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ABSTRACT

Small business revenues worldwide were drastically affected by lockdowns during the COVID-19 pandemic. As a result, many small businesses introduced new functionality through the adoption of digital technologies. However, little is known about the nature of these digital technology innovations, including whether they differed across industry sectors. Through a modified case study approach, we examine digital technology responses to the pandemic by small businesses that were identified in Google News. We introduce a new framework designed to describe the nature of the responses. Most small businesses that were examined introduced digital responses by offering new e-commerce facilities and/or converting their existing services to 'e-services', with some important cross sector exceptions. Practical suggestions for small businesses are provided.

1. Introduction

Small businesses are integral to the economy and employment in many countries (Bidan, Rowe, & Truex, 2012; Power & Gruner, 2017). For instance, in 2020 in the UK, there were over 5.9 million small businesses, which accounted for 99.3% of all businesses and employed 9.2 million people (48% of all employees) (Department of Business, Energy, & Industry Strategy, 2020). The COVID-19 outbreak emerged in January 2020 and, by March, had caused 24 times more cases than SARS in 2002/2003 (Ienca & Vayena, 2020).

Many small businesses were forced to close their operations and/or juggle work and family life to stay in operation (Facebook and Small Business Roundtable, 2020). The confidence of small businesses diminished further when subsequent lockdowns resulted in the loss of traditional forms of revenue. Recovery from the pandemic was difficult for small businesses, who faced supply chain issues and disrupted markets (Chang et al., 2022). The pandemic hit small businesses harder than larger businesses (Belitski, Guenther, Kritikos, & Thurik, 2022), with sectors such as hospitality, retail, services, arts and entertainment particularly affected (Bartik et al., 2020). One year after the pandemic hit, sectors such as leisure and hospitality were still struggling to recover (Ghosh, 2021).

Gkeredakis, Lifshitz-Assaf, and Barrett (2021) noted that crises (such as the COVID-19 pandemic) are events that are typically low in probability but high in impact. They were interested in how digital technologies were used by small businesses to respond to the COVID-19 pandemic, to determine how these responses may be applied to crises more generally. To that end, they introduced three different perspectives of crises to provide some insights into what constitutes a crisis and how businesses may respond using digital technologies. According to Gkeredakis et al., crises could be viewed as a *disruption* to regular activities, with the digital response being

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to move all or some of these activities online. Crises could also be viewed as an *opportunity* for change, where digital technologies are used to investigate new possibilities. Finally, crises could be viewed as chances for *exposure*, where actors who have previously gone relatively unnoticed become more visible. For example, the latter group includes essential workers and scientists, whose level of recognition increased at the time (Gkeredakis et al., 2021). In this paper we are interested in disruption- and opportunity-based digital responses as they relate directly to business processes.

Orlikowski and Scott (2021) explored how the conditions that characterised the pandemic resulted in tensions that generated "specific and innovative responses in how work is organized and performed" (p.2). They identified different digital responses to these tensions, including:

- businesses using digital technologies to continue with existing practices,
- businesses using digital technologies to produce new products or services, and/or
- businesses using digital technologies to replace established practices with alternative practices.

Studies have shown that a substantial proportion of small businesses had not previously used digital technologies as a key part of their operations before the pandemic. For instance, IDC (2020) conducted a survey of small businesses from North and Latin America, and Western Europe. They reported that before the pandemic over 60% of businesses in North America and Western Europe had little or minimal digitisation (IDC, 2020). However, after the pandemic hit, 70% of small businesses either quickly introduced digital technologies or increased their level of digitisation due to the COVID-19 pandemic (IDC, 2020). Two ways that businesses typically did this were to introduce online sales (e-commerce) and/or the delivery of online services (e-services) (Katare, Marshall, & Valdivia, 2021). The pandemic also led to increases in flexible work, with many organisations deciding to digitise their work processes (Faraj, Renno, & Bhardwaj, 2021). This rapid change in the level of digitisation was out of character for small businesses, which have traditionally been conservative in their use of digital technologies (Sellitto, Banks, Bingley, & Burgess, 2017). However, some businesses were hindered in their ability to use digital technologies during the pandemic, which threatened their sustainability (Klein & Todesco, 2021). For instance, many 'high street' fashion retailers' found it difficult to digitise the personalised service provided to customers when purchasing high end fashion. Also, Fletcher and Griffiths (2020) noted that digitally immature businesses were more vulnerable than digitally mature businesses during pandemic lockdowns.

Gkeredakis et al. (2021) observed the novel way that digital technologies can assist businesses to cope with crises, but noted a lack of theory underpinning how this occurs. Addressing this, our paper combines Gkeredakis et al's (2021) perspectives of crises, and Orlikowski and Scott's (2021) digital responses to crises, in order to build (and refine) a new framework that address the question, "*what is the nature of digital responses by small businesses during crises?*". We also investigate "*how was the organisation of work altered for small businesses because of their use of digital technologies to address the pandemic?*". This allows us to discuss strategies for how similar small businesses can use digital technologies to address tensions caused by ongoing pandemic waves or other crises, which was also an aim of Gkeredakis et al. (2021).

