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A SYSTEMIC SUPPORT TO BUSINESS MODEL INNOVATION: ENHANCING RESILIENCE-BUILDING PROCESSES OF SMEs IN TIMES OF CRISIS

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Abstract

Purpose. *The work proposes Dynamic Business Modeling (DBM) to support small and medium enterprises (SMEs) in implementing business model innovation (BMI) to increase their resilience during crises.*
Design/methodology/approach. *Drawing on System Dynamics and secondary data case studies, DBM is investigated as a way to make changes to business model elements and architecture in response to changing conditions.*
Findings. *The case-based analysis shows how DBM can help SMEs overcome BMI barriers during crises by enhancing the understanding of the interdependence between financial and non-financial factors.*
Practical and social implications. *The work shows how DBM can speed up BMI in SMEs, contributing to the scientific discussion by proposing a systemic methodological solution for SMEs to overcome BMI barriers.*
Originality of the study. *The work offers a qualitative perspective of DBM for SMEs coping with crises through BMI. It serves as groundwork for future applied research on SMEs' BMI.*

1. Introduction

In times of crisis, SMEs require additional methodological efforts to overcome their peculiar limits (e.g., limited access to credit lines, lack of strategic capabilities and resources, poor networking capacity) and adequately take on new entrepreneurial challenges and opportunities for survival. These firms represent more than 90% of all businesses worldwide (Latifi et al., 2021); therefore, providing theoretical and practical suggestions to improve their capabilities of dealing with crises has a pivotal relevance for the well-being of our economic and social system. Emerging crises – related to war, pandemics, energy supply, or others – further emphasize the conventional shortages characterizing SMEs, thus increasing complexity and uncertainty in their strategy design and performance management mechanisms (Ruisi, 2022; Fasth et al., 2022). Based on these insights, SME decision-makers could benefit from supplementary methodological support to understand and eventually reorient and innovate their business activities according to SMEs' peculiarities during times of crisis.

Studies have shown that innovating strategies help firms cope better with crises (Archibugi et al., 2013; Osterwalder et al., 2020; Wenzel et al., 2020). Research on business model innovation (BMI) has pointed out the importance for an SME to innovate its business model (BM) by relying on information technology support, business analytics and digitalization (Cosenz & Bivona, 2021; Ghezzi & Cavallo, 2020; Heikkilä et al., 2018; Li, 2020; Andersen et al., 2022; Zamani et al., 2022). These technologies and tools can be catalyzing factors for SMEs to take advantage of new opportunities (Andersen et al., 2022). Innovative digital technologies help businesses respond to adverse conditions by enabling processes and services that can, in turn, become the engine of BMI (Pateli & Giaglis, 2005; Garzella et al., 2021; Zamani et al., 2022; Jabeen et al., 2023). In particular, in the case of SMEs, these technologies can compensate for the lack of other resources by fostering their dynamic capabilities towards BMI (Zamani et al., 2022). Furthermore, innovating seems particularly fit for SMEs. Leveraging their flexibility may better seize new opportunities offered by the changing context than their larger competitors (Pencarelli et al., 2021) by temporarily renewing their business models (BMs).

However, unlike larger companies that can engage in BMIs with lower risks, SMEs must be careful in experimenting with new ideas, as these may be costly or even fatal to SMEs' survival (Cosenz & Bivona, 2021). SME entrepreneurs must develop their managerial skills to better cope with business crises. SMEs should overcome a potential lack of understanding of the complex system they operate in, particularly in times of crisis. To remain competitive, SMEs must learn how to design and implement BMIs.

BM frameworks can provide them with a tool to map value creation pro-

cesses and comprehend how their business responds to internal and external changes (Johnson et al., 2008; Osterwalder et al., 2020; Cosenz & Bivona, 2021). Under these conditions, lean BM frameworks can be helpful tools capable of fostering SMEs' key actors' cognitive and strategic capabilities facilitating innovation-oriented initiatives to improve their SMEs' competitiveness. Among these frameworks, the Business Model Canvas (BMC) proposed by Osterwalder and Pigneur (2010) is particularly useful for designing and understanding BM's strengths and weaknesses.

However, Cosenz and Bivona (2021) highlight a gap in the literature: the partial lack of attention in exploring how BMS and BMIs can support SME's strategic capabilities development. The authors point out that SME value creation processes present different organizational and strategic characteristics and drivers than their larger counterparts. BM researchers have mainly addressed larger companies (Alberti et al., 2018; Demil & Lecocq, 2015). Furthermore, the BMC provides a static perspective of firms functioning and value creation and this limit may prevent SMEs from experimenting and adapting to contextual changes and innovations (Cosenz & Bivona, 2021). According to the authors, as SMEs need to innovate their BMs under more profound uncertainty due to the higher risk they face, a tailored business modeling approach that addresses these challenges is needed.

This paper proposes the Dynamic Business Modeling (DBM) approach (Cosenz, 2017; Cosenz & Noto, 2018; Cosenz & Bivona, 2021) as an innovative method to address these gaps and limits. DBM is proposed as a tool to support SMEs in implementing BMI during times of crisis to increase their resilience. Differently from previous applications (Cosenz, 2017; Cosenz & Noto, 2017; Cosenz & Noto, 2018; Cosenz & Noto, 2018b; Cosenz et al., 2020; Cosenz & Bivona, 2021; Bivona & Cruz, 2021), this paper proposes the adoption of DBM to experiment with BMI strategies oriented to face crises and, in doing this, exploit emerging opportunities. The paper contributes to the ongoing scientific discussion by proposing a technological methodological solution to overcome BMI barriers for SMEs. In doing so, we show and discuss the application of DBM in three case studies. The case-based analysis we propose demonstrates how DBM can be a valuable method for accelerating BMI in SMEs by providing a way to experiment with how different elements of their BM interact with each other. Hence, we show how DBM can be particularly helpful during uncertain and crises. Our work answers the following research question: how can DBM overcome classic BM in supporting SME BMI in times of crisis?

The remainder of this paper is organized as follows: section 2 describes the methodology adopted in this work, and the DBM method, and section 3 provides an overview of the application of the method on three selected case studies. Eventually, in section 4, we discuss the implications of the applied method to SMEs coping with crises and provide some final reflections.

