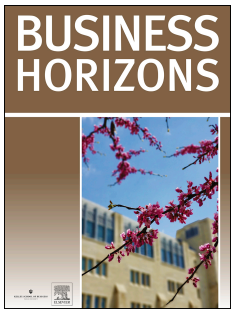

Business Continuity in the COVID-19 Emergency: A Framework of Actions Undertaken by World-Leading Companies

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Business Continuity in the COVID-19 Emergency: A Framework of Actions Undertaken by World-Leading Companies

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Abstract

The COVID-19 emergency has urged companies to operate in new ways to face supply chain interruptions, shifts in customer demand, and risks to workforce health. The organizational ability to respond to critical contingencies is crucial for business leaders in the perspective of continuing business. In our research, we investigate the actions undertaken by 50 world-leading corporations to respond to the pandemic outbreak. Applying content analysis to web pages and social network posts, we extract 77 actions related to 13 sub-areas and integrate these into a five-level framework encompassing operations, customer, workforce, leadership, and community-related responses. We also describe six illustrative company examples of how the emergency can generate opportunities for creating new value. The study advances the scholarly discussion on the impact of emergencies on business continuity and provides managers with a comprehensive view and some insights to define response strategies and actions in the current challenging scenario.

Keywords: business continuity; COVID-19; emergency; responses; value creation

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RESPONDING to COVID-19

Since the first months of 2020, the world has experienced an unprecedented health emergency generated by the global diffusion of a coronavirus pneumonia (COVID-19) epidemic, which has rapidly spread from China to most world countries. The World Health Organization (WHO) on March 11 declared COVID-19 a pandemic and, as of November 30, the WHO's website reported about 62 M confirmed cases; 1.5 M confirmed deaths; and 220 countries, areas, or territories with cases.

Besides representing an extraordinary health and social emergency, the pandemic is also a major threat for companies and the continuity of their business processes. Whereas business continuity represents a strategic organizational capability (Wong, 2009) also associated with resilience (Parker & Ameen, 2018; Sabatino, 2016; Sahebjamnia et al., 2015; Schätter et al., 2019), the literature has specifically discussed the relevance of crisis management for the survival of organizations (Laufer, 2015). A systematization effort was also conducted to identify key research themes and trends in crisis management (Coombs & Laufer, 2018) along the different pre-crisis (prevention and preparation), crisis (response), and post-crisis (learning and revision) activities (Coombs, 2015).

The interest in investigating business continuity and companies' ability to respond to a critical scenario is significantly relevant in the current global emergency. The difficult contingency caused by COVID-19 represents an important context to investigate companies'

reactions. In such an endeavor, the main positioning and research goal of this study is to analyze world-leading organizations and to build a framework of responses realized by those firms to ensure business continuity in the pandemic scenario. Besides analyzing responses aimed to ensure the preservation of current value, a secondary focus of the study is to discuss how the emergency can generate opportunities for organizations to create new stakeholder value.

After a review of extant approaches on business continuity and organizational resilience in emergency scenarios, we conduct an in-depth analysis of the responses of the first 50 Fortune "Global 500" companies to the COVID-19 emergency. We realize a content analysis of web pages and LinkedIn posts of companies dedicated to the pandemic. We then isolate 77 actions, which are aggregated into a five-level framework encompassing operations, customer, workforce, leadership, and community-related responses. Finally, we describe six company cases as illustrative examples of organizations attempting to create new business value in the critical scenario.

BACKGROUND

Academic interest in organizational responses to critical situations has strongly developed in recent years. Organizations are today forced to build resilience against numerous types of events that threaten the continuity of their business processes (Sahebjamnia et al., 2018). These include natural events (e.g., earthquakes and hurricanes) and man-made factors such as cyberattacks, geopolitical crises and terrorism (e.g., Castillo, 2005; Sheffi, 2001), corporate crisis (e.g., Yang & Jiang, 2015), and market and supply chain crises (e.g., Chopra & Sodhi, 2014; Kleindorfer & Germaine, 2005; Sáenz et al., 2018; Strandvik et al., 2018). A

significant stream of literature has studied the problem of planning and foresight for emergency preparedness and management (Turoff et al., 2013).

Organizations strive to cope with emergencies and critical events to keep their reputation, be more resilient, and ensure continuity (Parker & Ameen, 2018; Rezaei Soufi et al., 2019). The management of business continuity has evolved since the 1970s as a form of crisis management in response to the different risks that threaten an organization. It is a holistic management process that provides a framework for an effective response (Herbane, 2010), and business continuity plans have been developed primarily to minimize the effects of unanticipated events on the firm's ability to meet customer requirements (Zsidisin et al., 2005).