We were particularly interested in small businesses that had adopted new digital technologies as their digital response to the pandemic. This is because businesses introducing new innovations face uncertainties, such as knowing how to access and use the innovation (Rogers, 2003). As such, the study reported in this paper examines new digital responses by 68 small businesses from different industries and countries in response to the pandemic.

The paper is organised as follows. Section 2 develops a new *Small Business Digital Response Classification* framework as an initial means of classifying the nature of small business digital responses to crises. Section 3 summarises our research approach. Sections 4 and 5 present and discuss the results. Sections 6 and 7 address the theoretical and practical contributions of the study by presenting a revised framework and outlining how it may be used by small businesses affected by crises to implement an appropriate digital response. The final section summarises the paper, its limitations and potential future research opportunities.

2. A conceptual framework for analysing the nature of small business digital responses during crises

This section introduces our conceptual framework by integrating concepts from the literature on digital responses to crises (Section 2.1). Section 2.2 introduces literature related to diffusion of innovations because we were particularly interested in small business digital responses that involved the adoption of *new* digital technologies.

2.1. Digital responses by small businesses to crises

We found the work of Gkeredakis et al. (2021) and Orlikowski and Scott (2021) to be a useful starting point for our framework because their concepts relate to antecedents of crises and the nature of business responses.

Gkeredakis et al. (2021) offer two perspectives on how businesses may respond digitally to crises that are relevant to this study. Firstly, crises can be viewed as a **disruption** to the regularity and continuity of organisational practices. Businesses experiencing disruptions during crises typically shift their *existing organisational practices* to digital spaces. This often requires the rapid development of new organisational skills to cope with the new environment (Gkeredakis et al., 2021). Secondly, crises may also be viewed as an **opportunity** for positive change within businesses by: accelerating stalled business processes; questioning existing norms and processes; and/or experimenting with new ones. In these situations, expectations to conform to existing conventions and norms may be lowered. Gkeredakis et al. (2021) suggested three responses related to opportunities:

- accelerating innovation processes,
- leveraging digital technologies to experiment with new types of knowledge boundary work to produce new knowledge to cope with the crisis collaboratively, and
- increasing the investment in the 'health-tech' sphere.

Orlikowski and Scott (2021) also suggested that the disruption and suspension of established practices due to crises means that these practices are called into question. This is where existing practices are interrupted and the possibility of creativity is fostered (Orlikowski & Scott, 2021). They identified three categories of tensions that can occur during crises and their associated digital responses:

- *Pragmatic tensions.* These tensions occur where established practices are strained, which causes some practical difficulties. In these situations, organisations modify existing practices, including their use of digital technologies, in a way that allows them to continue with these practices. Orlikowski and Scott (2021) labelled this an **adaptation** response. This response aligns well with Gkeredakis et al's (2021) description of a crisis that causes a **disruption** to an organisation.
- *Tactical tensions.* These tensions occur where established practices are interrupted and become infeasible. In these instances, organisations use digital technologies to assist with repurposing their capacity from producing existing offerings, to produce *new* products or services (i.e. a **repurpose** response). This aligns with Gkeredakis et al's (2021) description of a crisis that provides an **opportunity** to a business.
- *Existential tensions.* These tensions occur when current ways of doing business are discontinued because existing practices "no longer make sense in practice" (p.3). In these instances, organisations introduce "alternative practices [to] displace established practices" that are novel or different (i.e. an **alternative practice** response). This can include the use of digital technologies. This response also aligns with Gkeredakis et al's (2021) description of a crisis that provides a business **opportunity**.

The concepts offered by Gkeredakis et al. (2021) and Orlikowski and Scott (2021) are useful for theorising the nature of crises, as well as the types of digital responses, including those involving changes in business processes, goods and/ or markets.

We now integrate the concepts from the preceding sections to present our consolidated *Small Business Digital Response Classification* framework (see Table 1) to describe the nature of the digital responses by small businesses reacting to crises.

In the framework, a digital response to a crisis by a small business is categorised into one of three categories (adaptation, repurpose or alternate practice) depending upon the type of tension faced (pragmatic, tactical or existential) (Orlikowski & Scott, 2021). Each response is then described by whether it involves (Gkeredakis et al., 2021):

- a disruption, where existing practices can be shifted online; or
- an opportunity, where new products/services are introduced.

The digital response by small businesses is described as an *adaptation* when the crisis causes pragmatic tensions and invokes an adaptation response (Orlikowski & Scott, 2021). Businesses face disruption (Gkeredakis et al., 2021), but can use digital technologies to maintain existing practices.

A digital response is described as a *repurpose* when the crisis causes tactical tensions. Existing practices cannot continue, so businesses enact a repurpose response (Orlikowski & Scott, 2021) to take advantage of new opportunities (Gkeredakis et al., 2021). This includes businesses repurposing their capacity to produce new products and/or services with the assistance of digital technologies. This typically involves introducing new product and/or service offerings that are consistent with the organisation's operations within its sector.