2. Methodology: a case-based perspective of Dynamic Business Modeling

To achieve our aim, we show the functioning of the DBM approach by relying on case studies. The DBM approach has been developed in recent years, drawing on combining an adapted version of the BMC with system dynamics (SD) modeling. SD is an approach to understanding and forecasting the behavior of complex systems using stocks and flows representation. Such a combination aims to overcome several limitations of the BMC as a managerial tool for strategy design, experimentation, and decision support. As such, it has been applied to (i) different market sectors (e.g., clothing e-commerce, luxury fashion multisided platforms, food & beverage), (ii) stages of business development (e.g., startups, SMEs), and (iii) purposes (e.g., BM design, BM innovation, entrepreneurial learning, sustainability). The DBM method is further deepened in the next section.

We demonstrate DBM's capability to support SMEs' BMI using case studies. Case studies are useful research methods that can help answer questions about "how" and "why" things happen in real-life situations (Yin, 2009). Yin (1981) suggests that case studies are particularly helpful when examining a current issue within its real-world setting, especially if it is difficult to distinguish between the issue and its context. Additionally, case studies can explore complex relationships and provide a foundation for developing theories (Flyvbjerg, 2006). According to Lindgreen et al. (2021), using the case study allows researchers to have a holistic view and explore complex social processes, leading them to identify contextual variables that can affect actors' behavior. Considering that the SD approach and the case study method share the characteristic of focusing researchers' efforts on the holism of investigated phenomena, we posit combining DBM and case studies as a proper choice for our investigation. Further, Lindgreen and colleagues (2021) suggest two steps to report case studies' results. They call the first step "within-case analysis" and the second one "across-case analysis." While in the first step, researchers document data from a single case, in the second step, researchers compare data from different cases to identify their differences and similarities. This step can be carried out to test generalizability and determine common patterns across the cases to develop theoretical insights. We will follow these two steps to present our findings.

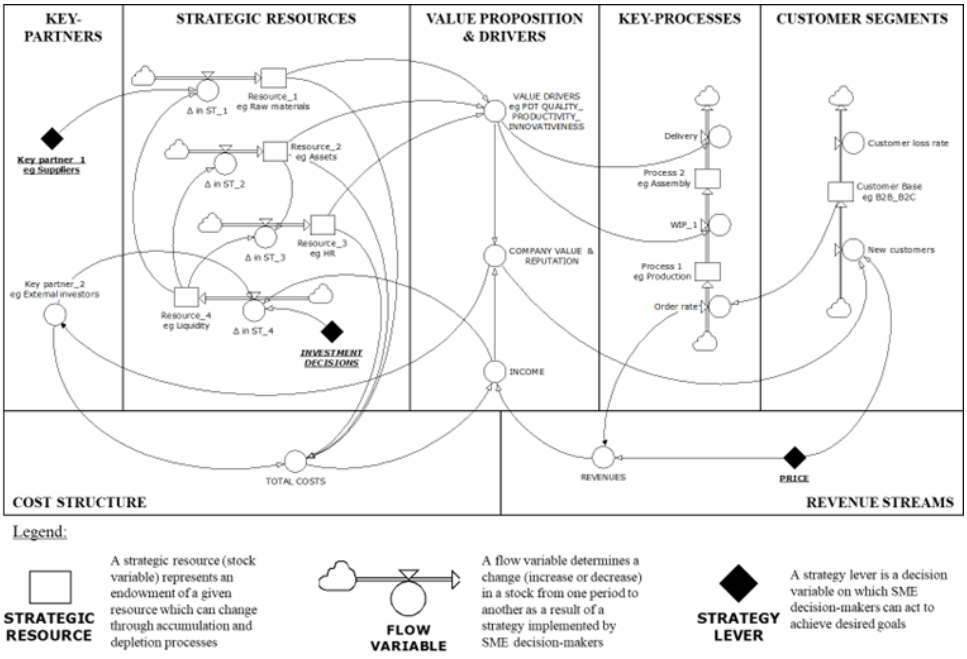
2.1 Method: Dynamic Business Modeling to enhance SMEs' resilience-building processes

Figure 1 outlines a refined version of the DBM framework, skillfully integrating an SD model into a streamlined version of the BMC. This integration results in a more concise BMC, reducing its components from nine to seven, thereby offering a holistic view of the interconnections between value creation, proposition, delivery, and capture.

In the same vein, SD modeling adopts a comprehensive approach, concentrating on weaving feedback loops, processes of resource buildup and depletion, temporal lags, and complex interactions. This approach is pivotal in articulating intricate and evolving feedback mechanisms (Sterman, 2000; Cosenz & Noto, 2016). Subsequent to pinpointing the causal feedback loops, the core elements of the BM are transformed into stock-and-flow structures through the application of SD computer-simulation tools (Groesser & Jovy, 2016). These sophisticated simulation models are instrumental for entrepreneurs, facilitating the simulation of the business system's temporal dynamics and providing a solid foundation for strategic experimentation. The value of simulation methodologies, particularly in navigating organizational systems marked by dynamism, complexity, and uncertainty, has been substantiated through various scholarly studies and practical applications in the realm of strategic management (Davis et al., 2007; Cosenz & Noto, 2016). The strength of these methodologies lies in their capacity to enable strategy formulation and organizational transformation through feedback model experimentation (Forrester, 1958; Sterman, 2000; Bouwman et al., 2020; Snihur et al., 2021).

DBM is not envisioned as a prescriptive model but rather as a heuristic framework, equipping SME entrepreneurs with analytical tools for dissecting intricate business systems and fostering their strategic learning (McDonald & Eisenhardt, 2020). In this light, the DBM approach emerges as a consistent tool for business strategy, particularly in innovating existing BMs by uncovering and examining novel business prospects that surface during turbulent times. By experimenting with alternative strategies within a risk-free and controlled learning setting, SMEs can circumvent the real-world execution of potentially hazardous plans. Instead, they can adopt comprehensive, cost-effective models and simulation scenarios, thereby mitigating risk and fostering innovation.

Fig.1 The Dynamic Business Modeling framework.



Source: Cosenz and Noto, 2018.