Scholars and practitioners have brought forth several methods to assist organizations to improve business continuity (e.g., Botha & von Solms, 2004; British Standard Institute, 2006; Gibb & Buchanan, 2006; ISO, 2012; Lindström et al., 2010; López & Ishizaka, 2019). Activities include risk and impact evaluation, continuity plan/process design, implementation and measurement, testing, and continuous update of measures (Cerullo & Cerullo, 2004; Pitt & Goyal, 2004; Speight, 2011). The literature emphasizes the compliance with continuity standards (Freestone & Lee, 2008; Tammineedi, 2010), risk management (Nosworthy, 2000; Schätter et al., 2019), and organizational culture (Alesi, 2008; Rapaport & Kirschenbaum, 2008). Typically, the focus has been on ensuring the continuity of a specific business domain, such as IT infrastructure (Bajgoric, 2006), supply chain (Benyoucef & Forzley, 2007), or outsourcing (De Luzuriaga, 2009).

With a particular focus on supply chain and business continuity, Zsidisin et al. (2005) highlighted the importance of developing business continuity plans by addressing key concepts such as risk, uncertainty, and exposure. The authors examined how and why firms

create business continuity plans to manage this risk and highlighted how various isomorphic pressures result in firms having similar risk management practices embedded in their supply management practices. Based on the study of companies operating in different environments, the authors found a consistency in their approaches to continuity planning, and four interrelated tasks, i.e., awareness, prevention, remediation, and knowledge management, which form a framework for effective continuity planning (Zsidisin et al., 2005).

Whereas business continuity is generically aimed to preserve the value that an organization provides with current activities, with business model innovation the organization is deliberately altering the core elements of its model in an aim to develop a totally "new-to-business" model (Bucherer et al., 2012; Heikkilä et al., 2018; Pohle & Chapman, 2006). The integration between business continuity and business model was recently advanced by Niemimaa et al. (2019), who pointed out that, whereas business continuity focuses on preserving current operations, a crisis could also be a source of new value. Recent research has also provided methods for companies to evaluate the components of their business model against future uncertainties (Bouwman et al., 2018; Haaker et al., 2017).

The scholarly interest in analyzing the strategic decisions and actions undertaken by companies to respond to a crisis is increasing. However, whereas the COVID-19 outbreak has generated a large stream of research contributions focusing on different managerial dimensions, a comprehensive study of company responses along a number of organizational perspectives is yet to be introduced. This analysis represents the focus of the study described in the following sections.

RESEARCH PROCESS

The study involved conceptual development work based on the analysis of available web-based information about the responses undertaken by leading corporations to the COVID-19 outbreak. Content analysis is a method of studying and analyzing communication in a systematic, objective, and quantitative manner for the purposes of measuring variables (Wimmer & Dominick, 2000). The method can be used in social science to examine patterns in communication in a systematic manner. One key advantage of using content analysis to analyze social phenomena is its noninvasive nature, in contrast to simulating social experiences or collecting survey answers. Practices of content analysis involve systematic observation of texts or artifacts to which labels are assigned to indicate the presence of interesting, meaningful content.

Different applications of web content analysis are described in the literature. For example, Jose and Lee (2007) used content analysis based on website disclosures to study the environmental reporting of global corporations. Ting et al. (2013) performed an advanced website evaluation to assess top 100 hotels. Maatota et al. (2019) used content analysis of storytelling elements and brand archetypes of LinkedIn ad campaigns. McCorkindale (2010) reported on content analysis of the Fortune 50's Facebook social networking sites, and Parsons (2013) engaged in content analysis of official Facebook pages to assess how companies would use social media to reach consumers. The core activities undertaken in these studies include a combination of sample design and preparation, source identification, analysis of content and cases, and synopsis of findings. Along such macro research activities, we conducted a research process as illustrated in Figure 1.

Figure 1. Steps of the research process.

[Figure 1 About Here]

Step 1, "*Sample design and preparation,*" was dedicated to identifying the population of companies to include in the study. We looked at big corporations, since they are extensively affected by the COVID-19 emergency, and they face challenges at both the local level (e.g., progression of the disease in the local communities) and the global level (e.g., impact on international markets and global logistics). The study of response strategies undertaken by these kinds of companies is thus more able to address a comprehensive view of the multidimensional challenges generated by the pandemic scenario.

We used the 2019 Fortune "Global 500" ranking, an annual ranking of the top 500 corporations worldwide as measured by the level of their revenues. We considered the first 50 companies, which represent a well-diversified group of organizations operating in different continents and countries (e.g., China, France, Germany, Russia, Saudi Arabia, the UK, the US) and in different industries (e.g., automotive, bank and insurance, energy, food distribution, oil, telecommunication, and utilities). Companies include world-leading players such as Allianz, Amazon, Apple, AT&T, Bank of China, Berkshire Hathaway, BP, Daimler, Gazprom, General Electric, Royal Dutch Shell, Saudi Aramco, Samsung Electronics, Toyota, Verizon, and Walmart. The sources used to collect data are twofold. First, we looked at the corporate websites of companies, and particularly the pages dedicated to COVID-19 and the actions undertaken by the organizations to face the pandemic. Second, we analyzed the LinkedIn pages of those organizations, with a specific focus on the posts providing information on how organizations are responding to the emergency. The output of the first phase was a worksheet with the list of organizations, along with key demographic data (i.e.,

home country, industry, and revenues) and the web addresses of COVID-related web pages and the LinkedIn page (main profile) of the company.

