



This is an electronic reprint of the original article. This reprint may differ from the original in pagination and typographic detail.

Björklund, Tua A.; Mikkonen, Maria; Mattila, Pauliina; van der Marel, Floris Expanding entrepreneurial solution spaces in times of crisis

Published in: Journal of Business Venturing Insights

DOI: 10.1016/j.jbvi.2020.e00197

Published: 01/11/2020

Document Version Publisher's PDF, also known as Version of record

Published under the following license: CC BY-NC-ND

Please cite the original version:

Björklund, T. A., Mikkonen, M., Mattila, P., & van der Marel, F. (2020). Expanding entrepreneurial solution spaces in times of crisis: Business model experimentation amongst packaged food and beverage ventures. *Journal of Business Venturing Insights*, *14*, Article e00197. https://doi.org/10.1016/j.jbvi.2020.e00197

This material is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

Contents lists available at ScienceDirect



Journal of Business Venturing Insights

journal homepage: www.elsevier.com/locate/jbvi

Expanding entrepreneurial solution spaces in times of crisis: Business model experimentation amongst packaged food and beverage ventures



Tua A. Björklund ^{a, b,*}, Maria Mikkonen ^a, Pauliina Mattila ^{c, b}, Floris van der Marel ^{a, c}

^a Aalto University Design Factory, PO Box 17700, FI-00076, Aalto, Finland

^b Department of Mechanical Engineering, Aalto University School of Engineering, PO Box 17700, FI-00076, Aalto, Finland ^c Swinburne University of Technology Design Factory, John Street, Hawthorn, 3122, VIC, Australia

ARTICLE INFO

Keywords: Crisis Entrepreneurship Capabilities Experimentation Value creation

ABSTRACT

Research summary: Times of crisis require entrepreneurial responses to mitigate adverse effects and address new opportunities. This study focuses on how packaged food and drink entrepreneurs in Finland took action to create and capture new value during the Covid-19 crisis. Examining 844 social media posts of 66 ventures between March and May 2020 and interviewing 17 of these ventures, we found ventures to experiment with new business model variations, which not only expanded their set of solutions directly, but resulted in action-based learning leading to longer-term changes and increased capabilities for subsequent value creation. Furthermore, collaborative experiments and prosocial support increased the solution space through developing the capabilities of the ecosystem.

Managerial summary: The global lockdown measures in response to the coronavirus pandemic have disrupted supply, production, sales and consumption. Facing these constraints, entrepreneurs can respond quickly and experiment to create new liquidity and opportunities. Our analysis of packaged food and beverage entrepreneurs in Finland during the crisis shows how entrepreneurs leverage existing resources and acquire new ones to create new offerings, operations and partnerships. These initial actions serve as experiments to learn from in creating and revising business models, promoting a virtuous cycle of further action and expanding potential future solutions accessible to entrepreneurs. Importantly, opportunities available to the venture expand through both venture specific learning and through supporting other actors in the ecosystem.

1. Introduction

The Covid-19 pandemic and related restrictions are creating a global crisis, shaping the economic landscape and challenging entrepreneurs (Kuckertz et al., 2020; Brown and Rocha, 2020). While organizational resilience is crucial to keeping business afloat in these times, crisis-based entrepreneurship research that might inform resiliency cultivation has remained scarce (Doern et al., 2019; Linnenluecke, 2017; Monllor and Murphy, 2017; Bullough et al., 2014). With the Covid-19 crisis, early research results have suggested diminished venture capital availability, particularly for early-stage ventures (Brown and Rocha, 2020). Entrepreneurs have also been

* Corresponding author.

https://doi.org/10.1016/j.jbvi.2020.e00197

Received 26 June 2020; Received in revised form 27 August 2020; Accepted 7 September 2020

2352-6734/© 2020 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons. arg/license/by-ac-ad/4.0/).

E-mail addresses: tua.bjorklund@aalto.fi (T.A. Björklund), maria.mikkonen@aalto.fi (M. Mikkonen), pmattila@swin.edu.au (P. Mattila), floris. vandermarel@aalto.fi (F. van der Marel).

quick to take action to cut costs and seek support (Giones et al., 2020; Kuckertz et al., 2020; Thorgren and Williams, 2020), although entrepreneurial needs and policy responses have not always matched (Kuckertz et al., 2020), with for example entrepreneurs reluctant to take on additional loans (Thorgren and Williams, 2020). However, these studies have provided limited insights into whether and how entrepreneurs might move from survival to thriving, calling for further research on creating new opportunities through innovation and revenue generating actions during the crisis (Kuckertz et al., 2020; Thorgren and Williams, 2020).

Indeed, taking action to create and pursue opportunities is at the heart of entrepreneurship. As Certo et al. (2009:319) state, "*doin*g is a key theme running throughout the academic literature in entrepreneurship" (italics original). Entrepreneurial behavior transcends present limitations and creatively repurposes resources (Becherer and Maurer, 1999; Baker and Nelson, 2005), with a growing literature on effectuation emphasizing how entrepreneurs engage in an active, flexible process focusing on experimentation and affordable losses to transform rather than adapt to existing environments (Chandler et al., 2009; Dew et al., 2008; Read et al., 2009). Similarly, recent research highlights the role of experimentation in devising novel, successful business models (Bocken and Snihur, 2020; McDonald and Eisenhardt, 2020). Business models - defined as how organizations create, deliver and capture value (Teece, 2010; Zott et al., 2011; Sjödin et al., 2020; Schneider, 2019; McDonald and Eisenhardt, 2020) - reflect the realized strategy of organization, networks and revenue models (McGrath, 2010; Spieth and Schneider, 2016; Schneckenber et al., 2017; Bocken; Snihur, 2020). The set of possible business models the venture would be able to experiment with using its current resources, capabilities and networks can be captured by its *solution space*, i.e. the range of potential solutions available to a venture, of which only a portion is actualized in any given moment (Macpherson et al., 2016; similar to the concept of problem space in cognitive psychology and design research, Simon, 1973; Goel and Pirolli, 1992; Björklund, 2013). Solution space expansion, in turn, represents increased options and potential for business model innovation and can thus offer an additional pathway to organizational resilience.

