How digitalization reinvented entrepreneurial resilience during COVID-19

Susana C. Santos [a,b,*], Eric W. Liguori [a], Erin Garvey [a]

[a] *School of Innovation and Entrepreneurship, Rowan University, United States of America*
[b] *Instituto Universitário de Lisboa (ISCTE-IUL), Business Research Unit (BRU-IUL), Lisboa, Portugal*

A B S T R A C T

The emergence of new digital technologies has transformed entrepreneurship and, very likely, enabled many new and established ventures to avoid bankruptcy throughout the COVID-19 pandemic. Digital technologies are key to identifying, evaluating and exploiting opportunities, scaling a venture's competitiveness, improving efficiency and innovating, especially during uncertain times. We explore how digital technologies reinvented entrepreneurial resilience during the COVID-19 pandemic and distill the digital artifacts, platforms and infrastructures used by entrepreneurs to demonstrate entrepreneurial resilience. We analyzed 42 reflective interviews featuring successful entrepreneurs from How I Built This "Resilience Series" podcast that explore how entrepreneurs responded to the COVID-19 crisis. We adopted a systematic approach to identify and describe the behaviors, actions and strategies related to digitalization to reinvent the business in the uncertain and resource-constrained context of COVID-19. The data analysis yielded thirteen first-order codes categorized into five second-order themes: creative digital pivoting, digital infrastructures, social impact through digital technology, burdens to digital adoption, and growth through digitalization. These second-order themes reveal to function as both enablers and barriers to entrepreneurial resilience in this adverse context. Our exploratory analysis suggests how digitalization influences entrepreneurial resilience.

> "*Definitely, a lot of innovative things are coming out of this moment. Acts of desperation will make you think creatively.*"
> Sarah LaFleur, founder and CEO of MM.LaFleur

1. Introduction

The emergence of new digital technologies transformed entrepreneurship and helped save many new and established ventures from bankruptcy during the COVID-19 pandemic. The digital transformation of innovation and businesses (Nambisan et al., 2019) allows improvements in productivity and innovation in business models (Schallmo et al., 2017), value creation processes (Boratyńska, 2019), and customer interaction (Matt et al., 2015; Bouncken et al., 2020). In fact, digital entrepreneurship, as the consideration of how digital technologies shape entrepreneurial activities (Nambisan, 2017), seems to blur traditional entrepreneurial boundaries and amplify an entrepreneur's agency in the marketplace, democratizing the ability to start, adapt or pivot ventures (Aldrich, 2014; Pergelova et al., 2019; Berger et al., 2021).

Digital technologies helped transform from linear, discrete, predictable, and stable business models to more flexible, agile, and resilient (Nambisan, 2017), enabling them to handle the pandemic's unpredictability better and operate in a more non-linear way. As such, digital technologies are key to identifying, evaluating and exploiting opportunities (Obschonka and Audretsch, 2020; von Briel et al., 2018), scaling competitiveness (Bridge and Peel, 1999), and innovating (Atherton, 2003), especially during uncertain times like natural disasters and pandemics. The COVID-19 pandemic presented an unprecedented challenge in many ways. In a blink of an eye, the world woke up to a disruption in the social, economic and health system of our lives, creating global pressures in all sectors and enormous challenges in small, medium and large businesses. Startups were required to develop rapid, innovative and effectual responses to the pandemic (Sharma et al., in press; Kuckertz et al., 2020), managing unprecedented challenges in supply chain and strategic management (Ketchen and Craighead, 2020) and deal with a drastic slump in the equity investments for startups, and small and medium-sized enterprises (Brown and Rocha, 2020). In addition to the business-related pressures, entrepreneurs were also exposed to a high risk of burnout (Torrès et al., 2022) and increased levels of stress (Backman et al., 2021; Patel and Rietveld, 2020). The

---

type and level of agility entrepreneurs adopt to respond to adversity affect their well-being in different ways (Stephan et al., 2022).

In this complex context of uncertainty and pressure triggered by COVID-19, declared one of the most threatening shocks for entrepreneurial ventures in the last century, digital technologies emerged as one of the primary vehicles to adapt and redesign businesses. As António Guterres, UN Secretary-General, tweeted, "*digital technologies sustain life, work, health and learning for billions of people. In the face of COVID-19, businesses, governments and the digital community have proven resilient and innovative, helping protect lives and livelihoods*". Overall, the COVID-19 circumstances "offer a unique opportunity to observe the role of digital technology in organizations and examine how it influences their ability to learn and adapt to change" (Lanzolla et al., 2020, p.344). Thus, digital entrepreneurship seemed to be an agile response to embracing new products, services, and processes within innovative business models in the context of the COVID-19 pandemic, permitting the resilience of businesses during these times. But how did successful entrepreneurs use digital technologies to navigate uncertainty and build resilience during the pandemic? Are digital and technological transformations enablers or barriers to entrepreneurial resilience? In this study, we attempt to answer these questions and uncover the specific actions and behaviors leveraging digital technologies enacted by entrepreneurs who successfully built entrepreneurial resilience during the COVID-19 pandemic.

In entrepreneurship, resilience is conceptualized as the ability to react and positively adapt a venture within the context of adversity and uncertainty (Korber and McNaughton, 2018; Corner et al., 2017). Resilience has recently drawn the attention of entrepreneurship scholars and continues to gain traction (Bullough et al., 2014; Corner et al., 2017; Shepherd et al., 2020), particularly in times of adversity, such as the COVID-19 crisis. Prior work explored resilience during the pandemic in new businesses (e.g., Purnomo et al., 2021; Giones et al., 2020), small businesses (e.g., Brito et al., 2022) and also in successful organizations (Shepherd and Williams, 2022). In this study, we view resilience as a response to the COVID-19 pandemic and explore how successful entrepreneurs build resilience through digitalization and technological breakthroughs during the pandemic. Specifically, we distill the digital artifacts, platforms and infrastructures (three distinct elements of digital technologies as defined by Nambisan, 2017) used by entrepreneurs to build entrepreneurial resilience and quickly reinvent their businesses.

This study makes three contributions to the literature. First, we contribute to the digital entrepreneurship literature (Nambisan, 2017; von Briel et al., 2018) by investigating successful entrepreneurs' actions, behaviors, and strategies during the COVID-19 pandemic to build resilience in their businesses. This is important because many entrepreneurial ventures struggled to survive due to the pressures imposed by the pandemic, and it is relevant to distill which digital actions, behaviors, and strategies were associated with entrepreneurial resilience. Rather than focusing on digital entrepreneurship in an uncertain and resource-scarce context like the COVID-19 pandemic, prior work on digital entrepreneurship has shown its benefits in types of industries (Denoo and Yli-Renko, 2019; Steininger, 2019; Richter et al., 2015), types of entrepreneurship (Ben Arfi and Hikkerova, 2021; Braune et al., 2021), new venture teams (Biga-Diambeidou et al., 2021) or among disadvantaged entrepreneurs (Santos and Neumeyer, 2022). We add to this discussion by considering behavior and action-based approach (e.g., Fisher et al., 2020) as a model to analyze digital entrepreneurship as a vehicle for resilience in the context of the COVID-19 pandemic. The analysis of interviews with accomplished entrepreneurs and leaders about how they responded to the COVID-19 crisis revealed multiple themes defining digital technologies as enablers of entrepreneurial resilience, but also one theme pointing to digital technologies as a barrier to entrepreneurial resilience. Thus, we contribute to the current conversations on digital transformation by exploring the interface between digital technologies and resilience (Verhoef et al., 2021).

Second, we contribute to work on entrepreneurship in the context of the COVID-19 pandemic, a specific uncertain context in our finite world

(e.g., Kuckertz et al., 2020). While prior scholarly work focused on different aspects of how the pandemic impacted entrepreneurship education (Secundo et al., 2021; Liguori and Winkler, 2020), social entrepreneurship (Ibáñez et al., 2021; Bacq and Lumpkin, 2021), crowdfunding (Allison et al., 2022; Cumming and Reardon, 2022), and broad economic effects on small businesses (Belitski et al., 2021), surprisingly, little work to date explores the role of digital tools and solutions during the pandemic. A few exceptions are Modgil et al. (2022) taxonomy on emerging digital entrepreneurship areas in India and Purbasari et al. (2021) reflection on digital platform-based SMEs in Indonesia. Using a sample of successful entrepreneurs who demonstrated organizational resilience during the pandemic, we capture the unique digital-based actions, behaviors and strategies adopted during high uncertain times and provide additional clarity on how these constitute enablers or barriers to entrepreneurial resilience. In doing so, we answer the call from Shepherd and Williams (2020), who encouraged understanding the nuances of entrepreneurship in adversity, like the COVID-19 pandemic.

Third, we contribute to the entrepreneurial resilience literature by focusing on the enabling or burdening role of digital technologies. Shepherd and Williams (2022) identified three response paths of organizational resilience among successful businesses after the COVID-19 pandemic. We dive deeper into how organizations built entrepreneurial resilience during the pandemic by focusing on the role of digital technologies and identifying specific actions, activities and strategies on how the digital scene shaped resilience in organizations. This adds to the current conversation on how entrepreneurs built resilience during the pandemic (Brito et al., 2022; Zighan et al., 2022; Smith et al., 2022) by finding that creative digital pivoting, digital infrastructures and the social impact enacted through digital technologies enable entrepreneurial resilience, and allow a business to continue to generate revenue throughout the crisis. Also, while significant prior research at the micro-level resilience focuses on the entrepreneurs' characteristics, traits and motivations (Korber and McNaughton, 2018), we do not know as much about how organizational resilience enacts strategic activities and decision-making, particularly by using digital transformation. Our results pinpoint how digital technologies shape resilience as both a strategic and operational aspect of the business. By doing so, we help answer the call to explore the combination of uncertainty-resilience-opportunity perspectives on entrepreneurship research during COVID-19 (Kuckertz and Brändle, 2022).

2. Theoretical background

2.1. Digital entrepreneurship and digital technologies during the COVID-19 pandemic

Digital technologies are an important asset for leveraging organizational transformation, given their disruptive nature and systemic effects on the organization (Besson and Rowe, 2012). Especially in entrepreneurship, digital technologies ease the boundaries in terms of the processes and the outcomes that are possible to achieve (Nambisan, 2017). A digital transformation requires both technologies- and actor-centric aspects as an interface between technology capability and integration plus a group of skilled employees and executives to design and execute its transformative power (Nadkarni and Prügl, 2021). Digital technologies are a source of innovation (Nylén and Holmström, 2015; Nambisan et al., 2019) and internationalization (Pergelova et al., 2019), helping to shape ecosystems (Autio et al., 2018) and create new business models and strategic positionings (Teece, 2018). Importantly, and in the scope of this paper, digital transformation and technologies also foster the development of resilience (Khurana et al., 2022).

During the pandemic, as entrepreneurs were required to reinvent their businesses, digital entrepreneurship and technologies emerged as a pathway to entrepreneurial resilience (Nambisan, 2017; von Briel et al., 2018) and thus impacted business survival during this period. Applying

digital technologies to one's venture during the COVID-19 pandemic can be a challenging proposition, as the speed of change, connectivity, and potential losses from flawed use could quickly hamper the tasks and become a threat. The pace of change in the market and among competitors (Grover and Kohli, 2013; Weill and Woerner, 2015), the disruption in value creation and value capture processes (Ng and Wakenshaw, 2017), the need for digital literacy, technology capacity and integration (Rayna and Striukova, 2016) and the disruptions in different stakeholders (Giones and Brem, 2017) are examples of technology-driven issues that influence digital transformation of business during the pandemic (Nadkarni and Prügl, 2021).

Beyond the internet, mobile connectivity, cloud computing, robotics, smart manufacturing, apps, marketplaces, software, and machine learning, among other new digital technologies that keep emerging, entrepreneurs during the pandemic reinvented innovative approaches for facilitating online transactions, improve perceptions of technologies to build online communities, and market to customers and suppliers through a virtual environment. Disparate platforms and software packages became quickly available to assist entrepreneurs in the novel day-to-day business activities imposed by the lockdown and social distancing requirements during the pandemic, but often required new, extensive and expensive financial and human resources to implement. Lastly, and importantly, the readiness and preparedness to use digital technologies to build resilience are also very different among industries and business models, depending on the managerial and organizational capabilities of the business, culture and work environment.

Building on the three distinct elements of digital technologies as defined by Nambisan (2017), we propose that entrepreneurs amid the COVID-19 pandemic were challenged with being able to effectively use digital artifacts (i.e., "a digital component, application, or media content that is part of a new product (or service) and offers a specific functionality or value to the end-user", p.1031), digital platforms (i.e., "a shared, common set of services and architecture that serves to host complementary offerings, including digital artifacts", p.1032) and digital infrastructure (i.e., "tools and systems that offer communication, collaboration, and/or computing capabilities to support innovation and entrepreneurship", p.1032). These digital technology infrastructures supported the entrepreneurial resilience of the organization, acting as external enablers to warrant the survival of the business during the crisis (Davidsson, 2015; Nambisan, 2017; von Briel et al., 2018).