Step 2, "*Analysis of responses and actions,*" was focused on capturing information on the identified companies in terms of responses to the coronavirus emergency. We studied corporate websites and LinkedIn pages to identify messages, statements, and reports on COVID-19 and on how the companies are responding along multiple perspectives. Overall, we analyzed about 300 web pages and 400 LinkedIn posts, and we annotated relevant information for further analysis and classification.

The content search was facilitated by the fact that practically all the analyzed organizations have set up web pages specifically dedicated to COVID-19. Concerning the LinkedIn pages, the identification of relevant content was more complex, as we needed to go through all the posts from February 2020 to the time of the study (mid-April 2020) in order to identify information related to the outbreak and to the vision and responses of the company. The content analysis process was thus not characterized by a bounded or limited sample of key concepts to be searched. More than using a priori coding schema, we conducted a systematic reading of the corporate web sources and social network messages dedicated to the emergency, and we identified three general categories of information.

First, we coded with "*scenario*" the general information provided by the company about the pandemic and its impact on the industry and market. The extracted content is mostly derived from the reports of the companies of what is happening in the external environment, and this was used to enhance our understanding of the business-related aspects of the coronavirus outbreak. An illustrative (adapted and anonymized) company statement is: "*The COVID-19 is rapidly diffusing in most European countries, and it is*

creating the conditions for a limitation of flows of people and products. This could strongly impact the logistic and dynamics of our industry."

Second, we extracted the "*strategies,*" general policies or approaches defined by companies to react to the outbreak. Here, the strategy refers to how the company sees the crisis and what is its position in responding to the crisis, thus providing a relevant interpretation of where the organization stands and what is the vision ahead. An illustrative statement is: "*Our company intends to react firmly to the emergency by following all the indications provided by health authorities and keeping to ensure first of all the health of our workers and customers.*"

Finally, we identified "*initiatives,*" i.e., practical activities undertaken by the companies along different areas. This content was the most relevant for the purposes of our study since it is explicitly related to the actions realized by the organization to face the emergency. Naturally, the information on scenarios and strategies was relevant to better interpret the purpose and scope of those actions. An illustrative statement is: "*We are extending the service period for most of our products and enhancing our contact center to provide the best service possible to our customers.*"

We triangulated content gathered from the websites and social network pages by looking at corporate videos and interviews (mostly delivered by top managers), broadcasts, and other sources available on the web. We collected all relevant information into a spreadsheet for further analysis and generated a long list of initiatives (actions) realized by the 50 companies, by doing a high-level consolidation of similar items.

Step 3, "*Response framework building,*" was aimed to obtain an integrative inventory of organizational responses. After careful analysis of extracted data, we aggregated companies' actions by deriving a taxonomy of common macro-areas that could group similar

items. These macro-areas are operations management, customer relationship management, human resource management, leadership and change management, and community management. Most of the initiatives were clearly in reference to one of those groups; only in a few cases were initiatives potentially relevant for two or more categories, and in those cases we selected the most relevant dimension. We also realized a cross-check of the taxonomy with business continuity methods, approaches, and cases found in the literature. We thus obtained a COVID-19 response model, which is described in the next section.

FRAMEWORK OF RESPONSE ACTIONS

This study focuses on two key concepts, i.e., business continuity (in crisis and emergency scenarios) and value creation (through business model innovation). We thus looked at how companies attempted to address the critical challenges caused by the pandemic event through minor or significant process changes, while also looking at how business models have been adapted to create new value leveraging the difficult contingencies.

All the 50 organizations analyzed took coordinated actions to face the COVID-19 emergency. We isolated 77 responses related to 13 sub-areas and five areas of organizational activities. The five areas are these: 1) *Operations and Value System*; 2) *Customer Experience and Support*; 3) *Workforce and Human Capital; 4*) *Leadership and Change Management*; and 5) *Community and Social Engagement*. The classification was obtained by aggregating the single responses into homogeneous categories (sub-areas) and then by identifying more high-level areas able to include those categories. Figure 2 provides a snapshot of the five areas and the 13 sub-areas of actions undertaken by companies in

response to the COVID-19 emergency. All the areas are detailed through the description of the sub-areas and the illustration of the specific actions.

Figure 2. Framework of response actions to COVID-19.

