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Bogers, Marcel; Chesbrough, Henry; Strand, Robert

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Sustainable Open Innovation to Address a Grand Challenge: Lessons from Carlsberg and the Green Fiber Bottle

Marcel Bogers

University of Copenhagen; Department of Food and Resource Economics
University of California, Berkeley; Haas School of Business
marcel@ifro.ku.dk

Henry Chesbrough

University of California, Berkeley; Haas School of Business
chesbrou@berkeley.edu

Robert Strand

University of California, Berkeley; Haas School of Business
Copenhagen Business School; Department of Management, Society and Communication
rstrand@berkeley.edu

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Abstract

Purpose

This paper describes the case of how the Danish beer manufacturer Carlsberg developed the Green Fiber Bottle as part of its sustainability program through an open innovation approach — in collaboration with complementary partners. It thereby illustrates attributes of how a grand challenge associated with sustainability can be effectively addressed through open and collaborative innovation, and which opportunities and challenges emerge in that context.

Design/methodology/approach

The paper summarizes some key elements of the case, and especially provides some of the lessons learned, which can be further explored in future research, practice and policy.

Findings

The case suggests a number of key issues that are relevant for addressing grand challenges in general, and sustainability in the food and beverage (F&B) industry in particular, namely: leveraging open innovation in the face of sustainability as a grand challenge, sustainability beyond a solid business case, opportunities and challenges of in the face of new business models, the importance of early wins for addressing societal challenges for signals and scaling, and the importance of the Nordic context and long-term vision.

Originality/value

The case describes a recent (and to some extent still ongoing) initiative of how a particular F&B company explores new approaches to develop its sustainability program, and it thereby highlights some of the unique characteristics of this case. This paper also lays the groundwork for the establishment of “Sustainable Open Innovation” as a domain in its own right.

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Introduction and Background

As a global society, we currently face significant grand challenges that affect many parts of our lives, and which will require more sustainable and responsible solutions. The United Nations (UN) Sustainable Development Goals (SDGs) bring the most pressing of these grand challenges into a single framework including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice¹. The food and beverage (F&B) industry is a particular industry that is linked to many of these issues, in terms of both the challenges that we face and the solutions that need to be developed. While we can generally describe a grand challenge as “specific critical barrier(s) that, if removed, would help solve an important societal problem with a high likelihood of global impact through widespread implementation” (George et al., 2016: 1881), the traditional and complex nature of some parts of the F&B industry does not always make it easy to address the relevant grand challenges, despite their importance and potential (e.g., Garcia Martinez, 2013; Monteiro & Cannon, 2012; Popkin, 2014; Riley, 2005). In such a context, F&B companies may face particular challenges to develop new innovation strategies and business models that combine economic consideration with environmental goals (Bogers & Jensen, 2017; Cantino et al., 2019; Franceschelli et al., 2018).

In this paper, we describe how the Danish beer producer Carlsberg approached the grand challenge associated with sustainability in the case of the Green Fiber Bottle through an open innovation approach, and we draw some lessons upon which future research, practice and policy could be based. The case serves as one of the first formal documentations of how open innovation can effectively drive innovation activities to address a stated sustainability objective.² This co-mingling of sustainability and open innovation has the potential to

¹ <https://www.un.org/sustainabledevelopment/sustainable-development-goals>

² See also the Berkeley-Haas Case “Innovation @ ENEL: From Monopoly Power to Open Power” by Henry Chesbrough, available at <http://cases.haas.berkeley.edu/search/articleDetail.aspx?article=5866>.

become a domain in its own right that we call “Sustainable Open Innovation”.³ Furthermore, this case may serve to spark considerations by students, practitioners and policy makers for how open innovation can be deployed in service of other sustainability objectives such as those represented by the seventeen SDGs, thereby also contributing to future research on open innovation (Bogers et al., 2017, 2018a; Stanko et al., 2017; Tucci et al., 2016; Vanhaverbeke et al., 2014; West & Bogers, 2014, 2017; West et al., 2014).

The case of the Green Fiber Bottle represents an example of how a F&B company dealt with the increasing complexity of addressing sustainability issues in line with its strategy. As such, it is in line with the significant transformations that the F&B industry has experience during the last decade (Kastelli et al., 2018; Rama, 2008; Vrontis et al., 2016). It is also in line with how grand challenges “can be plausibly addressed through coordinated and collaborative effort [to] help solve an important societal problem with a high likelihood of global impact through widespread implementation” (George et al., 2016: 1880-1881), given the increasing complex challenges that the F&B industry is facing (Civera et al., 2019) and the more open and inclusive approaches that need to be found in the face of these complex problems (Bresciani, 2017; Cillo et al., 2019).

