole ecosystem on and really develop it further’. This has certainly not happen with their classic construction wood products, as they have applied different business model.

A key partnership in developing the business ecosystem is with ‘TRÄ Group’ in a project named ‘HEAL’ (Healthy and Affordable Living). Through this spin-off initiative, Stora Enso collaborate with multiple partners across industries for ‘finding efficient and innovative solutions to make the construction and building industry more efficient’. As described by the Strategic and Digital Business Advisor, David Blomquist:

‘The HEAL purpose is all about being brave and challenging the status quo of the building industry…..through digital solutions, through co-creation, through collaboration we should be able to manage the construction industry in a much more efficient way. We should also be able through the collaboration and through digitalization to establish sufficient digital twins of the buildings, ensuring that we have more harmonized level of communication.’

Another key element of the partnership network of Stora Enso are educational institutions like ‘Universities, research centres and schools’. Acknowledging the current dynamic market development, these partnerships are considered as ‘investment in the future, ensuring that there will be well-trained professionals in urban construction with engineered wood’.

5.3. Products and services
Stora Enso develop and produce innovative wood-based solutions for the building industry. The product range covers all areas of construction, including massive wood elements (e.g. CLT). CLT is believed to be one of the most promising innovations of the century in the field of construction (Vatanen et al., 2017), which allows ‘customers to build efficient and ecological on the construction site’, as a few of the managers pointed out. The high degree of prefabrication, the lightweight and the environmental qualities are among the strongest arguments for CLT. The engineered wood solutions establish and facilitate efficient and sustainable building processes and provide ‘ecological alternative compared with steel and concrete’ on the multi-storey building market. The good environmental image of CLT and wood construction in general is also a result of the ‘wood’s capacity to serve as a carbon sink’ and the ‘positive effects on the well-being of wood building occupants. The prefabrication ‘allows the customer to manage the building process with a minimum of risk and to build extremely fast’ as the customized modules are delivered ‘on site, ready to use, just on time’. The ‘on-time and on-site’ logistic brings high value to the customers due to the project-based nature of the construction. Key product values are also ‘the speed of construction and less noise & dust during the building processes’. In the construction business, ‘speed is equal money’, especially with multi-storey building projects where the investment and the layers of complexity are high. The building process with CLT also require ‘very few people onsite for the installation’, which is very important for the construction companies, who experience ‘shortage of qualified labour force’ and difficulties ‘to get the right people to do the work onsite’. Another important pain of the customers is the work security onsite and they are seriously investing in ‘securing safe workplaces’. Stora Enso have a good answer with the ‘very safe installation of the CLT elements’.

CLT is considered as a platform that ‘opens up for variety of services in the value chain’, including custom sizes and openings of the panels, technical consultations in the planning phase, software packages and digital tools. CLT grow into ‘an ecosystem centric solution’ as the prefabricated, customized engineered wood is co-created with the intense collaboration of the entire business ecosystem (as for example: architects, constructors, engineers and building companies). With CLT, Stora Enso recognize the potential to go beyond the role of material provider and deeper customer engagement by becoming ‘a future provider of digital services in B2B’ that ‘embrace communication and collaboration between the different participants and stakeholders in the construction value chain’.

Finally yet importantly, CLT provide opportunity for business grow within the ecosystem, ‘because when an actor enter the partnership network, they participate in the fast-growing market’. The growth opportunities with CLT open a new market segments and provide ‘a quick return of investment, if the CLT solutions are well planned from the beginning of the project’.

### 5.4. Customers

Mainly having experience in the past with the forest and in pulp and paper segments, Stora Enso is building now a world-class reputation as innovator and a frontrunner in a different market - the AEC sector. They use their innovative construction wood technology to approach new customers and establish presence in the multi-storey building markets, traditionally dominated by concrete and steel.

The Construction industry value chain has multiple stages – from production of raw materials into manufactured products, and construction itself. The actors in each of the stages have their
own network of stakeholders. Together with the project-based nature of relationships, it creates highly fragmented business environment. Within this environment, Stora Enso build up a business ecosystem and apply multi-stakeholder approach to scale-up the adoption of the innovative building technology and establish their robust presence in the AEC market. Within the ecosystem, the company ‘differentiate between buying and non-buying customers’. The ‘buying customers’ are usually beginning with ‘small sub-contractors (installation companies)’, up to ‘large general contractors’. Another ‘buying customer’ segment is the ‘module manufacturer of prefabricating housing sector’.