Existential tensions occur when businesses cannot continue in their existing business direction. Organisations must therefore identify opportunities for new practices (i.e. an *alternate practice* digital response) to displace existing practices (Orlikowski & Scott, 2021). This means that the innovation not only involves new products and/or services (as with a repurpose), but also a new strategic direction for the business (Gkeredakis et al., 2021).

Table 1
Initial Small Business Digital Response Classification framework.

Digital response to crises (Orlikowski & Scott, 2021)		Crisis perspective (Gkeredakis et al., 2021)	
Tension	Digital response	Disruption (shift existing practices online)	Opportunity (introduce new products/services with digital technologies)
Pragmatic	**Adaptation** (existing practices continue)	Digital technology solution involving existing product/service	No
Tactical	**Repurpose** (capacity repurposed to produce new products and/or services)	No	Digital technology solution involving new products and/or services (within existing sector)
Existential	**Alternate practice** (alternative practices displace existing practices; reorient strategic direction)	No	Novel/different ways of doing things. Involves new products or services in new business direction

2.2. Small business digital responses to crises as innovations

In this paper we are interested in a particular type of digital response by small businesses to crises; those where the response in-volves the adoption of new digital technologies. Rogers' (2003) diffusion of innovations theory has been applied extensively in the literature to examine the adoption of digital technologies. One of the key aspects of Roger's theory is that an innovation does not have to be 'new' to be considered an innovation for (in our case, small) businesses. The technology may already be adopted widely, but it just needs to be new for the business to be considered an innovation (in the business context). Thus, when a small business adopts e-commerce or e-services for the first time, it can be defined as an innovation for that business. By extension, the following two digital responses would *not* constitute adoption of an innovation:

- when a small business has already adopted an innovation and increases (perhaps drastically) it's use at some stage (such as in response to a crisis), or
- when a small business has already adopted e-commerce through one supplier, but during a crisis they switch to another supplier to increase e-commerce functionality.

Rogers (2003) notes that the adoption of an innovation has a certain degree of uncertainty associated with it. This includes knowing how to obtain the innovation, how to use it and what problems may be encountered in its operation. In both situations above, the businesses implementing these digital responses would have already dealt with much of that uncertainty.

Traditionally, small businesses have adopted digital technologies at a lower rate than larger businesses. Part of the reason for this is they face resource poverty, a combination of not having the time to devote to new technologies, lacking the capital to invest in new technologies and lacking the knowledge to do so effectively (Sellitto et al., 2017).

Mandviwalla and Flanagan (2021) used an action design research approach to examine the experience of (mostly) micro businesses during the COVID-19 pandemic. The authors intervened to assist the businesses to introduce digital responses during the crisis. They presented three detailed case studies to illustrate how they achieved this. Their results illustrated the challenges related to *resource poverty* that the businesses had to overcome to introduce new digital technologies, even with outside assistance. An investigation into the adoption of new digital technologies by small businesses (as innovations) in response to crises is therefore vital, because they typically do so in an environment of uncertainty, reduced capital/income and the need for a rapid response.

3. Material and methods

In this paper we employed an inductive approach to examine our research framework, and used a modified case study method to examine our research question: *what is the nature of digital responses by small businesses during crises?* A case study is suitable when the research aims to address 'how' or 'why' type questions, does not require control of behavioural events, and focuses on contemporary events (Yin, 2003). Whilst we investigate 'what' digital technology adoption occurred in small businesses, the main area of investi-gation examines 'how' separate industry sectors adopted different digital responses to the pandemic. In this study, each small business and their digital response was a separate case and the unit of analysis. Another characteristic typical of a case study is the use of multiple forms of evidence (Yin, 2003). The primary form of evidence was news stories accessed via the news recommender service Google News. Yin (2003) describes articles appearing in the mass media as *documentation,* which is one of the six forms of evidence that are typically accessed in case studies and that exist before the research commences. Google News is an online news recommender service which we used to source stories of digital responses by small businesses during the pandemic. Google News provided us with access to more recent examples of digital responses than would appear in, say, traditional academic literature. With news recom-mender services, users enter search terms and receive a set of links to news articles from the general media, ordered according to the search terms used and the search engine's search criteria. This approach has been used previously in the IS literature. For example, Baskarada and Koronios (2013) used Google News to identify articles that used the terms 'data', 'information', 'knowledge' or 'wis-dom' in their text. News recommender systems are known as *customer centric* information systems, which consider customer prefer-ences and profiles as a key driver of the services being offered (Liang & Tanniru, 2006). One disadvantage of using these tools from a research perspective is that it is potentially difficult for other researchers to duplicate searches because the search results are, by design, personalised to individuals. However, Courtois, Slechton and Coenen (2018, p.2007–8) noted that recent studies had shown an "…absence of any meaningful personalization, apart from explicit suggestions". Courtois et al. (2018) noted a similar finding in their own study, as did Nechushtai and Lewis (2019) in their analysis of news stories related to the 2016 US presidential campaign.