Carlsberg and the Green Fiber Bottle

The Carlsberg⁴ brewery was founded in Copenhagen, Denmark in 1847 by J.C. Jacobsen, who was born in 1811 and died in 1887. He was a visionary man whose vision still strongly affects how Carlsberg is currently run. He has also been described as “a true pioneer of the brewing industry, fueled by a vision of production based on sound craftsmanship

³ The case that is described in this paper draws on the Berkeley-Haas Case “Sustainability Through Open Innovation: Carlsberg and the Green Fiber Bottle” by Henry Chesbrough, Marcel Bogers and Robert Strand, available at <http://cases.haas.berkeley.edu/search/articleDetail.aspx?article=5922>.

⁴ The name Carlsberg was a combination of the name of J.C. Jacobsen’s son, who was five years old at that time, and “bjerg”, the Danish word for “mountain” that referred to the hill where the brewery was built in the at-that-time-independent village of Valby in the outskirts of Copenhagen.

combined with science” (Bjerager, 2011: 11). Moreover, he enacted his vision in 1875 by establishing the Carlsberg Laboratory, which became the home of various important discoveries.⁵ The fact that J.C. Jacobsen’s legacy has left an important imprint on the current Carlsberg company is based not only on him “being visionary, challenging, open and magnanimous, and by always pursuing perfection regardless of what he was doing” but “his legacy is also the Carlsberg Foundation’s and the Carlsberg Group’s beacon and benchmark” (Carlsberg Foundation, 2014: 16).⁶

This legacy has also influenced Carlsberg’s current sustainability program as part of its strategy “Brewing for a better today and tomorrow” as launched by CEO Cees ‘t Hart. Besides improved beverage and production processes, Carlsberg has also been exploring solutions in related domains, such as the Green Fiber Bottle, which is a bio-degradable bottle made of wood pulp. As ‘t Hart explains: “When I joined Carlsberg, it became clear to me that at Carlsberg, the purpose has always been there. The founders’ mentality permeates the business, and to me, the Green Fiber Bottle is a good example of a project that brings that mentality to life.” (Chesbrough et al., 2018: 5) And to explain that this is also in line with the Carlsberg Foundation’s vision, which in the end has the majority voting rights in the company, the chairman Flemming Besenbacher summarized the connections among Carlsberg’s ownership structure, strategy, and operations with three Ps: “One is of course

⁵ One such significant discovery was when Emil Christian Hansen discovered a new method of cultivating pure strains of yeast, which enabled the production of beers with a good and consistent quality. His discovery revolutionized the brewing industry, not the least because the method was published and not patented so that it was freely available to use for all. Other significant discoveries by researchers of the Carlsberg Laboratory include S.P.L. Sørensen’s (1909) invention the pH unit to measure the acidity or alkalinity of a substance, or the more recent sequencing of the barley genome as part of an international collaboration (Mascher et al., 2017). In fact, in the Berkeley-Haas case “Sustainability Through Open Innovation: Carlsberg and the Green Fiber Bottle” (Chesbrough et al., 2018), the chairman of the Carlsberg Foundation Flemming Besenbacher mentions the the barley-genome sequencing project as one example that illustrates why open innovation is important for Carlsberg.

⁶ In fact: “The Carlsberg Foundation’s task is to manage the legacy of brewer J.C. Jacobsen in such a way that his thoughts and ideas are reflected and respected, and so that the Foundation’s Charter is duly applied and adapted to modern principles, thereby helping set the direction for the company, science and society.” (Carlsberg Foundation, 2014). The Foundation, originally established in 1876 by J.C. Jacobsen, has effective control of the corporation to this day, which ensures its continued adherence to these principles.

profit. We are here to create value for our shareholders, that's for sure. The next P is purpose. We are a purpose-driven company. And the final P is for planet. I do not believe that you can run a company in the twenty-first century without taking care of the planet.” (Chesbrough et al., 2018: 6)

