Strategic alliances for corporate sustainability innovation

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Strategic alliances for corporate sustainability innovation: The 'how' and 'when' of learning processes

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A B S T R A C T

Mounting sustainability pressures challenge established firms to engage with sustainability innovations, which are often introduced by startups. Research on alliance learning has established the potential of learning from startups to advance corporate innovation. Here, scholars have outlined alliance learning processes and outcomes and have distinguished learning *about* and learning *from* alliance partners as two key learning types. The saliency of learning *from* the operational alliance process is stressed. To date, however, no study has investigated alliance learning processes and outcomes for sustainability innovations. This is despite the fact that sustainability research suggests learning processes in the sustainability context have a distinct nature. This study addresses this research gap by analyzing the sustainability-specific learning processes and outcomes of a large European meat producer and wholesaler with a turnover of $2.7bn in the fiscal year 2019/2020. The firm formed alliances with nine startups for sustainable plant, insect-based and cell-based protein solutions. Our analysis (1) identifies three distinct characteristics of sustainability-related alliance learning processes and outcomes, and (2) specifies the temporal occurrence and outcomes of learning types in alliance learning phases. In contrast to findings of prior research, our study reveals that learning *about* alliance partners is of key importance throughout the whole sustainability-oriented alliance learning process. In addition, the findings highlight that alliance learning outcomes may support an established firm's contribution to the sustainability transformation of mass markets.

1. Introduction

Increasing societal and environmental challenges such as poverty and climate change have moved sustainability - i.e. the aspiration to "safeguard intergenerational equity" (Bansal and DesJardine, 2014: 70) in an economy operating within the space of planetary boundaries (Rockström et al., 2009) - from a niche to a mainstream issue (Bocken and Geradts, 2020). With mounting sustainability regulations and stakeholder pressure, established firms in different industries are challenged to analyze their strategies and practices with regard to sustainability requirements (Schaltegger and Hörisch, 2017). Firms can, and need to, respond to this new "sustainability imperative" (Lubin and Esty, 2010: 2) by engaging with sustainability innovations, often involving fundamental reconfigurations of products and processes so that they not only target economic but also environmental and/or social benefits (Arnold and Hockerts, 2011; Klewitz and Hansen, 2014). In doing so, established firms can secure their existence (Schaltegger and Hörisch, 2017), gain competitive advantage (Hall and Vredenburg, 2004; Hermundsdottir and Aspelund, 2021) and, at the same time, contribute to the transformation of markets and industries toward sustainable development (Hockerts and Wüstenhagen, 2010; Schaltegger and Wagner, 2011).

Established firms, however, frequently face difficulties in developing and adopting sustainability innovations (Bocken and Geradts, 2020). Such innovations are different from conventional innovations (Kennedy et al., 2017; Weissbrod, 2019), as they come with

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directional risks[1] (Hansen et al., 2009), involve different externalities in innovation and diffusion phases (Rennings, 2000) and require interdisciplinary learning toward systems thinking (Adams et al., 2016; Wals and Corcoran, 2012). While established firms struggle to implement sustainability innovations, a growing number of sustainability startups has started to introduce sustainable product innovations to the market (Hockerts and Wüstenhagen, 2010). Sustainability startups differ from conventional startups by integrating social and environmental value creation into their core business (Dean and McMullen, 2007) and following a values-oriented (Parrish, 2010), as well as a stakeholder-oriented (Freudenreich et al., 2019) approach.

In studies of how established firms advance innovation, strategic management research emphasizes the potential of strategic alliances. Leading scholars argue that strategic alliances can drive corporate innovation through organizational learning (Inkpen, 2008; Inkpen and Dinur, 1998; Kavusan et al., 2016; Schildt et al., 2012). Researchers have studied development and interaction patterns of alliance learning (Bingham et al., 2015; Davis and Eisenhardt, 2011; Doz, 1996; Kale and Singh, 2007), alliance learning types (Das and Kumar, 2007; Inkpen and Currall, 2004; Inkpen and Tsang, 2007) and alliance learning outcomes (Doz, 1996; Kavusan et al., 2016; Liu and Lui, 2020). Regarding learning types, initial research suggests that learning *about* alliance partners may dominate in the early phases of an alliance, whereas learning *from* dominates in the operational alliance phases (Das and Kumar, 2007). Empirical research confirms that alliances with startups hold high learning potential for established firms (Alvarez and Barney, 2001; Gopalakrishnan et al., 2008; McCutchen and Swamidass, 2004; Mittra, 2007; Weiblen and Chesbrough, 2015; Rothaermel, 2001). At the same time, sustainability research shows that sustainability startups possess sustainability innovation capabilities related to a sustainability-specific value proposition, creation and delivery, which established firms often lack (Keskin et al., 2020; Schaltegger et al., 2016). Learning from sustainability startups in the context of strategic alliances, therefore, might help established firms to develop capabilities for sustainability innovation.

The distinct nature of sustainability innovation and startups might suggest that sustainability-oriented alliance learning processes differ from those in conventional alliances. To date, however, no study has empirically investigated alliance learning processes and outcomes for sustainability innovations. Our study addresses this research gap and is guided by the research question: How do learning processes in strategic alliances between an established firm and sustainability startups unfold and influence sustainability innovation in the established firm? To answer this research question, we develop a *process model for alliance-driven learning for corporate sustainability innovation*, which depicts both the processes and outcomes of alliance learning from the perspective of an established firm. The analysis aims to gain new insights into the temporal occurrence and outcomes of two learning types (i.e. *from* and *about*) in alliance processes in a highly topical context. Using a qualitative methodology, we investigate processual dynamics in the established firm with regard to its alliances with sustainability startups, depicting how interactions evolve over time (Langley et al., 2013). An exploratory single case study design (Yin, 2009) was adopted to achieve an in-depth understanding of the interorganizational and personal interactions inherent to alliance learning.

Our findings contribute to the strategic management literature by establishing three distinct characteristics of alliance learning processes and outcomes in the context of sustainability innovations. This is done by specifying the temporal occurrence and outcomes of the two established learning types *about* and *from* and by describing novel alliance experiences in three distinct alliance learning phases.

Our review of literature on alliance learning processes and alliance learning outcomes is followed by a description of the methodology we adopted for data collection and analysis. After presenting the findings and the discussion of the results, we develop the process model. Our conclusions address areas for further research.

1.1. Literature review

Sustainability research claims that for sustainability innovations to address complex global challenges, they require interdisciplinary learning in collaborative environments (Bradbury-Huang et al., 2010; Mülling Neutzling et al., 2018; Rohrbeck et al., 2013). Strategic management research has identified strategic alliances as a valuable collective learning environment (Doz, 1996; Inkpen, 1998; Inkpen and Tsang, 2007; Kale and Singh, 2007) that can spur corporate innovation (Inkpen, 2008; Inkpen and Dinur, 1998; Kavusan et al., 2016; Mittra, 2007; Rothaermel, 2001; Schildt et al., 2012; Weiblen and Chesbrough, 2015). In strategic alliances, partners "exchange, share or co-develop […] resources, competencies and capabilities" (Russo and Cesarani, 2017: 1) and seek "solutions to long-term needs, rather than temporary fixes" (Chen and Chen, 2002: 1008). To answer this study's research question of *how* learning in strategic alliances advances corporate sustainability innovation therefore requires a deeper understanding of alliance learning processes and outcomes.

1.2. Alliance learning processes

The literature provides two complementary perspectives on alliance processes. The first relates to the overall alliance life cycle and is broken down into a linear sequence of partner selection, partner management and partner termination (Heimeriks et al., 2015) or formation, operation and outcome (Das and Teng, 2002; Russo and Cesarani, 2017). The second perspective, on which our study focuses, zooms in on the operational phase of an alliance starting with its formation. In this perspective, processes occur in a dynamic, iterative manner and are strongly related to learning (Inkpen and Tsang, 2007; Kumar and Nti, 1998). The alliance learning process

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[1] Directional risk is the risk of not knowing beforehand the direction of an innovation's actual effects on sustainable development.

generally involves articulation, codification, sharing and internalization (Kale and Singh, 2007). Doz (1996) and Doz and Hamel (1998) introduce an evolutionary view of alliance learning, as based on earlier work by Ring and Van de Ven (1992). This alliance learning theory suggests that successful alliances move through several cycles of learning, re-evaluation and readjustment, with each learning cycle making the alliance more efficient over time. Whether learning occurs and whether the alliance evolves favorably is determined by the initial conditions of the alliance, including partner expectations and strategies as well as absorptive capacities (Doz, 1996; Kumar and Nti, 1998). As the learning process evolves, alliance conditions change and shape subsequent behavior. Researchers argue that a favorable evolutionary path requires that partners are sufficiently compatible for learning to occur (Doz, 1996; Hamel, 1991; Lane and Lubatkin, 1998). Research on alliances between large and small firms suggests that due to differences in resource portfolios, market experience and cultures such alliances can involve unequal processes to the detriment of the smaller firm (Barabel et al., 2014; Doz, 1988; Minshall et al., 2010; Pérez et al., 2012; Prashantham and Birkinshaw, 2008).