The primary reason why we classified our investigation as a *modified* case study is that it differs from most traditional case studies in terms of the depth of information that we collected for each case (business). We used a combination of Google News stories and website analysis (described later) for our data collection. This did not produce the rich and detailed business information associated with a typical case. However, this was offset by the larger number of cases we could investigate using this approach when compared to traditional case study analyses.

Yin (2003) noted that case studies involving multiple cases can be designed to produce different patterns of theoretical replications, and that such studies should be supported by strong theoretical frameworks. We believed our study could make some theoretical distinctions between the digital responses used by small businesses in different industry sectors during the pandemic by using our conceptual framework as an analytical lens. As such, the aim was to identify at least 50 examples (cases) where small businesses had adopted new digital technologies as part of their digital responses to the pandemic. This required finding digital responses that had occurred as near as possible to the time when the pandemic started effecting businesses around the world. Thus, one of the authors

conducted a Google News search from Australia using the search terms: ***"small business" pivot***. Zheng and Walsham (2021) similarly drew upon news reports (among other sources) to investigate digital inequality occurring during the pandemic. Our search was conducted daily in the period 20 March, 2020 to 30 April, 2020, which was when the peak of news articles occurred with stories about how small businesses were adjusting to COVID-19 lockdowns. We used the word 'pivot' because it became part of mainstream vernacular in the media to describe how small businesses had introduced digital responses to counter the effect of pandemic lockdowns on their operations and revenues. If necessary, we were prepared to use alternative small business terms such as "SME" or "micro business" to widen the search. However, this was not required because the original search term produced the required number of small business cases.

Note that it was difficult to determine the total number of articles that this search initially produced. This is because, each day, the search produced between 25 and 32 screen pages of articles where the most recent articles appeared in the earlier pages of the search results, and the older articles 'dropped off' the latter pages over the period. It is this 'drop off' of news articles over time that would make it difficult for others to replicate our search for the specific dates we investigated. It is estimated that, over the period, the search resulted in 800–900 articles. These news articles were reviewed by one of the authors to *eliminate* articles unrelated to Internet activity, which were mostly in these categories:

- they offered general advice to small businesses on *how* to pivot during the pandemic,
- they offered information about grant schemes for small businesses during the pandemic, or
- they discussed small business 'pivots' that did not overtly involve digital technologies. For instance, there were examples of manufacturing small businesses that changed their focus to produce essential items such as face masks and hand sanitiser.

This left 64 news articles that reported on digital responses by small businesses, with some articles containing stories about multiple small businesses. Overall, there were 90 small business examples in these articles. However, there was one more filtering activity that was conducted to specifically identify adoptions of *new* digital technologies (innovations). As described in Section 2.2, a reaction to lockdowns that involved just increasing the use of an existing e-commerce website *was not considered* to constitute the adoption of an innovation and was not included in this study. However, the introduction of a *new* e-commerce capability, with online ordering and/or payment, was considered an innovation adoption by that small business, because it involved adding new Internet functionality. Note that in this paper 'online ordering' is a subset of e-commerce whereby customers can order products online or book services online without having to pay online. Payment is arranged separately, such as during pickup of products by customers.

Thus, the next stage of the analysis involved further investigation of each case by the authors to confirm the small businesses were using digital technologies, and that these uses could be classified as innovations, being the adoption of a new digital technology and/or application. This was determined by comparing the businesses' 'pre-pandemic' and 'during-lockdown' websites to confirm that the specific features or characteristics of the media-reported pivots were only on the 'during-lockdown' website. Using Yin's (2003) classification of case study evidence, the past websites of businesses could be classified as *documentation* because they represented different times and events. However, they are perhaps more accurately described as *archival records* because Yin states that such records can include computer files and because websites are the archived storage of HTML files. *During-lockdown* websites were examined during the initial pandemic lockdowns by searching for the URL of businesses using a regular Google search. *Pre-pandemic* websites were examined by entering the URL into the Internet Archive tool (www.wayback.archive.org), which archives websites. Website versions from early 2020 (January–February) or late 2019 were examined, depending upon what had been archived in the tool. We were looking specifically for:

- the **addition** of *e-commerce* facilities (allowing ordering/booking and payment) or *online ordering* (without payment) facilities, and/or
- the **addition** of *e-services* facilities such as offering online video classes. This involved either converting existing face-to-face services to e-services or creating new e-services.