In line with Macpherson et al. (2015), we view crises as critical episodes for ventures, representing periods of concentrated activity and learning (Cope, 2005; Schneider, 2019). Crises can intensify experimentation, with Fisher et al. (2020:5) suggesting that the Covid-19 pandemic can "give the permission to hustle", freeing "entrepreneurial actors from the perceived constraints or limitations that they typically face in their day-to-day work environments". Macpherson, Herbane and Jones (2015) also found entrepreneurs to expand the solution space of their venture through resource accretion prompted by crises. However, these studies focused on organization-specific or market-specific crises where the entrepreneurs were able to leverage skills and resources from stakeholders largely unaffected by the change or crisis.

In contrast, novel value creation or capture has been rare in extant results on entrepreneurial action in the face of the Covid-19 pandemic (Kuckertz et al., 2020; Thorgren and Williams, 2020; Giones et al., 2020). For example, while the majority of Swedish 456 SMEs promptly took cust-cutting actions, fewer than 7% reported engaged in revenue generating or innovation activities (Thorgren and Williams, 2020). As the availability and creation of community and collaboration can be crucial for venture resiliency (Muñoz et al., 2020; Giones et al., 2020), the global pandemic influencing society at large creates a challenging, yet important arena for value creation. The current study sheds light into how entrepreneurs can experiment with new opportunities and business models to expand entrepreneurial solution spaces in such times of wide-spread collective crisis, examining the activities of packaged food and beverage ventures during the Covid-19 pandemic in Finland.

2. Value creation and capture responses in Finnish packaged food and beverage ventures

The Covid-19 pandemic and emergency measures have had a global impact, including the packaged food and beverage industry in Finland, as production, sales, distribution channels and consumption patterns have been disrupted (Appendix 1). Examining the consumer-facing action responses of 66 packaged food and beverage ventures portrayed in their social media activity during the crisis



Fig. 1. Consumer-facing value creation and capture action responses and other Covid-19 communications in venture social media tracking.

(Appendix 2), we found that most entrepreneurs did indeed expand their solution range during the crisis through experimenting with novel *products* (68), *services* (30), *sales channels* (32) or *prosocial actions* (17) (Appendix 5). Furthermore, ventures began to exhibit such actions immediately when the lockdown was announced and continued throughout the 2.5-month tracking period (Fig. 1).

Noticing the prevalence of engaging in novel action already amongst consumer-facing communications in social media, we then interviewed a subset of 17 ventures to gain more in-depth visibility to a wider range of experimentation in value offering, value creation architecture and revenue models (Appendices 3 and 4). We found that most cases had experimented with multiple areas of their business model (Appendix 6). Many entrepreneurs described the crisis lowering the threshold for experimentation through creating a sense of urgency, forcing new solutions to compensate for lost revenue, giving a perceived mandate for experimentation or simply providing more time as travel and events were cancelled. As David remarked, "you just have to keep moving, do things, be present and show that you're alive and everything is happening, that might provide some bigger things over time. [...] The corona situation has made it very concrete that we have to come up with things, and try things out."

2.1. Areas of experimentation during the crisis

Novel value offering was the most common form of consumer-facing experimentation, most often taking the form of new products and services (Appendix 5 and 6). Many ventures entered completely new product categories, in addition to more incremental changes such as bundling products together or rebranding (Appendix 5). Collaborative experiments in new products and services tended to be incremental, joining forces for product bundles or producing collaborative variations of previously tested within-venture offerings. In addition to physical food and beverage products, many entrepreneurs tried out new online services, such as virtual tasting sessions as supplements to their offering. Particularly in the very first creative responses to the crisis, entrepreneurs described fast-tracking the development of ideas they had already been playing around with pre-crisis, while others found new circumstances to fit ideas that had been discarded in pre-crisis conditions as too risky, for example. Ten out of 17 ventures also appealed to new target customer segments (Appendix 6), most often switching from business customers to direct consumer offerings. Seeking change in the competitive positioning, however, was rare, with only 5 out of 17 ventures entering new competitive landscapes through diversifying their offering portfolio to new markets or successful experimentation in other business model areas.

Although visible to the consumers mostly in the area of sales and delivery processes (Appendix 5), all 17 interviewed ventures had experimented with their value creation architecture (Appendix 6). The most common experiments were in the realm of developing core competencies and resources, in which all case ventures reported taking some kind of action (e.g. acquiring the required skills to break into a novel product category or learning to use a new social media tool). Experiments in novel partners and distribution processes tended to be closer to the existing business model, whereas experiments in internal value creation processes often entailed larger departures from pre-crisis operations (Appendix 6).

Experiments in revenue models, in turn, were rarer than in value offering or value creation architecture. These were often conducted jointly with experiments in other business model areas, either intentionally aiming to increase revenue or reduce costs, or needing to change the revenue model as a result of alterations in other areas. For example, Nina's health snacks intentionally sought to reduce the fixed costs of their restaurant space by renting it out for remotely working teams, whereas in the case of Leo's snacks, the radical change to their target customer segment and altered user preferences made changes to their cost structure through streamlining their production.

Finally, the entrepreneurs engaged in a number of experiments that were not directly tied to their business models. These prosocial activities ranged from helping out critical and at-risk groups, such as donating products to health care professionals and deliveries to the elderly, to supporting fellow entrepreneurs. Prosocial experiments could also be collective, with ventures joining forces to help both themselves and their communities or industries. For example, Ben shared that "the same week as the lockdown was issued, at least all the companies [in the craft brewing industry] within our network, started to build online stores. Everyone was exchanging messages in a Whatsapp group and comparing which is the best platform and so on."

2.2. Pathways of action-based learning from experimentation

Analyzing the action responses of the entrepreneurs, we noted that rather than conducting isolated experiments, several elements were typically *bundled together* and initial responses often led to further action, sparking repetition, iteration and scaling of efforts, building on what entrepreneurs learned through engaging in the initial experiments. For example, a distillery turning to producing hand sanitizer as a novel product category (value offering) required also experimenting in the value architecture with novel supply chains and production, was coupled with experimenting with a new revenue and cost model and led to subsequent value architecture experiments with new delivery models and partnerships that would have not been possible with their original products. Unsuccessful tests, in turn, were discontinued, as in the case of Ben's roastery piloting an employee coffee subscription model for their business-to-business clients, due to low demand.