Strategic management scholars have distinguished two main types of learning that occur in the alliance process: learning *about* the alliance partner and learning *from* the alliance partner (Doz and Hamel, 1998; Khanna et al., 1998; Inkpen and Currall, 2004; Inkpen and Tsang, 2007). Doz's (1996) seminal work on alliance learning has largely focused on the first type of learning, learning *about*, which is partner-specific learning that occurs along five dimensions: environment, goals, skills, task and process. This type of learning focuses on the management of individual alliances and is linked to the concept of alliance management learning (Ireland et al., 2002). Learning *from,* which is also referred to as content learning (Das and Kumar, 2007), involves knowledge that has value to a firm outside the scope of the alliance, as firms can internalize knowledge to enhance their own operations (Khanna et al., 1998; Inkpen and Currall, 2004). Individual-level components, including personal interactions, are key building blocks for developing such knowledge integration capabilities (Felin et al., 2012).

Some studies explicitly link learning to different phases in the alliance life cycle (Das and Kumar, 2007; Heimeriks et al., 2015; Schildt et al., 2012). In their conceptual paper, Das and Kumar (2007) suggest that the partner selection phase is dominated by learning *about* the partner, while the partner management phase is increasingly dominated by learning *from* the partner. This is in line with research on interorganizational trust, highlighting that partner familiarity and understanding is needed for knowledge transfer to occur (Inkpen and Currall, 2004; Nielsen, 2005; Nielsen and Nielsen, 2009).

2. Alliance learning outcomes

Alliance learning research suggests that the two types of learning can result in different outcomes for the alliance and its members. Learning *about* the alliance partner helps firms to build trust, improve coordination and increase overall alliance performance (Inkpen and Currall, 2004; Khanna et al., 1998; Liu and Lui, 2020). In particular, positive experiences related to gaining knowledge *about* the partners increase a firm's motivation to continue the alliance (Das and Kumar, 2007). It has also been suggested that learning *about* an alliance partner can influence decisions on entering into and learning in further alliances (Gulati et al., 2009; Heimeriks et al., 2007; Heimeriks and Duysters, 2006). The more alliances a firm enters and the more diverse the partner firms are, the more learning can occur (Cui and O'Connor, 2012; Jiang et al., 2010). By contrast, Grant and Baden-Fuller (2004) propose with their knowledge accessing theory of strategic alliances that the more firms focus on only accessing knowledge, i.e., learning *about*, without the intention of integrating and applying that knowledge, the more alliances they can enter. Learning *about* therefore does not only relate to advancing an individual alliance, but also to whether a firm enters further alliances. With increasing experience with alliances, firms develop an alliance learning capability, which results in increased learning and alliance success over time (Anand and Khanna, 2000; Kale and Singh, 2007; Schilke and Goerzen, 2010).

The impact of learning *from* goes beyond improved alliance performance and can also substantially advance a firm's internal innovation. The link between learning success and corporate innovation has received substantial attention in the strategic management literature (e.g. Berghman et al., 2013; Cohen and Levinthal, 1990; Jiménez-Jiménez and Sanz-Valle, 2011). With regard to learning in the context of alliances, it is argued that a firm's ability to absorb and exploit a partner's knowledge is particularly high in alliances with a high degree of technological overlap or a complementary knowledge base (Kavusan et al., 2016; Schildt et al., 2012; Shenkar and Li, 1999). Subramanian and Soh (2017) further argue that learning *from* a wider range of alliance partners can increase the breadth of resulting innovation produced by the focal firm. However, learning *from* can also have a negative impact on alliances or even lead to early alliance termination, when one partner "outlearns" the other, takes advantage of its increased bargaining power and starts using its acquired knowledge competitively (Hamel, 1991; Inkpen and Beamish, 1997; Inkpen and Currall, 2004; Van de Ven and Walker, 1984). Research indicates that in alliances between large firms and startups the large firm is much more likely to win the learning race, rendering these types of partnerships difficult to maintain (Alvarez and Barney, 2001). Winning the learning race, however, requires that the large firm is able to overcome learning challenges attributable to a potential lack of management commitment and core business-focused corporate structures (Kohler, 2016).

2.1. Research gap

Extant research has neglected to explore alliance learning processes and outcomes in the context of sustainability innovations. Learning for sustainability innovations might be different, as it is influenced by the degree of commitment to a firm's sustainability strategy (Kennedy et al., 2017) and it involves further requirements, including the unlearning of prior knowledge that contradicts sustainability principles (Adams et al., 2016; Bossink, 2007; Magnusson et al., 2003). With their purpose to contribute to social and environmental goals beyond organizational boundaries, sustainability innovations require learning towards systems and about empathetic thinking (Wals and Corcoran, 2012) as well as learning about the interrelationships between organization, society and the

environment (Johnson and Schaltegger, 2020). In addition, differences in motivation, values and ideologies between mainstream and sustainability-oriented actors may complicate or prolong alliance learning processes, as actors tend to be resistant to learning from one another (London et al., 2004; O'Mahony and Bechky, 2008; Rondinelli and London, 2003; Stern and Hicks, 2000). Alliance learning outcomes might differ too, as sustainability innovations can support the sustainability transformation of whole markets and industries (Hockerts and Wüstenhagen, 2010; Schaltegger et al., 2016; Schaltegger and Wagner, 2011).

The investigation of sustainability-related alliance learning processes addresses the outlined research gap. Fig. 1 synthesizes previous research findings, illustrates the main research gap and highlights three specific aspects that have not been addressed by research, so far.

This study's in-depth analysis attends to all three of the outlined aspects, thereby contributing to alliance learning research. First, the investigation may provide empirical insights into how and when established firms learn *about* and *from* sustainability startups, thereby confirming or deviating from Das and Kumar's (2007) suggestion that the alliance process is increasingly dominated by learning *from*. Second, the investigation may shed light on how differences in the temporal occurrence and purpose of learning types influence experiences in the sustainability-related alliance process and, vice versa, affect the evolutionary path of alliances. Lastly, the investigation may give indications of broader sustainability-related alliance learning outcomes beyond organizational boundaries – an aspect that has not been investigated so far, neither in the sustainability nor in the alliance learning literature.

3. Methods

3.1. Empirical approach

In order to investigate the relationship characteristics of alliance learning for corporate sustainability innovation, we employ a qualitative, exploratory case study design (Yin, 2009). The qualitative study design allows for an in-depth analysis of alliance learning processes in a unique setting, "capturing the nuances of processes in and around organizations" (Langley et al., 2013: 10). Given the study's focus on corporate innovation, the analysis adopts the perspective of the established firm, i.e. its learning cycles and outcomes as partner-specific learning processes. We investigated innovation processes in a large established European meat producer and wholesaler with a turnover of $2.7bn in the fiscal year 2019/2020. This firm, anonymized as BIGMEAT, entered nine strategic sustainability-oriented alliances with international startup firms for alternative protein products. Given the social discourse on meat consumption and production (Sapontzis, 2004) and the radicalness of new meat replacement innovations (Shapiro, 2018), alliances between a meat producing firm and alternative protein startups constitute an intriguing and highly topical research case.

BIGMEAT is family owned and run and the alliances are part of the firm's strategy to diversify its product portfolio toward meat alternatives and thereby future-proof its business. The startup alliance partners offered ethical and ecological food tech innovations, including plant-based, insect-based, cell-based and 3D-printed meat analogues. All of the startups aimed to make their products available to the European mass market. BIGMEAT supported the alternative protein product startups by providing finance, infrastructure and market know-how, while the startups granted BIGMEAT access to state-of-the-art protein product innovations. Nine
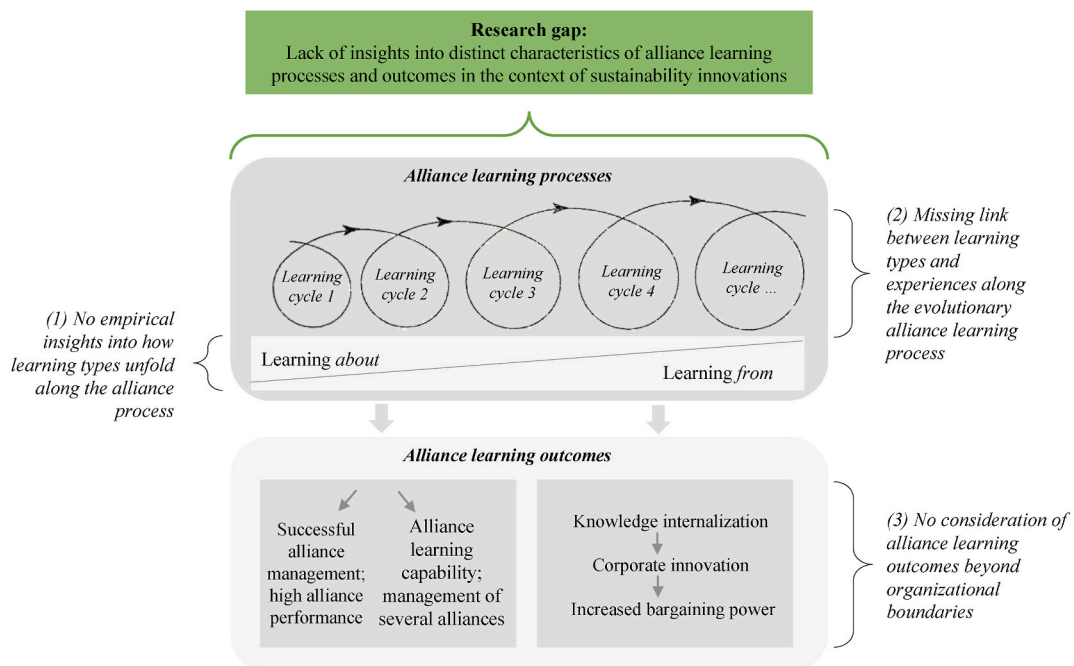

Fig. 1. Synthesis of previous alliance learning research and identified research gap.

strategic alliances were established between February 2016 and mid 2019 (Table 1) in the form of strategic investments (S, B, E) and/ or distribution partnerships (A, C, D, F, G, H). All but one alliance (G) are still ongoing at the time of the completion of the research.