2.2. Resilience in entrepreneurship during the COVID-19 pandemic

Resilience is the "ability to maintain relatively stable, healthy levels of psychological and emotional functioning overtime after experiencing trauma or serious loss (Bonanno, 2004, 2005; Eicher et al., 2015; Leipold & Greve, 2009)" (Corner et al., 2017, p.688), such as disasters, shocks, or jolts (e.g., Williams and Shepherd, 2016). Along the journey, entrepreneurs are confronted with numerous situations impacting the survivability of their businesses. The pressing nature of adversity and uncertain events, such as the COVID-19 pandemic, demands resilience to design and implement strategies to overcome these crises. In this sense, previous studies show that entrepreneurs' resilience contributes to business survival and success (Ayala and Manzano, 2014; Hartmann et al., 2022; Smith et al., 2022).

While resilience at the individual level is important, it also pertains to how small businesses, organizations, ventures and even ecosystems respond to unexpected adverse events (Corner et al., 2017; Roundy et al., 2017; Herbane, 2019; Gianiodis et al., 2022). Particularly relevant to our study is the notion of organizational resilience (Hillmann and Guenther, 2021), which is the "ability of an organization to maintain functions and recover fast from adversity by mobilizing and accessing the resources needed" (p.31) and comprises a set of resilient behaviors, resources and capabilities (Hillmann and Guenther, 2021). A meta-analysis focusing on resilience in the entrepreneurship literature (Korber and McNaughton, 2018) posits two ways of conceptualizing entrepreneurial resilience: as an *ex-ante phenomenon*, where firms build on their characteristics or abilities to guarantee survival, persistence or success of the ventures (e.g., Hmieleski et al., 2015); and *ex-post phenomenon* that conceives resilience as a dynamic process of adaptive transformation, demonstrated thought the execution of the strategic response to adversity (Herbane, 2019; Williams and Shepherd, 2016).

Prior work uncovered different types of entrepreneurial resilience enactment in diverse settings in the context of severe venture disruptions, such as the pandemic. In small businesses in low-income neighborhoods, resilient responses to COVID-19 were both static and dynamic (Mithani, 2020), and these emerged from the interconnectedness between the entrepreneur's human capital (such as personal skills, traits and training) and the characteristics of the context, which shaped the resource repertoire (i.e., the social capital, capabilities and financial capital) available to frame resilient resources (Brito et al., 2022). In retail, small business entrepreneurs in Canada adopted different types of resilience responses (e.g., some opened online store technologies, others did not), which were impacted by entrepreneurs' identity motives, technology affordances and a resilient mindset (Smith et al., 2022). SMEs in Indonesia reacted to the extreme events by value creation, value delivery and value capture strategies that emerged as opportunities and constraints, displaying both resourcefulness and coping/development strategies. These revealed three types of entrepreneurial resilience: survival, continuity and growth (Purnomo et al., 2021).

In established successful businesses, organizations adopted three response paths to build resilience during the pandemic: capitalizing resilience (i.e., taking advantage of potential opportunities for growth due to the market conditions), realigning resilience (i.e., redeploying existing resources to better align with the changed market conditions), and repurposing resilience (i.e., permanent restructuration of organizational resources, capabilities and activities to create market opportunities that allow for ongoing functioning) (Shepherd and Williams, 2022). These response paths were associated with the different market reactions (demand of their primary market substantially increased, reduced or substantially reduced), decision-making in the face of adversity, strategic change initiatives and operational activities enacted by the entrepreneurs (Shepherd and Williams, 2022). Entrepreneurial orientation was also relevant to developing resilience of Jordanian small and medium-sized businesses throughout COVID-19, expressed by efficiency, adaptive, collaborative, change and learning capabilities (Zighan et al., 2022).

2.3. The present study

This study explores how digital technologies can constitute a mechanism to foster entrepreneurial resilience amid the COVID-19 pandemic. Due to the lockdown and social distancing rules, developing, integrating and re-elaborating digital content, products and services emerged as a requirement for business survival during the pandemic. For example, this involved developing and customizing artifacts to be integrated with existing or new digital platforms, creating digital components that are part of a new digital product/service, reaching new markets and customers, and re-organizing business operations to follow the guidelines imposed by the lockdown and social distancing. Digital technologies require the ability to use coding and digital language to develop, reprogram and recombine new artifacts (software or hardware) (Yoo et al., 2010) that constitute new products or services for the business, and/or build complex products which require creating digital products or services. This study aims to uncover how successful entrepreneurs leveraged digital technologies to build resilience in their businesses during the pandemic. Specifically, we distill entrepreneurs' digital artifacts, platforms, and infrastructures to demonstrate entrepreneurial resilience and quickly reinvent their businesses.

Table 1
Interviews analyzed.

Entrepreneur's name	Venture name	Description of the business	Year of venture founded	Venture location	Date of the interview posted	Length of the interview
Brian Chesky	Airbnb	An online platform for lodging that connects hosts and guests	2008	San Francisco, CA	8/13/2020	00:24:43
Alli Webb	Drybar	A chain of salons specializing in blowouts	2010	Irvine, CA	5/30/2020	00:32:15
Andy Puddicombe & Rich Pierson	Headspace	An online platform providing sleep, mindfulness, and meditation services	2010	Santa Monica, CA	5/30/2020	00:32:15
Ethan Diamond	Bandcamp	An online audio distribution platform, where artists and labels upload music, sell merchandise and other related products, controlling how they sell it	2008	Oakland, CA	4/8/2021	1:33:34
Sadie Lincoln	barre3	Studios and online workout subscription offering athletic apparel, accessories, and equipment	2008	Portland, OR	6/20/2020	00:26:31
Jon Stein	Betterment	A banking service that provides digital investments	2008	York City, NY	5/16/2020	00:30:17
Morgan DeBaun	Blavity	An online media company sharing news primarily focused on the Black community	2014	Los Angeles, CA	7/11/2020	00:25:00
Simon Sinek	Book: Start with Why Book: The Infinite Game	Author of novels focused on uplifting business professionals and leaders	Start with Why: 2009 The Infinite Game: 2019		4/23/2020	00:20:05
Whitney Wolfe	Bumble	An online dating platform	2014	Austin, Texas	9/19/2020	00:20:58
Melanie Perkins	Canva	An online graphic design company used for readymade and editable templates, presentations, and graphics	2012	Sydney, AUS	6/27/2020	00:28:14
Tony Xu	Doordash	An online food ordering and delivery service	2013	San Francisco, CA	5/21/2020	00:32:46
Jessie Woolley-Wilson	DreamBox	An online software company providing educational resources for K-12 and middle school level students	2006	Bellevue, WA	8/8/2020	00:21:33
Julia Hartz	Eventbrite	An online event managing and ticketing organization, sharing and promoting local events	2006	San Francisco, CA	7/16/2020	00:24:38
Marcia Kilgore	FitFlop and Beauty Pie	FitFlop- Footwear store Beauty Pie- Luxury beauty and skincare platform	FitFlop- 2007 Beauty Pie- 2016	FitFlop- White Plains, NY Beauty Pie- London	5/21/2020	00:32:46
Sonia Gil	Fluenz	A language learning platform	2007	Miami Beach, FL	10/22/2020	00:20:07
Taha Bawa	Goodwall	A professional development network	2014	Geneva, CH	7/30/2020	00:19:04
Iman Abuzeid	Incredible Health	Career marketplace for healthcare workers	2015	California, United States	11/25/2020	00:29:27
Jennifer Neundorfer	January Ventures	A venture capital firm	2018	Cleveland, Ohio	10/3/2020	00:24:02
Justin Gold	Justin's	A food brand specializing in organic and natural nut butters	2004	Boulder, CO	10/31/2020	00:22:30
Sandra Oh Lin	KiwiCo	A subscription service offering crates packed with seriously fun projects for children	2011	Los Altos, CA	9/5/2020	00:21:21
Bert and John Jacobs	Life is Good	An apparel and lifestyle brand	1994	Boston, MA	9/17/2020	00:29:22
Beverly Leon	Local Civics	A company connecting students with civic learning opportunities	2018	New York City, NY	2/18/2021	00:28:50
John Zimmer	Lyft	An application-based ride-share service	2012	San Francisco, CA	9/26/2020	00:24:54
Sarah LaFleur	M.M. LaFleur	A womenswear brand	2011	New York City, NY	5/23/2020	00:18:44
John Foley	Peloton	A company offering exercise equipment and related workout services	2012	New York City, NY	7/18/2020	00:20:10
Imane Anys	Pokimane	A Twitch streamer and YouTuber known for video-game plays and broadcasts	2013	Los Angeles, CA	9/10/2020	00:27:07
Emily Powell	Powell's Books	A chain of bookstores offering used and new books	1971	Portland, Oregon	12/10/2020	00:28:08
Troy Carter	Q&A, Atom Factory	Q&A- A music and technology company Atom Factory- a talent management and entertainment company	2007	Culver City, CA	6/6/2020	00:24:39
Jennifer Hyman	Rent the Runway	An online apparel platform offering subscription and rental services on designer garments	2009	New York City, NY	6/4/2020	00:24:27
Vivian Ku	Restaurateur	A restaurant owner serving Taiwanese cuisine and opening a location during the pandemic	2014	Los Angeles, CA	3/25/2021	00:26:11
Ajay Prakash and James Joun	Rinse	A platform for laundry delivery and cleaning services	2013	San Francisco, CA	8/27/2020	00:23:19
Danny Meyer	Shake Shack	A chain restaurant serving American food	2004	New York City, NY	6/15/2020	00:57:08
Tobias Lütke	Shopify	An e-commerce platform helping businesses set up their websites to sell online	Shopify- 2006	Shopify- Ottawa	5/16/2020	00:30:17
Songe LaRon	Squire	A digital platform taking barbershop operations online	2016	New York City, NY	7/23/2020	00:25:27
Stewart Butterfield	Slack	A software and technologies company facilitating the workflow	Slack- 2009	San Francisco, CA	5/9/2020	00:22:19
	Strava		2009		2/11/2021	00:32:56

Table 1 (*continued*)

Entrepreneur's name	Venture name	Description of the business	Year of venture founded	Venture location	Date of the interview posted	Length of the interview
Michael Horvath and Mark Gainey		An online platform that tracks the progress of a user's physical fitness		San Francisco, CA		
Elisa Villanueva Beard	Teach For America	A non-profit organization to fight educational inequality	1989	New York, NY	1/21/2021	00.23:04
Lindsay Peoples Wagner	The Cut	A magazine and platform with the latest trends geared towards women	2008	New York City, NY	4/15/2021	00:31:00
Niraj Shah and Steve Conine	Wayfair	An online furniture and home decor platform	2002	Boston, MA	8/29/2020	00:29:17
Morra Aarons-Mele	Women Online	An online marketing platform	2011	N/A	12/23/2020	00:31:53
Shan-Lyn Ma	Zola	An online wedding retailer and planning services	2013	New York City, NY	3/11/2021	00:29:45
Alberto Perlman	Zumba Fitness	A fitness program incorporating dance and cardio	1998	Hollywood, FL	8/6/2020	00:20:46

3. Method

3.1. Data

We analyzed 70 reflective interviews featuring entrepreneurs from the podcast How I Built This, led by Guy Raz, and conducted for National Public Radio (NPR). This podcast interviews individuals who are recognized for having created a venture that delivers something novel – a new product, process, or business model. We centered our attention on the "Resilience Series" interviews because they explore how entrepreneurs and leaders responded to the COVID-19 crisis and offer direct insight into entrepreneurs' pathways to entrepreneurial resilience (Shepherd and Williams, 2022). Each entrepreneur was asked a series of questions about their individual story, their actions in founding and growing the venture, and, particularly important to our study, how their companies adjusted during the pandemic times. The first interview in the "Resilience Series" was released on April 2, 2020, and the last was on April 22, 2021.

Within the resilience series, we focused exclusively on the 42 interviews that explicitly mentioned *digital transformation* - defined as the "transformational or disruptive implications of digital technologies for businesses (new business models, new types of products/services, new types of customer experiences) (e.g., Boulton, 2018; Boutetiere & Reich, 2018), and more broadly, to indicate how existing companies may need to transform themselves to succeed in the emerging digital world radically (e.g., McAfee & Brynjolfsson, 2017; Rogers, 2016; Venkatraman, 2017)", cited in Nambisan et al., 2019, p.1. Table 1 identifies the 42 interviews included in the data analysis. We obtained the audio file from the podcast's official website (https://www.npr.org/podcasts/510313/how-i-built-this) and transcribed audio files for analysis.