Two of the authors each read the Google News stories and then summarised independently whether the website changes before and during the pandemic involved the adoption of new digital technologies. Where possible, differences were discussed until consensus was reached. For instance, one café had used the pandemic as an opportunity to replace its existing e-commerce capability with a new online ordering system, supported by Squarespace payments. Whilst this could perhaps be argued to be the adoption of a new digital technology, we decided not to include the business as it was not introducing a new e-commerce facility (as described in Section 2.2). Also, there were some businesses where the article did not provide a definitive description of whether the initiative described involved the adoption of a new digital technology. For instance, one café was said to have "added e-commerce", but it was unclear whether this involved an increased use of an existing e-commerce facility or a new adoption of e-commerce. This type of situation prompted us to add the investigation of pre-pandemic and during-lockdown websites, which resolved these issues. Unexpectedly, this analysis also identified some news stories that had described a digital technology adoption as occurring during the pandemic, but the website investigation showed that the business had already implemented it before the pandemic. For instance, a Google News story noted that a retail business had adopted e-commerce (via a shopping cart) in reaction to the pandemic. However, the examination of the business' pre-pandemic website revealed the shopping cart existed before the pandemic. Although its use was certainly increased dramatically during the pandemic, this was not considered to be an innovation adoption (as per Section 2.2). Such businesses were also excluded from the analysis. Overall, a further 18 businesses were removed from the study because their digital responses were not innovations (involving the adoption of new digital technologies).

This left 72 small business cases that had adopted new digital technologies. The cases were classified according to industry sectors adopted in Sensis' (2017) annual study of the use of digital technologies by Australian small and medium sized businesses. Note that three sectors were not represented in the results: *building and construction, transport and storage* and *finance and insurance*. It is known that many businesses in the building and construction and transport and storage sectors were still able to operate during lockdowns. This could explain the lack of representation of these sectors in the cases as these organisations did not need to adjust their operations to stay in business. We can see no obvious reason for the lack of finance and insurance cases, other than the services of these businesses would also have been required during lockdowns. We removed four cases that were difficult to classify because their activities involved businesses that operated across sectors, which made sector comparisons and cross-case analysis difficult. This left us with our final number of 68 business cases.

Interestingly, the website investigation identified some instances of e-commerce adoptions that were not evident in the Google News stories. There were some small business cases whose stories indicated that they adopted new e-services, for example online fitness classes. However, the stories did not mention that they also added e-commerce facilities to allow customers to book and pay for these new online classes. In these instances, we classified this as an additional aspect of the digital technology adoption (e-commerce) by the businesses.

A summary of the process we used to determine whether a case involved adopting a new digital technology, and the nature of those adoptions, is provided in Appendix One. A detailed summary of each case, including brief case vignettes, is provided in Appendix Two.

The vignettes for each case and the characteristics of their corresponding digital responses were entered into cells in an MS Excel worksheet, where they were additionally classified by industry sector. During the analysis we observed that cases within different industry sectors could be grouped into three 'general' sectors, based on their product and service offerings and how they were affected by and responded to the pandemic. *Bulk products* businesses tended to sell business-to-business and their activities were affected when their businesses customers were affected by lockdowns. *Services* businesses primarily provided services traditionally delivered on a face-to-face basis, mostly on business premises, that could not be delivered during lockdowns. The remaining *consumer goods* businesses predominantly sold products to customers. The three general sctors form the basis of the cross sector analysis in the Results and Discussion sections. Classifications of adaptations, repurposes or alternate practices were determined as per Table 1 descriptions.

Table 2 provides a breakdown of the small business cases by general sector, industry sector and location. There was a spread of cases across the sectors. However, most cases were from North America including 49 from the USA, which is a potential limitation of the study and should be considered when interpreting the results. This was perhaps not surprising as Watanabe (2013) analysed the news coverage patterns of Yahoo News! and Google News in the US and India and found a skewed representation towards 'Western' news results, which was likely a function of their sources of content.

The high proportion of consumer goods and service businesses is consistent with research that found consumer-focused sectors were disproportionately affected by COVID-19 lockdowns (Facebook and Small Business Roundtable, 2020). As mentioned, Bartik et al. (2020) noted that the pandemic affected sectors such as hospitality, retail and services, which also emerged in our study. These were all sectors that had their markets disrupted, which Chang et al. (2022) stated has occurred in other crises. Where applicable, comments directly attributable to business owners in the articles have been paraphrased in the results (as per our university ethics approval) to avoid direct comments being traced back to specific businesses via a search engine investigation.

4. Results

This section presents the disparate characteristics of small businesses associated with the three general sectors and presents the emergent digital response themes for each sector. The findings are further divided into separate categories as per their crisis perspective and crisis response classification in the conceptual framework. The specific details of selected cases in each category are also provided to offer further insights. The case numbers listed in Appendix Two are provided when referring to specific cases for cross-referencing purposes.

Table 2
Digital technology adoption cases by sector and location.