[Figure 2 About Here]

Actions Related to Operations and Value System

The first area of responses is related to the effects of COVID-19 on the management of the companies' operations and value system (Table 1). In particular, responses can be associated with three sub-areas according to their focus. Some actions are addressed to face the shifts in customer demand and the impact on the supply chain, which has brought companies to identify and measure risks, and to envision a possible future. Most companies analyzed were engaged in assessing the overall impact of the crisis on operations, as well as in defining scenarios of demand and sales evolution, also based on the use of advanced analytics and business intelligence systems. Different companies, such as AmerisourceBergen, have monitored inventory levels and customer purchasing behavior to assess any potential impact to the product supply chain.

The second sub-area of actions is related to logistic flows, both inflows of resources and materials and outflows of products and services to customers. In this case, companies' responses are addressed to enhance digital connectivity across the supply chain while ensuring business-critical resources, processes, and services. Also, the inventory/warehousing and order management processes are being reengineered to optimize routes and to reduce risks. As an illustrative example, Amazon has reported

realizing more than 150 process updates to ensure the reduction of risks and enhance the ability to satisfy prioritized needs.

The third sub-area includes actions related to the continuity of manufacturing processes and/or the conversion of the same to address new market needs or to contribute to the community's fight against the epidemic. Actions found include the conversion of production to deliver protective materials and products, the optimization of production capacity, and the reconfiguration of plants to enhance workforce security. In such a view, companies like General Motors have engaged in the production of protection devices (like face masks) and collaborated with partners to provide pulmonary ventilators. Whereas supply chain management generally includes logistics and manufacturing, we separated the three concepts in our framework. In fact, based on the analyzed responses, we needed to isolate actions generically addressed to assessing the supply chain impact of the crisis (thus including an ecosystem view) from more specific actions targeted at redesigning logistic and transformation activities, which are mostly related to an internal view of the organization.

Table 1. Sub-areas and actions related to the Operations and Value System category.

[Table 1 About Here]

Actions Related to Customer Experience and Support

A large number of response actions found in the study address the impact of COVID-19 on the customer experience and the management of the customer life cycle (Table 2). The first sub-area of actions concerns the customers' buying experience, including the buying process, with a specific focus on touch points and physical interaction with the company.

Most organizations have reengineered the access to shops and facilities and adopted a number of prevention measures across all customer touch points. Digital channels and contact centers have been enhanced, and customer mobility was assessed and reported. Companies such as Walmart have taken actions aimed to limit customer access and flows in shops (e.g., one-door entry), implement sanitation and social distancing, and provide sneeze guards in all shops. Companies have also provided payment relief and financial assistance to customers, along with other kinds of support services.

Response actions have included the development of new training for customer teams, new forms of customer outreach and communication, and "emotional" support to customers. For example, AT&T has provided digital parenting solutions for families. The company's ScreenReady site shares digital parenting tips and resources to help families stay connected, learning, and entertained at home during the coronavirus. Finally, a number of actions are addressed to respond to the marketing impact of COVID-19. For example, responses included the redefinition of brand strategies and the design of new purposeful payoffs, logos, and marketing messages. In this regard, Volkswagen and Audi have temporarily modified their well-known logos to communicate the importance of practicing social distancing.

Table 2. Sub-areas and actions related to the Customer Experience and Support category.

[Table 2 About Here]

Actions Related to Workforce and Human Capital

The third area of responses are addressed to ensuring the well-being of the workforce and to reducing the negative impacts of the outbreak while creating the conditions for enhancing the human capital of the organization (Table 3). First, actions aim to ensure the safety of workplaces (e.g., offices, shops, facilities) by activating a number of infection prevention measures. Responses include the definition of procedures for workplace hygiene and sanitization, rules for office layout and usage, the launch of employee-dedicated COVID-19 information portals, and the sharing of norms for physical interaction and employee tracking. For example, Hon Hai Precision Industry has used infrared scanning, severe social distancing measures in the workplace, and QR codes for employee tracking.

Second, responses are addressed to supporting employee productivity, although in a smart and remote configuration. Organizations have taken actions to cope with employee "infodemic" and disinformation, and they have defined criteria for workplace rotation, remote access, and competence development. As is the case with many other organizations, Trafigura Group has activated a social-spacing policy, including for some office-based employees working from home. Finally, a number of actions are focused on monitoring and managing cases of exposed and infected employees, defining leave and return-to-work procedures, and ensuring health assistance and psychological support. For example, Costco Wholesale has activated premium pay and paid time off for higher-risk employees, and ensured the availability of protective masks and symptom screenings for employees and managers.

Table 3. Sub-areas and actions related to the Workforce and Human Capital category.