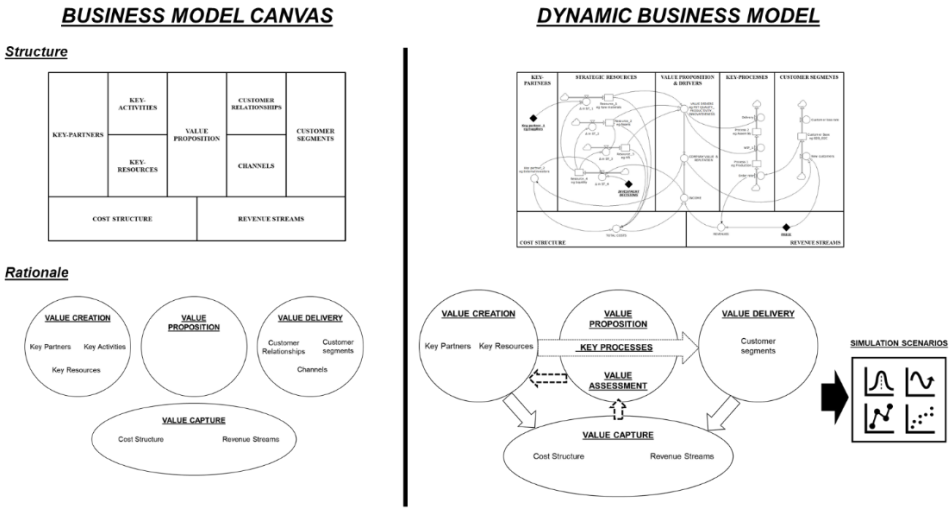
To highlight the potential advantages of using DBM for BMI in SMEs affected by crises, we build upon the comparison with the BMC. The motivation underlying this choice is twofold. First, the BMC is globally recognized as the predominant framework for designing BMs (Miller et al., 2021; Budler et al., 2021). Second, the DBM conceptualization originates from the structural articulation of the BMC.

The BMC is a well-known concise visual tool, largely used on a global scale, to design and share a cognitive representation of value creation, proposition, delivery, and capture related to a specific BM (Osterwalder & Pigneur, 2010; Massa et al., 2017; Taeuscher & Abdelkafi, 2017; Massa & Hacklin, 2020). However, despite its widespread popularity, it presents some methodological limitations, making it unsuitable for effective strategy experimentation (Chesbrough, 2010; Demil & Lecocq, 2010; McGrath, 2010; Cosenz & Bivona, 2021). Figure 2 portrays a graphical comparison between the BMC and the DBM approach regarding structure and rationale. Apart from removing two building blocks merged into the wider DBM key processes section (i.e., key activities, customer relationships, and channels -> key processes), both structures appear similar in their outline and premises. They aim to frame value creation, proposition, delivery, and cap-

ture in an inclusive construct.

The different rationale behind these structures is more likely to explain their distinctive core features. The BMC offers a blurred systemic representation of value creation, proposition, delivery, and capture by adopting a static qualitative approach. Such a perspective sets up a loose interaction between them. Lacking a quantitative approach to frame BM elements and related interplays, the BMC is unsuitable to support experimentation for BM scaling purposes. Conversely, the use of SD modeling enables the quantification of these interplays, thus providing a deeper understanding of how the formal strategic architecture – embedded in the BM – is translated into action. Unlike the BMC, the DMB approach relies on a more systemic view anchored to the key processes and related feedback mechanisms for operationalizing resource consumption into outputs delivered to the customer segments. Then, inputs and outputs are considered in economic terms through their conversion into costs and revenues, respectively.

Fig.2 Comparing the BMC with DBM in terms of structure and rationale.



Source: author's elaboration.

According to the above feedback mechanism, the value proposition also includes key performance indicators to assess value drivers and organizational results (e.g., the income resulting from the difference between revenues and costs). As such, it better explains how and if the business creates and captures value, and how this value fuels the strategic resources over time.

The emerging SD model enables simulation scenarios to convey new strategy experimentations, performance diagnosis, and learning. At this stage, each model variable can be quantified differently (e.g., setting up alternative investment allocations) or easily removed, substituted, and integrated (e.g., adding or removing one or more elements in one of the canvas building blocks). Model building and adjustment are quite easy tasks. This is how to realize an effective and robust experimentation process supporting the BMI of SMEs struggling to survive crises.

Table 1 synthesizes the main differences related to the adoption of the BMC and the DBM approach, as described in this section.

Table 1 Distinguishing the core attributes in the use of BMC and DBM.

BUSINESS MODEL CANVAS	DYNAMIC BUSINESS MODEL
Static approach to BM design	A dynamic approach to BM design
A blurred systemic view of value creation, delivery, and capture	A systemic view of value creation, delivery, and capture
Qualitative identification of BM's variables	Quantification of BM's variables and related interplays
No possibility of experimenting	Simulation-based experimentation and scenario analysis
Weak strategic learning	Deep strategic learning
No diagnosis of emerging performances	Diagnostic tool through KPIs
Unsuitable for BM innovation	Possibility to experiment with BM innovations

Source: author's elaboration.

Drawing on the work developed by Clauss et al. (2022), the following section illustrates an application of DBM to evaluate its methodological contribution to experimenting with BMI plans in times of crisis.

2.2 Case studies

We rely on three case studies to provide evidence on how the proposed systemic methodological support to implement BMI could improve SMEs' resilience-building processes.

The case studies analyzed in this section are reported through secondary data; we retrieved them from the work of Clauss et al. (2022). Namely, we carefully read the work of Clauss and colleagues and gained the supplemental material they provided to investigate these cases as possible sources to apply our methodology. The authors identified SMEs affected by the crisis that coped with the adverse situation using an innovation

strategy (Wenzel et al., 2020) and adopting a temporary BMI (Kraus et al., 2020). They collected the data from multiple sources (from internal reports and social media activities to semi-structured interviews and others) following Yin's advice (2009).

The final sample of cases investigated by Clauss et al. (2022) comprises five SMEs. These are firms from different industries and countries (Austria, Germany, and Liechtenstein). The authors labeled the cases as "Case A," "Case B," "Case C," "Case D," and "Case E" for the sake of anonymity. We selected only three case studies from these five to provide a more detailed focus on our methodology. In particular, we decided to focus only on those cases where the company's BM has been partly affected by the crisis. This choice was guided by the willingness to verify DBM supporting capabilities on firms not facing a radical transformation of their business activities.

The table below (Table 2) is a rework of the additional material in Clauss et al. (2022), highlighting the cases we decided to focus on.