We noted that a *radical experiment* in one of the areas of business innovation would lead to changes in one or more additional areas. For example, in the case of Nina's health snacks (Fig. 2), the pandemic halted the supply of a main ingredient to her core offering causing her to seek alternative raw ingredients from the Finnish suppliers. This, in turn, led her to develop a novel product category requiring the acquisition of new skills and competences, changes to internal value creation and changed the overall revenue structure of the venture (all radical changes for the venture). Radical experiments, when successful, often led to longer term shifts in strategy or adding complementary extensions to existing business models through entering new markets. For example, Nina's experiments sparked creating a whole new brand for a new 'ready-to-eat' product portfolio as a result of her learnings from the positive market response to her initial

actions. Similarly, Kevin's distillery found their hand sanitizer gaining so much traction that quantity-wise it surpassed their beverage production, leading them to create new distribution solutions and plan further products in the category, no longer viewing it as a short-term crisis response but as a strategic diversifying act.

However, longer term effects on the business models could also result from more *incremental experimentation*. In Anna's brewery (Fig. 3), bundling their existing products to increase their sales in a more commercial format than they had been used to was surprisingly successful: *"We are completely blown away with the result. It is just those six existing beers and our existing tote bags, but people ... when you make it easy for them, they get excited."* Encouraged by the positive market response, they proceeded with a series of experiments, including more radical shifts from their original operations. In a more incremental effect, Henri remarked that the positive experience they had with a seasonal product bundle made it easy to repeat it, and the type of bundle ended up as a permanent part of their desserts offering.

On the other hand, several ventures shifted their focus from collapsed business-to-business sales to consumer sales, often seeing these initially as *temporary measures* to maintain cash flow rather than a permanent change. For example, Ben developed a whole new system for customers to pre-order beer online and then pick it up at the brewery as restaurant sales halted (Fig. 4). After initial positive experiences, however, many intended to keep some form of the generated business-to-customer value offering and value creation architecture. This resulted in the ventures diversifying their offerings and operations in the longer term. However, these were considered as relatively minor changes in service of preserving the pre-existing business model at large rather than business model innovation. In other cases, the experiments themselves were discontinued, but the capabilities the entrepreneurs had learned from them were used to execute existing business models more effectively.

Finally, examining the experimentation pathways, we noticed that collaborative business model experiments and experimenting with prosocial help enhanced networked or ecosystem capabilities for further experiments in novel value creation and capture. For example, David's roastery initiated a crisis-branded coffee, using portions of the profits to purchase gift cards from local small cafes and restaurants, which were then randomly included in the customer webstore orders. Through this response, the roastery added value to private customers and built its business-to-business clientele: "*If [the cafés and restaurants are] not our existing clients, it should be pretty easy to get back to them again after things normalize a little, and say: 'hey, we were in touch a few months ago [...] and ask about how things are with their coffee, and there's potential clientele considering the future. We're leaving a positive memory". Similarly, Leo's snacks gave product giveaways to restaurants (Fig. 5). Rather than representing lasting changes to value offerings, value creation architecture or revenue model of the ventures as such, these experiments led to changes in the resources and capabilities that could be leveraged for subsequent business model innovation even when the experiments tended to be incremental. Interestingly, such effects could be seen even in cases where the original experiment was not aimed at the venture business model at all.*

Figs. 2–5 show the experimentation pathways and their longer-term effects in four example ventures responding to the Covid-19 crisis. For each venture, first response actions are in white boxes, follow-ups in light grey boxes and longer-term implications in dark grey boxes. Actions and effects are connected by arrows and lines if they were inspired by or resulting from the former actions. Dotted borders around actions indicate collaborative efforts.



Nina's health snacks

Fig. 2. Experimentation pathways and their effects for Nina's health snacks.

Anna's brewery



Fig. 3. Experimentation pathways and their effects for Anna's brewery.

Ben's brewery



Fig. 4. Experimentation pathways and their effects for Ben's brewery.

Leo's snacks



Fig. 5. Experimentation pathways and their effects for Leo's snacks.



Fig. 6. Four pathways for solution space expansion through experimentation.

3. Four pathways for expanding entrepreneurial solution spaces during the pandemic

Taken together, we could see four types of pathways to expanding the solution space of business models accessible to ventures through the experimentation activities of the packaged food and beverage entrepreneurs (depicted in Fig. 6).

First, business model experimentation - abundant in both the social media analysis and interviews - *extended the set of solutions actualized by the ventures*, through the new products, services, production, sales solutions and so forth created by the entrepreneurs during the crisis. These responses expanded the entrepreneurs' solution portfolio either by increasing the portion of the pre-crisis solution space they targeted (leveraging existing resources, capabilities and relationships) or by going beyond the pre-crisis solution space

in novel solutions enabled through proactively acquiring new resources, capabilities and relationships to create new offerings.

Engaging in and learning from these experiments also expanded the solution space of possible business models the ventures might pursue in the future through building new value creation capabilities. The second pathway, *internal capability-based expansion* of potential solutions occurred when entrepreneurs developed new capabilities within their venture while engaging in business model experimentation. These new capabilities could result from learning new domain-specific skills and knowledge, gaining new insights on the direction and processes of the venture, or increasing entrepreneurial efficacy through initial successes. Sometimes these capabilities were deliberately sought, while others were accrued as a by-product of gaining feedback through the experiments.

The third pathway also expanded the solution space through action-based learning from experimentation, but through its effects on *relational and ecosystem capabilities for value creation* rather than internal capabilities. Again, these could be both intentionally sought and organically developed as a by-product of experimentation. Growing networks with new contacts and diversifying and deepening interactions with existing ones, the entrepreneurs learned more about their networks, finding complementary skills and creating new potential opportunities for collaboration - and thus again extending the solution space available for the ventures. In addition to increasing the capabilities of the ventures, instances of joint actions also contributed towards enhancing the capabilities of actors. Thus, while many collaborative experiments were incremental in themselves, they increased their impact through indirect effects on both the entrepreneurs and their networks.