General sector	Industry Sector	Case locations				
		North America	Oceania	Europe	Asia	Total Cases
Bulk products	Manufacturing	1	–	–	–	**1**
	Wholesale Trade	4	1	–	–	**5**
Consumer goods	Hospitality	4	1	–	–	**5**
	Retail Trade	12	1	1	–	**14**
Services	Health and Community Services	15	3	–	1	**19**
	Cultural, Recreational & Personal Services	11	2	3	–	**16**
	Communication, Property & Business Services	6	2	–	–	**8**
Total:		**53**	**10**	**4**	**1**	**68**

4.1. Bulk products sector

The bulk products sector contained five small wholesalers selling food/beverage products and one brewery (manufacturing business). Prior to the pandemic these businesses delivered bulk product orders mostly to business customers such as hotels and restaurants (i.e. business-to-business or B2B operations). From the viewpoint of the conceptual framework, all bulk product businesses faced *tactical tensions* due to the pandemic, as their established practices became interrupted and then infeasible (Orlikowski & Scott, 2021) often due to customers closing during lockdowns. All bulk product businesses were classified as introducing a *repurpose* digital response. This classification involves a *reactive repurpose* because the businesses reacted to significant revenue losses due to pandemic lockdowns that prevented them from offering their traditional products to their regular customers. Instead, they switched from B2B operations to sell their products directly to consumers (business-to-consumer or B2C). This necessitated adopting new e-commerce facilities to access new markets. This switch also required a repurpose of their production lines to create smaller quantities/package sizes that were more suitable for B2C customers. A Canadian food wholesaler (Case #4) also added groceries to their offerings when they realised these were essential items for customers at the time.

The digital response for these businesses involved extending their existing website with new online ordering and payment facilities (new e-commerce) or new online ordering only. This allowed new B2C customers to order and/or pay for the items directly on their websites. Some comments in the Google News stories provided insights into their experiences. A US organic farm (Case #5) felt that they were reasonably well prepared for the disruption caused by the pandemic. Like many farmers, they are used to dealing with uncertainty and having to adjust their operations regularly due to weather changes and changing competition. The business set up a new website with an online store to replace previous sales made to restaurants and at farmers markets. A US restaurant food supplier (Case #1) introduced online ordering (but not payment) for their new B2C customers after losing their major source of revenue. This required them to repackage their products into small, resealable bags that were more suitable for B2C customers. A US brewer (Case #6) lost almost three-quarters of their sales from pubs, restaurants and major events. They launched a new website with an online store and said that the move to e-commerce to sell direct to consumers was the biggest change they had to make due to the pandemic. The wholesale food supplier (Case #4) lost most of their business when restaurants were closed. They felt that the shift to B2C sales might alter consumer behaviour on an ongoing basis, suggesting that in the future customers will likely expect to be able to order products from them in the longer term. Note that there were no instances of digital responses involving e-services for bulk products businesses.

4.2. Consumer goods sector

The consumer goods sector category included five small cafés/restaurants (hospitality) and 14 retailers that sold to customers (B2C). Prior to the pandemic these businesses typically sold products to consumers via face-to-face interactions, with only one café and three retailers also selling online via existing e-commerce websites. The results are discussed according to the businesses' different digital responses.

4.2.1. Adaptation responses

The pandemic created *pragmatic tensions* for many consumer goods businesses because customers could not access the businesses' premises during the lockdowns. This meant that existing ways of trading were unavailable to them, but the businesses could continue operating in another form using digital technologies (Orlikowski & Scott, 2021). Most of the consumer goods businesses (15 out of 20), unlike the bulk product businesses, were able to sell their existing products with little alteration, which meant that the crisis perspective was a *disruption*.

For 12 of these 15 businesses, this meant that they adopted new e-commerce or online ordering facilities to assist customers to access their existing products. One retailer, a US bakery (Case #17), added *do it yourself* (DIY) baking kits so that customers could make their own bread at home. Although it was essentially selling the same product, this required a shift by the business (to produce the kits) and by their customers (to bake the bread). Prior to the pandemic this bakery business had been planning to introduce the kits and e-commerce, but the pandemic meant this was introduced earlier than expected. The bakery suggested that they were pleased with the change and that it felt sustainable, indicating that they did not previously realise the opportunities that online platforms provided. A US sports store (Case #22) initially lost their ability to sell their major product, high-end athletic shoes, when their store was closed. They introduced the facility for customers to place orders online via various online channels (email, Instagram and Facebook), as well as by text message and telephone. They observed that this was an entirely new way of selling to customers. Two businesses added new products typically needed by customers during the pandemic such as groceries and toilet paper. One of these businesses was a US restaurant (Case #11), who introduced online ordering and curb side pickup of products. The owner noted how exhausting this was to set up and how unusual it was for a restaurant to sell items such as toilet paper. The other business was a US retailer (Case #15 – cheese shop) who introduced a new e-commerce facility on the business website. They noted that being able to make such changes quickly was one of the advantages of being a small business. Introducing these new products required few adaptations to the operations of either business.

Three other businesses with an adaptation response had traditionally offered support services to supplement their product sales. They converted these support services to online by adopting new digital technologies. A US business selling 'high end' fabric and quilt kits (Case #19) converted its pre-pandemic, in-store fashion advice service to an online service operated via a new Facebook page. The owner indicated that the service was necessary as it was very difficult for customers to shop for fabric online, most likely because they could not view and/or touch the fabric. A US bookstore (Case #24) converted its pre-pandemic book club meetings to online. The owner indicated that it was a good way for people to connect when they were feeling so isolated. Finally, an Australian high-end

camera store (Case #25) converted its personalised, pre-pandemic camera advice service to online consultations. During a consultation a team member demonstrated the main features of the cameras and answered specific questions from their customers. The owner felt that this was very important as it provided customers with a better idea of what they were buying than was possible when just viewing the business' website.