We chose this data set for several reasons. First, this data set provided unique access to an otherwise inaccessible group of highly successful entrepreneurs. Second, the interviews reveal substantial personal and business-related stories meaningful for the development and survival of the business during the pandemic. In addition, interviews also featured action-oriented descriptions, explaining in detail the specific digital actions, strategies and behaviors implemented during this time of adversity. Third, this data set was also used in other studies to better understand emerging concepts in entrepreneurship, such as entrepreneurial hustle (Fisher et al., 2020), and was previously used to explore entrepreneurial resilience (Shepherd and Williams, 2022). In this study, our goal was to identify the parts of the interview explaining the role of digitalization and technology in the actions, strategies and behaviors adopted during the pandemic.

3.2. Analysis

We adopted the systematic approach outlined by Gioia et al. (2013). We used this inductive approach to identify and describe, from within the interview data collected, the actions related to digitalization and

technology to reinvent the business in the uncertain and resource-constrained context of COVID-19. Two of the authors first worked through the interview transcripts highlighting all actions and behaviors reported by the interviewees that explained the use of digitalization in navigating the uncertainties and difficulties of managing a business during the pandemic. In this first-order analysis, we retained informant terms and did not attempt to distill categories for the reported actions or behaviors (Gioia et al., 2013). We then analyzed all the highlighted text and assessed the identified actions and behaviors, looking for common themes (Corbin and Strauss, 1990). We categorized these into five broad themes – second-order themes – representing key aspects related to digitalization associated with entrepreneurial resilience implemented during the pandemic. We used these behavioral themes to develop a data structure diagram that allowed us to configure our data visually and provided a graphic representation of how we progressed from raw data to themes (Gioia et al., 2013; Pratt, 2008). After adopting and defining the concept of second-order themes, we returned to our interview data to examine what function these appeared to serve during the COVID-19 pandemic: *enablers of entrepreneurial resilience* and *barriers to entrepreneurial resilience*.

4. Findings

In this section, we present our main findings. Fig. 1 illustrates the data ordering, including first-order codes that capture the actions and behaviors leveraging digital technologies and the more general induced second-order themes that summarize the main trends in the context of resilience narrated by the entrepreneurs. The five second-order codes are (1) creative digital pivoting; (2) digital infrastructure; (3) social impact through digital technology; (4) burdens of digital adoption; and (5) growth due to business resilience through digitalization. These second-order themes entail two aggregated dimensions: the first three second-order themes are enablers of entrepreneurial resilience; the burdens of digital adoption express a barrier to entrepreneurial resilience. Growth due to business resilience through digitalization is an outcome of entrepreneurial resilience. Next, we describe the findings and include illustrative quotes for each one of the first-order codes.

4.1. Enablers of entrepreneurial resilience

4.1.1. Creative digital pivoting

The constraints of the pandemic required successful entrepreneurs to reinvent products, services and business models (Kuckertz et al., 2020), which led to different response paths to resilience (Shepherd and Williams, 2022). Our study focuses uniquely on how digital technologies contributed to entrepreneurial resilience during the pandemic. One of the most frequent actions deployed was to **create new digital artifacts and platforms** that allowed adapting to the new digital environment. "*It was clear that the way to do it was to pivot and go online,*" shared Sonia Gil, founder of Fluenz.
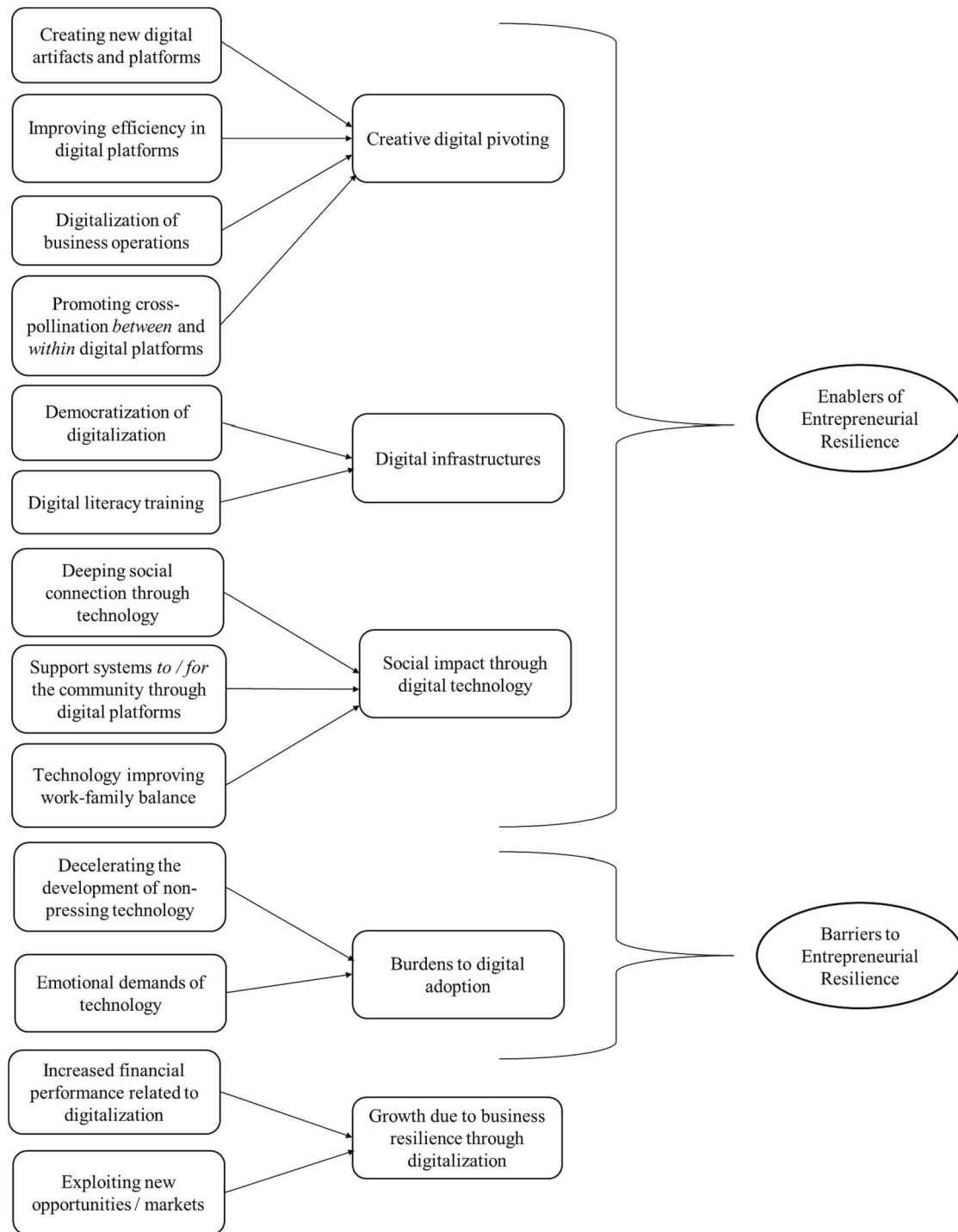
Fig. 1. Data structure.

With serious-time constraints, pressure to minimize costs and a shortage of incoming cash flow, businesses with in-person services had to pivot to offer digital and virtual options to continue to operate, which required creating digital platforms, artifacts and infrastructures. Sadie Lincoln, co-founder of barre3, mentioned that "*within 24 hours, we came out and we said: we are not closed, we're opening a virtual studio! And we opened Livestream classes in our living rooms, with babies and cats and dogs slamming*". Zumba also followed the same approach and offered classes through a virtual platform, which constitutes an example of a digital artifact: "*It was our instructors telling their students: Hey, now I'm teaching online; come take my class virtually*" (Alberto Perlman, co-founder of

Zumba). By developing their own digital platform, instructors increased agility and fluidity in the business, which is essential for innovation and financial performance (Troise et al., 2022). In the education sector, Elisa Villanueva Beard, CEO of Teach for America, explained that they "*pivot to offering virtual spaces to school leaders or teachers … The big very practical decision we had to pivot to is the way we train our teachers … we have to quickly figure out how to do that virtually (…).* In retail clothing, Sarah LaFleur, founder of M.M.LaFleur, shared, "*we launched virtual appointments … one of the things that we really love in our stores is that a lot of our customers book these one-on-one appointments … and obviously, that is no longer happening, but we launched virtual appointments*". This

demonstrates that when adopting newer technologies facilitates consumption, customers learn to innovate and improvise creatively (Sheth, 2020).

Customers also requested digital pivots and challenged entrepreneurs to find creative solutions, demonstrating the important role of customer-driven innovation (Desouza et al., 2008). For example, Shan-Lyn Ma, co-founder of Zola, mentioned "*people starting to ask us and beg us: could we help them facilitate a Zoom wedding through our wedding website … we very quickly built this*". In multi-sided digital platforms like Eventbrite, ticket sellers and event producers also inspired the creative development of the digital platform during the pandemic: "*it's a whole new world. Frankly, our creators are showing us the way … our job is to create a product experience that is better, faster and more effective for what they are already using the platform to do*" (Julia Hartz, Eventbrite). The technology integration with new digital artifacts allowed the development of new services and products (Wang, 2022). "*We have been really excited to launch and grow a rental service … with Lyft rentals, you get a Lyft to the car rental location that we operate, and then you can just grab the keys and go. There's no counter. It's really fast and easy. And in COVID we launched a kind of contactless experience to get the car … we brought that technology and access through our app to their vehicles as well*" (John Zimmer, Lyft).

During the pandemic, successful entrepreneurs also **improved efficiency in digital platforms** and made the necessary adjustments to serve the new customer demands during the uncertain period. For example, Melanie Perkins, co-founder of Canva, observed how customer behavior and needs changed during the pandemic (e.g., Kohli et al., 2020): "*things that people are designing has transitioned dramatically … [we] are creating less … things that resonate with the physical world. And what [we] are creating way more is things like Zoom backgrounds and presentations … Our marketing teams, design teams, template designers, everyone tried to transition on a dime to this new world to help facilitate all of the new things that people need to design*".

Flexibility in digital platforms is a competitive advantage for rapid adjustments in turbulent times (Ahmed et al., 1996) such as the pandemic: "*the technology platform was built in a way that was flexible … if we had not built it in a way that allowed us to grow into this strategy, it would have taken a lot longer than it actually took*" (Shan-Lyn Ma, Zola). Teams became creative and adjusted daily operations to a digital context: "*Within about 24 hours, the company was working online … our video team of activists got really creative … we put out a daily video product every single day. They had to restructure the way that they produce that content … internally our team has almost become more creative*" (Andy Puddicombe & Rich Pierson, Headspace). The digital transformation consisting of improved business models during the pandemic allowed delivering of better content to customers (e.g., Soto-Acosta, 2020): "*the learning that we can do remote … COVID forced us to test content in people's living rooms and our instructors' living rooms. We now have mobile apparatuses that we can plug into different places*" (John Foley, Peloton). Overall, these findings demonstrate how digital technologies unleash the creativity of entrepreneurs (Hisrich and Soltanifar, 2021).

The lockdown and social distancing mandates have disrupted business operations and required entrepreneurs to quickly adjust and implement different types of **digitalization of business operations**. One example comes from the healthcare industry. The urgent demand for healthcare specialists required decreasing the hiring time and streamlining the process. At Incredible Health, Iman Abuzeid describes how the digital platform they created changed the industry: "*Hospitals and health systems use our platform and our custom matching technology to hire permanent nurses in 15 days or less. Usually, the industry average is 90 days … our software and automation to screen the nurses as well as custom match nurses to the right employers*". This exemplifies how digital transformation changed the healthcare industry (Kraus et al., 2021), its scale of business operations and expanded customer reach, which proved to be cost-effective: "*we added in automated interview scheduling, remote interviewing because that's just what you have to do during a pandemic. In the*

app chat, we enhanced our matching algorithms" (Iman Abuzeid, Incredible Health). These are examples of the digitalization of business operations like hiring, onboarding and customer service.

The mandates for social distancing required adjusting the protocols and business operations to comply with the recommendations. Most of the adjustments needed technological developments, including implementing new digital platforms. Alli Webb, co-founder of Drybar, shared "*that's what we've spent the last two months … getting our technology in place, so that we could do like things like the virtual check-in, being able to test the health and the temperatures of people walking in the door …*". Another example of the digitalization of business operations is explained by Brian Chesky (co-founder of Airbnb) where they developed a digital platform to train hosts on cleaning protocols: "*we launched the enhanced cleaning protocol. We asked the host to go through an online course [with] the basic cleaning protocols. They get a badge or a seal on their listing … there's a whole system that we're working on*".