The ‘non-buying customers’, consist of a very large and diverse group of ‘technicians, engineers, architects, experts in specific technical fields as fire, acoustic and structural issues, municipalities, authorities and publicity ...up to NGOs’. Here are also included the ‘building owners and investors’ who are not directly involved in the sales but influence with their decision-making power on the project development. The ‘non-buying customers’ group is very heterogeneous, which make the task of Stora Enso to find the right communication very challenging. The company is trying to establishing the CLT solutions as ‘ecosystem centric’, which actually ‘move the buying-customer from the centre’ and position instead the selected ecosystem. Accordingly, by designing the solutions for and with the business ecosystem, Stora Enso is able to break the path-dependency of the conservative construction industry and establish the novel building practices and standards with CLT.

5.5. Channels and interaction

Customer communication, sales and distribution are of a high importance for Stora Enso in their strategy to establish a sustainable business in the AEC industry. Setting up communication channels and value-added distribution networks (own or via partners) is a complex process, and depending of the geographical location, customer segment value and the market importance, the company combine direct and indirect approaches, and build flexible distribution. Stora Enso has chosen to develop its own channels for communication and sales for the key markets and with the key customer segments. The sale force is built in multiple layers, which involves capabilities of multiple departments, such as ‘Business development’, ‘Sales and marketing’, ‘Technical & Engineering support’, ‘Manufacturing’, ‘Product development’ and ‘R&D’ teams. Their responsibilities and actions depend on the phase of the customer in the sales process, which consist of ‘three to four different touchpoints’.

Early in the process are positioned the ‘Business developers’, shaping the business ecosystem and raising the awareness about the values that CLT offers within this network. In the next step, they help the customers to evaluate the value proposition, together with ‘technical and R&D teams’, as each project is unique and offer different technical and business challenges. For each project, they join efforts in collaborating with various key ‘non-buying actors’, who have the power to influence, and persuade them to apply the wood solutions in the projects. To support this process, Stora Enso developed their own building concepts, as the recently launched Building Concept booklet for office buildings, which is intended for designers, contractors, building owners and developers, allowing them to gain an understanding of how to create cost-competitive office buildings from Stora Enso’s wood products (Enso, 2019).

By moving to the purchasing and delivery phases, ‘sales and customer service team’ are involved together with the ‘Manufacturing team’ in the actual purchase of the solution. In the delivery phase, the ‘Manufacturing team’ together with external ‘logistic providers’
synchronise the actual on-site delivery of the products. The ‘Business developer’ supports the whole process from the beginning until the end and coordinates the project with the customers and within the company.

The indirect channels (mainly in central Europe and oversea), owned by Stora Enso’s partners, are responsible for small and fragmented customer segments (e.g. small carpenters). Those partners are bringing additional value by organizing trainings and workshops for rising the knowledge level in the market. Partner’s sales vary in different markets and can reach up to 20-30% of the total volume.

All the established relationships by Stora Enso are based on human interaction in supporting the actors involved in different stages of a project, before, during and after the sales process. With individual clients, Stora Enso has also dedicated ongoing personal relationship. In business projects with very large ‘A class’ customers, the ‘top management’ is also involved in the communication process. As described by some of the managers, ‘the customer journey consists of many phases and involve multiple actors’. In order to ensure a high customer experience, Stora Enso recently established a ‘Customer experience team’, who is responsible for optimizing and improving the experience in all stages of the process.

In combination with the formal, designed structures and processes, Stora Enso are becoming orchestrators of a more fluid and fluctuating business ecosystems of contractors, architects, engineers and constructors, in addition to research institutes and regulatory authorities. The company facilitate connections between the ecosystem members for exchanging business opportunities, knowledge and driving the innovation processes forward. In this environment, informal structures or ‘communities of practice’ emerge, which establish networks of communications (Capra, 1996). The business ecosystems do not entirely depends on Stora Enso for building those relationships and the informal networks of communications show an evidence of self-organization. Through those networks of communications, Stora Enso exchange skills, generate knowledge, obtain better understand of the ecosystem needs, and co-create together more efficient solutions.

**5.6. Revenue model**

Considering the project-based nature of the CLT business, Stora Enso developed their revenue model as transactional, resulting from the sales of physical goods. As one of the managers pointed: ‘…we are pricing for m2 and m3 of CLT and this is our key revenue driver’. Their revenue model includes also product-related services, priced as usage fees. One of the managers described the services as: ‘logistic, cutting, technical support and technical expertise’ and pointed them as ‘the area, which from the revenue point of view will grow in the future’. Another manager mentioned that: ‘we have discovered service sales components, but they are currently implemented to a small extend’.