The first alliance, Alliance S, remained undisclosed to the public due to reputational concerns voiced by both partners. While the owner of Startup S was concerned about potential negative responses from its vegan customer base, BIGMEAT's management had not yet formulated and communicated their strategic intentions to become involved in the alternative protein field at the point of alliance formation.

3.2. Research process

We designed the case research to ensure internal validity, construct validity, and reliability (Gibbert et al., 2008). The research process (Fig. 2) was abductive (Dubois and Gadde, 2002) and alternated between the literature, empirical findings and data analysis (Thomas, 2010).

The link between alliances and corporate innovation (e.g. Weiblen and Chesbrough, 2015) and sustainability-oriented interactions between startups and established firms (e.g. Hockerts and Wüstenhagen, 2010) provided the foundation for this study. Our empirical observations of alliance learning processes, however, could not be fully explained in this initial theoretical framework. We therefore engaged in an iterative abductive process of "theory matching," resulting in a revised theoretical framework that incorporated constructs of alliance learning (Kovács and Spens, 2005). By alternating between data collection, data analysis and theory matching, we gained an increasingly comprehensive understanding of the phenomenon of alliance-driven learning for corporate sustainability innovation. This deeper understanding encouraged us to develop a new process model.

4. Data collection and preparation

The lead researcher sought to collect salient data without influencing the alliance process or interviewees using a variety of data collection methods. First, the data collection included semi-structured interviews (Wengraf, 2001) as well as informal conversational interviews (Turner, 2010) with managers from BIGMEAT and the startup partners (see Appendix A, Tables A.1 and A.2). For those interviews that were conducted in German, relevant text sections were translated by the lead researcher. Top managers interviewed included BIGMEAT's CEO and Chairman, the Board Lead for Alternative Proteins (previous Head of M&A), and the CEO of two BIGMEAT subsidiaries. Middle managers included managers from sales, marketing, project management, product development, communication, sustainability management and the new head for the alternative protein unit. The interviews with startups were conducted with the founders and top managers. Second, the lead researcher engaged in balanced participatory observations. This included taking part in the ongoing activities of the participants while consciously observing and, after the interaction, recording the observations made. In doing so, we aimed for a balance between observation and participation (DeWalt and DeWalt, 2002). Third, we collected data in the form of documents (Prior, 2003). Each data source fulfilled a different purpose during analysis (Table 2). In total, our database comprises 40 formal and informal interviews, observations at 11 events and 71 documents.

As proposed by Dwyer and Buckle (2009), we adopted an insider-outsider perspective to take into account the complexity of human experiences and the impossibility for qualitative researchers to remain completely separate from the study. The lead researcher travelled to the company headquarters and participated in industry events and conferences while the co-researchers acted as 'sparring partners' to reflect on the observations at a critical distance. Interactions with study participants took place in work settings, at meetings and at industry events. The Board Lead for Alternative Proteins was the main point of contact during the 18-month long investigation.

Data was collected from August 2018 until February 2020. To reconstruct the strategic decisions and alliance processes that occurred prior to August 2018, interviewees were asked to recall the alliance process back to February 2016 and these recollections were used as retrospective data (Pettigrew, 1990). The final three interviews with top and middle management at BIGMEAT (Interviews 10; 11; 12) corroborated the data findings and were used to seek final clarification of some factual information (e.g. people involved, timelines). Interviews were transcribed ad verbatim and the observational data, including interviews, were uniformly protocolled (McLellan et al., 2003).

Table 1
The nine strategic alliances of the BIGMEAT research case.

| Alliance	Core product value proposition of startup	Alliance formed	Alliance status
S	Plant-based protein	Beginning of 2016	Commercialization active
A	Cell-based protein	End of 2017	Commercialization planned for 2022/23
B	Insect-based protein	Beginning of 2018	Commercialization active
C	Plant-based protein	April 2018	Commercialization active
D	Plant-based protein	July 2018	Commercialization planned for 2021
E	Insect-based protein	July 2018	Commercialization planned for 2021
F	Plant-based and cell-based protein	November 2018	Commercialization planned for 2021
G	Plant-based protein	November 2018	Planned commercialization stopped
		Terminated January 2020	
H	Plant-based protein and technology platform	Mid-2019	Commercialization planned for 2021
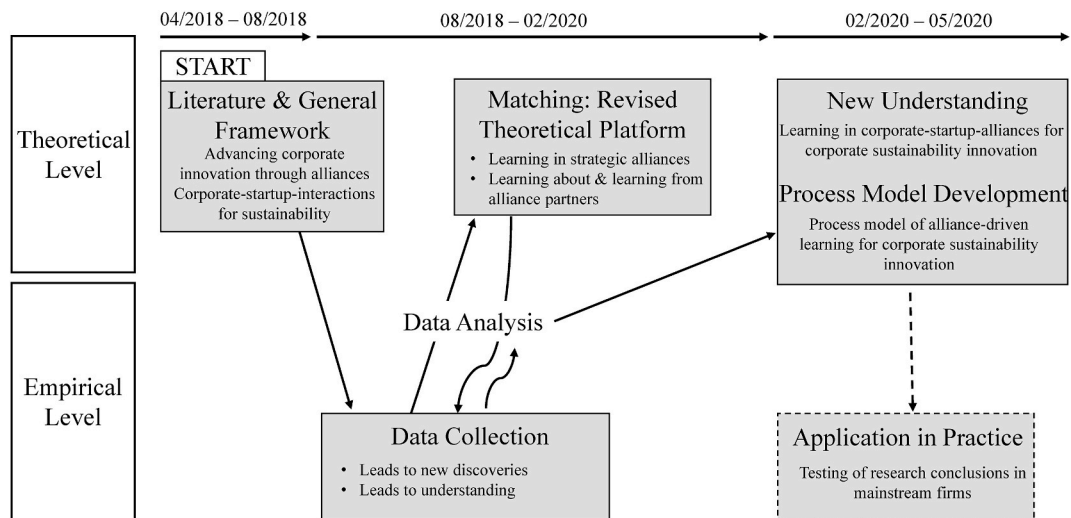
Fig. 2. Abductive research process used in the case study (adapted from Kovács and Spens, 2005, 139).

Table 2

Data sources and their use in the analysis.

Data types	Sources	Use in the analysis
Semi-structured interviews at BIGMEAT	12 formal interviews with top and middle managers (see Appendix A, Table A1)	• Reconstruct the process of alliance development • Investigate the motivations behind alliance formation and learning intentions • Examine changes over time/whether and how organizational learning occurred
Semi-structured interviews at startups	8 formal interviews with founders/top managers (see Appendix A, Table A1)	• Reconstruct the process of alliance formation and development • Investigate startup motivations • Corroborate statements about alliance formation and processes by BIGMEAT managers
Informal interviews	20 informal interviews at BIGMEAT with top and middle management (see Appendix A, Table A2)	• Supplement formal interviews • Gain deeper insights into personal motivations and learning over time
Balanced participatory observation	6 industry events 4 meetings 1 press event	• Investigate the relationship and fit of partners • Investigate the direct collaborative learning processes • Analyze the external communication of the alliances
Publicly available documents	30 firm reports & press releases 29 media reports 4 firm magazines	• Examine external communication of alliances • Examine external perceptions (e.g. media coverage) of alliances and its implications
Internal documents	8 presentations and written communication	• Examine internal communication of alliances and related learning processes and outcomes

4.1. Data analysis

The data analysis was composed of three steps. Step one used the qualitative data analysis software program MAXQDA (see Appendix B, Figure B1) to conduct a coding process. Table 3 shows the resulting 106 first-order descriptive, process and emotion codes (Saldaña, 2015), which were grouped into 8 second-order codes. All first-order and second-order codes were compiled in a codebook (DeCuir-Gunby et al., 2011; Saldaña, 2015) and were discussed between two researchers.

In step two of the data analysis, we marked codes and specific text sections according to the alliance the statements referred to. The alliance-specific text sections are organized in matrix tables (Miles et al., 2014). The process was informed by alliance learning research (Doz, 1996; Doz and Hamel, 1998; Inkpen and Currall, 2004) and identified the learning cycles (i.e. cycles of learning, re-evaluation and readjustment), including the temporal occurrence of learning types (i.e. learning *about* and learning *from*), and their respective outcomes (columns in Table 4). We systematically identified learning *about* and learning *from* alliances in the collected data set (rows in Table 4). Data sections referring to one or more of Doz's learning dimensions, i.e. the partners' environment and market context, the partners' goals and motives, the partners' skills, the alliance task and the alliance process, all indicated learning *about*. Statements were classified as instances of learning *from* if the data referred to knowledge from the partners with a clear intention to internalize and use the knowledge, unconnected to the alliance process (Inkpen and Currall, 2004). Both learning processes and outcomes were analyzed from the perspective of BIGMEAT in order to identify the scope and dominant type of learning at BIGMEAT. The process generated nine matrix tables, one for each alliance. Table 4 shows the simplified matrix table of Alliance F.

Table 3

First-order and second-order codes identified in qualitative data.