Finally, the fourth pathway for solution space expansion represented building *relational and ecosystem value creation capabilities through experiments in prosocial help* rather than direct business model experiments. While these experiments were rarer, they expanded the solution space of the support giving entrepreneurs through building relational and ecosystem capabilities even in instances that directly benefited solely the support receiver. In addition to specific contacts, these actions could serve to strengthen the clusters the ventures belonged to, such as the industry niche (e.g. small breweries producing craft beers) or regional communities (e.g. ventures or actors in a specific town). Maintaining and growing capabilities of the stakeholders, in turn, opened up further value creation and capture possibilities for the entrepreneurs in the future through potential collaboration. Thus, while helping out others might not directly expand the solution repertoire or business model of a venture, strengthening collective capabilities could still enhance the venture's opportunities going forward.

4. Conclusions: what entrepreneurs can do when a crisis hits

The current study highlights the prevalence and opportunities for value creation during global crises. Both the social media analysis and founder interviews showcased an abundance of new business model experiments in response to the Covid-19 pandemic amongst Finnish packaged food and beverage ventures. These experiments led to both crisis management by maintaining operational viability through searching for alternative revenue streams, but also further enhanced the resiliency of the ventures through expanding the solution space (Williams et al., 2017; Herbane, 2019; Duchek, 2020). As the value and originality of new ideas are difficult to predict before-the-fact (Berg, 2016; Fuchs et al., 2019), taking action creates new knowledge, skills and resources that can then be leveraged to discontinue, modify or scale subsequent efforts to pursue opportunities. This suggests that when in doubt, entrepreneurs may be well served by action rather than inaction. Indeed, the knowledge-creating effects of experimentation can help to speed up decision making under uncertainty by avoiding prolonged debate based on assumptions only (McDonald and Eisenhardt, 2020). As such, experimentation can be a key activity to practice the effectual logics of aiming to control rather than predict uncertain events (Sarasvathy, 2001; Read et al., 2009, 2016).

In contrast to Macpherson et al. (2015) and Kuckertz et al. (2020) examining entrepreneurial responses to crises, our study found entrepreneurs rarely relied on one-directional support from their networks or additional funding from the government, investors nor non-profit organizations. Rather, entrepreneurs utilized their networks for collaboration and collective action. The ventures launched new collaborative products, services and sales channels, leveraged and built their networks, and helped others in their local communities. Although these actions were often initially incremental, even incremental experimentation can serendipitously lead to or gradually give rise to radical innovation (Bocken and Snihur, 2020). We found entrepreneurs able to find such opportunities for collaboration despite their stakeholders being adversely influenced by the crisis.

Similar to post-disaster entrepreneurs (Grube and Storr, 2018), having Covid-19 as a 'common' crisis for all initiated sharing vital information, but also discussing best practices and current experiences amongst the ecosystem actors. Crises can spark a mutual need for collective identity (Giones et al., 2020), and social cohesion should be both supported and leveraged in crisis recovery (Muñoz et al., 2020). Collaborative experiments not only benefit the development of internal capabilities, but also enhance relational and ecosystem capabilities, further expanding the potential for future joint value creation and ecosystem resilience. As such, they initiate virtuous spirals of co-development of the entrepreneurs and their ecosystems (Feld, 2013; Björklund and Krueger, 2016), with shared learning connected to more innovative enterprises (Zhang et al., 2006). Many of the entrepreneurs also reported being supported by their customers through 'supporting local' and purchasing from 'craft businesses', highlighting a can-do-spirit of the wider ecosystem during this crisis. However, more research is still needed on the shared experience dynamic between entrepreneurs and their ecosystems and how actions balancing profitability and goodwill are perceived by different stakeholders.

Finally, many entrepreneurs found the crisis to further lower their threshold for business model experimentation, fast-tracking dormant ideas and removing some perceived constraints, similar to institutional actors finding "permission to hustle" during the pandemic (Fisher et al., 2020). Though both the current study and that of Thorgren and Williams (2020) illustrated widespread entrepreneurial action in response to the Covid-19 pandemic, they portrayed opposite tendencies in the frequency of value creation experimentation relative to cost-cutting actions - despite both data sets representing entrepreneurs in Nordic countries with highly

Table 1

Solution space expansion checklist for entrepreneurs taking action during crises.

Pathways for solution space expansion	Immediate action opportunities	Longer-term benefits		
Business model experi- mentation	 Value offering: novel bundling, rebranding, streamlining or adding physical or online components to your offering expanding from business-to-business to business-to-customer, and vice versa revisiting dormant or discarded ideas to assess their appropriateness for the changed circumstances working with other ventures to create joint offerings to reach new customers Value creation architecture: leveraging staff skills and networks to create new solutions and upskill repurposing resources such as production and facilities reaching out to new partners in supply, sales and delivery chains pool resources and deepen collaboration with existing networks establish new physical, online or joint points of sales Revenue model: repurposing existing offerings to new revenue structures 	 Internal capabilities: novel domain-specific knowledge and skills validating or disproving assumptions on viable strategy, operations and positioning increased efficacy for staff through early successes Relational and ecosystem capabilities: a wider set of partners higher-quality relationships with increased awareness of synergies enhanced network coverage 		
Prosocial experi- mentation	 partnering up and streamlining to shift cost structures Venture-specific action:. donating offerings, expertise or portion of sales to those affected by or fighting the crisis providing visibility, platforms or campaigning for relevant causes Collective action: lobbying for changes needed to support your region or industry creating forums and avenues for learning from one another 	 Relational and ecosystem capabilities: better positioned and more diverse partners to collaborate with collective culture for support through enhanced cohesion improved regional or cluster competitiveness to attract resources 		

developed social systems mitigating economic, social and health concerns (Wilkinson and Pickett, 2009). As the current study suggests early experiments - even those seemingly superfluous or trivial - can lead to a lasting competitive edge through action-based learning and capability building, further comparative research should explore environmental and entrepreneurial variables that promote and inhibit value creation experimentation during crises.