Table 2 Selected case studies from Clauss et al. (2022).

Case	Current business model	Temporary business model adjustment	Case summary	Source
A	Producer of beverages/ spirits	Producer of disinfectant	- Family-owned firm producing spirits - Mainly B2B sales - COVID-19 leads to B2B sales decrease - Core competencies in production and bottling and contacting a business expert in disinfectant - Producing and selling disinfectants	Clauss et al. (2022) and Clauss et al. (2022) supplementary material concerning: "Case description" and "Interview guide"[1]
B	Services and Events	Online networking	- Event planning and consultancy firm - Hosts annual profitable networking event in person - COVID-19 restrictions on social events - Contact a consulting company - Develop a digital event	Clauss et al. (2022) and Clauss et al. (2022) supplementary material concerning: "Case description" and "Interview guide"

[1] We retrieved the supplementary material word file at https://onlinelibrary.wiley.com article doi/10.1111/radm.12498 in the supporting information section. The document contains information such as cases' background (backstory/story pre-BMI, country, data sources, type of BM and BMI) and the interview guide divided into "assessment of the situation" and "focus on the temporary BMI." We have combined this material with the results reported in the full article to show the potential advantages of applying our DBM.

E	Producer of food and sale to businesses	Seller of food to customers	- Family-owned organic farm - Sells milk and meat B2B - COVID-19 leads to a complete drop in B2B - Adapt a small part of its infrastructure - Sells meat B2C through a digital shop and on the farm	Clauss et al. (2022) and Clauss et al. (2022) supplementary material concerning: "Case description" and "Interview guide"

Source: Our reworking from Clauss et al. (2022) additional material.

3. Business model canvases and emerging dynamic business models of the selected cases

3.1 Within case analysis

Case A is about a family-owned firm specializing in producing schnapps and other beverages, with over 200 employees. The company's main business model is B2B sales to retailers and restaurants. Still, they also have a B2C model, selling directly to end consumers through a shop near the production facility and an online shop. The firm's main season is winter, with the most important customers being après-ski bars and ski huts. During the COVID-19 crisis, B2B sales temporarily decreased due to the early end of the winter season, but the online shop received more orders from private customers, leading to an increase in B2C sales.

In response to the COVID-19-related decrease in B2B sales, the firm started to produce, bottle, and sell disinfectants. Clauss and colleagues highlight that the change in the BM was not structural. They emphasize that the firm took the opportunity from its core spirit of production and bottling competencies. All departments were involved in the transformation of the value proposition. Moreover, the transformation required the support of experts and consultants with expertise in the new market segment.

Based on these pieces of information, the following canvas (Table 3) should represent the BMs of the firm in the crisis period.

Table 3 - Case A BMC.

<table>
<tr>
<td rowspan="2">Key-Partners

- Raw material suppliers

- Family (investors)

- Business experts***</td>
<td>Key-Activities

- Producing spirits
- Producing, bottling and selling beverages
- Producing, bottling, and selling disinfectant***</td>
<td rowspan="2">Value Proposition

- Offer beverages that are pleasant warming and help create a convivial atmosphere
- Offer a product that makes people safe in everyday life in the face of the current pandemic emergency***</td>
<td>Customer Relationship

- Word of mouth</td>
<td rowspan="2">Customer segment

- B2B: restaurants and retailers, particularly ski huts
- and après-ski bars (decreased during the crisis) (<)
- B2C (increased during the crisis) (>)
- Disinfectant buyers***</td>
</tr>
<tr>
<td>Key-Resources
- Specialization in beverages and spirits production
- More than
- 200 employees
- Bottling assets
- Production assets
- Inventory</td>
<td>Channels

- Online shop (stronger during the crisis) (>)
- Shop near the production facility</td>
</tr>
<tr>
<td colspan="3">Cost structure

- Fixed costs related to bottling, production and selling processes
- Variable costs related to bottling, production and selling processes
- Variable costs specifically related to beverages
- Variable costs specifically related to disinfectant***</td>
<td colspan="3">Revenue streams

- B2B beverages revenues (decreased during the crisis) (<)
- B2C beverages revenues (increased during the crisis) (>)
- Disinfectant revenues***</td>
</tr>
</table>

*Legend: (<) Declined element, ~~abc~~ Removed element, (>) Increasing element, *** New element. No symbol stands for already present element.*

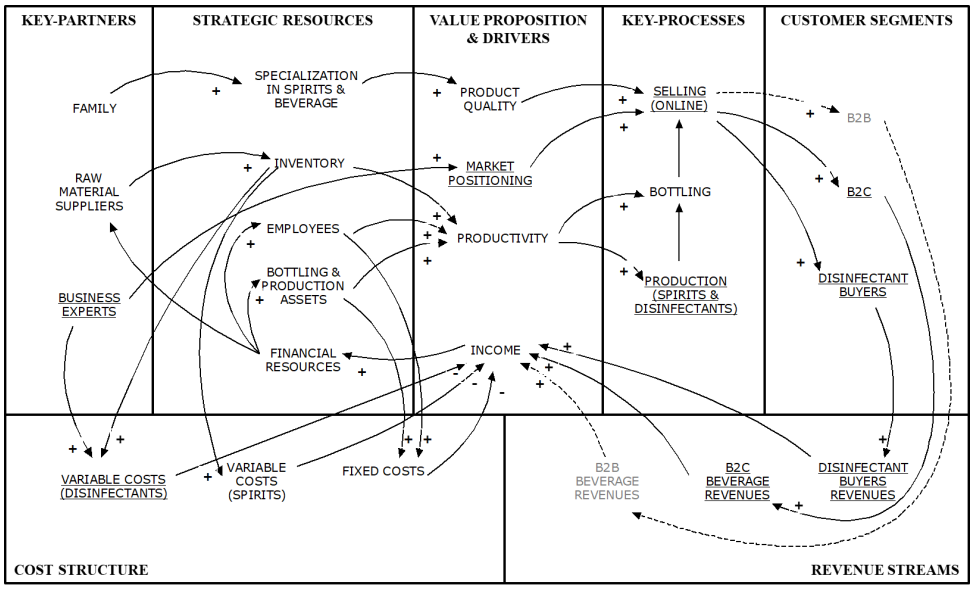
Source: author's elaboration.