Codebook containing first- and second-order codes		
First-order codes		Second-order codes
• Openness • Pioneer thinking • Growth through diversity • Traditionalism • Sustainability views • Future of meat business • Customer orientation • Product focus • Employee orientation	• Careful decision-making • Family business • Market orientation • Corporate identity • Uniqueness • Strategy • Personal conviction • Company connectedness • Competitive advantage • Authenticity • Profit orientation • Collaboration focus	**Established firm characteristics & strategy**
• Fascination/hype • High expertise • Seriousness/long-term thinking • Vegan vs. meat • Low awareness • Perception of startup	• Skepticism • No defined process • Market opportunity • Trust in leadership • Existential fear • Acceptance	**Established firm initial conditions**
• New knowledge • Generation 2.0 • Structural change • New sustainability perspective • Positive feedback • More involvement • New innovativeness • Opportunities for meat business • Risks for meat business • Positive experience	• Ambivalent work tasks • Negative experience • Limits to internal change • Disagreements/discussions • Employee encouragement • Staff shortages • Company image • Strategy development • Newness • Product development challenge • Knowledge sharing • Learning challenge	**Established firm internal processes**
• Planning & management • Structural integration • Enthusiasm		**NewCo/Accelerator Platform**
• Compatibility • Pragmatism • Personal contact • Partner fit • Type of partnership	• Goals • Differences • Philosophy & values • Unstructured process • Competition	**Alliance conditions**
• Challenges • Established firm support • Open communication • Further alliance potential	• Startup dominance • Time-consuming • Mutual partnership • Alliance re-evaluation • Functioning collaboration • Alliance synergies	**Alliance processes**
• Strategy/approach • Motivation for partnership • Praising established firm • Sustainability mission • Business motivation • Alliance goal • Initial concerns • Personal story	• New knowledge • Market orientation • Independence • External feedback • Expertise • Established firm products • Technological innovation • Growth • New market access • Business challenges • Welcoming partner learning	**Startup perspective**
• Industry change • Startup hype • Competition • Negative reputation • Uncertainties	• Political awareness • Stakeholder pressure • Decreasing hype • Local market challenges	**External conditions**

Note: The code book and related coding process were the basis for creating nine matrix tables, which provide insights on learning processes and outcomes of each alliance.

Table 4

Matrix table of BIGMEAT's learning processes and learning outcomes in Alliance F.

ALLIANCE F		Learning processes at BIGMEAT (learning cycles)			
		Initial conditions	Learning	Re-evaluation	Readjustment
Learning outcomes at BIGMEAT	*About*	*Personal fit:*Alignment with startup management, compatibility of competencies	*Local market challenges:* Regulatory barriers	*Dealing with challenges:* Open communication, more support for startup	*Goal readjustment:* Postponing market launch, adjusting alliance management
	From	*Fascination* with R&D process, awareness of opportunities for core business	*New R&D knowledge* for development of plant-based protein products, potential for competitive advantage *New sustainability perspectives* related to global food security	*Re-orientation:* Desire to focus on own strength	*New innovativeness:* Accelerating development of own plant-based protein products

In the third and final data analysis step we reconstructed the timeline of alliance learning and linked it to BIGMEAT's innovation process. To increase the findings' validity, we conducted three triangulation interviews (Interviews 9; 10; 11) as well as a presentation and group meeting with four key BIGMEAT managers toward the end of data analysis in late February 2020. These measures did not result in additional second-order codes of the previously collected data on the alliance learning process.

4.1.1. Findings

The findings on BIGMEAT's alliance learning are presented in three parts. The first two parts cover alliance learning processes and alliance learning outcomes, with tables summarizing the key data findings and relating them to prior research. The third part merges the key findings into a *process model for alliance-driven learning for corporate sustainability innovation.*

4.2. BIGMEAT's alliance learning processes

The data indicates that while BIGMEAT learned extensively in its alliances with sustainability startups, the learning scope and intensity varied. This variation in learning over time is seen in the different temporal occurrence of learning *about* and learning *from,* impacting the frequency of learning cycles, as well as in the different experiences for BIGMEAT in distinct learning phases. Fig. 3 depicts the learning cycles for BIGMEAT in each of the nine alliances as boxes encompassing instances of learning *about* and/or *from,* re-evaluation and readjustment in the alliance learning phases.

Occurrence of learning types: The learning cycles of BIGMEAT include instances of both learning *about* and learning *from.* Learning *about* occurred in all nine alliances and continuously throughout the alliance processes. This type of learning was the main trigger for learning cycles, confirming the importance of partner familiarity and trust on the scope of alliance learning (Inkpen and Currall, 2004; Nielsen, 2005; Nielsen and Nielsen, 2009). In total, five alliances (Alliances B, C, D, F and G) went through one or two full cycles of learning, re-evaluation and readjustment, with Alliance C being the only alliance that saw the completion of two full learning cycles. Accordingly, Alliance C offered extensive learning opportunities to BIGMEAT managers (Interviews 5; 8; 10). For middle management, including sales (Interviews 5; 7; 8) and marketing (Interview 12), it was the first alliance the managers were involved in and the one that required the most intensive contact. Late 2019 saw a cluster of parallel learning cycles, pointing to an alliance learning capability developed by BIGMEAT (Anand and Khanna, 2000; Kale and Singh, 2007; Schilke and Goerzen, 2010). In line with this, BIGMEAT managers perceived learning to be particularly high at later phases of the alliance processes (Interviews 4; 9; 10).

The data indicates that learning *from* only occurred after extensive learning *about* had taken place and that it only occurred in the early stages of Alliances C, D and F. Interestingly, learning *from* was limited to those three alliances and did not reoccur in later stages of the alliance process. BIGMEAT's top management offered explanations for the lack of learning from Startups B and G, who they considered "*outliers''* in terms of learning and integration opportunities due to startup focus on niche products such as insect-based meat analogues or plant-based mozzarella (Board discussion February 2020; Interviews 10; 8).

No.	Finding	Main topic	Relation to prior research
1.1	While the established firm continuously learned *about* all partners, the occurrence of learning *from* was limited to three instances and partners, and was not relevant in later alliance phases.	The diverging temporal occurrence of learning *about* and learning *from* in the alliance process	The finding contrasts with earlier research suggesting that the partner management phase would be dominated by learning *from* (Das and Kumar, 2007).

Three learning phases: The data findings suggest that BIGMEAT's overall alliance learning process can be separated into three distinct phases (bottom, Fig. 3). The first phase involved overcoming a perceived *"inhibition threshold"* to learning (Interview 10). Before entering the first alliance, Alliance S, the startups were perceived as *"ideological stereotype images of enemies"* (Informal interview 1) and reservations existed on both sides about collaboration between a meat firm and a vegan firm (Interviews 1; 3; 10; 13). The differences in values and missions (see Appendix C) strongly impacted the early alliance phase (Interviews 1; 10; 13). Barriers were
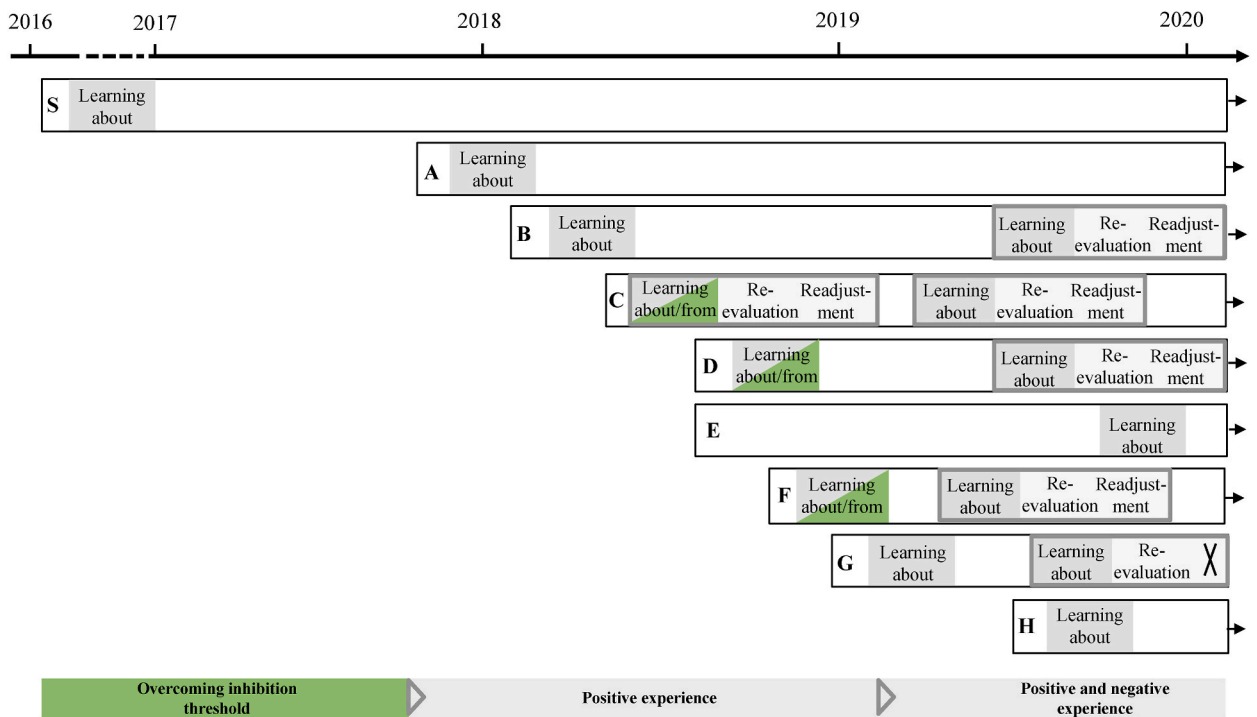
Fig. 3. BIGMEAT timeline of 'learning *from*' and 'learning *about*' along distinct alliance learning phases.

perceived as high due to stakeholder expectations, including employees and customers, which is also why the first alliance was never disclosed to the public (Interviews 1; 10; 13). However, with Alliance S, BIGMEAT managers recognized the feasibility of collaborating with and learning from vegan sustainability startups: *"Everyone can learn from the other. It's not that one is bad and the other one is good. Let's just try this experiment"* (Interview 10). Learning was especially facilitated by the pragmatism expressed by both parties, i.e. their ability to look beyond differences in values and missions and focus on the joint alliance objective (Interviews 1; 10; 13; 14; 16; 19). Alliance S created the conditions necessary for forming Alliances A, B and C and thus for entering a second phase marked by positive alliance experiences (Interview 10).