One example of the three Ps can be found in the Green Fiber Bottle project. This project originated from a collaboration between the Danish brewer Carlsberg and a smaller Danish company ecoXpac, which developed environmental-friendly packaging solutions (e.g., based on biodegradable molded fiber). Later, they were joined by the Technical University of Denmark (DTU) and the Swedish packaging company BillerudKorsnäs, who contributed investment capital to ecoXpac and complementary expertise in raw materials. The project ultimately also received funding from the Innovation Fund Denmark (IFD). The result is a far more environmentally friendly container. “The Green Fiber Bottle is a fully biodegradable bottle made from molded paper pulp. Its development depends on the establishment of the manufacturing technology. Impulse drying, an innovative way of drying, has the potential to improve significantly the manufacturing process of the Green Fiber Bottle, towards a sustainable packaging.” (Didone et al., 2017: 1)

Even though Carlsberg more often engages in collaborative innovation projects, the Green Fiber Bottle project had some particular characteristics. For example, even though Carlsberg typically requires partners to sign non-disclosure and exclusivity agreements in order to protect its first-mover advantage, they considered the breakthrough nature of this project not to be suited for such an approach. This was mainly due to the high level of complexity and uncertainty of the project, and there were just too many unknowns, such as the composition of fibers that would withstand sufficient pressure, the type of bio-based barrier that would function effectively yet also prove biodegradable, and the design and cap that would satisfy customers. Therefore, the company had to approach the project in a fully

open and transparent way in order to attract the different companies or institutions that it needed to execute the project. And even though Carlsberg did secure the right of first refusal, ecoXpac and BillerudKorsnäs may sell the technology behind the bottle to anyone else after Carlsberg had the opportunity to do so. In the face of sustainability as a grand challenge, Carlsberg's Director of Sustainability Simon Boas Hoffmeyer, in fact saw this as an advantage: "It's also absolutely key that other industries and other companies can benefit from the work we and the partners put into the Green Fiber Bottle, because that's true sustainability — when something can reach the right scale and scope and is not just confined to one company or one industry" (Chesbrough et al., 2018: 9).⁷

Leveraging Open Innovation in the Face of Sustainability as a Grand Challenge

In the case of the Green Fiber Bottle, the original motivating factor for its development was a desire for greater sustainability performance. When Carlsberg audited its environmental footprint as a brewery, they found that approximately 40% of their footprint came from packaging. Yet Carlsberg did not want to get into the packaging business itself so it needed to find complementary partners to be able to leverage this potential (Teece, 1986; West & Bogers, 2014). This is typical of many sustainability issues, where the focal organization is causing a negative impact upon the environment, but cannot alone find an economically viable solution for mitigating its impact. Moreover, it needs to resolve the negative impact in ways that remain consistent with its business strategy.

The uncertainty and complexity that is inherent in the grand challenge — in this case connected to that of plastic waste — oftentimes call for coordinated and collaborative efforts that draw upon the competencies of multiple organizations to more successfully address the

⁷ This paragraph draws on the Berkeley-Haas case "Sustainability Through Open Innovation: Carlsberg and the Green Fiber Bottle" (Chesbrough et al., 2018), where more detailed descriptions are available.

problem (George et al., 2016). This is precisely where the sustainability concept and open innovation concept come together.

Sustainability (and ‘sustainable’) is most commonly defined as “development that meets the needs of the present without comprising the ability of future generations to meet their own needs” (Brundtland, 1987). Open innovation is defined as “a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model.” (Chesbrough & Bogers, 2014: 17).⁸ Therefore, we define Sustainable Open Innovation as *a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model, that contributes to development that meets the needs of the present without comprising the ability of future generations to meet their own needs*. Pecuniary mechanisms, which imply that knowledge flows relate to or consist of money, can be linked to the idea that a business case (i.e., the financial case) is a motivating factor for an innovation activity. However, for sustainability challenges it is increasingly apparent that non-pecuniary mechanisms are oftentimes observed as the most conspicuous *initial* motivating factor that ultimately leads to the open innovation activity. This is readily observed in the case of the Green Fiber Bottle.

Sustainability challenges also relate to the longer-term perspective, in the broader scope of the wider “triple bottom line” of economic prosperity, environmental protection and social equity (Elkington, 1998, 2013). This idea that a business activity can simultaneously result in financial, social and environmental benefit is much in line with recent developments in sustainability and related concepts such as Circular Economy

⁸ See also Dahlander and Gann (2010) for the distinction between pecuniary and non-pecuniary knowledge flows, and Chesbrough (2003), Enkel et al. (2006), Chesbrough et al. (2006, 2014), West et al., (2014), West and Bogers (2014, 2017), Randhawa et al. (2016), Bogers et al. (2017), and Stanko et al. (2017) for various overviews of and perspectives on open innovation.