Shortages in the supply chain and social distancing mandates required a transition from in-house business operations to the virtual world or employees' houses. This triggered the need to invest in technology and define new paradigms in business operations as a strategy for entrepreneurial resilience: "*we've invested in technology … we decided that we would really try to jump into this and see if it could save our business*", said Bert and John Jacobs (co-founders of Life is Good). Another example is technology adoption to allow hybrid product development, integrating the physical and digital interface. Sandra Oh Lin, founder of KiwiCo, explained that: "*we have a physical product design and development team, and then we have a digital … e-commerce platform … as we've been working remotely … we quickly decided to purchase 3D printers, laser cutters, etc., that we distributed to different product designers. On the testing side, we ended up either shipping or having handoff locations for kids to pick up and test the materials and then do them via video conference. We asked for different camera angles to see what the kids are doing … that has been an area where we've had to figure out how to get things done in this environment*". This quote exemplifies the complexity underlying the digital transformation of business operations.

Pivoting to digital-first business operations required extensive training and development. "*Getting everybody together, training and making sure that the exchange through a screen was the correct one*" (Sonia Gil, Fluenz) required significant dedication and energy from all the staff members. "*The thing that I'm probably most proud of is seeing our culture, seeing how our team has been able to rally through this crazy period … one day, we realize we're going to have to shut down the office, to have everyone working from home. The next day, we had an onboarding class … it was just incredible seeing how rapidly we're able to transition to an online environment*" (Melanie Perkins, Canva).

Another strategy leveraged during the pandemic was the **promotion of cross-pollination *between* and *within* digital platforms**, creating diverse patterns of digital infrastructure that enabled entrepreneurial resilience. One of the strategies applied by entrepreneurs running businesses with a strong physical customer interface was establishing partnerships with existing digital platforms. For example, restaurants integrated existing delivery and take-out digital platforms instead of building their own. Vivian Ku, a restaurateur in Los Angeles, shares that "*when the pandemic happened … we changed out our point of sale system to make it more contactless … we got on a lot of different delivery platforms*". One such digital platform is Doordash which expanded its operations capacity to provide the necessary infrastructure to accommodate more local businesses and guarantee the safety of their drivers: "*be there for the workers on the platform and make sure that not only do they have the flexibility but that they also have the protections that they need and deserve to be on the road*" (Tony Xu, Doordash).

Another example is Lyft who created a delivery platform for retail and e-commerce: "*digital platforms to develop new services for new customers … [we] created the delivery platform for small business owners*" (John Zimmer, Lyft), building on the existing organizational capabilities of the company. Businesses that operated already with a combination of

different digital technologies (apps, websites, marketplaces, etc.) recognized they could support other businesses who lacked these digital capabilities and infrastructure: "*It's just been an enormous community effort of bringing local businesses online so that they can do curbside pickup, or even do deliveries in the neighborhood. And it's been remarkable that we have seen some of these businesses actually do better than they have ever done before*" (Tobias Lütke, Shopify).

Similarly, Ajay Prakash and James Joun, co-founders of Rinse, recognized that "*Because people are searching for companies and services online … we found that was a need that we could help fill … it's our job to partner with the best dry cleaners and then give them volume. We're good at acquisition; we want to partner with those who are really good at cleaning and make that a win-win situation*". The cross-pollination between dry cleaning and laundry shops with Rinse's existing digital platform created a synergetic relationship. Another cross-pollination strategy for businesses with customer-facing products was the integration with existing online shopping platforms: "*we've also positioned ourselves well with a lot of retailers by being a part of their online shopping programs. Consumers aren't going into stores as often. And so the brands that have leveraged themselves with the online platforms … are seeing success with that as well*" (Justin Gold, Justin's).

Cross-pollination between digital platforms allowed an easier integration with other platforms that offer complementary services, creating the foundation for developing stronger and more complex digital infrastructures. For example, Strava shared "*we have an open API that allows developers to develop an experience. Perhaps it is around a sport that we don't do particularly well inside our app; they can plug in through our API [application programming interfaces] to get the data from the athletes into Strava. And then it's part of that community experience inside Strava*" (Michael Horvath and Mark Gainey, Strava). This strategy is an example of how the openness of the digital platform allows innovation through building and complementing one another's contributions (Nambisan et al., 2019).

4.1.2. Digital infrastructures

Rethinking business models and work during the lockdown required significant changes in digital infrastructures, which acted as enablers of entrepreneurial resilience through democratizing access to technologies and digital literacy training. For example, employees needed to develop technical and human skills, acquire digital competencies to raise their productivity, and accelerate adopting and implementing more sophisticated teleworking tools to succeed at remote work and collaboration.

When it comes to considering the prominent role of digital and technology development in entrepreneurship (Nambisan, 2017; von Briel et al., 2018) during the pandemic, the **democratization of digitalization** allowed the pursuit of new possibilities with a lower budget. Troy Carter, music and talent manager and co-founder of Q&A, shared his perspective about how technology democratizes the music industry: "*I think it is going to accelerate technology in terms of finding better options around live streaming … the live concert experience is good in one sense, terrible in another sense because only a small percentage of people have really good seats … technology can provide everybody with a much better seat and a much better experience*". This shows how digitally improved business models complement existing traditional ones (Soto-Acosta, 2020), which is a form of business ambidexterity – i.e., firms' ability to simultaneously deepen their current competitive advantage while also seeking opportunities to introduce innovative products and services to new groups of customers (Hitt et al., 2001; Ireland et al., 2003) - enables resilience during adversity. This is in line with Iborra et al. (2022) work on how ambidextrous organizations can take advantage of their experience to pursue exploration and exploitation activities to build resilience.

In a similar vein, digital platforms also promoted the democratization of education, and entrepreneurs advocated for more equal opportunities during the pandemic. Jessie Woolley-Wilson, CEO of Dreambox, shared the approach adopted during the early days of the pandemic,

aiming to democratize education access to a larger number of students. "*I went to my board, I said that we should open up the platform so that if a district had three of 50 schools on Dreambox, they could put the remaining 47 on for free … just so that they could keep their kids learning at home … and within six weeks, we nearly doubled the number of students.*" This demonstrates that the democratization of access to digital technologies and platforms accelerated the digital transformation of education: "*the online immersion is here to stay … there's one thing this pandemic has accelerated, and it has opened the doors towards online education. I think people are definitely ready, and willing and much more open to it*" (Sonia Gil, Fluenz).

Importantly, there are still significant gaps in the democratization of access to technology and the digital divide is still a reality. Access and capabilities to use digital technologies are still skewed. "*One of the biggest needs that still exist today is that so many of our kids don't have access to hotspots and broadband. And still today, 10 months into this thing [COVID], 15 to 16 million kids still do not have access to learning. And that is one of the biggest injustices … having access to a device, having access to broadband is like having pencil and paper, these are the basics now. And we still have about one to 3 million kids that have not been engaged since March in any kind of learning*", shared Elisa Villanueva Beard, CEO of Teach For America.

The democratization of access to technology during the pandemic also shows that home-based technology can constitute a valuable resource that cuts down high fixed costs and increases productivity for the business. Overall, if technology and digital solutions increase business productivity, organizations will be interested in using them as much as possible in decision-making and business implementation. Iman Abuzeid, co-founder of Incredible Health, states, "*we talked about the product changes: dramatically reprioritize and reconfigure things, and double down on what's it going to take to help hospitals and nurses find each other faster, and interview remotely and just and dramatically reduce the cost for the hospitals*". By building an effective digital platform with significantly reduced costs, Incredible Health democratized access to new job possibilities for many nurses and diversified the hiring pool.

While the pandemic had severe effects on unemployment (Blustein et al., 2020), remote work and the democratization of access to technologies allowed entrepreneurs to diversify the hiring pool and human talent. Whitney Wolfe, founder of Bumble, recognized the "*opportunity to hire in a way that we never thought about before. Usually, we are just hiring at our two or three main locations. Now that things are moving remote, we're opening up our talent pool opportunity*". Recruitment during digital transformation is required to enhance organizational absorptive capacity because of the strategic implications that digital transformation imposes on recruitment (Gilch and Sieweke, 2021).

The COVID-19 pandemic brought the need to adopt digital artifacts and infrastructures quickly. Arguably, the cornerstone for integrating digital technologies in entrepreneurship is "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (Glister, 1997, p.1), that is, **digital literacy**. Knowing how "to use a growing variety of technical, cognitive, and sociological skills in order to perform tasks and solve problems in digital environments" (Eshet-Alkalai, 2004, p.93) is an essential component to integrate the infusion of new digital technologies across all stages of entrepreneurship (Nambisan, 2017; von Briel et al., 2018; Gartner et al., 2022).

Acquiring digital literacy tends to be a function of needs. In the context of the pandemic, it was necessary to invest in digital literacy training to help employees, partners and customers advance through different levels of digital literacy (Neumeyer et al., 2020). Alberto Perlman, co-founder of Zumba, shared how they prepared their instructors to use the virtual platform: "*we created virtual Facebook groups that people could join and learn how to teach virtually. We created e-learning courses and Zumba virtual Pro, which would help them not only with their technical skills, but when you're speaking to a camera … when you're dancing to a camera, your movements have to be a little different*". Improving digital literacy from basic usage enough to connect to the digital world to a transformational level which includes developing, integrating and re-

elaborating digital content and programming (Neumeyer et al., 2020), requires significant investment and empathy from entrepreneurs as well. Sadie Lincoln, co-founder of barre3, agreed with the importance of digital literacy: "*our online streaming workouts are premium. We have beautiful set production and trained instructors … It's very different to teach a class to a camera than to a group of people. A very different skill set is needed*".

Like fitness instructors using virtual platforms, teachers transitioning to remote education also needed digital literacy training. Jessie Woolley-Wilson from Dreambox explains "*we need to train teachers to use Dreambox in schools. All of our [internal] professional development had to be put on hold or used with Zoom*". While the development of digital literacy among teachers was critical to ensure the resilience of the business, the fast pace of changes requires constant flexibility and learning: "*as soon as you think you have something understood, you have to adapt, because it changes and you just have to stay flexible*" (Jessie Woolley-Wilson, founder of Dreambox). As the development of the digital platforms unfolded, training had to be permanent and ongoing: "*We started off with helping our instructors get on Zoom, Google Meet and Microsoft Teams. They were teaching on these platforms and had a lot of audio issues or video issues as they were learning … there was a whole learning process and a lot of issues in the first few classes. Then we launched our own platform and had to work out all the technical bugs*" (Alberto Perlman, Zumba). This is in line with prior work on the effect of fear of technology adoption during the COVID-19 pandemic, which supports the importance of training during the transition (Al-Maroof et al., 2020).

The growing engagement in the digital world during the COVID-19 pandemic and the development of individuals' digital literacy is related to increased positive attitudes towards technology and digital solutions. Stewart Butterfield, the founder of Slack, reflects "*generally there will be more accepting of technology in the workplace in a positive way, and people will be able to take advantage of that to restructure how they work*".

Overall, the democratization of digitalization and the increased training in digital literacy enabled entrepreneurial resilience by demonstrating the potential of the Internet, mobile connectivity, cloud computing, and other new digital technologies to leverage how employees do their work more effectively (Levit, 2018).

4.1.3. Social impact through digital technology

Our findings uncovered that digital technology created social impact during the pandemic in three ways: deepening social connection through technology, providing support systems *to* and *for* the community through digital platforms, and improving work-family balance.

While the COVID-19 pandemic brought significant challenges with social disconnection and lockdown loneliness (Shah et al., 2020; Kaun, 2021), entrepreneurs thriving for resilience in their businesses also focused on guaranteeing a **deeper social connection through technology**. In education, Wendy Kopp, co-founder of Teach For America, remarked that schools had good technology infrastructure when the pandemic hit. "*[We] focused on building the infrastructure with relationships. And so, every adult is … responsible for building a relationship. There's mutual accountability for what the school is doing and the connection with the family and the students*". This discourse shows how technology can help deepen social connections during the COVID-19 pandemic. Importantly, entrepreneurs focused on maintaining interpersonal human competencies in the digital world.

Remote work required entrepreneurs to reinvent how to connect with their employees using digital platforms. While there is evidence of the difficulty in maintaining the ideal team performance during a crisis because of the challenges that teams face when they have to quickly adapt to the next context (Tannenbaum et al., 2021; Feitosa and Salas, 2021), supportive mechanisms (i.e., team charters, team building, feedback) are important for psychological safety and promote team cohesion (Kilcullen et al., 2022). In line with these recommendations, Jennifer Hyman from Rent the Runway recognized that connecting in a

remote setting opened the door to establishing personal connections with team members during the pandemic: "*I have used these coffee chats on a weekly basis, not even to ask about what they're working on, but just to have their kids run into the frame and ask what they're going through in their lives. And this created this intimacy around our team that I've never felt so strongly before … this feels like I'm really getting to know my own team on a much deeper level.*"

Overall, the conversation points to how technology and digital artifacts can contribute and assist the humanization of work. Jessie Woolley-Wilson, from Dreambox, mentions that "*I fundamentally believe that technology should be used to support human beings … technologies can help personalize learning and give learning guardians actionable insights … the trick is to connect what the technology can do with them in the person learning experience, to bring it to a new level*". In this context, the pandemic created the opportunity to uncover the potential of technology to serve humanity in many different aspects, enabling business resilience during this challenging time.