The second phase included acquiring valuable knowledge for BIGMEAT *about* and *from* the alliance partners. Some of these positive experiences continued to occur further in the process whenever BIGMEAT entered alliances with new alternative protein startup partners. In initial positive learning experiences with startup partners, BIGMEAT managers learned *about* the pragmatic approach and collaborative potential of vegan companies and startups (Interview 10; 6), *about* the market potential of *"second generation"*.[2] plant-based products (Interview 6), *about* the products' compatibility with BIGMEAT's existing production know-how (Interviews 1; 8) and customer base, the so called *"flexitarians"* [3] (Interviews 5; 9), *about* the products' global sustainability potential (Interviews 4; 5; 2; 9), *about* new markets including the fish, egg and cheese markets (Interviews 10; 11; Informal interview 17), and *about* the potential applications of new technologies such as 3D-printing (Interview 9). Particularly valuable knowledge was generated in the context of BIGMEAT's learning *from* three startups, Startups C, D and F. This type of learning adopted a dual nature and included both product-related and sustainability-related learning. In the former, BIGMEAT managers learned how to develop and produce second generation products through extrusion technologies and novel product ingredients (Interviews 3; 5), the value of a high-emotion branding approach for alternative protein products (Interview 10) and, what was perceived as the most valuable learning, the positioning of such products for proper target group reach (Interviews 8; 10). Concerning the latter, individual managers, in particular BIGMEAT's Board Lead for Alternative Proteins, learned from the startups how business can serve as a powerful vehicle for achieving fundamental change for sustainability (Informal interview 9).

The third learning phase was overwhelmingly marked by negative alliance experiences. In the course of Alliances B, C, D, F and G, BIGMEAT managers had negative experiences with regard to alliance processes relating to what were perceived as bold demands by startup partners, communication misunderstandings and project delays. All this was particularly evident in Alliance C. In the first learning cycle with Alliance C, BIGMEAT had already learned *about* the startup's demand for "collaboration among equals" and that it was not willing to *"let go of the reins"* (Interview 10) of strategic product placement decisions. The second learning cycle involved increasing frustration in the BIGMEAT top management team and among various middle managers (Observation 09/2019), which

[2] Second generation products are in appearance, texture, preparation method and taste almost undistinguishable from the animal-based original.
[3] Flexitarians are customers who are keen to reduce meat consumption while still eating (some) animal meat.

resulted in delivery delays (Interviews 5; 8) and what was perceived as uncooperative behavior by the startups (Interview 3; Informal interview 15). The impacts were mostly felt by the sales managers who coordinated interactions between the startups and BIGMEAT's sales partners:

> *"What is happening right now [in Alliance C] is painful. We are consciously inflicting pain on ourselves. And right now, you need a very, very, very high tolerance limit, because it isn't working out as it should."* (Interview 8)

No.	Finding	Main topic	Relation to prior research
1.2	Learning *about* and *from* sustainability startups occurs in three phases marked by (1) overcoming an inhibition threshold, (2) positive experiences and (3) mixed positive and negative experiences.	Subdivision of alliance learning processes into three distinct phases	This subdivision adds to alliance process research (e.g. Heimeriks et al., 2015). The diverging experiences in alliance learning phases specify evolutionary alliance learning paths (e.g. Doz, 1996).

4.3. BIGMEAT's alliance learning outcomes

BIGMEAT's learning *about* and *from* the sustainability startups in the three phases of alliance learning had different outcomes within and beyond organizational boundaries.

Learning about: This type of learning enabled the BIGMEAT top management team to make decisions regarding further alliances, establish processes to ensure efficient alliance handling, and make new structural considerations. The first phase of learning in Alliances S and A helped the leadership team to overcome initial resentment toward vegan startups (Interviews 10; 4; 6) and made them *"open to dealing with technologies that may represent a massive competition to our core business"* (Interview 10). The second phase of valuable learning outcomes, particularly in the context of Alliance C, created a newfound enthusiasm for second-generation plant-based products among BIGMEAT employees (Interviews 10; 7; 6; 3; 4). This was driven by the first taste experience with the startup product: *"I was able to taste it and I said: My goodness, this is a product that can become something"* (Interview 5). The data suggests that initial positive experiences and related valuable knowledge were the main triggers for formulating the new firm strategy of *"growth through diversity"* (Interview 11; Firm magazine 12/2018) and marked the beginning of a deliberate alliance portfolio approach. Valuable learning in Alliance C also facilitated processes and helped avoid pitfalls in subsequent alliances, especially D, E and F:

> *"Due to the way we learned to work with each other in [Alliance C], a lot of progress is being made here at the firm [BIGMEAT]. Thus, for the next startup, we already know from the outset: Okay, we also have to pay close attention to this or that aspect, we have to approach that differently."* (Interview 4)

BIGMEAT's alliance decisions increasingly shifted from startups for meat analogues (S, A, B, C) to startups that can be placed under a much wider "*protein umbrella*" (Observation November 2018; D, F, G). Engaging with diverse alternative protein startups further away from BIGMEAT's core product range (i.e. meat) stressed the firm's willingness to engage in sustainability-oriented product innovation in the broader alternative protein field. In line with this, the data indicates that learning processes sped up significantly over the third learning phase and BIGMEAT's decisions on alliances were made faster (e.g. F, G, H).

The negative experiences in the third learning phase in Alliances B, D, F and G prompted the top management team to renew financial support for Startup B (Interviews 9; 11), to postpone planned market launches with Startups D and F (Interviews 3; 4; 10), and to eventually terminate Alliance G in January 2020 (Board Discussion 02/2020). Even though experiences were particularly negative with Alliance C and evoked the desire among BIGMEAT managers to become independent from startup demands (Informal interview 15), the benefit of Alliance C in enabling BIGMEAT to change its product portfolio outweighed the frustration (Interview 10). Instances of negative alliance experiences led to the acceleration of BIGMEAT's own plant-based product development (Interview 5; Informal interviews 13; 15). At the organizational level, *"We try to really push our own product development forward now"* (Interview 9). Individuals were also affected by negative alliance experiences: *"[This] spurred me on personally and the same happened with my team, I mean those people working for me"* (Interview 3).

No.	Finding	Main topic	Relation to prior research
2.1	Continuous positive experiences related to valuable knowledge *about* the startup partners accelerated decisions on alliance partners further away from the core business. Later negative experiences related to learning *about* startup partners accelerated the established firm's innovation processes.	The changing nature and purpose of learning *about* over time	The finding extends previous work on alliance learning types (e.g. Inkpen and Currall, 2004) and outcomes of learning *about* (Doz, 1996) by considering learning over time.

Learning from: Product-related learning *from* the startups prompted BIGMEAT to abandon their previous focus on vegan products serving market niches and instead started to develop second-generation plant-based protein products for the mass market (Interviews 5; 8; 9):

> *"We increasingly focus on pimping our existing products in terms of marketing and taste, maybe integrating something that the [product of Startup C] has that we haven't had yet."* (Interview 5)

Realizing the boundaries of its own meat focused product development (Interviews 3; 10), BIGMEAT's management first increased collaboration with external product developers and then in early 2020 created new positions in the product development department (Interviews 4; 10; Board discussion 02/2020). This served the future objective to have a separate product development department for alternative proteins: "*The more in-house the better*" (Interview 10). Before engaging in alliances, BIGMEAT's sales manager thought of positioning the alternative protein products with its veggie food service and product brand, targeting vegan or vegetarian consumers (Interview 8). In contrast to this original product placement strategy, BIGMEAT learned from Alliance C to ask retailers to position these products directly in the same aisle as conventional meat products.

> "*[Startup C] knows today that 92 percent of the customers that buy [products of Startup C] also buy meat. It shows us that the positioning and orientation of [Startup C] is exactly right.*" (Interview 8)

Based on this learning from Startup C, all new BIGMEAT products will now be positioned in close proximity to animal-derived meat. Concerning product marketing, BIGMEAT managers learned how to implement an alternative protein branding strategy. Before the alliances, BIGMEAT's operations focused on the conventional high-volume meat market, which typically does not involve any brands. In late 2019 and early 2020, BIGMEAT formulated its first social media strategy and planned a separate communication channel for BIGMEAT's own new alternative protein brand (Interview 11; Board discussion 02/2020). This activity was not directly triggered by the alliances, but "*It helps to see, of course, which successes a partner […] has with which strategy. In terms of social media, [Startup C] is certainly a good example*" (Interview 12). The more knowledge about plant-based protein innovations filtered into BIGMEAT's product development department, the more experimental and ambitious BIGMEAT became in the development of its own plant-based products (Interview 4; Informal interview 9). BIGMEAT now aims at increasing the share of total revenue for alternative protein products from 5% in January 2018 to 25% in 2025 (Media report 08/2019). However, the rapid implementation of alternative protein products was only possible through learning enabled by BIGMEAT's existing expertise and the infrastructure of the conventional meat industry.