[Table 3 About Here]

Actions Related to Leadership and Change Management

The fourth area of responses to face the COVID-19 emergency concerns actions aimed to manage the current emergency while preparing the organization for the future (Table 4). First, analyzed actions include the definition of a response plan and a dedicated management team, the creation of an emergency coordination task force, and the undertaking of stress tests to assess the working capital and resource preparedness of the organization. For example, Verizon Communications has gathered purposeful senior crisis leadership and response teams able to face the emergency by identifying proper strategies and actions. Second, responses include the alignment of business leaders in terms of the organization's strategy against the emergency, the definition of a portfolio of post-emergency actions and value creation opportunities, and efforts to maintain the trust of people. For example, companies such as Honda Motors have put extra effort into their marketing and social media presence to enhance positive communication and encouragement for customers and the larger community.

Table 4. Sub-areas and actions related to the Leadership and Change Management category.

[Table 4 About Here]

Actions Related to Community and Social Engagement

The last area of actions is related to the interaction of the organization with external stakeholders, both to contribute in a tangible manner to fight the pandemic and by sharing knowledge useful to support first responders and the whole community (Table 5). The first

sub-area relates to money donations, financial support, and the provision of resources and products (e.g., protection masks, ventilators) to fight the pandemic. Actions include the provision of special discounts and gift programs to responders/helpers, contributions to open innovation initiatives by disclosing knowledge and intellectual property, and support to research entities. For example, BP has provided donations, free fuel, free delivery of food, and convenience goods to customers and partners.

Second, actions are addressed to ensure coordination with agencies and institutions, and to share best practices and organizational experience, which can be useful for the community. Initiatives include the sharing of critical information and response tactics with responders, as well as the strengthening of public and private collaborations to define more effective response strategies. For example, Alphabet (the holding company including Google) is strongly engaged in assisting educational institutions with content, tools, and distance learning, and it has planned to launch a national platform to educate the community on coronavirus.

Table 5. Sub-areas and actions related to the Community and Social Engagement category.

[Table 5 About Here]

In this section, we have presented a comprehensive inventory of 77 response actions undertaken by 50 big corporations to the COVID-19 emergency, and we have aggregated the actions into a five-level business continuity framework. The next section discusses how the current emergency can also generate opportunities for creating new value.

CREATING VALUE BEYOND THE CRISIS

Drivers of Value Creation

The literature on companies' behavior during recessions has showed how companies can survive and be profitable by modifying their marketing strategy (Köksal & Özgül, 2007), increasing the R&D budget (Laperche et al., 2011), investing in innovation (Archibugi et al., 2013; Paunov, 2012), and enhancing their corporate governance (Villanueva-Villar et al., 2016). The business crisis generated by the COVID-19 outbreak has also generated opportunities for organizations to go beyond "simple" business continuity and the preservation of current value.

A combination of transforming customer and supply chain trends and the necessary redesign of corporate processes has indeed stimulated the redefinition of strategies and actions able to generate new business value. Whereas some of the responses provided by organizations to the COVID-19 are mostly reactions critical for survival (e.g., protection of employee safety), others can be considered more "transformational" actions. These are aimed at developing new capabilities to respond to the current challenges while looking at the challenges as opportunities for future growth (e.g., digital health assistance and smart working).

We proceeded with a more in-depth analysis of our research data to identify interesting examples of initiatives, processes, or projects where the organizations are creating new value in a medium- and long-term perspective. Whereas new value can be generated by leveraging each element in the response framework (Figure 2), the innovation potential seems to be related especially to three elements, i.e. 1) new products/services to address new customer needs; 2) improvement of virtual interaction and integration with customers;

and 3) an enhanced image of the corporation as a socially responsible and community-oriented organization. Next, we illustrate these three value creation avenues by providing six company examples.

Toyota started to face the COVID-19 emergency soon after its president announced the transformation of the company's business model for the CASE era (Connected, Autonomous, Shared, Electric) and the evolution of the organization toward a mobility company providing resources and services for the connected city. Whereas the company has decreased its production due to COVID-19, Toyota has maintained employment and increased investment in the R&D of electric cars. It was able to create new customer-related value by introducing new car models to the market and by improving virtual interaction with customers who can explore and buy in virtual showrooms via WhatsApp video, Facebook Live, web chat, or phone. The company has adopted a product- and customer-centric view, which looks at the after-emergency in terms of new societal and market needs. Toyota has provided value to the community by full-scale production of medical devices and by offering Japan Taxi models to transport patients with mild symptoms. Also, the company has cooperated in the production of equipment such as makeshift beds for hospitals, disinfectant containers, and simple partition walls for use at medical facilities.

BP has robust business continuity plans in place to make sure that the company can supply energy, fuel, and vital petrochemical feedstocks uninterruptedly. In retail sites, BP has increased cleaning procedures and encouraged customers to practice social distancing while also taking precautionary measures such as removing the sale of open food products. BP has also undertaken socially responsible initiatives by supporting governments and partners with donations and free fuel to emergency services vehicles, such as ambulances and helicopters. Working with the US government, leading universities, and high-tech

companies, BP's Center for High-Performance Computing has been used for research on COVID-19. These new collaborations have provided the basis for a strategic renewal and a new paradigm of extended collaboration (with countries, cities, and industries) aimed at creating new value.