(Bocken et al., 2014; Geissdoerfer et al., 2017). As such, the Green Fiber Bottle case shows how open innovation and sustainability are linked as openness was required by the individuals that were involved in the project, while respecting the organizational constraints, aligning with each organization's business model, and developing a wider ecosystem to leverage the complementary expertise and develop a holistic solution that could have wider and long-lasting impact (Ahn et al., 2017; Bogers et al., 2018b; Du et al., 2014; Holgersson et al., 2018; Rangus & Černe, 2019).

Sustainability Beyond a Solid Business Case

As the Chairman of the Carlsberg Foundation stated, “For the Green Fiber Bottle, sustainability is the why, and open innovation is the how” (Chesbrough et al., 2018: 1). A solid business case, in the traditional sense, for the Green Fiber Bottle was not immediately apparent. Nevertheless, Carlsberg elected to move ahead given the strongly positive non-financial factors related to the sustainability aspects of the bottle. Because its packaging was responsible for about 40 percent of its total environmental impact, the Green Fiber Bottle was targeting a key area of improvement for sustainability for the company. The decision to pursue the bottle likely represents a comparatively unique aspect of a sustainability-driven open innovation project that taps into “purpose-driven” (and oftentimes “non-pecuniary”) factors motivating the involved individuals and organizations (Dahan et al., 2010; Muñoz et al., 2018; Osterwalder & Pigneur, 2011; Rexhepi et al., 2013). These factors also relate to broader sustainability challenges, including plastic waste.

Sustainability challenges, like those represented by the SGDs and the challenge at hand in the case of the Green Fiber Bottle, represent problems for which organizations and individuals derive a deep sense of purpose for which non-pecuniary mechanisms are powerful drivers. Such purpose represents a powerful force to bring people together, within and across organizations. Later on, the ability to scale the resulting innovations across society

requires alignment with the business models of the participating organizations. Carlsberg may in fact realize financial benefits — i.e., be able to demonstrate a “business case” — as result of the Green Fiber Bottle but such a business case is not initially apparent. The heightened role that non-pecuniary mechanisms play to drive open innovation activities related to addressing sustainability challenges represent further reason to consider the establishment of Sustainable Open Innovation as a domain. The concept of open innovation is so readily useful to describe and more effectively coordinate such activities related to sustainability objectives whereby we hypothesize, and intend to encourage, the development of Sustainable Open Innovation — both in its initial phases and again in the scaling phase — as a domain worthy of its own recognition.

Opportunities and Challenges of in the Face of New Business Models

All potential benefits and opportunities of the Green Fiber Bottle project aside, Carlsberg did not itself wish to become a packaging company. It therefore needed to collaborate with others to address this challenge. One of the core ideas of open innovation is that collaborating on innovation projects across organizational boundaries can be a win-win proposition when those collaborations are aligned with each collaborator’s business model. Indeed, open innovation is only scalable if it *is* a win-win proposition. The interests of the various parties, from Carlsberg to ecoXpac to the IFD were in fact aligned, and that each organization was benefiting from this collaboration. The IFD funding mechanism played a useful role by subsidizing the development costs in this collaboration at its early stages. Furthermore, the IFD is a public foundation that “invests in new knowledge and technology creating growth and employment in Denmark,”⁹ so Danish society may also benefit from the investment and the innovation if the Green Fiber Bottle project is successful.

⁹ <https://innovationsfonden.dk/en/about-ifd> (accessed July 30, 2018).

However, there are also risks in this initiative. As with any innovation project, the bottle may create unexpected outcomes, some of which may be negative. For example, many companies want to avoid branded waste (i.e., waste with their logo on it). It is also likely that the first example of the new packaging will be far from the most effective implementation of the packaging, so there is a need for sustained follow-on innovation and investment to improve and advance the technology. At the same time, it will need to be assessed what the overall life cycle impact of the Green Fiber Bottle is relative to other projects, as potential downsides may be emission of unwanted greenhouse gases in case of suboptimal decomposition or the fact that certain countries (like Denmark, for example) have a well-functioning glass and plastic recycling system. In the latter case, the Green Fiber Bottle will effectively have to compete with the existing system, or possibly actually collaborate, thus also raising interesting and important questions in terms of competition and business model innovation (Bocken et al., 2014; Bouncken et al., 2015; Chesbrough, 2010; Franceschelli et al., 2018).