Sustainability-related learning that occurred in the context of the three alliances prompted individual BIGMEAT employees to adopt novel perspectives and integrate global sustainability concerns into decision-making (Interview 4; Informal interview 15). BIGMEAT's project team member and trend scouter, for instance, recounts how the interaction with the founder of Startup F gave him a new "*awareness to find alternative*s" and encouraged him to consider global food security concerns. According to him, "*These are perspectives that I have only adopted in the last few years because of such people and companies*" (Interview 4). Similarly, other BIGMEAT managers, after learning about the sustainability potential of the startups' products, began to question the long-term viability of conventional meat production and became more open toward alternative protein solutions (Interviews 3; 5; 8; Informal interview 7). Adopting the startups' approaches to the development, positioning and marketing of BIGMEAT's plant-based product innovations was increasingly seen as a way to combine the goals of increasing sales revenue in the mass market and gaining competitive advantage as well as the proactive goal of contributing to sustainability (Interview 9; Informal interview 9). The data indicate that knowledge spillovers of sustainability perspectives and goals were highly welcomed by the startup owners, who saw BIGMEAT's involvement in the alternative protein field as contributing to their agenda of transforming the market toward sustainability (Interviews 14; 15; 17). The owner of startup A states, for instance:

> "*We are definitely an ideologically-driven startup […] Maybe in other ways [BIGMEAT] wouldn't have been exposed to the potential of the ideologically-driven activities [we display in our business]. I think in that sense we are affecting them. And through this, [BIGMEAT] is also exposed to the audiences that very much relate to this ideology. And [BIGMEAT] sees other potential value in that as well. I think it's extremely beneficial for all sides.*" (Interview 14)

No.	Finding	Main topic	Relation to prior work
2.2	Product-related knowledge for sustainability innovation advanced the established firm's innovation capability. Sustainability-related learning *from* sustainability startups resulted in changes to perspectives and behaviors of individuals in the established firm, advancing their ambition for corporate sustainability.	The dual nature and purpose of learning *from* in the context of sustainability innovations	The specification of learning *from* in the context of sustainability innovations extends work on alliance learning types (Inkpen and Currall, 2004) and outcomes of learning *from* (e.g. Alvarez and Barney, 2001)

Combined learning over time: The continuous flow of valuable knowledge related to learning *about* the startup's high market potential and the products' compatibility with BIGMEAT's existing expertise, and the occasional occurrence of learning *from,* which was related to developing and marketing plant-based products, coupled with later negative experiences related to alliance processes and coordination resulted in a powerful outcome for sustainability innovation. The combination of different learning types and experiences over time made BIGMEAT's top management eager to find ways to "*extremely expand*" in the alternative protein field while simultaneously avoiding financial risks, dependencies and challenges that come with an increasing number of alliance partners (Informal interview 6). As a result, they decided to co-found a global accelerator platform for plant-based protein products as well as a joint venture for the production and distribution of these products across Europe (Interview 9; 10; 11). With these new activities, BIGMEAT was aiming at the "*accelerated development of strong brands, high quality standards and a wide range of products for a mass market that*

extends far beyond vegan and vegetarian niches" (Press release 02/2020).

No.	Finding	Main topic	Relation to prior research
2.3	The combined effect of alliance learning types and alliance learning experiences over time resulted in sustainability-oriented corporate entrepreneurial activities aiming at broader market impact	The large-scale sustainability impact of accumulated alliance learning experiences	Adds a market perspective to the inter- and intra-organizational perspective on alliance learning outcomes suggested by previous research focused on alliance performance (e.g. Liu and Lui, 2020), alliance decisions (e.g. Heimeriks et al., 2007) learning capabilities (e.g. Schilke and Goerzen, 2010) and corporate innovation (e.g. Kavusan et al., 2016)

The findings show that learning from various startups in strategic alliances continuously increased BIGMEAT's sustainability innovation in the alternative protein field.

4.4. Process model development

A new process model for alliance-driven learning for corporate sustainability innovation depicts how the findings are sequentially linked (Fig. 4). The grey area encompassing alliance learning processes combines Findings 1.1 and 1.2 on alliance learning types and experiences in three alliance learning phases. The underlying light grey area encompassing alliance learning outcomes combines Findings 2.1, 2.2 and 2.3 on alliance decisions, in-house sustainable product innovation and sustainable mass market transformation. The temporal sequences as well as direct and indirect influences of alliance learning are indicated by dark colored arrows.

In line with Finding 1.2, the conceptual model distinguishes three learning phases in the evolutionary alliance learning process. The different scopes and contents of the learning cycles, which are represented in Finding 1.1, suggest an at least equal importance of learning *about* and learning *from* for corporate innovation. The larger distance between the first and second learning cycles indicates the inhibition threshold identified in Finding 1.2. In line with Finding 2.3, the dark arrows at the top and bottom show how the combination of alliance learning types and experiences can advance and accelerate corporate entrepreneurial activities for sustainable mass market transformation. Such transformation is understood as the replacement of conventional products, services and market structures by superior environmental and social products and services (Hockerts and Wüstenhagen, 2010; Schaltegger and Wagner, 2011). In the case of BIGMEAT, this happened directly through (1) the formation of alliances further away from the core business (Finding 2.1, arrows at top), and (2) the acceleration of in-house product innovation (Finding 2.2, arrows at bottom). The dotted arrows show the indirect transformation outcomes of sustainability learning (Finding 2.2). They visualize how personal learning from startup owners advanced the sustainability ambition of individual managers at BIGMEAT, influencing the firm's innovation activities and therefore also driving market change. The dark colored areas in the process model indicate those alliance learning characteristics
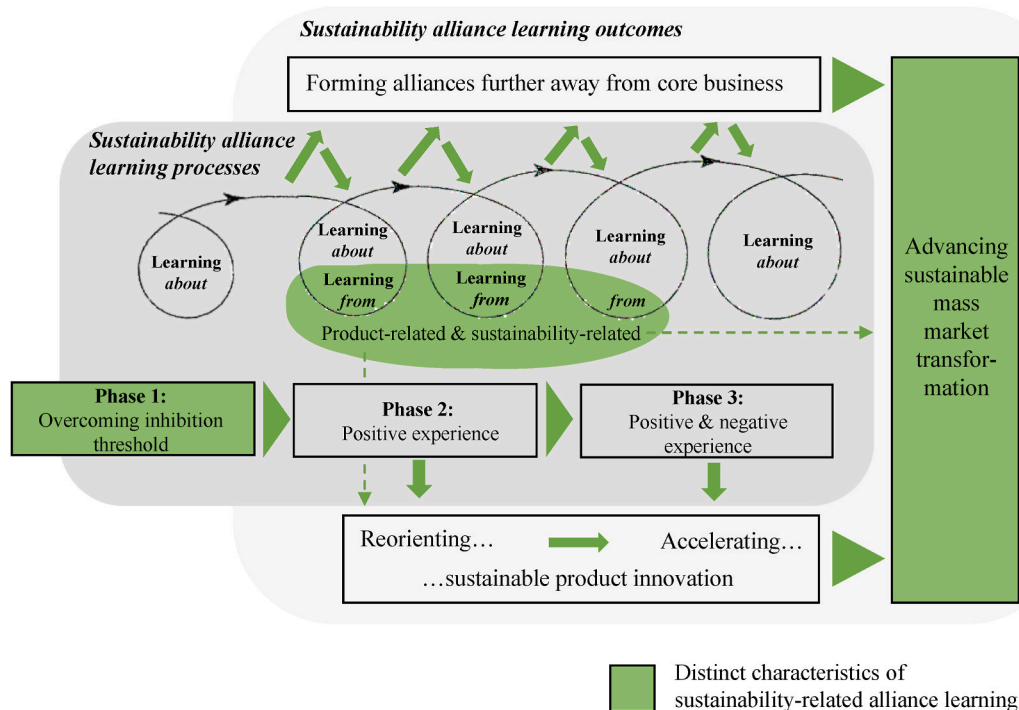

Fig. 4. Process model of alliance-driven learning for corporate sustainability innovation.

that were specific to the sustainability context. The following section elaborates on how these insights help close the research gap identified in this paper.

5. Discussion

Previous research dealing with alliance learning processes and outcomes has described learning as highly evolutionary (Doz, 1996) and has defined two main types of learning, learning *about* and learning *from*, which influence decision-making and the success of alliances or corporate innovation in the established partner firm (Inkpen and Currall, 2004; Das and Kumar, 2007). In this regard, there are some general findings about the temporal occurrence of learning *about* and *from* in the alliance process (Das and Kumar, 2007). So far however, no empirical study has explored alliance learning processes in the context of sustainability innovations, in particular different learning experiences, challenges and outcomes. Our case findings address the research gap by offering insights into the processes and outcomes of an established firm's learning in alliances with sustainability startups. Our study makes important contributions to the existing literature as discussed in the following.

5.1. Characteristics of alliance learning processes and outcomes for sustainability

The study findings are in line with the initially posed assumption that alliance learning processes and outcomes differ in the context of sustainability innovations. Our process model shows the three distinct characteristics of sustainability-related alliance learning (see dark colored areas in Fig. 4). Each of these characteristics extends prior research in alliance learning.