While based on a small number of ventures in a single sector and country, the current study contributes towards starting to unpack the interconnections between entrepreneurial resources, resilience and value creation through business model experimentation in times of crisis. Through experimentation, ventures not only mitigate short-term adverse effects of crises but expand their overall solution space and increase the capabilities they can draw from. Based on the insights of our study, we provide a checklist for entrepreneurs (Table 1) to identify opportunities for experimentation and capability cultivation to expand their solution space during crises such as the Covid-19 pandemic. Although further research into the post-crisis effects of such solution space expansions, as well as if, when and how new capabilities are subsequently put to use for business model innovation is still needed, at its best, entrepreneurial experimentation can create new value, capabilities and lasting resilience for both ventures and those in their ecosystem.

Credit author statement

Tua Björklund: Writing - original draft, Writing - review & editing, Conceptualization, Investigation, Methodology, Project administration, Supervision, Funding acquisition, Visualization. **Maria Mikkonen**: Conceptualization, Investigation, Methodology, Formal Analysis, Writing - review & editing, Visualization, Funding acquisition. **Pauliina Mattila**: Conceptualization, Formal Analysis, Writing - review & editing. Floris van der Marel: Formal analysis, Visualization, Writing - review & editing.

Declaration of competing interest

None.

Acknowledgements

We appreciate the input from our interview partners who supported this research under very difficult conditions. We would also like

to thank Business Finland (grant 211822) and Jenny and Antti Wihuri Foundation for partial funding of the research, as well as Anna Kuukka for helping to examine and visualize our social media data.

Appendices

Appendix 1. Study context: The Covid-19 pandemic in Finland

Although the impact of the Covid-19 pandemic has been global, the severity and associated experience including imposed restrictions are contextual, as is also the case for entrepreneurs in Finland. After the first infected domestic citizen on February 26, 2020, the Finnish Government declared a state of emergency on March 16, 2020 (Yle, 2020; Helsingin Sanomat, 2020), restricting gatherings of over ten people, closing borders, and enforcing social distancing and hygiene measures. Restricting gatherings resulted in the cancellation of events and festivals, as well as closing restaurants and bars, hotels, specialty stores, meaning excess raw ingredients were at hand due to decreased demand and sales. Closing schools and transitioning to remote studies March 18, 2020 meant parents had to organize homeschooling for the family - entrepreneurs included. Restrictions on travel led to reduced availability of raw ingredients and packaging materials, changes in supply chains, and halting of international sales efforts. To comply with the social distancing restrictions and hygiene measures, situations with human contact were minimized, leading into cancellations of tasting events in supermarkets and causing complications in production and sales facilities to ensure a safe working environment. Restaurants struggled with unclear demands and lack of support, many closing their doors and the remaining ones transitioning to take-away service only - making a significant dent in the food and beverage cluster.

As a support measure, the government simultaneously with the emergency declaration announced a five billion euro support package in the form of grants and loans for small companies towards research and planning of new business operations (up to 10k euro) and execution of these development actions (up to 100k euro) (KPMG, 2020), which was increased to 15 billion euro four days later. On April 2nd, the government announced that entrepreneurs, including sole traders and freelancers, were eligible for unemployment benefits (KPMG, 2020; Ministry of Economic Affairs and Employment, 2020). The support system in Finland for entrepreneurship, in general, is well-established with clear policies, regulation, and infrastructure (GEM, 2018), and comparing Finland with other EU members, opportunity perception levels are higher while fear of failure is lower on average (GEM, 2018).

In May 2020, some national restrictions were eased, and it was announced that as of the 1st of June, groups of 50 were allowed to meet, restaurants could reopen "with special arrangements" (including opening only half of the seats inside venues, restricted alcohol service and no self-service offering), and public places were opened gradually (Finnish Government, 2020). The state of emergency ended on June 16, 2020, although the pandemic continues as of writing.

Our study pursued a two-fold design (Appendices 2 and 3) in order to explore how entrepreneurs responded to the crisis, focused on understanding the responses taken by entrepreneurs during the time period when government-imposed restrictions were in place, hence the data collection spanning from the time when restrictions were introduced to the partial easing of the restrictions (mid-March to the end of May). Similar to Macpherson et al. (2015), we view the crisis period as a critical episode of concentrated activity and learning (Cope, 2005) and build on a critical incident approach (Flanagan, 1954; Chell, 2004). As conducting research with human subjects during crises poses unique practical and ethical challenges (Mezinska et al., 2016), we coupled a non-obtrusive longitudinal design (examining social media activity for 66 ventures, Appendix 2) with a more in-depth cross-sectional data set (interviews with 17 select cases, Appendix 3) a month or two into the crisis.

Appendix 2. Social media data collection and analysis

The first study tracked packaged food and beverage ventures along the nature and stages of the crisis (Doern et al., 2019) through social media activity, enabling a novel longitudinal analysis of during-crisis responses in real-time (Buchanan and Denyer, 2013). Identifying Instagram as the social media platform where the ventures were most active, we tracked public activity on the platform, including both posts that remain visible on the account grid (permanent collections of images and their captions on the account feed) and temporary stories (visible to the followers of the user's account for 24 h). This provided an unobtrusive yet effective access to empirical data on consumer-facing value creation and capture action responses, avoiding the pitfalls related to recall such as false recollection, a posteriori rationalization, missing archives, etc. (Roux-Dufort, 2016:25).

Based on targeted searches and scanning media coverage, we identified 66 active Finnish small-to-medium packaged food and beverage ventures' Instagram accounts to follow. Data was captured and saved daily starting March 16, 2020 (declaration of the state of emergency) to the May 31, 2020 (the last day before restaurants could reopen with restrictions), resulting in a total of 844 posts related to the COVID-19 situation. When an image or post caption mentioned a Covid-19 crisis-related activity (e.g. social distancing, maintaining hygiene, staying home, conducting remote work, spending time outdoors) it was considered as one data point and copied through screenshots to a daily data archive (see anonymized examples in Figure A1). If several posts or stories were published on the same day, each of them was considered as a separate data point. Not all 66 companies posted COVID-19 related content, therefore the collected response data set represented activities from 51 companies (including 11 ventures displaying only marketing or communications responses rather than taking action to create new value).