Figure 3 converts case A's BMC into the corresponding DBM, thus offering a systemic overview of how the company enhanced its resilience toward crises by seizing new market opportunities. Interestingly, the framework highlights a set of performance drivers (e.g., product quality, productivity, market positioning, income) useful for evaluating the outcomes that could emerge by adopting such a new strategy.

As it can be noted, the new business experts that can offer consulting services are, on the one hand, directly linked to the new variable cost structure. Therefore, these actors represent that classic increase in costs that can

jeopardize the survival of SMEs. On the other hand, new business experts may also positively influence market positioning in the new sector and related sales. This increase in disinfectant sales should compensate for the decrease in B2B revenues. The DBM is a helpful tool in highlighting the underlying patterns of value creation embedded in the BMI. By allowing managers to visualize the connections between the different canvas elements, DBM can create more awareness than static canvas.

Fig.3 Case A DBM.



Source: author's elaboration.

Case B describes a small event planning and consultancy firm in the finance industry that was founded in 2009. The firm employs eleven people, and its annual event has become a profitable opportunity to network with market players, focusing on the networking of asset managers and asset owners. The event takes place on a smaller scale, with only 3-5 individual sponsors allowed to sponsor each event, and the majority of networking is done during unofficial dinners. Due to COVID-19-related border controls and event bans, the firm's annual cash cow event cannot occur. However, the firm already works on multiple business models, one unaffected by the crisis.

The firm was concerned it should refund all the sponsors for being unable to carry out the planned event due to COVID-19 restrictions. Therefore, it contacted a consulting company that developed an event with personal character in a digital space as a substitute for the original event. A handwritten invitation was sent out to participants to create a more personal-

ized and pleasant environment. These were invited to digital rooms where the sponsors presented themselves to develop networks.

The following canvas (Table 4) should represent the BM of Case B in the crisis period.

Table 4 Case B BMC.

<table>
<tr>
<td>Key-Partners

- Sponsors
- Consulting firm***</td>
<td>Key-Activities

- Event planning
- Consultancy
- Online event organization***
- ~~Room booking~~
- ~~Catering~~

Key-Resources

- Eleven employees
- Expertise in event planning
- Reputation
- Digital platform***</td>
<td>Value Proposition

- ~~Offering a stimulating an annual event for market players' networking~~
- Offering online events with a personal character addressing the needs of customers and sponsors***</td>
<td>Customer Relationship

- Targeted Google Ads

Channels

- Direct contact
- Handwritten invitation***
- Digital space***</td>
<td>Customer segment

- Asset managers
- Asset owners</td>
</tr>
<tr>
<td colspan="3">Cost structure

- ~~Hospitality costs (travel, lodging, meals, drinks…)~~
- Digital platform costs***</td>
<td colspan="2">Revenue streams

- ~~Firm's cash cow annual event~~
- Firm's online events***</td>
</tr>
</table>

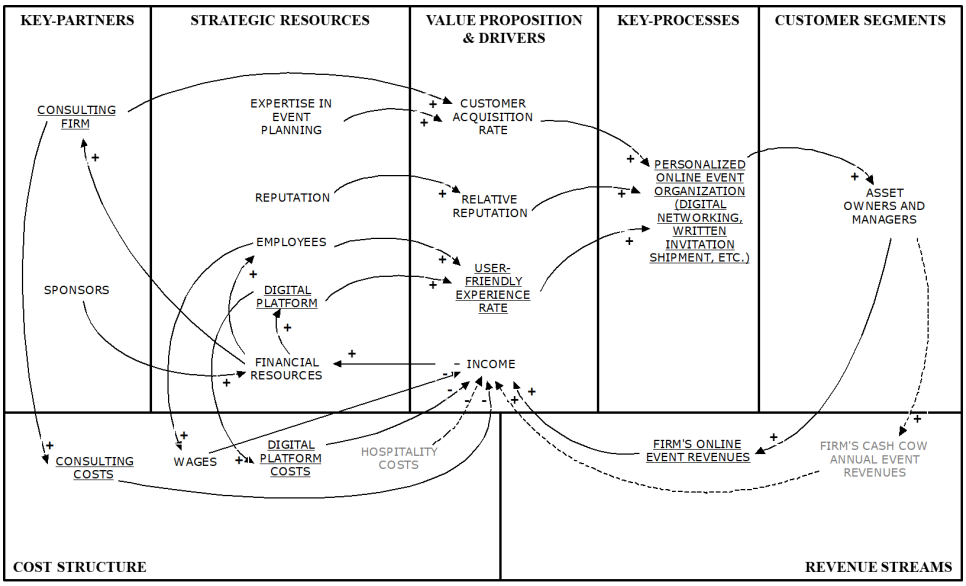
*Legend: (<) Declined element, ~~abc~~ Removed element, (>) Increasing element, *** New element. No symbol stands for already present element.*

Source: author's elaboration.

We can start observing the BMI, focusing on the new key partners. The firm was supported by a new partner, particularly a consulting firm. We have a trade-off between consulting costs and new revenues mediated by the customer acquisition rate. Moreover, the income due to the new revenues from the provision of digital events could be invested to improve the functionalities of the digital platform, improving the new business value proposition. The DBM emphasizes the digital platform's pivotal role and the provision of

a user-friendly experience to incentivize new business revenues.

Fig.4 Case B DBM.



Source: author's elaboration.

Case E is about a family-owned organic farm that employs five people and sold milk to a regional dairy and meat only to restaurants before the crisis. The manager, who is 25 years old, took over the farm in 2018, but the former manager still provides support in strategic decisions and operational work. The farm's main customers' activities were strongly affected by the lockdowns during the COVID-19 crisis. This caused a complete drop in B2B demand for meat. As a result, the farm had to find alternative ways to sell its products, as they could still sell their milk. However, since meat sales make up the bulk of the revenue, the farm needed another solution to compensate for the loss of B2B meat sales.

The firm quickly integrated a new BM to sell meat directly to consumers. To implement the BMI, the firm had to adapt only a small part of its infrastructure to sell meat on the farm and through a digital shop. The case study described by Clauss and colleagues can be represented by the following canvas (Table 5).

Table 5 Case E BMC.