Inhibition threshold: The inhibition threshold identified in the study, which is seen in an initially reduced learning scope and pace, provides a new temporal perspective on differences of learning processes between established firms and sustainability startups. The observed hesitancy and only gradual increase in learning pace over time extends previous alliance learning research that has emphasized the facilitation role of partner familiarity and trust for learning in alliances (Inkpen and Currall, 2004; Nielsen, 2005; Nielsen and Nielsen, 2009). Our study's findings combine insights on alliance learning processes with previous sustainability research, which has pointed to potential complications in alliance learning due to differences between mainstream and sustainability actors (London et al., 2004; O'Mahony and Bechky, 2008; Rondinelli and London, 2003; Stern and Hicks, 2000). In the case of BIGMEAT, extensive learning *about* sustainable startup partners and their collaborative potential (particularly Alliance S) was necessary for the firm to eventually learn *from* the first startup (Alliance C) in later phases of the alliance process. The inhibition threshold experienced in sustainability-oriented alliances can thus help to explain the observed time lag between the first experience of learning *about* and the first experience of learning *from,* and the gradual acceleration of alliance learning over time. This indicates that the more alliances an established firm enters into, the greater the likelihood is to find sustainability partners to learn *from* and to find the one special alliance that becomes the main driver of learning for sustainability innovation.

Dual nature of learning from: By outlining the temporal occurrence and outcomes of sustainability-related learning, our study adds a new dimension to learning *from* that becomes relevant in the context of sustainability innovations and that has not yet been discussed in strategic management literature (Doz and Hamel, 1998; Khanna et al., 1998; Inkpen and Currall, 2004; Inkpen and Tsang, 2007). The adoption from startup owners of new sustainability perspectives by some BIGMEAT managers highlights the relevance of personal interactions for sustainability innovations. This finding relates to Felin et al.'s (2012) microfoundation view of capabilities. The finding that sustainability startup partners welcomed sustainability-related learning at the established firm conflicts with previous alliance learning research. It was previously assumed that accessing and internalizing knowledge from partners constitutes a learning race and struggle for dominance that negatively impacts the relationship between the partner firms (Alvarez and Barney, 2001; Hamel, 1991; Inkpen and Beamish, 1997; Inkpen and Currall, 2004; Van de Ven and Walker, 1984). While this might be true for conventional product-related learning outcomes, the opposite may be true for sustainability-related learning outcomes. As BIGMEAT only internalized sustainability-related knowledge from the three startups that also provided relevant product-related knowledge, our study further suggests that sustainability-related learning *requires* previous valuable product-related learning.

Learning outcomes for market transformation: The identification of alliance learning outcomes *beyond* organizational boundaries extends previous alliance learning research, which has focused on learning outcomes for alliance learning capability and alliance performance (e.g. Kale and Singh, 2007; Liu and Lui, 2020), decisions on alliance formation (e.g. Gulati et al., 2009; Heimeriks et al., 2007), and corporate innovation (e.g. Subramanian and Soh, 2017). The case of BIGMEAT gives indications of alliance learning outcomes that benefit the transformation of mass markets toward sustainability. It is thus in line with previous suggestions that large established companies have significant impact on the marketplace by dedicating resources toward addressing sustainability challenges (Hockerts and Wüstenhagen, 2010). The learning-triggered formation of additional distribution alliances increases the availability of meat alternatives in mainstream distribution channels. Early impacts were observed in the context of Alliance C, with products having reached conventional meat consumers, as well as non-organic retail and food service chains in May 2019, thirteen months after Alliance C was established. Thus, our finding also supports that there is a positive relationship between corporate sustainability innovations and competitiveness (Hall and Vredenburg, 2004; HermundsdottirAspelund, 2021). The learning alliance with BIGMEAT further accelerated the expansion rates of individual startups, thereby increasing their impact on conventional markets. For instance, Startup C's revenue quadrupled between 2018 and 2020. Considering that the goal of sustainability innovations is to solve broader problems relating to planetary boundaries or the United Nations' Sustainable Development Goals (e.g. Johnson and Schaltegger, 2020), market transformation triggered by alliance learning has the potential to contribute to the sustainable development of society as a whole.

5.2. Temporal occurrence and purpose of learning types in specific learning phases

Our process model highlights the study's new findings on the temporal occurrence of learning *about* and learning *from* in the three alliance learning phases*,* and differentiates the learning type and purpose depending on contextual alliance experiences (see learning cycles, types and phases in Fig. 4). While these findings arise from our sustainability-oriented case study, our findings suggest that they are not necessarily limited to the sustainability context.

The crucial role of learning about: The continual occurrence and far-reaching impact of learning *about* emphasize the crucial role of this type of learning for advancing corporate innovation. This finding is distinct from Das and Kumar's (2007) suggestion that learning *from* dominates learning *about* in the alliance operation phase. In contrast, our empirical study identified the repeated dominance of learning *about* over learning *from* in the alliance process. Furthermore, our findings extend research that has limited the outcomes of learning *about* to alliance-specific processes (Doz, 1996; Ireland et al., 2002). Our study suggests that learning *about* directly accelerates innovation in the established firm, particularly in the later stages of the alliance process. The prevalence of learning *about* enabled BIGMEAT to enter a wide range of alliances with product offers increasingly distanced from BIGMEAT's core business of animal derived meat products. Confirming Grant and Baden-Fuller (2004) knowledge accessing theory, we find that learning *about* can trigger opportunities for strategic re-orientation over time. Our study, however, does not support Subramanian and Soh's (2017) finding that increased partner diversity positively impacts the breadth of the resulting corporate innovation. Even though BIGMEAT acquired knowledge with regard to plant-based meat, egg and dairy as well as cell-based meat, the BIGMEAT product innovations remained focused on plant-based meat substitutes.

Positive and negative experiences: Phase 2 and 3 of our process model suggest that alliance learning involves positive experiences in the early phase and mixed positive and negative experiences in later phases. Indeed, past research has addressed positive experiences related to the acquisition of valuable knowledge (Das and Kumar, 2007) and negative experiences related to learning challenges in alliances between established firms and startups (Barabel et al., 2014; Doz, 1988; Minshall et al., 2010; Pérez et al., 2012). Our case study, however, introduces a novel process perspective on these different experiences within alliances. Most importantly, we show that negative experiences in Phase 3 of the alliance process, despite being detrimental to the alliance process as such, can become key drivers of radical innovation activities in an established firm. In the case of BIGMEAT, negative alliance experiences had a very significant impact due to an aggregation of parallel learning cycles within different alliances. In the case of Alliance C, for example, negative experiences were linked to the startup's strong sales relationships and this resulted in an unanticipated sense of dependency at BIGMEAT. This finding conflicts with previous research suggesting that partner asymmetry implies unequal processes to the detriment of the smaller firm (Barabel et al., 2014; Doz, 1988; Minshall et al., 2010; Pérez et al., 2012; Prashantham and Birkinshaw, 2008).

6. Conclusion, limitations and future research

This study provides empirical insights into the processes and outcomes of alliance learning in the context of sustainability innovation and establishes a conceptual link to their role in fostering market transformation toward sustainability.

The analysis provides valuable contributions to the alliance learning literature by identifying three distinct characteristics of sustainability-related alliance learning. We found that learning in alliances with sustainability startups (1) requires overcoming an inhibition threshold, and is thus initially slow and only accelerates over time, (2) includes not only product-related learning (i.e. development, marketing), but also sustainability-related learning (i.e. perspectives, goals), and (3) can indirectly and directly advance a firm's contribution to sustainable mass market transformation. The case of BIGMEAT shows how sustainability-related alliance learning processes can be separated into three distinct alliance learning phases with positive and negative alliance experiences, in which the temporal occurrence of learning types and their purpose (*about* and *from*) differ. Most importantly, we found the crucial role of learning *about* for advancing corporate sustainability innovation over time, which conflicts with previous research's strong focus on learning *from*.

BIGMEAT constitutes a unique case in the meat industry, and accordingly case research was designed for internal validity, construct validity and reliability (Gibbert et al., 2008). To increase external validity (i.e. transferability) of the findings and therefore our alliance learning process model to other established firms, future research could further investigate processes and outcomes of direct collaborations between established firms and sustainability startups. In addition, the startup perspective could be explicitly explored by analyzing learning cycles and outcomes for small firms collaborating with large firms. These analyses would constitute a valuable addition to the findings presented here. The processes of intra-organizational knowledge diffusion and potentially diverging learning outcomes in different organizational departments or among individual employees have a high impact on corporate innovation. It would therefore be valuable to explore these differences with regard to learning *about* and learning *from* alliance partners and their potential impact on corporate sustainability innovation. Further, it might be worthwhile to investigate to what extent reputational concerns – as those voiced in Alliance S – can hamper corporate engagement with sustainability innovation. Lastly, since our study indicates only the potential for mass market transformation, future longitudinal studies could provide more detailed accounts of actual market changes following alliance processes.