4.2.2. Special adaptation responses

Our analysis identified an emergent category of consumer goods businesses that employed an adaptation response to the pandemic that was unique. Two hospitality businesses (both US cafés – Cases #7 and #9) also identified new **opportunities** to allow customers to access their offerings for home use, in addition to selling existing products. The cafés altered their operations to offer customer pickup of traditional offerings (meals for Case #7 and coffee for Case #9), and also offered kits for customers who were willing to prepare the businesses' offering at home. Case #7 offered their meals for clients to prepare at home via DIY meal kits, while Case #9 offered a similar service with DIY home barista kits. These DIY kits required the businesses to adopt new e-services to support the kits sold via the (new) e-commerce capability. For example, Case #7's chef complemented the DIY meal kits with new live Instagram stories containing plating instructions via online classes. Case #9 sold coffee kits that were supported by barista classes for customers, accessible via a new YouTube channel. Note that these were classified separately from the US bakery in the previous section that also offered DIY kits, as the bakery did not offer *new e-services* to support customers in the baking process. The digital responses of the two cafés were therefore classified differently as *special* adaptation responses. This is because the businesses were still able to sell some of their offerings for customer pickup, but additionally introduced 'kits' that customers could order and enhanced the kits with online services to instruct the customers on how to prepare them.

One retail business selling vintage clothing (Case #12) also introduced a new e-service for customers. The retailer's digital response involved adopting a new e-auction service for their existing range of vintage clothing that operated in real-time via Instagram. The owner suggested that the auction provided a form of entertainment for customers at a time when entertainment options were reduced. Interestingly, the owner noted that more items were sold during the auction than would typically be sold in the store over the same period. This digital response was classified as a **special adaptation response** as it had not been specifically identified in the conceptual framework but had emerged in the results.

4.2.3. Repurpose responses

One Australian restaurant (Case #8) was not able to replicate their meals with simple pickup or delivery options as described in the previous section. This is because their business offered a fixed menu consisting of five to seven courses. To stay in business, they also offered DIY kits that were supplemented by their chef offering online classes on a new YouTube channel that detailed how to prepare each course. The business tested the idea with customers on social media before its implementation and, after receiving a positive response, set up a new online store and new meal kits within two days. This was another example of a small business that was able to react quickly to the situation presented by the pandemic. Note that this was classified as a repurpose response because the decision occurred on a *needs basis* (Silva, Figueroa, & González-Reinhart, 2007) for the business to remain viable, similar to bulk product businesses. This was different to cafes in the previous section as this restaurant was unable to offer pickup or delivery options for their traditional, prepared meals.

4.3. Services sector

This general sector was the largest, with 43 businesses comprising:

- 19 health and community services businesses, including fitness, counselling and school education businesses,
- 16 cultural, recreational and personal services businesses, such as special events planners/hosts, personal tutoring, dance/music/art schools, and
- eight communication, property and business services businesses such as real estate agents and business incubators.

This category was typified by service businesses:

- adopting new digital technologies to convert their existing service to an online version, or
- developing new e-services – all in response to their face-to-face operations being shut down.

Of the 43 businesses in this category, only one (discussed later) did not move to e-services. The results are discussed according to their different digital responses. However, the new adoptions of e-commerce are discussed separately later in the section because the nature of their implementation did not appear to be related to specific digital responses.

4.3.1. Adaptation responses

For most services businesses in the study (77%), the pandemic introduced *pragmatic tensions* and involved *disruptions*. The digital responses of these businesses involved *adaptations* to their pre-pandemic face-to-face services by moving them to new, online platforms. Digital responses by health and community services businesses mostly involved offering fitness classes or school programs online. One US business that ran after-school programming classes (Case #32) moved them online via Zoom. The owner commented that this was popular with both teachers and students as it provided some routine in their schedules. It was also a way for children to

see friends they would not otherwise see during lockdowns. A New Zealand business that offered science and maths education for schools (Case #40) noted that the decision to offer online classes came down to the business either accepting defeat and winding up or fighting for something in which they believed. An Australian fitness/dance instructor (Case #34) indicated that she had no choice but to convert her home into a studio to deliver online courses. The owner noted the challenges involved in doing this, such as a great deal of trial and error involved with setting up the new technology. She commented that it was like starting the business from scratch again. Another Australian fitness studio (Case #38) decided to offer live-streamed courses through Facebook Live rather than record them as they felt this helped to keep their community connected. Some fitness businesses referred to the general struggles of dealing with the pandemic and introducing new innovations. The owner of a Canadian business offering yoga classes (Case #42) indicated that she knew many business owners who had 'freaked out' due to the pandemic, so she decided to do her best to assist them. A US fitness studio (Case #41) suggested that the expertise needed to add e-commerce, which included learning how to shoot videos and how to upload them to Instagram for online classes, was not in their 'wheelhouse' but they did it anyway.