Amazon has updated 150 processes, from social distancing measures to new efforts like disinfectant spraying and temperature checks. It established a $25 million relief fund for its partners (e.g., delivery drivers) facing financial hardship or quarantine. To address increased customer demand, the company has focused on fast delivery of high-priority items, such as household staples and medical supplies. Amazon has provided the option of unattended delivery and defined a system to prevent price gouging. The company has also significantly addressed the needs of customers and looked at the current situation as an opportunity to create value with new services. To help communities around the world, Amazon has made donations and provided work to 175,000 additional people. Finally, it launched a global initiative with participation from 35 global research institutions, start-ups, and businesses to accelerate COVID-19 diagnostics, research, and testing.

The change in insurance firm AXA's business profile due to the pandemic has been notable. The company started providing its customers apps for video medical consulting and new processes for online incident communication. It has also reached new customer segments. For example, AXA collaborated with the Accor hotel chain, which offered its customers free access to AXA's medical teleconsultations from hotel rooms. Moreover, AXA has invested heavily in R&D. It provided 5M euros for research to develop responses to infectious diseases, and notably to COVID-19, including the building of post-crisis solutions. The company has also supported the COVID-19 Task Force launched by the Institut Pasteur (developing new diagnostic tools and treatments). AXA supported an open research

initiative in which a digital platform brings together engineers, practitioners, and researchers collaborating to design, test, and provide efficient emergency solutions.

The drug wholesale company AmerisourceBergen has increased inventory on items related to COVID-19 treatment and supportive care. The company has business continuity plans that include monitoring inventory levels and customer purchasing behavior for any potential impact to the product supply chain. General Electric, and in particular GE Healthcare, developed a new product, the Venue Go ultrasound system, which includes an artificial intelligence feature, the auto B-lines tool, that highlights and counts B-lines, which may signal COVID-19. The tool provides a lung diagram and generates a lung ultrasound score that helps clinicians to follow the progression of the lung condition in patients as they fight the virus.

DISCUSSION

Highlights and Contribution

This study has contributed to the extant business continuity literature by introducing an empirically derived inventory of response actions undertaken by leading companies during the COVID-19 crisis. The framework includes five dimensions, which are divided further into sub-areas and actions that address operational aspects affected by the outbreak. The dimensions span a spectrum, from internal operations to supply chain management, from human resources and leadership to relations with customers and stakeholders. We also include a community and social engagement perspective, which is not typically considered in the business model literature (e.g., Osterwalder & Pigneur, 2010). This finding shows that,

at least in exceptional circumstances, the relations between a company and its (g)local community is an important part of the company's activities and value creation potential.

Although many articles have depicted companies' responses to critical emergencies (e.g., Alesi, 2008; Castillo, 2005), we contributed with a comprehensive and evidence-based analysis of actual responses undertaken by large organizations to face the pandemic. Additionally, whereas emergency and business continuity studies have focused on general and crisis-independent activities such as risks and impact evaluation, continuity plan/process design, implementation, and measurement (e.g., Cerullo & Cerullo, 2004; Pitt & Goyal, 2004; Speight, 2011), we identified specific fine-grained actions aimed to ensure the continuity of business operations over a large spectrum of management dimensions.

Finally, the contribution of our study may be found in the integration between business continuity and business model innovation for value creation (Bouwman et al., 2018; Foster & Dye, 2005; Haaker et al., 2017; Niemimaa et al., 2019). All large corporations have taken actions to ensure the continuity of their current business operations. However, as our illustrative cases show, some companies are also able to create new value, for instance by reaching current and new customers via digital channels, by redirecting more resources from current operations to R&D activities, or by increasing the companies' social responsibility and involvement with their local communities.

Managerial Insights

Some insights can be derived that could be useful for application in other companies dealing with the consequences of COVID-19 or thinking about improving their own response strategies for future (likely although undesired) events. In the area of emergency

management and crisis response, a number of key success factors have been discussed in the literature, such as adaptability, agility, communication, coordination, leadership, and technology application (e.g., Harrald, 2006; Zhou et al., 2017). These aspects were all found in the investigated companies and their responses to the crisis, and four main recommendations can be formulated here.

First, companies have been urged to develop an immediate reaction to the operational breakdown and the risks of infection within and outside the organization. Successful answers have been based on the implementation of agile business processes (which has involved redesign or adaptation of existing activities) and the use of digital technologies as key enablers. Second, most organizations have been forced to rely on available crisis management capabilities and financial and technical assets useful to face and overcome the emergency. Successful responses thus have also been based on the existence of technical reserves useful to ensure the sustainability of operations in the transition phase and to support smooth adaptation of the organization to the changing business situation.