Role of funding source

Author statement

Charlott Hübel: Writing- Original Draft, Investigation, Formal Analysis, Conceptualization Ilka Weissbrod: Writing- Review & Editing, Conceptualization, Formal Analysis Stefan Schaltegger: Supervision, Conceptualization, Writing- Review & Editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Interview details

Table A.1
Details of semi-structured interviews at BIGMEAT and startups

Interview No.	Firm of interviewee	Position of interviewee(s)	Duration of interview
1	BIGMEAT	CEO/Chair	74 min
2	BIGMEAT	CEO of key subsidiaries	47 min
3	BIGMEAT	Project Manager/Product Developer	52 min
4	BIGMEAT	Project Manager/Trend Scouter	47 min
5	BIGMEAT	CEO of international sales firm	45 min
6 (group interview)	BIGMEAT	A: Head of Sustainability Management & PR	42 min
		B: Sustainability Manager & Board Secretary	
7	BIGMEAT	Alliance Coordination Manager	34 min
8	BIGMEAT	Sales Manager	51 min
9	BIGMEAT	Head of Alternative Protein Unit	49 min
10	BIGMEAT	Board Lead for Alternative Proteins	73 min
11	BIGMEAT	Press Spokesperson	47 min
12	BIGMEAT	Marketing Manager	47 min
13	Startup S	Founder/CEO	40 min
14	Startup A	Co-Founder/CEO	52 min
15	Startup B	Co-Founder/CEO	49 min
16	Startup C	Board member	32 min
17	Startup D	Co-CEO/Chair	30 min
18	Startup E	Executive Vice President	36 min
19	Startup F	Co-Founder/CEO	29 min
20	Startup G	Founder/CEO	52 min

Table A.2
Details of informal conversational interviews at BIGMEAT

Interview No.	Interviewee	Date of interview	Interview location/context
1	Board Lead for Alternative Proteins	August 2018	Phone conversation
2	CEO of key subsidiaries	September 2018	Firm headquarters
3	Project Manager	October 2018	Firm headquarters
4	Board Lead for Alternative Proteins	November 2018	Industry event
5	Board Lead for Alternative Proteins	January 2019	Firm headquarters
6	Board Lead for Alternative Proteins	February 2019	Phone conversation
7	Project Manager	March 2019	Press event
8	Board Lead for Alternative Proteins	May 2019	Meeting with potential alliance partner
9	Board Lead for Alternative Proteins	May 2019	Industry event
10	Board Lead for Alternative Proteins	June 2019	Industry event
11	International Sales Manager	June 2019	Industry event
12	Board Lead for Alternative Proteins	July 2019	Firm headquarters
13	Board Lead for Alternative Proteins	August 2019	Firm headquarters
14	Sales Manager	August 2019	Firm headquarters
15	Board Lead for Alternative Proteins	September 2019	Industry event
16	Board Lead for Alternative Proteins	October 2019	Industry event
17	Head of Alternative Protein Unit	October 2019	Industry event
18	Head of Alternative Protein Unit	November 2019	Firm headquarters
19	Marketing Manager	November 2019	Firm headquarters
20	Board Lead for Alternative Proteins	November 2019	Firm headquarters

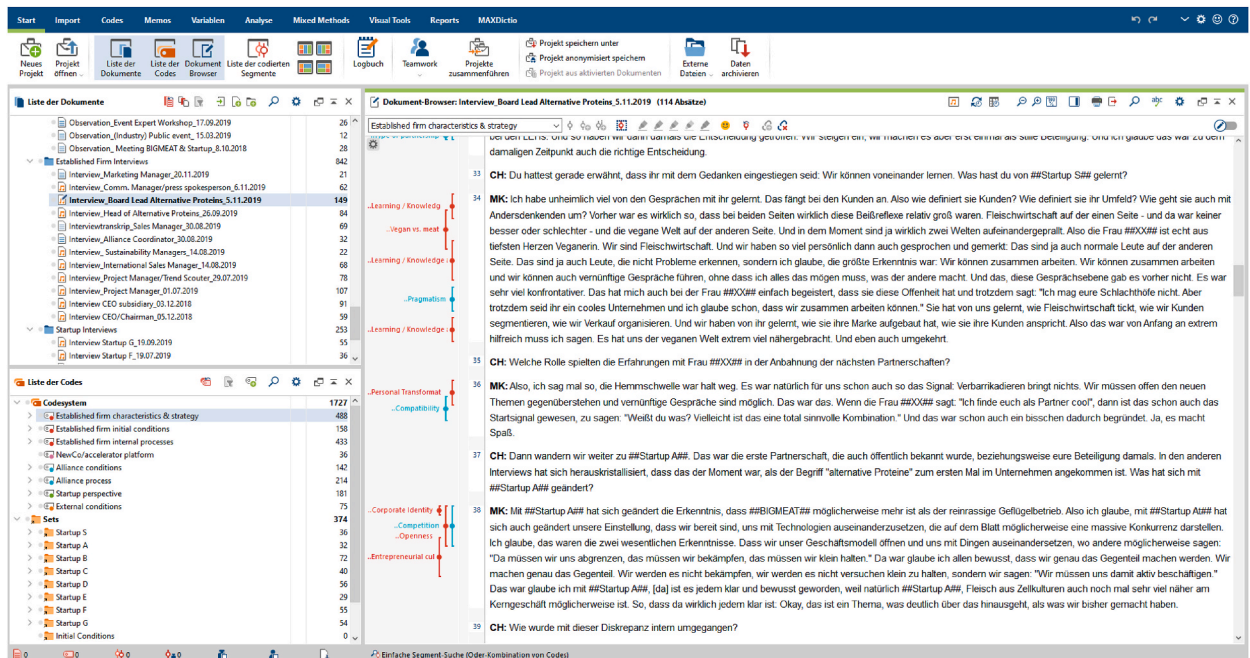## Appendix B. MAXQDA coding process

Figure B.1. Example of interview coding with the data analysis software MAXQDA.

Appendix C. Motivations for entering the alliances

Table C.1

BIGMEAT and startup motivations for entering the alliances

Alliance	Articulated motivation for entering alliance	
	BIGMEAT	Startups
S	"We got to know each other through contacts and then started the talks. And we said: You know what? We can actually both learn from each other. Everyone can learn from the other. It's not that one is bad and the other one good. Let's just try the experiment." (Interview 10)	"For me it was more like the pressure is taken away from me … It was more like saying it is great that it is taken away from me, that you have a partner who would catch you if you stumble. I did wish for such opportunities that they would help you to gain a foothold abroad, but I didn't know whether everything would really happen that way or whether they really did have the opportunity. This makes it especially great that it worked out too." (Interview 13)
A	"We have to deal with it, because if we don't do it, others will. And we cannot understand this technology if we are not involved. And we cannot prevent this technology." (Interview 10)	"We are definitely an ideologically-driven startup. I think it is one of our advantages. From the start we thought that partnering with the meat industry and with major players like [BIGMEAT] would be extremely important and beneficial to cultured meat firms. […] We wanted to partner with them, because we believed that, in order to really make an impact, partnering with an existing industry - that would allow us to get the type of [impact]" (Interview 14)
B	"[Alliance B] enables us as [BIGMEAT] to get a taste of a new area and to benefit a little from the startup world." (Interview 10)	"I would say: innovation meets experience. Especially at the beginning. I think this is extremely fruitful and there should be a lot more of it. […] Maybe I'm only speaking for myself here, but I think we now know what sustainability means. We try to live accordingly. I think many of the older generation are becoming familiar with the term, but not yet properly. This is why you have to combine innovation and experience." (Interview 15)
C	"But in the case of [Startup C], when you bite into [the product] for the first time, I thought: This is a completely new league, which we don't even know in Europe. This is how the idea came up: Can't we also offer this to our customers, who we already have in the meat sector, and thereby possibly turn it into an extremely attractive product?" (Interview 10)	"Together we can achieve something that one cannot achieve alone, at least not in time. The meat producer cannot bring the product to the consumer if he doesn't get it from us. We cannot address the consumer in [Europe] because we do not have the infrastructure, the network, the distribution and the cold chain. If our common goal is to bring the product to the European consumer, then we need a partner in Europe who enables us to do this, and so we have an ideal situation." (Interview 16)

Table C.1 (*continued*)

Alliance	Articulated motivation for entering alliance	
	BIGMEAT	Startups
D	"Doesn't it make sense to include these areas, as we also have the sales logistics and production skills to cover these products accordingly?" (Interview 10)	"For us, because we have a mission, because time is of the essence, who better to help us speed that up than the firms that are already really well established? […] I don't care whether you are looking from animal welfare or environmental degradation or climate change or health care, [for] all of those things, time is not on our side. So, speed to market, speed to innovation, all of that strategic help accelerate and that's why we partner with them." (Interview 17)
E	"We are investing in [Startup E] with a small amount to reduce the use of soy as much as possible."	"It allowed us to accelerate discussions with our partners for the various products. It allowed us to start development of plant two and three. It was very meaningful to us in terms of going from demonstration to pure commercial." (Interview 18)
F	[Startup F] fits under [BIGMEAT's] new "protein umbrella." It is more about "enlarging the pie," creating completely new categories, and giving customers a choice. (Meeting 10/2018)	"If firms can help us do more good faster, I am going to partner with them. It's as simple as that." (Interview 19)
G	The owner of [Startup G] approached [BIGMEAT] and he is "a great guy." The cheese has a lot of possible uses and can enhance the existing product range. (Informal interview 15)	"Through [BIGMEAT], I have the opportunity to be represented in so many supermarkets at the same time, and discounters too, and thus I can do TV advertising […] [BIGMEAT] opens the doors for us to bring the product to the midst of society." (Interview 20)
H	"In the case of [Startup H], it is also a long-term partnership, where still a lot of development has to be put it. But if it is going to happen, it is a really great technology. And we will be a part of it." (Interview 9)	no startup interview -

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