Fig. A1. Anonymized, redrawn example Instagram posts and stories included in the data set.

To examine the responses, the data set of 844 Covid-19 related Instagram posts and stories were scanned for value creation and capture action responses (experimenting with novel value offerings or other business model elements visible to customers) linked to the crisis, excluding descriptions of individual or company circumstances (such as personally working remotely for the week or having trouble in procuring ingredients) and marketing messages without novel solutions (such as promotion of previous products through existing channels). The action response posts and stories were then coded and categorized based on a semantic-level thematic analysis (Braun and Clarke, 2006) of the type of response portrayed in the post, using constant comparative analysis (Schneider and Wagemann, 2012). The images and their accompanying text were analyzed as a pair, as removing either text or image would have resulted in the loss of context and meaning (Laestadius, 2016). In unclear instances, researchers separately categorized posts, and in case of disagreement, the post was discussed until agreement was reached and categories further defined as a result. This iterative process resulted in 13 categories of actions evidencing novel solutions (see Appendix 5), where the self-descriptive categories themselves are key results characterizing the types of novel value offerings that the entrepreneurs experimented with (Butterfield, 2005). Finally, the timing of these categories of social media posts was plotted on a week-by-week basis for the 11.5 weeks of data collection from the start of the state of emergency to partial re-opening, allowing us to examine the timing of responses.

Appendix 3. Interview data collection and analysis

The second, interview-based, study aimed at providing a more in-depth understanding of the underlying mechanisms of business model experimentation and solution space expansion, (e.g. Runuyan, 2006; Doern, 2016; Williams and Vorley, 2015), revealing changes in value creation architecture and revenue models beyond what was visible to the general public through social media. We approached 22 out of the 51 active cases from the social media dataset, targeting a rich variety of responses. Seventeen entrepreneurs accepted the invitation, all being either founders or having director-level positions in a small company producing packaged goods (see Appendix 4). It is noteworthy that our sampling biases active cases, representing relatively high performing entrepreneurs who were willing to share their crisis response. Negative reactions or lack of reaction to the crisis may thus be underrepresented in the interview data set.

Altogether 17 interviews were conducted during a timeframe of April and early June 2020, either in person or over distance via phone or teleconferencing platforms. We note that timing of the interviews during the crisis may affect the results, with 1.5 months between the first and last interview (giving later interviewees more time to potentially recover and create new solutions, but also more time to experience additional challenges and fatigue). The interviews lasted from 18 to 31 min and were audio-recorded and transcribed verbatim for analysis. For presentation purposes, excerpts have been translated from Finnish to English by authors fluent in both languages. The interviews were semi-structured with the general themes of coping with the situation, unpacking the situation after the declaration of the state of emergency, types of action taken by the venture during the crisis and how these had been received by customers or stakeholders, and their future outlook and plans.

Coding of the interview data was conducted using axial coding, going from first-order to second-order to aggregate dimensions (Gioia et al., 2013). First, we went through the transcripts to identify responses related to the impact and perception of the crisis, the ventures' responses (actions, and their corresponding reasons, enablers and consequences), and the entrepreneurs' plans. First responses were coded using the response coding scheme developed for the social media responses (see Appendix 5). We then reviewed transcripts against the nine elements of business model innovation identified by Spieth and Schneider (2016), coding for changes in target customers, products/services and competitive positioning for value offering, core competences/resources, internal value creation activities, role/involvement of partners and distribution for value creation architecture, and revenue and cost mechanisms and for revenue models. Similar to Andries and Debackere (2013), we also categorized the degree of novelty of the effects in terms of the degree of change, or the distance between the original and revised business model, examining novelty for the venture rather than industry. These layers of coding focused on identifying where novel actions had been taken, and are represented in Appendix 5.

The second layer of analysis focused on the connections between actions and the consequences of experimenting with new business model elements. Pathways across actions were charted for each case (see example Figs. 2–5), as well as a characterization of the overall effects on the venture's business model (Appendix 5). Based on the identified experimentation pathways and effects, we identified longer term effects in terms of their effect on the business models of the ventures and patterns in spread and sequence of experimentation activities. These findings were then finally connected to the aggregate dimensions of expanding solution spaces, noted in Fig. 6.

Appendix 4. Case ventures and their interview dates

Type of offering	Pseudonyms	Interview date	
Breweries	Anna	Late May	
	Ben	Early May	
Roasteries	Carl	Mid-April	
	David	Mid-May	
Condiments	Ella	Late April	
	Felix	Late April	
Desserts	Gabriella	Early May	
	Henri	Mid-May	
	Isla	Late April	
Distilleries	Joel	Mid-May	
	Kevin	Late April	
Snacks	Leo	Early May	
	Marianne	Mid-May	
Health Snacks	Nina	Late April	
	Olivia	Late May	
	Paula	Early May	
	Riitta	Early June	

Appendix 5. Consumer-facing value creation and capture action responses to the Covid-19 crisis amongst food and beverage ventures

Group	Category	Description (example)	Instances in social media (# of 66 ventures)	# of 17 ventures mentioning response in interviews
Value offering: products	Product bundles	Grouping existing (within-company) products into a bundle with its own brand	28 (12)	2
	New product categories	Launching a new product within a new category, needing production changes (e.g. hand sanitizer for distillery)	12 (11)	3
	Collaborative product bundles	Creating a product bundle consisting of different companies' offerings	8(6)	2
	New products	Launching new product	8 (5)	2
	Product modifications	Modifying an existing product (e.g. changing labels for existing products)	7 (5)	6
	Product collaborations	Creating joint products (e.g. clothing company collaborating with spirits producer)	5 (5)	3
Value offering; services	Virtual experiences	Creating experiences through social media platforms (e.g. virtual brewery tours and tastings)	17 (15)	3
	New delivery services	Establishing of new home delivery services	8 (8)	2
	New services	Creating a new service (e.g. company starts renting out their premises for external use)	5 (4)	1
Value creation architecture: sales channels	New online sales platforms	Establishing online stores to sell products, either delivered directly to customers or pre-ordered online and picked up by the customers from venture premises.	12 (12)	9
	New physical sales points	Setting up new physical sales or product pick-up points that comply with Covid-19 directions	11 (10)	1
	Collaborative sales channels	Creating joint sales channels (e.g. drive-through pop up with another company) or utilizing each other's sales points (e.g. a section of the factory store dedicated to other companies' products)	9 (8)	1
Other experiments: prosocial actions		Support actions for victims of the Covid-19 crisis (e.g. at-risk groups), the ones working in the 'frontlines' (e.g. giving away food products to the nurses working in a hospital as a 'thank you' for their work), other ventures or local communities	17 (12)	8