<table>
<tr><td>Key-Partners

- Raw material suppliers
- Family (investors)
- Former manager</td><td>Key-Activities

- Producing and selling beef and milk
- Processing and selling wood and other by products of livestock farming</td><td rowspan="2">Value Proposition

- Offering high quality organic products to restaurants
- Offering high quality organic products to consumers***</td><td>Customer Relationship

- Targeted Google Ads</td><td rowspan="2">Customer segment

- ~~B2B (restaurants)~~
- Regional dairy
- B2C***</td></tr>
<tr><td></td><td>Key Resources

- Five employees
- Cattle
- Farm assets
- E-commerce website***</td><td>Channels

- Digital space (digital organic farm shop) ***
- Selling meat directly on the farm***</td></tr>
<tr><td colspan="3">Cost structure

- Fixed costs for meat and milk production and selling
- Variable costs for meat and milk production and selling</td><td colspan="2">Revenue streams

- ~~Revenues from selling beef to restaurants~~
- Revenues from selling milk to dairy
- Revenues from selling beef directly to consumers***</td></tr>
</table>

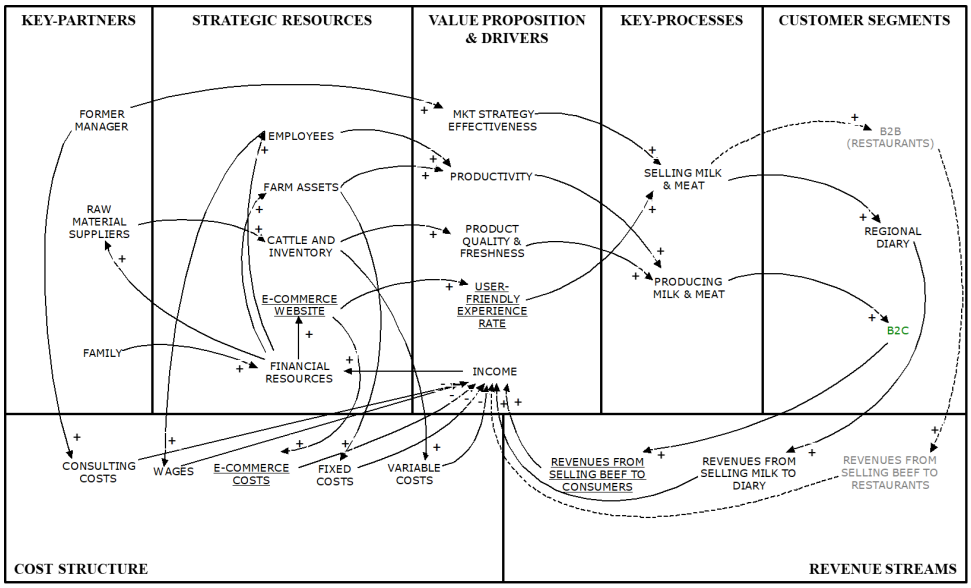
*Legend: (<) Declined element, abc Removed element, (>) Increasing element, *** New element. No symbol stands for already present element.*

Source: author's elaboration.

Eventually, figure 5 illustrates case E's DBM as a third example of how to design, evaluate and implement BMI, thus taking on new entrepreneurial challenges in times of crisis. The first new element we can focus on in the DBM is the e-commerce website. This element will determine a change in the cost structure that should also lead to the value proposition outcome of providing a user-friendly shopping experience. The increase in the user-friendly experience rate should improve the sales rate and consequently increase the revenues from selling beef to consumers, compensating for the B2B loss. Also, in this case, developing and visualizing the DBM may help comprehend the connections between the old and new business elements

and focus on their interactions to implement BMI better.

Fig.5 Case E DBM.



Source: author's elaboration.

3.2 Across case analysis

Our analysis allowed us to identify similarities and differences among the cases considered. In all the cases, we demonstrated that DBMs (Figures 2, 3 and 4) show causal interplays and performance drivers hidden in the traditional BMCs (Tables 3, 4 and 5). In all the cases, we explained how the representation of these causal interplays and performance drivers can provide additional support to frame the BMI as a strategic response to crises. For example, in the first two cases, we start the design of a BMI by focusing on adding new key partners to the current BM. While in the first and second cases, the firms were supported by a new partner (i.e., business experts and consulting firm), in the third case, it was unnecessary. This last firm can focus on changing its mix of efforts on the drivers in the block "strategic resources" by leveraging more on the website.

Two further steps are necessary once these changes have been drawn on the DBM. It should be taken into account that these changes will lead to a change in the cost structure and, further, potential value proposition drivers should be identified. These drivers can be both financial (e.g., "income") and non-financial (e.g., "user friendly experience rate"). This step needs a good knowledge of the business and a certain level of creativity to

locate good proxies to monitor and make predictions about. Lastly, in all cases, the effects of the potential innovation on the existing and potential key-processes and customers should be considered to forecast the trade-off between costs and revenues.

4. Discussion and conclusions

This paper proposes DBM as a methodological framework for SMEs to overcome barriers to BMI in times of crisis. Crises can worsen conventional shortages in SMEs, adding further complexity and uncertainty to their strategy design and performance management mechanisms. While researchers pointed out that innovating can help firms cope with crises, SMEs must be more cautious than larger companies when experimenting with new ideas, as these may jeopardise their survival. However, although these firms could be more vulnerable than their larger counterparts to increasing costs or decreasing revenues, it is also true that SMEs are more flexible than larger companies. In light of this flexibility, as emphasized by Clauss and colleagues, crises can also present opportunities for SMEs willing to search for them. However, SMEs' decision-makers need supplementary methodological support to take advantage of their flexibility to develop strategies to deal with crises. This paper focuses on DBM as a methodological approach that blends a revised BMC structure with SD modeling. This approach can be applied to SMEs engaged in a BMI process for coping with crises to trace the BMI pathway and enable scenario analysis for strategy evaluation.