Another example of how technology allows deepening social connections also with customers is offered by Sarah LaFleur (founder of M. M.LaFleur): "*we launched virtual appointments … a lot of women see this a little like self-care moment for themselves … the conversations go much deeper than clothing needs … that level of conversation that's now happening in our virtual appointments is actually more working mom-friendly than asking a mom to come into a store*". Similarly, John Foley, co-founder of Peloton, also acknowledges how the digital nature strengthened the sense of community among their users: "*we are bringing connection, and we are helping people relate, we are understanding, we are supportive, and we are there for them … in a wild way it feels like Peloton was built for this moment of helping people connect virtually*".

Entrepreneurs reflected on how the digital platforms allowed them to remain connected with their customers during the restrictive time of the pandemic, showing the nature of the **support systems *to* and *for* the community created through digital platforms**, which enabled resilience. Entrepreneurs recognized how customers' loyalty and the strength of their relationships enabled resilience: "*Some of our studios have remained amazingly 90% pre-COVID revenue because of the loyalty of their community. Having an emotional connection with them … knowing the owner on a personal basis … our communities have really stepped up to support us*" (Sadie Lincoln, barre3). Interestingly, Sadie Lincoln recognizes that the strong relationships developed before the pandemic at the brick-and-mortar establishment (the fitness studio, in this case) are more important than the quality of the remote digital product, showing that the emotional connection supersedes: "*we've had this beautiful online streaming service … but what we learned is that our studio clients don't care … they want the instructor that they know, they want their owner that they have an emotional connection with, and they don't care if she's in her house with dog hair on her yoga pants*" (Sadie Lincoln, barre3).

The support system is also driven by the customers "*Our community sharing their stories with us, their pictures, their messages, their photos, lifting us … we have quite a community online, and they are lifting each other constantly and we enjoy that energy to from them*" (Bert and John Jacobs, Life is Good). The sense of community is also expressed through digital platforms in such a way that the relationship was transposed to the online environment: "*What's interesting is that 85% of consumers buying tickets to these virtual events knew the creator prior to COVID. So there is a continuity of relationship, and a gathering of community on a virtual experience that didn't exist before*" (Julia Hartz, Eventbrite). This shows that the strength of the relationships persisted in the digital world and enabled entrepreneurial resilience. Digital platforms also allowed to serve as a support system to the community: "*making sure that we are a partner to the community … to bring supplies to make sure that healthcare workers are protected*" (Tony Xu, Doordash).

Remote work integrated digital technologies and artifacts at home and into families' routines. The work-family balance means cutting back on work to spend more time with one's family (Greenhaus et al., 2003). Organizations, families and individuals recognize the importance of

balancing work demands and family needs (Kreiner et al., 2009). This struggle mainly affects women, who still face challenges balancing these two important spheres of life compared to their male counterparts (Sundaresan, 2014). This is also critical among women entrepreneurs (Eddleston and Powell, 2012) due to their social and cultural obligations as the primary caretakers of children and families. Women typically assume multiple roles within the home, which affects their ability to achieve work-family balance (Grünberg and Matei, 2020). When virtual work replaced the usual mode of work, family life also ceased to be "normal", and now both work and life take place in people's homes, challenging the notion of work being confined to employment, remuneration and location. Information and communication technologies facilitate virtual work, reduce face-to-face contact, and promote flexibility for achieving work-family balance (Fenner and Renn, 2010).

The COVID-19 pandemic blurred the borders for women working from home and increased their struggle with juggling work and family responsibilities (Nash and Churchill, 2020; Bahn et al., 2020), as women undertook more domestic duties during the lockdown compared to the pre-pandemic period (Adisa et al., 2021). While role conflict among women increased due to the intensified pressures on their work and familial duties (Adisa et al., 2021), successful entrepreneurs emphasize the other side of the coin and state how remote work and **technology improves work-family balance**. Jennifer Hyman, co-founder of Rent the Runway, remarks that "*one of the biggest challenges for women has been that 50% of women leave the workforce after they have kids. And some of those women leave because they want to be stay-at-home moms. And that's wonderful. Some of those women leave because it's just too complicated to be an employee, be a mom, and take care of your responsibilities at home. This* [referring to the pandemic] *actually may be the best thing to ever happen to women's empowerment. The idea of more remote work and to trust that we can do it in a more livable, thoughtful way. This actually may be the thing that levels the playing field*". This anecdotal perspective may be explained by different transition profiles of the work-family interface depending on the work demands (Vaziri et al., 2020) and the division of household and childcare labor during the pandemic (Martucci, 2021). The discourse of successful female entrepreneurs highlights how technology and digital tools that allow remote work contributed to reconciling women's multiple roles, harmonizing work demands and family duties which were traditionally mentioned as mutually incompatible (Greenhaus and Beutell, 1985). Marcia Kilgore, a serial entrepreneur founder, notes, "*that is a gift … because of technology, and I'm able to be with my kids and also able to be with my customers. And that's a wonderful thing.*"

Successful male entrepreneurs also allude to how remote work and digital tools contribute to positive work-family interactions experienced within couples (Vieira et al., 2018). Jon Stein, founder of Betterment, recognizes that "*I think being remote is a big part of it … my wife said yesterday - you've been home for dinner with us every night, and in our 10-12 year relationship, that's never been the case, you've never done that.*" This demonstrates that digital and remote work can contribute to high work-family enrichment and low work-family conflict.

4.2. Barriers to entrepreneurial resilience

4.2.1. Burdens to digital adoption

While digitization is transforming businesses and spurring survival and sometimes growth, in the successful resilient ventures featured in our sample, burdens to digital adoption were also mentioned in the discourse. These burdens constituted barriers to entrepreneurial resilience. The context of uncertainty generated a rapid demand for efforts to use innovative technologies to cope with damage from COVID-19 on our life (O'Leary, 2020), and at the same time, **decelerated the development of technology** that was not so prominent to address the pressing needs of the pandemic. John Zimmer, co-founder of Lyft, remarks that "*the ability to create health safety through autonomous vehicles is definitely quite interesting and through designing the vehicle … but it's still a technology limitation and a cost limitation at this point*". The pandemic also slowed

geographic expansion, as entrepreneurs needed to prioritize investing in the business's digital development to guarantee survival. Incredible Health saw its growth delayed: "*when the pandemic first hit in April, we just had to delay all our New York expansion plans. As a pandemic has spread throughout the country, we have to adjust our different expansion plans … we haven't been able to roll out our geographic expansion plans as normal*", said Iman Abuzeid. This aligns with the notion that "planned digital infrastructure work can be suspended unless a project can contribute directly to coping with the crisis" (Papagiannidis et al., 2020, p.3).

Another theme mentioned as a burden resulting from the digital requirements of the pandemic refers to the **emotional demands of technology**. The restrictions on physical interaction seriously impacted small business owners (Fairlie, 2020), which required them to rethink interactions with customers and other businesses (Runfola et al., 2021). Songe LaRon, co-founder of Squire, explained, "*It's been a challenge to keep those relationships remotely. We had a little bit of an advantage because we were already somewhat distributed … we are already used to collaborating on Zoom and communicating on Slack, but this took it to a whole new level because there is no physical presence anymore*".

The consumption of technology and excessive exposure to digital platforms are also associated with emotional burnout and exhaustion (Prikhidko et al., 2020; Mheidly et al., 2020), which is particularly relevant during the lockdown (Sharma et al., 2020). Lindsay Peoples Wagner, the editor-in-chief of The Cut, a digital publication and the co-founder of the Black in Fashion Council, acknowledged the overwhelming emotional burden of the digital world: "*I have to turn everything off. Honestly. Technology and social media are great because you can connect with all these people … but the less people can reach me, the better because I just need to turn my brain off*". Vivian Ku, Restaurateur, also expressed a similar emotional burden to the overwhelming exposure to the digital technologies: "*so much of my energy has been on what is the best thing to do next, and like keeping the morale of the team going, trying to make it through … I think we're all a little bit physically tired but also mentally drained.*"

Mimicking work routines from the offline to the online setting also leads to emotional burdens: "*I think that a lot of people … just slap the old routine onto Zoom. So if you had six meetings a day in the office, all of a sudden you had six on-camera meetings … Zoom is often draining for everyone … we feel disconnected because we are all just out there performing on Zoom, wondering what the social cues are sort of fake connecting and not getting any real energy back*" (Morra Aarons-Mele, Women Online). This is called Zoom fatigue, and experimental studies demonstrated that meetings held through video conferences predict individuals' exhaustion because of difficulties in reading social cues and feeling pressured to provide such cues themselves (Nesher Shoshan and Wehrt, 2022).

4.3. Growth due to business resilience through digitalization

4.3.1. Increased financial performance and exploitation of new opportunities/markets

It is well established that uncertainty during the COVID-19 crisis brought significant downsides to the financial landscape (Brown and Rocha, 2020), jobs and labor market (Dua et al., 2020; Albanesi and Kim, 2021), creating a recession with global severe financial crisis (Shibata, 2021). The actions, behaviors and strategies leveraging digital technologies developed by many successful entrepreneurs and managers allowed resilience, which **increased financial performance** in several ways. Alberto Perlman (Zumba) disclosed their surprise with the fast growth in user rates once they adopted the virtual platform: "*To our surprise, within a month and a half, we had about a million people a week taking Zumba classes virtually, which is amazing for a new virtual product*". Similarly, Strava "*went from adding about a million new athletes to the platform every month to, at some point, 3 million a month, and them it settled down to about 2 million a month now*". This exponential growth required a fast adjustment in the operations "*So we overnight had to go to a different*

mode of operating. Though it's software, you still have a lot of hardware somewhere that is running all of this and scaling that up and making sure that it wouldn't all fall down and crumble under the increased load".

Similarly, several digital businesses included in our analysis clearly expressed growth metrics and increased financial performance. Ethan Diamond, co-founder of Bandcamp, said "*Everything more or less doubled in 2020 … artists signups, fan signups, sales through the site, digital, physical music*". Julia Hartz, co-founder of Eventbrite, also acknowledged, "*In April alone, we processed over 8 million tickets to our events, virtually*". Canva, the online graphic design tool, also "*continued to grow rapidly throughout this time,*" said Melanie Perkins‚ as she also recognized the competitive advantage of being already an online business before the pandemic: "*I think that the challenges of navigating from an offline world … to a culture online have been relatively smooth because most of our things were already online; we were already working in an online world*". While buying online was the only option available during the lockdown, digital transformation also allowed product purchase optimization and improved online customer experience, which also led to growth in sales: "*Except for an immediate shock at the very beginning, online actually grew through it. And the reason is, customers who maybe weren't as keen on buying online, all sudden were more curious about value, more curious about availability*" (Niraj Shah and Steve Conine, Wayfair).

Growth during the pandemic was also expressed by **exploiting new opportunities/markets**: "*I don't know if this is despite COVID or because of COVID… other opportunities came. We have partnered … with market leaders, in markets that we are not present in or were very marginally present in, and it is actually allowing us to take up extra market share and grow in a more significant way*" (Taha Bawa, Goodwall). In the context of education technology, there were also accelerated opportunities for digital opportunities. Jessie Woolley-Wilson, from DreamBox, recognized that "*we've had explosive growth in users … there are growth opportunities for proven effective, engaging and reliable learning technologies*".

5. Discussion

Entrepreneurship and entrepreneurial ventures have received increased attention during the COVID-19 pandemic (Majchrzak and Shepherd, 2021; Kuckertz et al., 2020). Prior work focuses on entrepreneurship education (Secundo et al., 2021; Liguori et al., 2021), social entrepreneurship (Ibáñez et al., 2021; Bacq and Lumpkin, 2021), economic and financial aspects of new businesses (Belitski et al., 2021; Brown and Rocha, 2020), and resilience paths of small and medium businesses (Smith et al., 2022) and established ventures (Shepherd and Williams, 2022). This study delves deeper into analyzing resilience in the context of the pandemic, exploring the role of digital technologies as both an enabler and a barrier.