Stora Enso combine the products and services and tailor them specifically for each project, by creating more competitive, customer-specific “solutions”. The additional services help Stora Enso to build deeper relationships with their customers and help them to continue collaboration with the customer over longer periods of time. The revenue streams mix different pricing mechanisms, combining fixed and dynamic pricing, based on the volume, market and applied customizations and extra services. Still, just for a few services (e.g. the design services and some cutting services) Stora Enso are charging extra and the rest are offered free of charge.
Most of their digital services (e.g. Calucatis - software for calculating the engineered wood, QR system of the panels) are currently free as Stora Enso aim at this stage to heavily promote the construction with wood. Some managers recognized that ‘service revenue stream is something that we need to develop overtime’. Stora Enso have started to identify ‘which are the actual services, which the customer is willing to pay’, but they are not yet there.

5.7. Bioeconomy, Business model innovation and new business ecosystems

Increasing urbanization around the world will continue to drive the construction of innovative buildings, where materials play a key role. Wood building solutions reduce embodied greenhouse gas emissions and promote safe, circular and low-carbon construction (Stora Enso, 2019). Wood products also have significantly lower embodied greenhouse gas emissions associated with them compared with concrete and steel. One cubic meter of wood product captures approximately 700 kilograms of carbon dioxide from the atmosphere (Lundmark and Hannerz, 2017). At the end of their life cycle, wood products can be reused, recycled or used for energy production.

In recent years, innovations in wood material and construction technologies—such as cross-laminated timber (CLT)—have demonstrated potential to contribute in the renewal of AEC industry and circular economy (Antikainen et al., 2017). Due to CLT technical and ecological qualities, and small carbon footprint, the positive image is seen as important for future competitiveness (Vatanen et al., 2017). However, from an historical perspective, AEC sectors has been sluggish to changes.

The key drivers for innovation adoption have been persuasive factors as time, quality and cost efficiencies. Innovative solutions as CLT are triggering a radical change in the sectors by altering the entire process of building, which is traditionally very fragmented and inefficient. These changes are not only technological, but also business related.

Stora Enso have strong experience with the forest and pulp and paper segments. With CLT and engineered wood solutions, they are trying to building reputation as frontrunner and key player in the AEC industry. Their presence in the building sector as material supplier of classic construction wood products offer limited business opportunities. The shift from pure material producer to solution provider and ecosystem orchestrator require radical change of the business model (as shown in fig. 5).

At the industry level, the turn to engineered wood construction in multi-storey building market represents a radical innovation (Vatanen et al., 2017). Stora Enso are positioning themselves in the AEC sector as a forerunner, aiming to transform the industry. However, this shift also involves a move from considering innovation as an isolated and shielded activity to consider it as a collaborative process in open innovation systems (Lilja and Moen, 2017). The BM of Engineered wood solutions, which Stora Enso cultivate together with the selected business ecosystem, shift the position of the forest company in the AEC industry. Shaping a new business ecosystem involves the management of interdependencies between actors, orchestrated by a leading organization (Gawer and Cusumano, 2014). It also set new norms of interaction in the entire value chain of clients, suppliers, builders, architects and engineers by shaping so called “a sector specific types of innovation behaviour” (Pavitt, 1984), where formal, designed structures and informal communities or ‘communities of practice’ emerge (Capra, 1996).
Fig. 5: Overview of findings comparing BMs of Engineered and Classic construction wood at Stora Enso

As discussed above, the CLT building solutions and the BM behind require changes in building and business processes in the entire industry. In order to facilitate that, Stora Enso shape business ecosystem (fig. 6), where the players act as a team from the initial stage of each building projects. This new approach enable seamless design, production and installation of the build where cost, timesaving and environmental benefits come as main change drivers. The new building and business processes brings value by facilitating the development of affordable and sustainable constructions. This also shift power, reshape structures and encourage other actors in the new ecosystem to follow the business model pattern. Thus, the change of Stora Enso’s business models can be determined by a paradigm in such a way as technological developments and the BM change follow new trajectory (Teece, 2008). In the case of Stora Enso, the BMI resonate in new forms of business cooperation and facilitate cross-company network. The innovation demands a Business model paradigm shift as new principles of networking for cooperation are created and integrated. The BM dynamics spread at the ecosystem level, and enhance interactions between firms such as patterns of collaboration, organization of value chains, behaviour of firms, knowledge flows between actors, and collaboration of firms with universities (Weber and Rohracher, 2012).
Fig. 6: The Business Ecosystem of Stora Enso with Engineered wood

The business ecosystem illustrates the part of the environment with which an organization interacts, selects its stakeholders and defines its importance (Demil, 2018). Thus, the business ecosystem is performed by the choices made by an organization concerning its business model. With the choices that Stora Enso make for their BM, they persuade, involve and enrol other organizations within an ecosystem for gaining support and opening up the technological and business opportunities with engineered wood (fig. 7). Their business model changes also affects the business models of other interdependent firms and supporting institutions. The new processes of co-creation of the CLT solutions together with the business ecosystem are established very early in the production process. It engages processes of collaboration and open innovation and mobilization of cross-disciplinary knowledge and competences. Introducing a novel building process to the AEC industry also involve active learning processes. The knowledge base and knowhow are critical for the new key actors in order to fit and adapt into the ecosystem.