The case-based analysis demonstrates how DBM can be a helpful tool for SMEs and contributes to the ongoing scientific discussion by providing a methodological solution to overcome SMEs' BMI barriers. The empirical findings show that DBM provides a lean methodological framework for representing causal interdependencies of financial and non-financial factors. This methodological solution can assist SME entrepreneurs in developing their comprehension of BMI and managerial skills to cope with business crises more effectively. Indeed, DBM can lead to a better understanding of firms' core competencies and potential flexibility, generating positive effects in the long term. In all three cases considered, DBMs highlight the underlying patterns of value creation embedded in BMIs, allowing managers to better conceptualize the connections between the different BM elements. DBM can, therefore, stimulate awareness and comprehension of BMIs better than static canvases. However, drawing up DBM also requires more effort than that requested for their static counterparts. Overall, the paper provides valuable insights into how entrepreneurs can enrich their cognitive schemas through the DBM tool and how SMEs can adapt

and innovate their BMs to increase resilience during crises.

Lastly, this study is not without limitations. First, the methodological application offered in this paper is based on secondary data from previously carried out case studies. We gathered available data from previous research. Considering that the main aim of the paper was to demonstrate the potential superior auxiliary role of DBM compared to classic BM for BMI in SMEs and draw methodological considerations, we found this data sufficiently suitable for our purpose. However, future research should apply the methodology to primary data single and multiple case studies to gain more theoretical insights into the proposed approach. Second, the methodological application adopts a qualitative perspective of DBM that forms instrumental groundwork to develop a simulation model and emerging scenario analysis, thus exploiting the full potential of the proposed approach. A shortage of quantitative input data related to the selected cases limited the possibility of simulating BM behavior over time. However, this provides new windows for future applied research perspectives on this topic. Future research can test DBM using quantitative data and propose this approach to SME entrepreneurs as a gamified BMC to gain their feedback and observations. Indeed, using data, system dynamics allows us to perform simulations to guide actors' decision-making rather than only providing a flow and stock chart, simplifying the reality in which they act.

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References

Alberti, F. G., Ferrario, S., & Pizzurno, E. (2018). Resilience: Resources and strategies of SMEs in a new theoretical framework. *International Journal of Learning and Intellectual Capital*, *15*(2), 165–188. https://doi.org/10.1504/IJLIC.2018.091969

Andersen, T. C. K., Aagaard, A., & Magnusson, M. (2022). Exploring business model innovation in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making. *Creativity and Innovation Management*, 31(1), 19-34. https://doi.org/10.1111/caim.12474

Archibugi, D., Filippetti, A., & Frenz, M. (2013). Economic crisis and innovation: Is destruction prevailing over accumulation?. *Research Policy*, *42*(2), 303–314. https://doi.org/10.1016/j.respol.2012.07.002

Bivona, E., & Cruz, M. (2021). Can business model innovation help SMEs in the food and beverage industry respond to crises? Findings from a Swiss brewery during COVID-19. *British Food Journal*, *123*(11), 3638–3660. https://doi.org/10.1108/BFJ-07-2020-0643

Bouwman, H., Reuver, M., Heikkilä, M., & Fielt, E. (2020). Business model tooling: Where research and practice meet. *Electronic Markets*, *30*(3), 413–419. https://doi.org/10.1007/s12525-020-00424-5

Budler, M., Župič, I., & Trkman, P. (2021). The development of business model research: A bibliometric review. *Journal of Business Research*, *135*, 480–495. https://doi.org/10.1016/j.jbusres.2021.06.045

Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Business Models*, *43*(2), 354–363. https://doi.org/10.1016/j.lrp.2009.07.010

Clauss, T., Breier, M., Kraus, S., Durst, S., & Mahto, R. V. (2022). Temporary business model innovation – SMEs' innovation response to the Covid-19 crisis. *R&D Management*, *52*(2), 294–312. https://doi.org/10.1111/radm.12498

Cosenz, F. (2017). Supporting start-up business model design through system dynamics modeling. *Management Decision*, *55*(1), 57–80. https://doi.org/10.1108/MD-06-2016-0395

Cosenz, F., & Bivona, E. (2021). Fostering growth patterns of SMEs through business model innovation. A tailored dynamic business modeling approach. *Journal of Business Research*, *130*, 658–669. https://doi.org/10.1016/j.jbusres.2020.03.003

Cosenz, F., & Noto, G. (2016). Applying System Dynamics Modeling to Strategic Management: A Literature Review. *Systems Research and Behavioral Science*, *33*(6), 703–741. https://doi.org/10.1002/sres.2386

Cosenz F., & Noto G. (2017). Il Dynamic Business Model: una prospettiva dinamica per la progettazione dei modelli di business. *Piccola Impresa/Small Business*, 2, 9-34. https://doi.org/10.14596/pisb.257

Cosenz, F., & Noto, G. (2018a). A dynamic business modeling approach to design and experiment new business venture strategies. *Long Range Planning*, *51*(1), 127–140. https://doi.org/10.1016/j.lrp.2017.07.001

Cosenz, F., & Noto, G. (2018b). Fostering entrepreneurial learning processes through Dynamic Start-up business model simulators. *The International Journal of Management Education*, *16*(3), 468–482. https://doi.org/10.1016/j.ijme.2018.08.003

Cosenz, F., Rodrigues, V. P., & Rosati, F. (2020). Dynamic business modeling for sustainability: Exploring a system dynamics perspective to develop sustainable business models. *Business Strategy and the Environment*, *29*(2), 651–664. https://doi.org/10.1002/bse.2395

Davis, J. P., Eisenhardt, K. M., & Bingham, C. B. (2007). Developing theory through simulation methods. *The Academy of Management Review*, *32*, 480–499. https://doi.org/10.2307/20159312

Demil, B., & Lecocq, X. (2010). Business Model Evolution: In Search of Dynamic Consistency. *Business Models*, *43*(2), 227–246. https://doi.org/10.1016/j.lrp.2010.02.004

Demil, B., & Lecocq, X. (2015). Crafting an innovative business model in an established company: The role of artifacts. In C. Baden-Fuller, & V. Mangematin (Eds.), *Business Models*

and Modeling (Advances in Strategic Management) (vol. 33, pp. 31–58). Bingley (UK): Emerald Group Publishing. https://doi.org/10.1108/S0742-332220150000033003

Fasth, J., Åkerman, N., Elliot, V., & Hilmersson, M. (2022). Small and medium-sized enterprises response to Covid-19: The effect of external openness and procedural management. *International Small Business Journal*, 41 (5), 465-487. https://doi.org/10.1177/02662426221101528

Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, *12*(2), 219–245. https://doi.org/10.1177/1077800405284363

Forrester, J. W. (1958). Industrial dynamics: A major breakthrough for decision makers. *Harvard Business Review*, *36*(4), 37–66.