The Importance of Early Wins for Addressing Societal Challenges for Signals and Scaling

Carlsberg has not constrained ecoXpac from offering its novel packaging solutions to other companies for other uses. This makes it more likely that the technology will develop further, and improve over time. Carlsberg does not want to enter the packaging business, while ecoXpac and BillerudKorsnäs, an investor in ecoXpac, are eager to expand their businesses.¹⁰ The willingness of external investors to back ecoXpac is encouraging, suggesting that an outside party also sees the opportunity to deploy this environmentally beneficial technology far more widely. Thus, even if Carlsberg's project is not very

¹⁰ Indeed, additional volume will be critical to driving the Green Fiber Bottle's cost down to commercially acceptable levels.

successful, there might be many other ways to deploy the Green Fiber Bottle technology for other packaging applications. Carlsberg's embrace of the wood fiber bottle is thus an "early win" for ecoXpac and its investors.

Addressing grand challenges such as those embodied in the SDGs requires a great deal of imagination, collaboration, and perspiration. Since the actions of multiple parties must be orchestrated over an extended period of time to have any hope of achieving an effective response to a grand challenge, it is imperative that those seeking this response find some way to provide hope and validation at interim phases for reaching the final goals of the project. "Early wins" are an important way to achieve this. While the early win by itself is far from meeting the ambitious societal goal, it represents a tangible step on the path. That step, by being concretely realized, provides supporters with encouragement to persevere. It also provides skeptics some tangible evidence that the goal can indeed be realized, and thus attract uncertain parties off the fence, and get them to join in.

The Green Fiber Bottle is such an early win. By itself, the bottle will only be used by one company, and initially only for one portion of its business. But one can easily envision follow-on packaging improvements that would begin to penetrate the plastic packaging products market as well. ecoXpac is just one startup developing new, sustainable materials to improve and change the world. With its mastery of open innovation processes, Carlsberg — or other companies inspired by Carlsberg — can survey new sustainable technologies from around the world, and work with these innovators to bring them to market. As such, Carlsberg and the other partners are seeing this as an opportunity to explore future packaging options, and they are approaching this in a very open-ended way in which they embrace the uncertainty and complexity that is inherent in such grand societal challenge (George et al., 2016).

Many companies in a wide variety of domains will face such challenges in the future — often connected to the sustainability imperative — and this case shows how open innovation gives a part of the “how” of addressing such challenges. Applying open innovation in this way requires important changes in business models, organizational culture and structure, corporate governance, and so on, across multiple collaborating parties. Open innovation processes also share the costs and the risks of the projects across multiple parties. The willingness of these other parties to participate provides important early validation for nascent technologies that offer environmental benefits, but have yet to be deployed at scale.

This validation from external parties also plays an important role for public agencies, as they pursue the realization of the SDGs. Participation from multiple actors provides useful signals to public authorities for viable pathways to address sustainability goals, and allows public actors to support those pathways with greater confidence. In this instance, the technology of ecoXpac was enhanced by funding from DTU and IFD, who in turn were influenced by the interest of Carlsberg in the outcome of the work. These signals help public agencies direct innovation funding towards more useful areas. In addition, as early wins arise from these public-private collaborations, public agencies can act to help scale the initiatives to reach farther than they otherwise might, if left only to private actors. Thus, open innovation helps to provide signals and scaling to public organizations, who also have an important role to play in pursuing the SDGs.

The Importance of the Nordic Context and Long-Term Vision

Carlsberg is a Nordic-based company whereby the Nordic context plays an important role in this case that calls for deliberate considerations.¹¹ Overall, Nordic firms are recognized as

¹¹ The Nordics are defined as Denmark, Norway, Sweden, Finland and Iceland. These five countries share historical and cultural ties and, since 1952, are formally affiliated through the Nordic Council of Ministers. The expression ‘Scandinavia’ is used interchangeably with ‘Nordics’ by many, although it can also be more narrowly to indicate Denmark, Norway, and Sweden (Bondeson, 2003; Strand & Freeman, 2015).

demonstrating a strong willingness and ability to cooperate with their stakeholders. This phenomenon, which reflects deep cultural norms to cooperate in the Nordic context and formalized institutional structures that encourage cooperation, is described by the concept of “Nordic Cooperative Advantage” (Strand & Freeman, 2015)¹². Nordic Cooperative Advantage is defined as “the general tendency for companies in a Nordic context to implement a value creating strategy based on cooperating with their stakeholders that results in superior value creation for the companies and their stakeholders” (Strand & Freeman, 2015: 81). Central to the concept of open innovation is the ability to cooperate across organizational boundaries (Chesbrough & Bogers, 2014) whereby it is a short leap to connect Nordic Cooperative Advantage to open innovation. Said another way, the Nordic context is particularly fertile grounds for the practice of open innovation. Furthermore, Bjerke (1999: 217) describes how Nordic business leaders tend to “have good contacts with the government; cooperate with universities and research institutions” whereby the stage is set in the Nordics for effective open innovation efforts.