Third, organizations have developed a real-time awareness of the impact of the pandemic through advanced data gathering and monitoring capabilities. Successful responses have been based on the adoption of effective business analytics methods and tools that support information-rich communication and leadership. Finally, organizations have been challenged with risks of declining sales due to switching customer needs and demand. Successful responses have included the creation of diversified and modular product/service portfolios and adaptable business models that can support a faster recovery.

CONCLUDING REMARKS

In this study, we investigated the responses of 50 world-leading companies to the COVID-19 emergency, and we integrated the responses into a descriptive framework. To the best of our knowledge, this study is the most extended attempt to build an inventory of real actions undertaken by large companies to deal with a common global emergency.

The research is not without limitations. First, business continuity has been historically associated with medium and large corporations, and our research also focused on big organizations. However, the concepts of business continuity and resilience against emergencies should be extended to small organizations, which face the crisis generated by the pandemic along different and equally significant dimensions. Second, we used data available online (web pages and social network posts), which is the information shared by organizations about their responses to COVID-19. However, such public information is not necessarily able to describe in a comprehensive manner the policies defined and actions undertaken by the companies. At the same time, corporate communications messages conveyed through public outlets like websites and social network posts may be biased as possibly self-serving statements, which might not represent the situation with either complete accuracy or comprehensiveness. Access to real company knowledge and objective analytical reports, where possible, would thus allow researchers to strengthen the model by adding more fine-grained actions implemented by managers.

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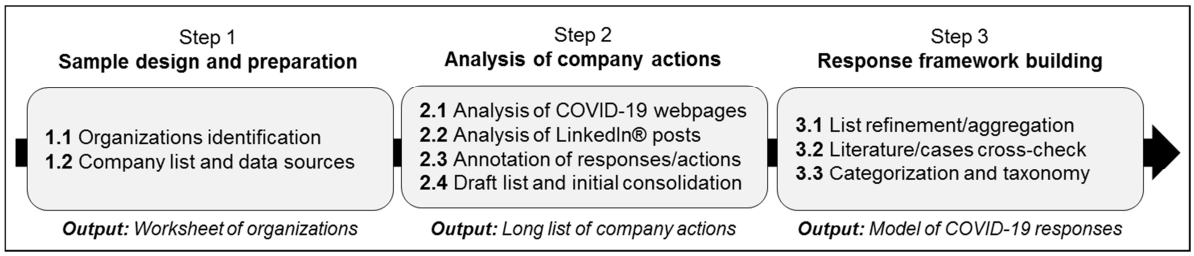

Figure 1. Steps of the research process.

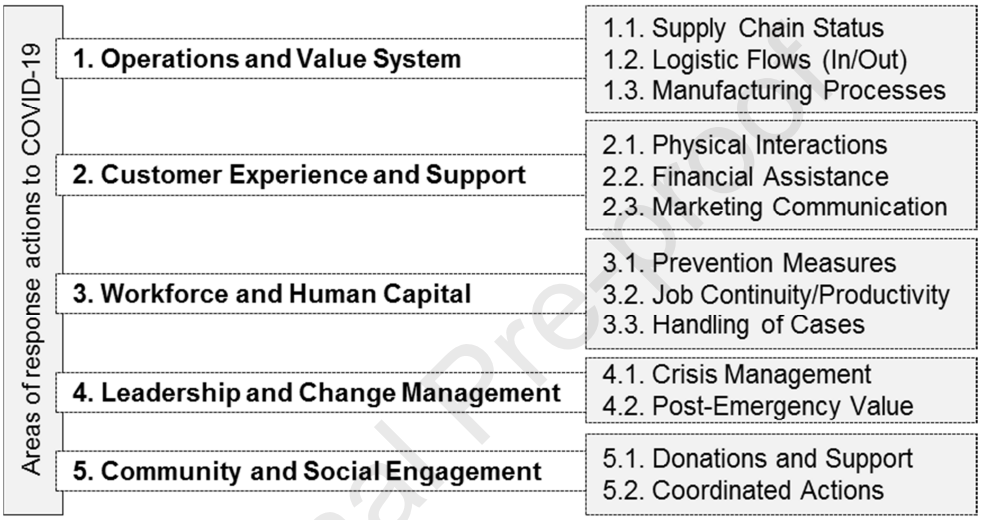

Figure 2. Framework of response actions for COVID-19.

Table 1. Sub-areas and actions related to Operations and Value System.