Using data from in-depth public interviews with notable entrepreneurs who successfully built resilience in their ventures during the pandemic, we uncover the actions, behaviors and strategies for leveraging digital technologies to enable or stifle entrepreneurial resilience. We adopted an inductive qualitative approach to discover such complexities, in line with recent arguments that qualitative research is particularly suitable and rich for adversity and uncertain contexts such as the COVID-19 crisis (Kuckertz et al., 2020). Our results revealed three themes defining digital technologies as enablers to entrepreneurial resilience: creative digital pivoting, digital infrastructure, and social impact through digital technology; and one theme pointing to digital technologies as a barrier to entrepreneurial resilience: burdens to digital adoption. Another theme that emerged in the data analysis is growth due to business resilience through digitalization, suggesting that digital technologies supported organizational performance throughout the COVID-19 pandemic. However, these relationships are complex, with the type of business model and nuances of the industry mattering. Businesses already operating as digital platforms before the pandemic or with a more robust set of digital technologies in place (e.g., Canva, Airbnb, Doordash) exhibited more flexibility in adapting to digital

technologies because they built on the existing capabilities, platforms, knowledge, infrastructure and systems. Businesses operating primarily in brick-a-mortar outlets, with strong customer-facing interaction, such as traditional retailers (e.g., Drybar, Life is Good, Zumba), experienced a slower transition and ongoing adaptation to digital technologies. Below, we discuss the main theoretical contributions of our findings.

Pursuing digital technologies to respond to the COVID-19 crisis constitutes an enabler to entrepreneurial resilience when successful entrepreneurs develop *creative digital pivoting*. These can define a fairly complex configuration of actions and behaviors, including developing digital artifacts and platforms, improving current ones, digitalizing business operations, and promoting cross-pollination *between* and *with* platforms. This theme is aligned with the prior work on digital entrepreneurship literature by showing that entrepreneurs leveraging digital technologies as a path for resilience during the pandemic can have three main impacts on the strategic positioning of the business: (a) enable the venture to be more focused and specialized (Kuusisto, 2017); (b) broaden the scope of the venture by exploring the potential of multiple revenue streams simultaneously (Yoo et al., 2012); and (c) expand the scope of the business by entering new or unrelated markets created by digital technology diffusion (Lanzolla and Markides, 2021). In these three, resilience is expressed at a strategic level, demonstrating how enabling digital technologies may represent a deviation from organizational core resources.

A second theme that constitutes an enabler for entrepreneurial resilience is *digital infrastructures*. This includes both the democratization of digitalization and digital literacy training and adds to the debate on how digital technology might trigger operational efficiency and change business operations (e.g., Lanzolla and Frankort, 2016; Steininger, 2019). Digital infrastructures are needed to enact systematic changes in business operations and implement the firm's strategic positioning. Here, digital infrastructures enact resilience at the operational level, adjusting production, sales, customer interface, and different aspects of value creation and value capture. Digital infrastructures also have the potential to democratize access to different opportunities, such as greater access to ideas, potential markets and other necessary resources (Pergelova et al., 2019; Ughetto et al., 2019). Preparing entrepreneurs to adopt and exploit digital opportunities and act upon them can constitute a learning challenge to advance through four levels of technology and digital literacy (Neumeyer et al., 2020), especially for entrepreneurs who were not involved and operating in the digital space before the pandemic.

A third theme refers to the *social impact through digital technology*, where entrepreneurs express how digital technologies helped to deepen social connection, how they constituted support systems *to* and *for* the community, and how technology improved work-family balance. This contributes to the emerging conversation on how digital entrepreneurship shapes the social context, specifically how digital networks support bridging and bonding social capital between entrepreneurs and stakeholders (Smith et al., 2017). Our findings also show that digital spaces reduce social hierarchies, encourage open communication and help bridge social voids (McAdam et al., 2019). Increasing social connections through technology with various stakeholders enacted resilience, which was a determinant to maintaining continued revenue generation throughout the crisis. Importantly, social connections through digital technologies broadened and deepened relationships in online and blended offline-online contexts.

While the discourse of successful entrepreneurs mostly positioned digital technologies as an enabler for resilience, a theme around *burdens to digital adoption* emerged, which constitutes an important barrier. Here, interviewees referred to the deceleration of the development of non-pressing technologies that were not responding to the pandemic's core needs and the emotional demands of the overuse of technology. Digital technologies do not necessarily always democratize entrepreneurship and innovation (Berger et al., 2021) and can have a downside and a destructive effect on organizations and individuals. Entrepreneurs
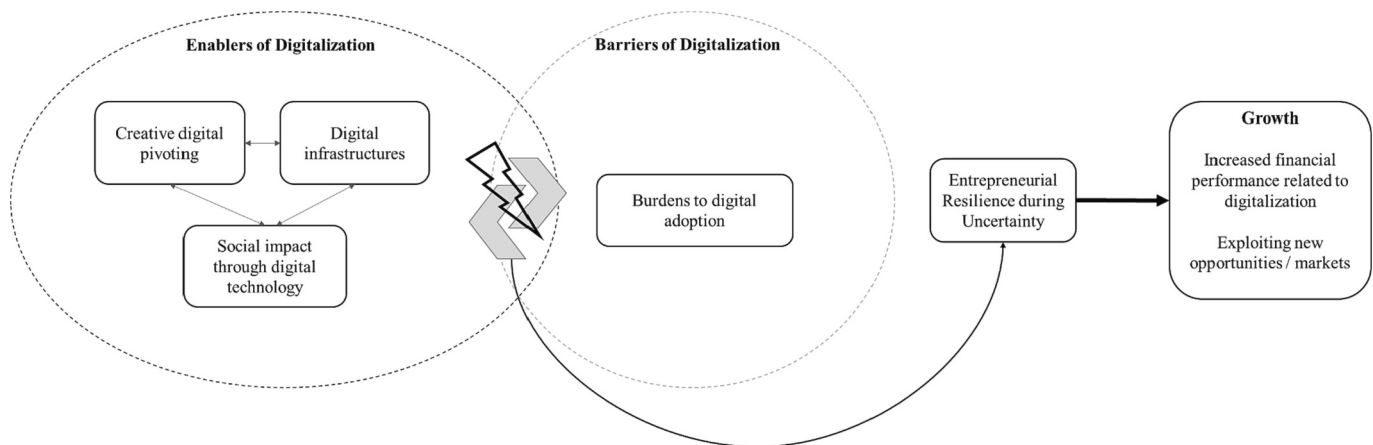
Fig. 2. Digital technologies as a vehicle for entrepreneurial resilience during uncertainty.

in our sample voiced some negative impacts on mental health, business operations, organizational identity, and access to the required infrastructure. As a result, the digital space remains partially fragmented, with the digital divide between developed and developing nations continuing to expand (United Nations, 2020).

Finally, the last theme that emerged in the scope refers to the *growth due to business resilience through digitalization*. Even in the context of uncertainty and adversity, successful entrepreneurs adopting digital technologies were able to increase financial performance and explore new opportunities and markets because of their digital transformation. These findings strengthen the perspective that digitalization can significantly affect value creation in markets by expanding the range of goods and services offered, expanding to new markets that were unreachable, and decreasing the costs of customer acquisition (e.g., Lanzolla et al., 2020). Fig. 2 summarizes our main findings.

Although we recognize the paradox between the opportunities that digital technologies offer and the constraints of the context of the pandemic, our inductive analysis demonstrates that successful entrepreneurs were mostly able to leverage digital technologies as an enabler for resilience. Thus, we consider digital entrepreneurship an important lever to systematically create recovery pathways for ventures and explore mechanisms and conditions that might mitigate negative outcomes in such adverse contexts. Future research should expand on this finding and continue to investigate successful pathways to recover from adversity, also building on the work exploring digital technologies' role in the entrepreneurial process (Zaheer et al., 2022).

5.1. Practical implications, limitations and future research

Our findings offer practical implications, highlighting the complexities of digital entrepreneurship and its impact on resilience in the context of a crisis. First, entrepreneurs and founders need to recognize the intercept of adopting disruptive digital technologies and transforming capabilities, structures, processes and business model components. Digital technologies are a response path for adversity by promoting strategic and operational resilience, but they require both skilled and digitally literate employees and executives, and investment in digital technologies and organizational capabilities. Second, this study compiled a set of real-life examples of how digital artifacts and platforms can be used to build resilience during adversity. This comprehensive framework describing what facets of digital technologies can constitute an enabler and a barrier to resilience is an important resource for future crisis management scenarios. Particularly important to practice is to recognize that digital technologies constitute an enabler of resilience, albeit this strategy may be an expression of the necessity of the situation. Boundary conditions such as the type of industry, the business model of the organization, digital infrastructure, market

positioning, value creation and value capture strategies are important to be considered. Also, our findings revealed the importance of the identity of the firm's core business and how digital solutions may deviate or create tensions in organizational and founders' identity. Third, entrepreneurship education should cover the role of digital technologies in case of adversity in businesses by creating awareness of such configurations' idiosyncrasies and discussing specific actions, behaviors and strategies leveraging digital technologies, especially at the executive level. Science and technology entrepreneurship education is changing due to the developments in information and communication technology and digital infrastructures (Lamine et al., 2021) and these should be integrated as a possible path to respond to adversity and build strategic and operational resilience.

This study is not without limitations. First, we focus exclusively on successful entrepreneurs, which may introduce the potential for a winner's bias and leaves unknown how and why businesses failed during the pandemic. Relatedly, we analyzed the public discourses of entrepreneurs, so impression management could have been used as a strategy of the entrepreneur during the interview, though this seems minimal given the candor expressed by the entrepreneurs during the interviews. Future research should consider successful entrepreneurs from other sources, industries and contexts to explore the emerging themes. Second, we did not quantify how entrepreneurial resilience influences performance, limiting the analysis to a subjective perception of performance. Future research should integrate a quantitative perspective to capture performance data over time, quantifying resilience and survival. Future longitudinal work may want to explore the dynamic aspect of digital technology implementation of digital technologies and how that relates to resilience, and, consequently, performance. Despite these limitations, we use a unique and untapped source of high-quality data from highly successful entrepreneurship that otherwise is inaccessible. This fits with the expanding practice of using novel, unobtrusive, archival sources of qualitative data, collected and stored for a purpose other than the primary research purpose, as a key data source to generate novel research insights.

Declaration of competing interest

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

Data availability

Data is public available. Web reference list provided.

Acknowledgements

References

Adisa, T.A., Aiyenitaju, O., Adekoya, O.D., 2021. The work–family balance of british working women during the COVID-19 pandemic. J. WorkAppl. Manag. 13 (2), 241–260. https://doi.org/10.1108/JWAM-07-2020-0036.

Ahmed, P.K., Hardaker, G., Carpenter, M., 1996. Integrated flexibility—key to competition in a turbulent environment. Long Range Plan. 29 (4), 562–571.

Al-Maroof, R.S., Salloum, S.A., Hassanien, A.E., Shaalan, K., 2020. Fear from COVID-19 and technology adoption: the impact of google meet during coronavirus pandemic. Interact. Learn. Environ. 1–16.

Albanesi, S., Kim, J., 2021. Effects of the COVID-19 recession on the US labor market: occupation, family, and gender. J. Econ. Perspect. 35 (3), 3–24.

Aldrich, H.E., 2014. The democratization of entrepreneurship? Hackers, makerspaces, and crowdfunding. Annual Meeting of the Academy of Management. https://www.researchgate.net/profile/Howard-Aldrich/publication/268520673_The_Democratization_of_Entrepreneurship_Hackers_Makerspaces_and_Crowdfunding/links/546f54730cf216f8cfa9d6c3/The-Democratization-of-Entrepreneurship-Hackers-Makerspaces-and-Crowdfunding.pdf.

Allison, T.H., Anglin, A.H., Davis, B.C., Oo, P., Seyb, S.K., Short, J.C., Wolfe, M.T., 2022. Standing out in a crowd of victim entrepreneurs: how entrepreneurs' language-based cues of personality traits affect public support. J. Small Bus. Manag. 1–40 https://doi.org/10.1080/00472778.2022.2056606.

Atherton, A., 2003. The uncertainty of knowing: an analysis of the nature of knowledge in a small business context. Hum. Relat. 56 (11), 1379–1398.

Autio, E., Nambisan, S., Thomas, L.D., Wright, M., 2018. Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. Strateg. Entrep. J. 12 (1), 72–95.

Ayala, J.C., Manzano, G., 2014. The resilience of the entrepreneur. Influence on the success of the business. A longitudinal analysis. J. Econ. Psychol. 42, 126–135.

Backman, M., Hagen, J., Kekezi, O., Naldi, L., Wallin, T., 2021. In the eye of the storm: entrepreneurs and well-being during the COVID-19 crisis. Entrep. Theory Pract. https://doi.org/10.1177/10422587211057028.

Bacq, S., Lumpkin, G.T., 2021. Social entrepreneurship and COVID-19. J. Manag. Stud. 58 (1), 285–288.

Bahn, K., Cohen, J., Rodgers, V., 2020. Feminist perspective on COVID-19 and the value of care work globally. Gender Work Org. 27, 695–699. https://doi.org/10.1111/gwao.12459.

Belitski, M., Guenther, C., Kritikos, A.S., Thurik, R., 2021. Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses. Small Bus. Econ. 1–17.

Ben Arfi, W., Hikkerova, L., 2021. Corporate entrepreneurship, product innovation, and knowledge conversion: the role of digital platforms. Small Bus. Econ. 56 (3), 1191–1204.