Effective cooperation depends greatly upon the ability to form trust-based relationships. Nordic firms, on the whole, have demonstrated a unique competency to build high-trust relationships that cross organizational lines (Strand & Freeman, 2015). One may consider reflective of the norms related to expectations of leaders in the Nordic context to be collaborative and trustworthy (Bjerke, 1999; House et al., 2004) that is arguably reflective of the high-trust Nordic societies (Bondeson, 2003). Among other benefits, trust fosters a spirit of openness that is essential to open innovation.

Furthermore, the Nordic context readily demonstrates the strongest sustainability performances in the world, whereby the Nordics and companies based in the Nordics, are actively engaged in heightened levels of sustainability activities. Nordic countries regularly

¹² Originally described as “Scandinavian Cooperative Advantage” (Strand & Freeman, 2015).

top the SDG Index that measures country level performances against the 17 SDGs (Sachs et al, 2019) and Nordic based firms are strongly over-represented in the variety of company-level sustainability performance measurements (Strand et al, 2015). Therefore, the general willingness to engage in open innovation activities to drive innovations more specifically related to sustainability motivations is likely heightened in a Nordic context.

Additionally, Carlsberg is structured through an industrial foundation ownership model. While the industrial foundation is not unique to the Nordic region (e.g., Germany's Robert Bosch and Switzerland's Rolex are such structures as well), the industrial foundation model is remarkably pervasive across the Nordic context. In Denmark, in particular, it represents approximately 70% of the Danish stock market capitalization (Børsting & Thomsen, 2017). Such a structure, where the majority of shareholder voting rights is held in perpetuity by a foundation such as the Carlsberg Foundation, protect a firm from heightened short-term pressures by investors with short-term horizons and thereby enables sustainability efforts to be undertaken that may not have immediate and readily visible business cases (Thomsen et al., 2018). As such, this type of governance and ownership structure can enable longer-term decisions that are required given the complexity and uncertainty of a grand challenge like sustainability — all in line with Carlsberg's "DNA" (cf. Dyer et al., 2011) and J.C. Jacobsen's "founder mentality" (cf. Fauchart & Gruber, 2011).

Conclusion

Sustainability challenges represented by the SDGs are a critical test for the world. In advanced economies it appears there is a lack of political will to tackle the SDGs with public funds. Therefore, any successful initiatives that positively address the SDGs will require public-private cooperation, and significant collaboration within industry as well. This extensive collaboration might be motivated by non-pecuniary interests in early stages, while later scaling will require alignment with the business models of the participating

organizations. While this might seem a daunting task, the Green Fiber Bottle shows a “proof of concept” that such collaboration can indeed be achieved.

There are a number of specific key issues that we presented in this paper. First, we described how Carlsberg, together with its partners, could leverage open innovation in the face of sustainability as a grand challenge. Furthermore, we explained how they approached the sustainability challenge beyond seeing it as a solid business case, for example also acknowledging a more “purpose-driven” strategy. We then discussed various opportunities and challenges of in the face of new business models, including both risks and benefits of linking sustainability to open innovation. We also elaborated on the importance of “early wins” for addressing societal challenges, as it enables commitment of various stakeholders, and provided a basis for the required signals in this context and a basis for scaling the sustainability project. Finally, we highlight the importance of the Nordic context and the related long-term vision, both in a general sense and in the specific case of Carlsberg.

On this basis, we provide a number of key issues that are relevant for addressing grand challenges in general, and sustainability in the F&B industry in particular. However, given the limitations of our case study, future research will need to further explore and potentially validate these initial findings. Nevertheless, we hope that this paper will offer a basis for further developing the domain of Sustainable Open Innovation, and also for better informing open innovation practices and policies in the face of sustainability and other grand challenges in the F&B industry and beyond.

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