Garzella, S., Fiorentino, R., Caputo, A., & Lardo, A. (2021). Business model innovation in SMEs: The role of boundaries in the digital era. *Technology Analysis & Strategic Management*, 33(1), 31-43. https://doi.org/10.1080/09537325.2020.1787374

Ghezzi, A., & Cavallo, A. (2020). Agile business model innovation in digital entrepreneurship: Lean startup approaches. *Journal of Business Research*, 110, 519–537. https://doi.org/10.1016/j.jbusres.2018.06.013

Groesser, S., & Jovy, N. (2016). Business model analysis using computational modeling: A strategy tool for exploration and decision-making. *Journal of Management Control: Zeitschrift* Für *Planung Und Unternehmenssteuerung*, *27*(1), 61–88. https://doi.org/10.1007/s00187-015-0222-1

Heikkilä, M., Bouwman, H., & Heikkilä, J. (2018). From strategic goals to business model innovation paths: An exploratory study. *Journal of Small Business and Enterprise Development*, 25, 107–128. https://doi.org/10.1108/JSBED-03-2017-0097

Jabeen, F., Belas, J., Santoro, G., & Alam, G. M. (2023). The role of open innovation in fostering SMEs' business model innovation during the COVID-19 pandemic. *Journal of knowledge management*, 27(6), 1562-1582. https://doi.org/10.1108/JKM-05-2022-0347

Johnson, M.W., Christensen, C.C., & Kagermann, H. (2008). Reinventing Your Business Model. *Harvard Business Review*, 87(12), 52-60

Kraus, S., Clauss, T., Breier, M., Gast, J., Zardini, A., & Tiberius, V. (2020). The economics of COVID-19: Initial empirical evidence on how family firms in five European countries cope with the corona crisis. *International Journal of Entrepreneurial Behavior & Research*, *26*(5), 1067–1092. https://doi.org/10.1108/IJEBR-04-2020-0214

Latifi, M.A., Nikou, S., & Bouwman, H. (2021). Business model innovation and firm performance: Exploring causal mechanisms in SMEs. *Technovation,* 107, 102274. https://doi.org/10.1016/j.technovation.2021.102274

Li, F. (2020). The digital transformation of business models in the creative industries: A holistic framework and emerging trends. *Technovation*, 92–93, 1–10. https://doi.org/10.1016/j.technovation.2017.12.004

Lindgreen, A., Di Benedetto, C. A., & Beverland, M. B. (2021). How to write up case-study methodology sections. *Industrial Marketing Management*, *96*, A7-A10. https://doi.org/10.1016/j.indmarman.2020.04.012

Massa, L., & Hacklin, F. (2020). Business Model Innovation in Incumbent Firms: Cognition and Visual Representation. In K. J. Sund, R. J. Galavan, & M. Bogers (Eds.), *Business Models and Cognition* (Vol. 4, pp. 203–232). Emerald Publishing Limited. https://doi.org/10.1108/S2397-521020200000004010

Massa, L., Tucci, C., & Afuah, A. (2017). A Critical Assessment of Business Model Research. *Academy of Management Annals*, *11*, 73–104. https://doi.org/10.5465/annals.2014.0072

McDonald, R. M., & Eisenhardt, K. M. (2020). Parallel Play: Startups, Nascent Markets, and Effective Business-model Design. *Administrative Science Quarterly*, *65*(2), 483–523. https://doi.org/10.1177/0001839219852349

McGrath, R. G. (2010). Business Models: A Discovery Driven Approach. *Business Models*, *43*(2), 247–261. https://doi.org/10.1016/j.lrp.2009.07.005

Miller, K., McAdam, M., Spieth, P., & Brady, M. (2021). Business models big and small:

Review of conceptualisations and constructs and future directions for SME business model research. *Journal of Business Research*, *131*, 619–626. https://doi.org/10.1016/j.jbusres.2020.12.036

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.

Osterwalder, A., Pigneur, Y. & Etiemble, F. (2020). *The Invincible Company: How to Constantly Reinvent Your Organization with Inspiration From the World's Best Business Models*. John Wiley & Sons.

Pateli, A. G., & Giaglis, G. M. (2005). Technology innovation induced business model change: A contingency approach. *Journal of Organizational Change Management*, 18(2), 167–183. https://doi.org/10.1108/09534810510589589

Pencarelli, T., Cesaroni, F. M., & Demartini, P. (2021). Covid-19 and Italian small and medium-sized enterprises: Consequences, threats and opportunities. *Piccola Impresa / Small Business*, (3). https://doi.org/10.14596/pisb.413

Ruisi, M. (2022). *Reconceptualizing Business Models in Light of the COVID-19 Experience: Insights from the World of Start-Ups for a Renewed Corporate Finalism*. In: AA.VV. (Eds): Campisi, G., Mocciaro Li Destri, A., Amenta, C., COVID-19 and Communities - The University of Palermo's Voices and Analyses During the pandemic. UNIPA SPRINGER SERIES, p. 257-264, Springer.

Snihur, Y., Lamine, W., & Wright, M. (2021). Educating engineers to develop new business models: Exploiting entrepreneurial opportunities in technology-based firms. *Technological Forecasting and Social Change*, *164*(C). https://doi.org/10.1016/j.techfore.2018.1

Sterman, J. (2000). *Instructor's Manual to Accompany Business Dyanmics: Systems Thinking and Modeling for a Complex World*. McGraw-Hill.

Taeuscher, K., & Abdelkafi, N. (2017). Visual tools for business model innovation: Recommendations from a cognitive perspective. *Creativity and Innovation Management*, *26*, 160–174. https://doi.org/10.1111/caim.12208

Wenzel, M., Stanske, S., & Lieberman, M. (2020). Strategic responses to crisis. *Strategic Management Journal*, *42*. https://doi.org/10.1002/smj.3161

Yin, R. K. (1981). The case study crisis: Some answers. *Administrative Science Quarterly*, *26*(1), 58–65. https://doi.org/10.2307/2392599

Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). sage.

Zamani, E. D., Griva, A., & Conboy, K. (2022). Using business analytics for SME business model transformation under pandemic time pressure. *Information Systems Frontiers*, *24*(4), 1145-1166. https://doi.org/10.1007/s10796-022-10255-8