Appendix 6. Experimentation and its longer-term effects on ventures' business models



12

References

Andries, P., Debackere, K., 2013. Business model innovation: propositions on the appropriateness of different learning approaches. Creativ. Innovat. Manag. 22 (4), 337–358.

Baker, T., Nelson, R.E., 2005. Creating something from nothing: resource construction through entrepreneurial bricolage. Adm. Sci. Q. 50 (3), 329–366.
Becherer, R.C., Maurer, J.G., 1999. The proactive personality disposition and entrepreneurial behavior among small company presidents. J. Small Bus. Manag. 37 (1), 28–36.

Berg, J.M., 2016. Balancing on the creative highwire: forecasting the success of novel ideas in organizations. Adm. Sci. Q. 61, 433-468.

Björklund, T.A., 2013. Initial mental representations of design problems: differences between experts and novices. Des. Stud. 34 (2), 135-160.

Björklund, T.A., Krueger, N.F., 2016. Generating resources through co-evolution of entrepreneurs and ecosystems. Journal of Enterprising Communities 10 (4), 477–498.

Bocken, N., Snihur, Y., 2020. Lean Startup and the Business Model: Experimenting for Novelty and Impact. Long Range Planning, December.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3 (2), 77-101.

Brown, R., Rocha, A., 2020. Entrepreneurial uncertainty during the Covid-19 crisis: mapping the temporal dynamics of entrepreneurial finance. Journal of Business Venturing Insights 14, e00174.

Buchanan, D.A., Denyer, D., 2013. Researching tomorrow's crisis: methodological innovations and wider implications. Int. J. Manag. Rev. 15 (2), 205-224.

Bullough, A., Renko, M., Myatt, T., 2014. Danger zone entrepreneurs: the importance of resilience and self-efficacy for entrepreneurial intentions. Enterpren. Theor. Pract. 38 (3), 473–499.

Butterfield, L.D., Borgen, W.A., Amundson, N.E., Maglio, A.S.T., 2005. Fifty years of the critical incident technique: 1954-2004 and beyond. Qual. Res. 5 (4), 475–497. Casadesus-Masanell, R., Ricart, J.E., 2010. From strategy to business models and to tactics. Long. Range Plan. 43 (2/3), 195–215.

Certo, S.T., Moss, T.W., Short, J.C., 2009. Entrepreneurial orientation: an applied perspective. Bus. Horiz. 52, 319-324.

Chandler, G.N., DeTienne, D.R., McKelvie, A., Mumford, T.V., 2009. Causation and effectuation processes: a validation study. J. Bus. Ventur. 26 (3), 375–390.
Chell, E., 2004. Critical incident technique. In: Cassell, C., Symon, G. (Eds.), Essential Guide to Qualitative Methods in Organizational Research. SAGE Publications Ltd, London, pp. 45–60.

Cope, J., 2005. Toward a dynamic learning perspective of entrepreneurship. Enterpren. Theor. Pract. 29 (4), 373-397.

Dew, N., Read, S., Sarasvathy, S.D., Wiltbank, R., 2008. Outlines of a behavioral theory of the entrepreneurial firm. J. Econ. Behav. Organ. 66, 37-59.

Doern, R., 2016. Entrepreneurship and crisis management: the experiences of small businesses during the London 2011 riots. Int. Small Bus. J. 34 (3), 276–302.
Doern, R., Williams, N., Vorley, T., 2019. Special issue on entrepreneurship and crises: business as usual? An introduction and review of the literature. Enterpren. Reg. Dev. 31 (5–6), 400–412.

Duchek, S., 2020. Organizational resilience: a capability-based conceptualization. Business Research 13, 215-246.

Feld, B., 2013. Startup Communities. Wiley, Hoboken, NJ.

Fisher, G., Stevenson, R., Burnell, D., 2020. Permission to hustle: igniting entrepreneurship in an organization. Journal of Business Venturing Insights 14, e00173. Finnish Government, 2020 [Ministry notice for changing restrictions for restaurants in Finland] Accessed June 26th, 2020. https://valtioneuvosto.fi/en/article/-/asset_

publisher/1271139/ravintolat-avattaisiin-1-6-ja-niiden-toimintaa-koskevista-rajoituksista-saadettaisiin-tartuntatautilain-maaraaikaisella-muutoksella. Flanagan, J.C., 1954. The critical incident technique. *Psychological Bulletin*, 51 (4), 327–358.

Fuchs, C., Sting, F.J., Schlickel, M., Alexy, O., 2019. The ideator's bias: how identity-induced self-efficacy drives overestimation in employee-driven process innovation. Acad. Manag. J. 62 (5), 1498–1522.

GEM Global Entrepreneurship Monitor, 2018. Global Report 2017/2018. Available at: http://www.gemconsortium.org/reports.

Gioia, D.A., Corley, K.G., Hamilton, A.L., 2013. Seeking qualitative rigor in inductive research: notes on the Gioia methodology. Organ. Res. Methods 16 (1), 15–31. Giones, F., Brem, A., Pollack, J.M., Michaelis, T.L., Klyver, K., Brinckmann, J., 2020. Revising entrepreneurial action in response to exogenous shocks: considering the COVID-19 pandemic. Journal of Business Venturing Insights 14 (May), e00186.