<table>
<thead>
<tr>
<th>BM modules</th>
<th>Example of BMI</th>
<th>Consequences on the business ecosystem (BE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value Creation</strong></td>
<td></td>
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<tr>
<td>Accepts and Capabilities</td>
<td>Business development capabilities</td>
<td>Changing the BE configuration</td>
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<tr>
<td></td>
<td>Develop own manufacturing units</td>
<td>No need for outsourcing production</td>
</tr>
<tr>
<td>Interacting with new partners as contractors, architects, constructors, engineers in addition to research institutes and regulatory authorities</td>
<td>Bargaining power of stakeholders</td>
<td></td>
</tr>
<tr>
<td><strong>Value Proposition</strong></td>
<td>Novel, customized, sustainable, pre-fabricated, efficient wood-based solutions</td>
<td>Need business ecosystem of partners to adopt the innovation in the conservative AEC sector</td>
</tr>
<tr>
<td>Customers</td>
<td>Approaching customer segments on the multi-storey building market, dominated by steel and concrete</td>
<td>Intensity of competition</td>
</tr>
</tbody>
</table>

Supply-side partners: Glue producers, Machine suppliers, Logistic providers, Forest owners, Connection materials producers

Non-buying customers: Designers, Architects, Engineers, Building consultants, Technicians

Buying customers: Installation companies, Construction companies, Module manufacturers

Non-buying customers: Investors, Building owners, Project developers, Municipalities
<table>
<thead>
<tr>
<th>Value Capture</th>
<th>Channels and interactions</th>
<th>Direct sales</th>
<th>No need for distributors</th>
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<td></td>
<td>Introducing Business Development Managers</td>
<td>Intense stakeholder communication early in the design phase of a project</td>
<td></td>
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<tr>
<td>New Revenue Model</td>
<td>Potential for increasing service sales</td>
<td>Involving partners across industries (logistic)</td>
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Fig. 7: Examples of choices in a business model and consequences for the ecosystem (adapted from Demil, 2018)

6. Conclusion

This research is in the context of a forest-based bioeconomy firm, their BMI and actions related to a unique renewable engineering wood solution offered to the construction industry. Innovations in wood construction revitalised the wood as building materials and give a promise to become a material of the future due to the environmental and cost benefits. Engineered wood technology as CLT, used in multi-storey structures could be alternative to concrete or steel and significantly reduce the global CO2 emissions. However, the industry is still searching the most viable business options. Stora Enso, as a bioeconomy leader and global producer of construction wood, are pushing the technical and business boundaries of what’s possible with engineer wood and dramatically transform many key part of the AEC industry. During this journey, the business environment exposes Stora Enso to various risks and advantageous opportunities, which the organizations cannot control. Applying the business model framework, but ignoring the environmental aspects is considered as organizational myopia (Bech, 2015). The diverse environmental variables are determined to a large extent and Stora Enso cannot exercise control over them. However, Stora Enso found business creativity by co-creating a business ecosystem, which they use to gain support, enhance the adoption of their BM and open new business opportunities. Building successful business ecosystem requires Stora Enso to act at a collective level, and convince and enrol other actors. A key element for Stora Enso in business ecosystem co-creation is to understand the BMs of the integrated partners, and align them with their own BM perspective. The partners in the business ecosystem run their own BMs. They have their own motivations, goals, knowledge and resources for running the businesses and Stora Enso cannot demand or control how they should operate their businesses. When Stora Enso incorporate independent actors in the value creation process, they introduce a layer of substantial complexity. However, when they succeed to match and scales their BM with the selected business ecosystem, they benefit substantially from reducing the environmental constrains such as switching costs and path dependence. A key importance of the business ecosystem is not only the market penetration, but also identifications of new business and innovation areas. The adoption of the new BM is not just about creating suitability and fit with the environment but also a matter of about how the firm interacts reactively or proactively with their business ecosystem. By effective orchestration of the business ecosystem in a way that the common projects do not drift into areas where Stora Enso’ solutions are nonconformist, they profit from the diversity of the various actors by improving their position in the value chain.
7. Acknowledgements

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8. References