Berger, E.S., Von Briel, F., Davidsson, P., Kuckertz, A., 2021. Digital or not–the future of entrepreneurship and innovation: introduction to the special issue. J. Bus. Res. 125, 436–442.

Besson, P., Rowe, F., 2012. Strategizing information systems-enabled organizational transformation: a transdisciplinary review and new directions. J. Strateg. Inf. Syst. 21 (2), 103–124.

Biga-Diambeidou, M., Bruna, M.G., Dang, R., Houanti, L.H., 2021. Does gender diversity among new venture team matter for R&D intensity in technology-based new ventures? Evidence from a field experiment. Small Bus. Econ. 56 (3), 1205–1220.

Blustein, D.L., Duffy, R., Ferreira, J.A., Cohen-Scali, V., Cinamon, R.G., Allan, B.A., 2020. Unemployment in the time of COVID-19: a research agenda. J. Vocat. Behav. 119, 103436 https://doi.org/10.1016/j.jvb.2020.103436.

Boratyńska, K., 2019. Impact of digital transformation on value creation in fintech services: an innovative approach. J. Promot. Manag. 25 (5), 631–639.

Bouncken, R.B., Fredrich, V., Kraus, S., 2020. Configurations of firm-level value capture in coopetition. Long Range Plan. 53 (1), 101869 https://doi.org/10.1016/j.lrp.2019.02.002.

Braune, E., Lantz, J.S., Sahut, J.M., Teulon, F., 2021. Corporate venture capital in the IT sector and relationships in VC syndication networks. Small Bus. Econ. 56 (3), 1221–1233.

Bridge, J., Peel, M.J., 1999. A study of computer usage and strategic planning in the SME sector. Int. Small Bus. J. 17 (4), 82–87.

Brito, R.P.D., Lenz, A.K., Pacheco, M.G.M., 2022. Resilience building among small businesses in low-income neighborhoods. J. Small Bus. Manag. 1–36.

Brown, R., Rocha, A., 2020. Entrepreneurial uncertainty during the Covid-19 crisis: mapping the temporal dynamics of entrepreneurial finance. J. Bus. Ventur. Insights 14, 1–10. https://doi.org/10.1016/j.jbvi.2020.e00174.

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

Corbin, J.M., Strauss, A., 1990. Grounded theory research: procedures, canons, and evaluative criteria. Qual. Sociol. 13 (1), 3–21.

Corner, P.D., Singh, S., Pavlovich, K., 2017. Entrepreneurial resilience and venture failure. Int. Small Bus. J. 35 (6), 687–708.

Cumming, D., Reardon, R.S., 2022. COVID-19 and entrepreneurial processes in US equity crowdfunding. J. Small Bus. Manag. 1–24.

Davidsson, P., 2015. Entrepreneurial opportunities and the entrepreneurship nexus: a re-conceptualization. J. Bus. Ventur. 30 (5), 674–695.

Denoo, L., Yli-Renko, H., 2019. Entrepreneurship in a new digital industry: the emergence and growth of mobile health. In: Digital Entrepreneurship, pp. 79–98.

Desouza, K.C., Awazu, Y., Jha, S., Dombrowski, C., Papagari, S., Baloh, P., Kim, J.Y., 2008. Customer-driven innovation. Research-Technology Management 51 (3), 35–44.

Dua, A., Jain, N., Mahajan, D., Velasco, Y., 2020. In: COVID-19's Effect on Jobs at Small Businesses in the United States, 8. McKinsey & Company, pp. 28–35 (3).

Eddleston, K.A., Powell, G.N., 2012. Nurturing entrepreneurs' work–family balance: a gendered perspective. Entrep. Theory Pract. 36 (3), 513–541.

Eshet-Alkalai, Y., 2004. Digital literacy: a conceptual framework for survival skills in the digital era. J. Educ. Multimed. Hypermed. 13, 93–106.

Fairlie, R., 2020. The impact of COVID-19 on small business owners: evidence from the first three months after widespread social-distancing restrictions. Journal of Economics & Management Strategy 29 (4), 727–740.

Feitosa, J., Salas, E., 2021. Today's virtual teams: adapting lessons learned to the pandemic context. Organ. Dyn. 50 (1), 100777.

Fenner, G.H., Renn, R.W., 2010. Technology assisted supplemental work and work-to-family conflict: the role of instrumentality beliefs, organizational expectations and time management. Hum. Relat. 63 (1), 63–82.

Fisher, G., Stevenson, R., Neubert, E., Burnell, D., Kuratko, D.F., 2020. Entrepreneurial hustle: navigating uncertainty and enrolling venture stakeholders through urgent and unorthodox action. J. Manag. Stud. 57 (5), 1002–1036.

Gartner, J., Maresch, D., Tierney, R., 2022. The key to scaling in the digital era: simultaneous automation, individualization and interdisciplinarity. J. Small Bus. Manag. 1–28 https://doi.org/10.1080/00472778.2022.2073361.

Gianiodis, P., Lee, S.H., Zhao, H., Foo, M.D., Audretsch, D., 2022. Lessons on small business resilience. J. Small Bus. Manag. 60 (5), 1029–1040.

Gilch, P.M., Sieweke, J., 2021. Recruiting digital talent: the strategic role of recruitment in organisations' digital transformation. German J. Hum. Resour. Manag. 35 (1), 53–82.

Gioia, D.A., Corley, K.G., Hamilton, A.L., 2013. Seeking qualitative rigor in inductive research: notes on the Gioia methodology. Organ. Res. Methods 16 (1), 15–31.

Giones, F., Brem, A., 2017. Digital technology entrepreneurship: a definition and research agenda. Technol. Innov. Manag. Rev. 7 (5), 44–51.

Giones, F., Brem, A., Pollack, J.M., Michaelis, T.L., Klyver, K., Brinckmann, J., 2020. Revising entrepreneurial action in response to exogenous shocks: considering the COVID-19 pandemic. J. Bus. Ventur. Insights 14, e00186. https://doi.org/10.1016/j.jbvi.2020.e00186.

Glister, P., 1997. Digital Literacy. Wiley, New York.

Greenhaus, J.H., Beutell, N.J., 1985. Sources and conflict between work and family roles. Acad. Manag. Rev. 10, 76–88.

Greenhaus, J.H., Collins, K.M., Shaw, J.D., 2003. The relation between work–family balance and quality of life. J. Vocat. Behav. 63, 510–531.

Grover, V., Kohli, R., 2013. Revealing your hand: caveats in implementing digital business strategy. MIS Q. 37 (2), 655–662.

Grünberg, L., Matei, S., 2020. Why the paradigm of work–family conflict is no longer sustainable: towards more empowering social imaginaries to understand women's identities. Gend. Work. Organ. 27, 289–309.

Hartmann, S., Backmann, J., Newman, A., Brykman, K.M., Pidduck, R.J., 2022. Psychological resilience of entrepreneurs: a review and agenda for future research. Journal of Small Business Management 1–39. https://doi.org/10.1080/00472778.2021.2024216.

Herbane, B., 2019. Rethinking organizational resilience and strategic renewal in SMEs. Entrep. Region. Dev. 31 (5–6), 476–495.

Hillmann, J., Guenther, E., 2021. Organizational resilience: a valuable construct for management research? Int. J. Manag. Rev. 23 (1), 7–44.

Hisrich, R.D., Soltanifar, M., 2021. Unleashing the creativity of entrepreneurs with digital technologies. In: Digital Entrepreneurship, pp. 23–49.

Hitt, M.A., Ireland, R.D., Camp, S.M., Sexton, D.L., 2001. Strategic entrepreneurship: entrepreneurial strategies for wealth creation. Strateg. Manag. J. 22, 479–491. https://doi.org/10.1002/smj.196.

Hmieleski, K.M., Carr, J.C., Baron, R.A., 2015. Integrating discovery and creation perspectives of entrepreneurial action: the relative roles of founding CEO human capital, social capital, and psychological capital in contexts of risk versus uncertainty. Strateg. Entrep. J. 9 (4), 289–312. https://doi.org/10.1002/sej.1208.

Ibáñez, M.J., Guerrero, M., Yáñez-Valdés, C., Barros-Celume, S., 2021. Digital social entrepreneurship: the N-helix response to stakeholders' COVID-19 needs. J. Technol. Transf. 47, 556–579. https://doi.org/10.1007/s10961-021-09855-4.

Iborra, M., Safón, V., Dolz, C., 2022. Does ambidexterity consistency benefit small and medium-sized enterprises' resilience? J. Small Bus. Manag. 1–44 https://doi.org/10.1080/00472778.2021.2014508.

Ireland, R.D., Hitt, M.A., Sirmon, D.G., 2003. A model of strategic entrepreneurship: the construct and its dimensions. J. Manag. 29 (6), 963–989.

Kaun, A., 2021. Ways of seeing digital disconnection: a negative sociology of digital culture. Convergence 27 (6), 1571–1583.

Ketchen Jr., D.J., Craighead, C.W., 2020. Research at the intersection of entrepreneurship, supply chain management, and strategic management: opportunities highlighted by COVID-19. J. Manag. 46 (8), 1330–1341.

Kilcullen, M., Feitosa, J., Salas, E., 2022. Insights from the virtual team science: rapid deployment during COVID-19. Hum. Factors 64 (8), 1429–1440.

Khurana, I., Dutta, D.K., Ghura, A.S., 2022. SMEs and digital transformation during a crisis: the emergence of resilience as a second-order dynamic capability in an entrepreneurial ecosystem. J. Bus. Res. 150, 623–641.

Kohli, S., Timelin, B., Fabius, V., Veranen, S.M., 2020. In: How COVID-19 Is Changing Consumer Behavior–Now and Forever. McKinsey & Company, pp. 1–2.

Korber, S., McNaughton, R.B., 2018. Resilience and entrepreneurship: a systematic literature review. Int. J. Entrep. Behav. Res. 24 (7), 1129–1154. https://doi.org/10.1108/IJEBR-10-2016-0356.

Kraus, S., Schiavone, F., Pluzhnikova, A., Invernizzi, A.C., 2021. Digital transformation in healthcare: analyzing the current state-of-research. J. Bus. Res. 123, 557–567.

Kreiner, G.E., Hollensbe, E.C., Sheep, M.L., 2009. Balancing borders and bridges: negotiating the work-home interface via boundary work tactics. Acad. Manag. J. 52 (4), 704–730.

Kuckertz, A., Brändle, L., 2022. Creative reconstruction: a structured literature review of the early empirical research on the COVID-19 crisis and entrepreneurship. Manag. Rev. Q. 72 (2), 281–307.

Kuckertz, A., Brändle, L., Gaudig, A., Hinderer, S., Morales, A., Prochotta, A., Steinbrink, K., Berger, E.S., 2020. Startups in times of crisis – a rapid response to the COVID-19 pandemic. J. Bus. Ventur. Insights 13, 1–13. https://doi.org/10.1016/j.jbvi.2020.e00169.

Kuusisto, M., 2017. Organizational effects of digitalization: a literature review. Int. J. Org. Theory Behav. 20 (3), 341–362. https://doi.org/10.1108/IJOTB-20-03-2017-B003.

Lamine, W., Mian, S., Fayolle, A., Linton, J.D., 2021. Educating scientists and engineers for technology entrepreneurship in the emerging digital era. Technol. Forecast. Soc. Chang. 164, 120552.

Lanzolla, G., Frankort, H.T., 2016. The online shadow of offline signals: which sellers get contacted in online B2B marketplaces? Acad. Manag. J. 59 (1), 207–231.

Lanzolla, G., Markides, C., 2021. A business model view of strategy. J. Manag. Stud. 58 (2), 540–553.

Lanzolla, G., Lorenz, A., Miron-Spektor, E., Schilling, M., Solinas, G., Tucci, C.L., 2020. Digital transformation: what is new if anything? Emerging patterns and management research. Acad. Manag. Discov. 6 (3), 341–350.

Levit, A., 2018. Humanity Works: Merging Technologies and People for the Workforce of the Future. Kogan Page Publishers.

Liguori, E.W., Winkler, C., Zane, L.J., Muldoon, J., Winkel, D., 2021. COVID-19 and necessity-based online entrepreneurship education at US community colleges. J. Small Bus. Enterp. Dev. 28 (6), 821–830.

Liguori, E., Winkler, C., 2020. From offline to online: challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. Entrepr. Educ. Pedagog. 3 (4), 346–351.

Majchrzak, A., Shepherd, D.A., 2021. Can digital innovations help reduce suffering? A crowd-based digital innovation framework of compassion venturing. Inf. Organ. 31 (1), 100338.

Martucci, S., 2021. He's working from home and I'm at home trying to work: experiences of childcare and the work–family balance among mothers during COVID-19. J. Fam. Issues. https://doi.org/10.1177/0192513X211048476.