Sub-areas	**Actions taken by companies** (alphabetical order)
1.1. **Supply chain status and scenarios**	1. Assess the overall impact of emergency on company operations 2. Define micro-scenarios of evolution for demand and sales 3. Leverage analytics to monitor operations and supply chain status 4. Share risk scenarios with key partners and suppliers
1.2. **Inbound and outbound logistic flows**	5. Enhance digital connectivity across the supply chain 6. Ensure business-critical processes and services 7. Identify core physical resources needed to maintain continuity 8. Revise inventory/warehousing and order management processes 9. Revise logistics and route optimization to reduce risks
1.3. **Manufacturing continuity and conversion**	10. Convert to or increase production of protective materials/products 11. Optimize production capacity and redefine production plans 12. Update or reengineer production to enhance workforce security

Table 2. Sub-areas and actions related to Customer Experience and Support.

Sub-areas	**Actions taken by companies** (alphabetical order)
2.1. **Physical interaction and mobility**	1. Adopt prevention measures across all customer touchpoints 2. Change shop/facility access and buying/payment (contactless) process 3. Track customer mobility and build fact-based customer reports
2.2. **Financial and emotional assistance**	4. Extend warranty and service recall, online and telephone support 5. Provide digital parenting to customers and their families 6. Provide digital resources and emotional support or telehealth services 7. Relief payments, provide delays and financial support to customers 8. Support customer communities and facilitate peer-to-peer interactions
2.3. **Marketing and communication with customer**	9. Develop training for customer teams and emergency communication 10. Improve digital channels and strengthen customer contact centers 11. Redefine brand strategy, pay-offs, logos and marketing messages

Table 3. Sub-areas and actions related to Workforce and Human Capital.

Sub-areas	**Actions taken by companies** (alphabetical order)
3.1. **Employee safety and disease prevention**	1. Define policies for evacuation and return from infected areas 2. Define procedures for workplace hygiene and sanitization 3. Ensure availability of medical consultation in emergencies 4. Establish travel restrictions and mobility guidelines 5. Evaluate facility closure and layout redesign 6. Launch an employee-dedicated COVID-19 information portal 7. Provide infection control supplies in all business locations 8. Provide information about at-home care and prevention 9. Provide Personal Protective Equipment (PPE) to workforce 10. Regulate norms for workplace physical interaction 11. Track employees through infrared scanning, RFID and QR codes
3.2. **Work continuity and job productivity**	12. Anticipate or face anxiety due to infodemic and disinformation 13. Create training opportunities to upskill employees during pandemic 14. Define criteria for workplace rotation, flexible and smart working 15. Define shifts to new patterns of work and the “new” normal 16. Define the overall workforce impact of pandemic 17. Develop platforms for intra and extra-organization communications 18. Enhance network capacity to support remote access/collaboration 19. Implement special compensation and payment policies 20. Launch competence development and informative webinars 21. Provide official information to enhance employee awareness 22. Share response plans and organizational actions with employees 23. Train and prepare ancillary workforce (contractors, retirees)
3.3. **Leave and infection handling**	24. Define return to work policies after infection or quarantine 25. Define sick-leave and quarantine policies 26. Develop status reporting for exposed and infected employees 27. Identify special needs and incorporate them in the emergency plan 28. Manage work impact of employee infection and quarantine 29. Provide physical and psychological support/assistance services

Table 4. Sub-areas and actions related to Leadership and Change Management.

Sub-areas	**Actions taken by companies** (alphabetical order)
4.1. **Emergency and continuity management**	1. Access lines of government/bank credit to support continuity plan 2. Acquire authoritative epidemiological and economic outlook/data 3. Articulate a detailed company response plan 4. Build leadership and response teams who can proactively manage risks 5. Define issue map and handling/management mechanisms 6. Define, activate and test business continuity and recovery programs 7. Freeze capital expenditure and reallocate funds to where most needed 8. Identify a pandemic and emergency coordinator or team 9. Perform stress tests on key resources and working capital requirements
4.2. **Post-emergency vision and value creation**	10. Align business leaders and conduct roundtable exercises 11. Define a portfolio of post-emergency actions 12. Develop positive scenarios and maintain trust of people in the future 13. Establish robust emergency communication plans 14. Identify opportunities for new value creation beyond the crisis 15. Share CEO talks to ensure stakeholders about company preparedness

Table 5. Sub-areas and actions related to Community and Social Engagement.

Sub-areas	**Actions taken by companies** (alphabetical order)
5.1. **Community donations and support**	1. Invest on local government debt to reduce the social impact of crisis 2. Offer special discounts and gift programs to responders/helpers 3. Participate in open innovation initiatives by disclosing knowledge/IP 4. Produce/donate individual protection devices and sanitization products 5. Provide money donations to institutions, agencies and first responders 6. Support scientists and researchers through research grants and funds
5.2. **Communication and coordinated actions**	7. Communicate assets/services available to the community 8. Share best practices with the public to improve community responses 9. Share the response plan with public agencies, healthcare and responders 10. Strengthen public and private collaborations for emergency responses