Goel, V., Pirolli, P., 1992. The structure of design problem spaces. Cognit. Sci. 16, 395-429.

Grube, L.E., Storr, V.H., 2018. Embedded entrepreneurs and post-disaster community recovery. Enterpren. Reg. Dev. 30 (7-8), 800-821.

Helsingin Sanomat, 13.6.2020. Outo Virus Kiinasta Mullisti Elämän Kolmessa Kuukaudessa - Aikajana Näyttää, Miten Epidemia Eteni Suomessa. National news summary of the epidemic in Finland. https://www.hs.fi/tiede/art-2000006539847.html. (Accessed 26 June 2020).

Herbane, B., 2019. Rethinking organizational resilience and strategic renewal in SMEs. Enterpren. Reg. Dev. 31 (5-6), 476-495.

KPMG, 2020. https://home.kpmg/xx/en/home/insights/2020/04/finland-government-and-institution-measures-in-response-to-covid.html. (Accessed 26 June 2020).
Kuckertz, A., Brändle, L., Gaudig, A., Hinderer, S., Reyes, C.A.M., Prochotta, A., Steinbrink, K., Berger, E.S., 2020. Startups in times of crisis–A rapid response to the COVID-19 pandemic. Journal of Business Venturing Insights, e00169.

Laestadius, L., 2016. Instagram. In: Sloan, L., Quan-Haase, A. (Eds.), The SAGE Handbook Of Social Media Research Methods. SAGE Publications Ltd, London, pp. 573–592.

Linnenluecke, M.K., 2017. Resilience in business and management research: a review of influential publications and a research agenda. Int. J. Manag. Rev. 19, 4–30. Macpherson, A., Herbane, B., Jones, O., 2015. Developing dynamic capabilities through resource accretion: expanding the entrepreneurial solution space. Enterpren. Rev. Dev. 27 (5–6). 259–291.

McDonald, R.M., Eisenhardt, K.M., 2020. Parallel play: Startups, nascent markets, and effective business-model design. Adm. Sci. Q. 65 (2), 483–523.

McGrath, R.G., 2010. Business models: a discovery driven approach. Long. Range Plan. 43 (2-3), 247-261.

Mezinska, S., Kakuk, P., Mijaljica, G., Waligóra, M., O'Mathúna, D.P., 2016. Research in disaster settings: a systematic qualitative review of ethical guidelines. BMC Med. Ethics 17 (62).

Ministry of Economic Affairs and Employment, 2020. Ministry support notice for medium enterprises in Finland. https://valtioneuvosto.fi/en/article/-/asset_

publisher/1410877/hallitus-tukee-yrityksia-koronavirustilanteessa-uusi-rahoitusohjelma-keskisuurille-yrityksille. (Accessed 26 May 2020).

Monllor, J., Murphy, P., 2017. Natural disasters, entrepreneurship, and creation after destruction: a conceptual approach. Int. J. Entrepreneurial Behav. Res. 23 (4), 618–637.

Read, S., Song, M., Smit, M., 2009. A meta-analytic review of effectuation and venture performance. J. Bus. Ventur. 24, 573–587.
Read, S., Sarasvathy, S.D., Dew, N., Wiltbank, R., 2016. Response to arend, sarooghi, and burkemper (2015): cocreating effectual entrepreneurship research. Acad. Manag. Rev. 41 (3), 528–536.

Roux-Dufort, C., 2016. Delving into the roots of crises: the genealogy of surprise. The Handbook of International Crisis Communication Research 43, 24.

Sarasvathy, S.D., 2001. Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency. Acad. Manag. Rev. 26,

243–263. Schneckenberg, D., Velamuri, V.K., Comberg, C., Spieth, P., 2017. Business model innovation and decision making: uncovering mechanisms for coping with uncertainty. R D Manag. 47 (3), 404–419.

Schneider, S., 2019. How to approach business model innovation: the role of opportunities in times of (no) exogenous change. R D Manag. 49 (4), 399–420. Schneider, C.Q., Wagemann, C., 2012. Set-theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis. Cambridge University Press. Simon, H.A., 1973. The structure of ill structured problems. Artif. Intell. 4, 181–201.

Sjödin, D., Parida, V., Jovanovic, M., Visnjic, I., 2020. Value creation and value capture alignment in business model innovation: a process view on outcome based business models. J. Prod. Innovat. Manag. 37 (2), 158–183.

Spieth, P., Laudien, S.M., Meissner, S., 2020. Business model innovation in strategic alliances: a multi-layer perspective. R D Manag. 1–16.

Spieth, P., Schneider, S., 2016. Business model innovativeness: designing a formative measure for business model innovation. J. Bus. Econ. 86 (6), 671–696. Teece, D.J., 2010. Business models, business strategy and innovation. Long. Range Plan. 43 (2/3), 172–194.

Thorgren, S., Williams, T.A., 2020. Staying alive during an unfolding crisis: how SMEs ward off impending disaster. Journal of Business Venturing Insights 14 (May), e00187.

Wilkinson, R.G., Pickett, K.E., 2009. Income inequality and social dysfunction. Annu. Rev. Sociol. 35 (1), 493–511. Williams, T.A., Gruber, D.A., Sutcliffe, K.M., Shepherd, D.A., Zhao, E.Y., 2017. Organizational response to adversity: fusing crisis management and resilience research streams. Acad. Manag. Ann. 11 (2), 733–769.

Williams, N., Vorley, T., 2015. The impact of institutional change on entrepreneurship in a crisis-hit economy: the case of Greece. Enterpren. Reg. Dev. 27 (1-2), 28-49. Yle (National Broadcasting Company, 2020. https://yle.fi/uutiset/osasto/news/finland_closes_schools_declares_state_of_emergency_over_coronavirus/11260062. (Accessed 26 June 2020).

Zhang, M., Macpherson, A., Jones, O., 2006. Conceptualizing the learning process in SMEs: improving innovation through external orientation. Int. Small Bus. J. 24 (3), 299-323.

Zott, C., Amit, R., Massa, L., 2011. The business model: recent developments and future research. J. Manag. 37 (4), 1019–1042.