Matt, C., Hess, T., Benlian, A., 2015. Digital transformation strategies. Bus. Inf. Syst. Eng. 57 (5), 339–343.

McAdam, M., Crowley, C., Harrison, R.T., 2019. "To boldly go where no [man] has gone before"- institutional voids and the development of women's digital entrepreneurship. Technol. Forecast. Soc. Chang. 146, 912–922.

Mheidly, N., Fares, M.Y., Fares, J., 2020. Coping with stress and burnout associated with telecommunication and online learning. Front. Public Health 8, 672.

Mithani, M.A., 2020. Adaptation in the face of the new normal. Acad. Manag. Perspect. 34 (4), 508–530. https://doi.org/10.5465/amp.2019.0054.

Modgil, S., Dwivedi, Y.K., Rana, N.P., Gupta, S., Kamble, S., 2022. Has covid-19 accelerated opportunities for digital entrepreneurship? An indian perspective. Technol. Forecast. Soc. Chang. 175, 121415.

Nadkarni, S., Prügl, R., 2021. Digital transformation: a review, synthesis and opportunities for future research. Manag. Rev. Q. 71 (2), 233–341.

Nambisan, S., 2017. Digital entrepreneurship: toward a digital technology perspective of entrepreneurship. Entrep. Theory Pract. 41 (6), 1029–1055.

Nambisan, S., Wright, M., Feldman, M., 2019. The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. Res. Policy 48 (8), 103773. https://doi.org/10.1016/j.respol.2019.03.018.

Nash, M., Churchill, B., 2020. Caring during COVID-19: a gendered analysis of Australian university responses to managing remote working and caring responsibilities. Gend. Work. Organ. 27 (5), 833–846.

Nesher Shoshan, H., Wehrt, W., 2022. Understanding "zoom fatigue": a mixed-method approach. Appl. Psychol. 71 (3), 827–852.

Neumeyer, X., Santos, S.C., Morris, M.H., 2020. Overcoming barriers to technology adoption when fostering entrepreneurship among the poor: the role of technology and digital literacy. IEEE Trans. Eng. Manag. 68 (6), 1605–1618.

Ng, I.C.L., Wakenshaw, S.Y.L., 2017. The internet-of-things: review and research directions. Int. J. Res. Mark. 34 (1), 3–21.

Nylén, D., Holmström, J., 2015. Digital innovation strategy: a framework for diagnosing and improving digital product and service innovation. Bus. Horiz. 58 (1), 57–67.

O'Leary, D.E., 2020. Evolving information systems and technology research issues for COVID-19 and other pandemics. J. Organ. Comput. Electron. Commer. 30 (1), 1–8.

Obschonka, M., Audretsch, D.B., 2020. Artificial intelligence and big data in entrepreneurship: a new era has begun. Small Bus. Econ. 55 (3), 529–539.

Papagiannidis, S., Harris, J., Morton, D., 2020. WHO led the digital transformation of your company? A reflection of IT related challenges during the pandemic. Int. J. Inf. Manag. 55, 102166.

Patel, P.C., Rietveld, C.A., 2020. The impact of financial insecurity on the self-employed's short-term psychological distress: evidence from the COVID-19 pandemic. J. Bus. Ventur. Insights 14, e00206.

Pergelova, A., Manolova, T., Simeonova-Ganeva, R., Yordanova, D., 2019. Democratizing entrepreneurship? Digital technologies and the internationalization of female-led SMEs. J. Small Bus. Manag. 57 (1), 14–39.

Pratt, M.G., 2008. Fitting oval pegs into round holes: tensions in evaluating and publishing qualitative research in top-tier North American journals. Organ. Res. Methods 11 (3), 481–509.

Prikhidko, A., Long, H., Wheaton, M.G., 2020. The effect of concerns about COVID-19 on anxiety, stress, parental burnout, and emotion regulation: the role of susceptibility to digital emotion contagion. Front. Public Health 8, 894.

Purbasari, R., Muttaqin, Z., Sari, D.S., 2021. Digital entrepreneurship in pandemic covid 19 era: the digital entrepreneurial ecosystem framework. Rev. Integr. Bus. Econ. Res. 10, 114–135.

Purnomo, B.R., Adiguna, R., Widodo, W., Suyatna, H., Nusantoro, B.P., 2021. Entrepreneurial resilience during the covid-19 pandemic: navigating survival, continuity and growth. J. Entrep. Emerging Econ. 13 (4), 497–524.

Rayna, T., Striukova, L., 2016. From rapid prototyping to home fabrication: how 3D printing is changing business model innovation. Technol. Forecast Soc. Chang. 102, 214–224.

Richter, C., Kraus, S., Syrjä, P., 2015. The shareconomy as a precursor for digital entrepreneurship business models. Int. J. Entrep. Small Bus. 25 (1), 18–35.

Roundy, P.T., Brockman, B.K., Bradshaw, M., 2017. The resilience of entrepreneurial ecosystems. J. Bus. Ventur. Insights 8, 99–104.

Runfola, A., Milanesi, M., Guercini, S., 2021. Rethinking interaction in social distancing times: implications for business-to-business companies. J. Bus. Ind. Mark. 36 (13), 105–115.

Santos, S.C., Neumeyer, X., 2022. The technologization of entrepreneurial processes: a poverty perspective. IEEE Trans. Eng. Manag. https://doi.org/10.1109/TEM.2022.3195485.

Schallmo, D., Williams, C.A., Boardman, L., 2017. Digital transformation of business models—best practice, enablers, and roadmap. Int. J. Innov. Manag. 21 (08), 1740014.

Secundo, G., Gioconda, M.E.L.E., Del Vecchio, P., Gianluca, E.L.I.A., Margherita, A., Valentina, N.D.O.U., 2021. Threat or opportunity? A case study of digital-enabled redesign of entrepreneurship education in the COVID-19 emergency. Technol. Forecast. Soc. Chang. 166, 120565.

Shah, S.G.S., Nogueras, D., van Woerden, H.C., Kiparoglou, V., 2020. The COVID-19 pandemic: a pandemic of lockdown loneliness and the role of digital technology. J. Med. Internet Res. 22 (11), e22287.

Sharma, G.D., Kraus, S., Liguori, E.W., Bamel, U.K., Chopra, R., 2023. Entrepreneurial challenges of COVID-19: Re-thinking entrepreneurship after the crisis (in press). Journal of Small Business Management.. https://doi.org/10.1080/00472778.2022.2089676.

Sharma, M.K., Anand, N., Ahuja, S., Thakur, P.C., Mondal, I., Singh, P., Venkateshan, S., 2020. Digital burnout: COVID-19 lockdown mediates excessive technology use stress. World Social Psychiatry 2 (2), 171.

Shepherd, D.A., Williams, T., 2020. Entrepreneurship responding to adversity: equilibrating adverse events and disequilibrating persistent adversity. Organization Theory 1 (4), 2631787720967678.

Shepherd, D.A., Williams, T.A., 2022. Different response paths to organizational resilience. Small Bus. Econ. 1–36.

Shepherd, D.A., Saade, F.P., Wincent, J., 2020. How to circumvent adversity? Refugee-entrepreneurs' resilience in the face of substantial and persistent adversity. J. Bus. Ventur. 35 (4), 105940.

Sheth, J., 2020. Impact of Covid-19 on consumer behavior: will the old habits return or die? J. Bus. Res. 117, 280–283.

Shibata, I., 2021. The distributional impact of recessions: the global financial crisis and the COVID-19 pandemic recession. J. Econ. Bus. 115, 105971.

Smith, C., Smith, J.B., Shaw, E., 2017. Embracing digital networks: entrepreneurs' social capital online. J. Bus. Ventur. 32 (1), 18–34.

Smith, J.B., Smith, C.G., Kietzmann, J., Lord Ferguson, S.T., 2022. Understanding micro-level resilience enactment of everyday entrepreneurs under threat. J. Small Bus. Manag. 1–44 https://doi.org/10.1080/00472778.2021.2017443.

Soto-Acosta, P., 2020. COVID-19 pandemic: shifting digital transformation to a high-speed gear. Inf. Syst. Manag. 37 (4), 260–266.

Steininger, D.M., 2019. Linking information systems and entrepreneurship: a review and agenda for IT-associated and digital entrepreneurship research. Inf. Syst. J. 29 (2), 363–407.

Stephan, U., Zbierowski, P., Pérez-Luño, A., Wach, D., Wiklund, J., Alba Cabañas, M., Zahid, M.M., 2022. Act or wait-and-see? Adversity, agility, and entrepreneur wellbeing across countries during the Covid-19 pandemic. Entrep. Theory Pract. https://doi.org/10.1177/10422587221104820.

Sundaresan, S., 2014. Work-life balance – implications for working women. Int. J. Sustain. Dev. 7 (7), 93–102.

Tannenbaum, S.I., Traylor, A.M., Thomas, E.J., Salas, E., 2021. Managing teamwork in the face of pandemic: evidence- based tips. BMJ Qual. Safety 30, 59–63.

Teece, D.J., 2018. Profiting from innovation in the digital economy: enabling technologies, standards, and licensing models in the wireless world. Res. Policy 47 (8), 1367–1387.

Torrès, O., Benzari, A., Fisch, C., Mukerjee, J., Swalhi, A., Thurik, R., 2022. Risk of burnout in french entrepreneurs during the COVID-19 crisis. Small Bus. Econ. 58, 717–739.

Troise, C., Corvello, V., Ghobadian, A., O'Regan, N., 2022. How can SMEs successfully navigate VUCA environment: the role of agility in the digital transformation era. Technol. Forecast. Soc. Chang. 174, 121227.

Ughetto, E., Rossi, M., Audretsch, D., Lehmann, E.E., 2019. Female entrepreneurship in the digital era. Small Bus. Econ. 55 (2), 305–312. https://doi.org/10.1007/s11187-019-00298-8.

United Nations, 2020. General assembly: road map for digital cooperation: implementation of the recommendations of the High-level Panel on Digital Cooperation. Accessed November 11, 2020. In: Report of the Secretary-General. United Nations General Assembly A/74/821. May 29, 2020. https://undocs.org/A/74/821.

Vaziri, H., Casper, W.J., Wayne, J.H., Matthews, R.A., 2020. Changes to the work–family interface during the COVID-19 pandemic: examining predictors and implications using latent transition analysis. J. Appl. Psychol. 105 (10), 1073.

Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N., Haenlein, M., 2021. Digital transformation: a multidisciplinary reflection and research agenda. J. Bus. Res. 122, 889–901.

Vieira, J.M., Matias, M., Lopez, F.G., Matos, P.M., 2018. Work-family conflict and enrichment: an exploration of dyadic typologies of work-family balance. J. Vocat. Behav. 109, 152–165.

von Briel, F., Davidsson, P., Recker, J., 2018. Digital technologies as external enablers of new venture creation in the IT hardware sector. Entrep. Theory Pract. 42 (1), 47–69.

Wang, G., 2022. Digital reframing: the design thinking of redesigning traditional products into innovative digital products. J. Prod. Innov. Manag. 39 (1), 95–118.

Weill, P., Woerner, S.L., 2015. Thriving in an increasingly digital ecosystem. MITSloan Manag. Rev. 56 (4), 27–34.

Williams, T.A., Shepherd, D.A., 2016. Building resilience or providing sustenance: different paths of emergent ventures in the aftermath of the Haiti earthquake. Acad. Manag. J. 59 (6), 2069–2102. https://doi.org/10.5465/amj.2015.0682.

Yoo, Y., Boland Jr., R.J., Lyytinen, K., Majchrzak, A., 2012. Organizing for innovation in the digitized world. Organ. Sci. 23 (5), 1398–1408.

Yoo, Y., Henfridsson, O., Lyytinen, K., 2010. Research commentary—the new organizing logic of digital innovation: an agenda for information systems research. Inf. Syst. Res. 21 (4), 724–735.

Zaheer, H., Breyer, Y., Dumay, J., Enjeti, M., 2022. The entrepreneurial journeys of digital start-up founders. Technol. Forecast. Soc. Chang. 179, 121638.

Zighan, S., Abualqumboz, M., Dwaikat, N., Alkalha, Z., 2022. The role of entrepreneurial orientation in developing SMEs resilience capabilities throughout COVID-19. Int. J. Entrep. Innov. 23 (4), 227–239.

Susana C. Santos is an associate professor of entrepreneurship at Rowan University. She received her Ph.D. from ISCTE-IUL, Instituto Universitário de Lisboa, Portugal and completed her post-doctoral program at the University of Florida.

Eric W. Liguori is Founding Head of the School of Innovation and Entrepreneurship at Rowan University. He also holds the William G. Rohrer Chair of Entrepreneurship and serves as Executive Director of the Rowan Center for Innovation and Entrepreneurship.

Erin Garvey is graduated from Rowan University in 2022 with a marketing major. She works as a Marketing Associate at Heat-Timer Corporation, in Fairfield, NJ.