The viability of two US businesses offering cycling fitness classes (Cases #29 and #33) relied on customers having access to exercise bikes they would normally use in the fitness studio. These businesses offered their studio exercise bikes as rentals to customers to use at home during the pandemic and delivered the classes online. For Case #33, customers used these bikes, or their own, together with the online classes, which meant revenue for the business came from both bike rentals and online classes. Case #29 offered their online classes for free, so their only source of revenue was bike rentals. However, the online classes were viewed as being vital to support the rental income.

4.3.2. Special adaptation responses

Some health and community services businesses also took the *opportunity* to offer new e-services in addition to moving existing face-to-face services online. This was classified as a *special adaption* response, as it was not *required* as a response to the pandemic. A US spin cycling business (Case #27), like the businesses in the previous section, switched to online classes, but they also supplemented this by adding new types of online fitness classes that did not require bicycles. The owners indicated that they would not have considered these new classes if not for the pandemic, which encouraged them to be nimble and try new things. A US 'sensory' gym (Case #26), which had offered one-to-one physical therapy for children, also added new online classes for therapists, who were not the gym's clients before the pandemic hit.

4.3.3. Repurpose responses

Five services businesses faced *tactical tensions,* which meant that they could not operate existing services, nor move them online. Thus, they identified new *opportunities* through a *repurpose response*. Two cultural, recreational and personal services businesses adopted this strategy, introducing new e-services to replace the services they could not deliver face-to-face. For example, the owner of an Australian bridal services business that specialised in makeup and hair design (Case #48) had been planning, prior to the pandemic, to create a new YouTube channel offering makeup and hair 'tips of the trade' to differentiate the business from competitors. The owner noted that the pandemic lockdown gave her time to do this as she could no longer provide her usual services. This required her to gain new knowledge about video production. A Swiss business (Case #47) that previously ran holiday camps and birthday parties had lost all of its business during the pandemic. They switched to offering weekly online videos involving craft activities and online quizzes to remain engaged with customers during the pandemic. Three communication, property and business services businesses adopted a *repurpose response* strategy with new e-services. For instance, an Australian media and presentation training business (Case #63) was unable to offer face-to-face courses on media training and therefore switched to offer an online course on how to conduct virtual meetings for people working from home. This was a repurpose involving their existing media presentation and production skills.

4.3.4. Alternate practice responses

Two cultural, recreational and personal services businesses faced *existential tensions* when their existing way of operating *made no sense* (Orlikowski & Scott, 2021). They took the *opportunity* to change their business model completely from services to online retail. An Australian business (Case #46) had previously managed 'pop up' activities at events. The owner indicated their business suddenly lost all its event bookings and described how their change to retail was "do or die". They fortunately had paid for a liquor license they had not previously used, which meant they could switch to selling liquor online. The other business (Case #45) had previously supplied popular character costumes at childrens' birthday parties. When their revenue dropped during lockdowns they switched to a retail model, instead selling children's clothing online.

4.3.5. E-commerce in the services sector

In this subsection we separately discuss the service businesses' use of e-commerce as part of their digital responses. This is because e-commerce adoption varied widely throughout the services sector, seemingly independent of their digital responses. This contrasts with the other two general sectors, where new e-commerce facilities were needed in all cases to help implement their digital responses. The use of e-commerce in the services sector generally related to the *method of payment* that had already been established in each business. Some businesses operated on a subscription model (especially personal services businesses) or via invoice (typically communication, property and business services businesses). These transactions most likely already occurred by bank transfer, and thus did not require the adoption of e-commerce via websites. The rest of the businesses introduced e-commerce if they had not previously implemented it.

Drilling down to industry sector, half of the health and community services businesses already had e-commerce in place for customers to book and pay for face-to-face classes, so their digital responses did not require new e-commerce facilities. Another five

businesses added e-commerce to allow their customers to book and pay for online classes. The other seven businesses had other payment methods in place such as direct debit payments for monthly memberships.

In the cultural, recreational and personal services sector, some businesses had existing e-commerce facilities. Others required new e-commerce facilities which were set up to support their new e-services, such as booking and payments for online classes, or ordering and payments for tasting kits. In other instances, e-commerce supported new products, such as floral arrangements offered by wedding planners.

Cultural, recreational and personal services businesses, for the most part, operated on a B2B basis and therefore did not require new e-commerce facilities.

The next section discusses the study results and compares the digital responses by bulk product, consumer product and services sector categories.

5. Discussion

This section addresses the research questions by describing the emergent digital responses evident in the specific context of small businesses sourced using Google News stories, which were grouped into three general sector categories. We believe the study provides valuable insights into the digital responses observed across the three sector categories in our inductive study, but care should be taken when extrapolating the findings to the broader population of small businesses. For instance, it is possible that owner/managers who tell their stories to the newspapers and magazines listed in Google News may be more predisposed to introducing digital responses during a crisis than other small business owner/managers.

5.1. What is the nature of digital responses by small businesses during crises?

We found that the COVID-19 pandemic meant that the traditional business processes of the small businesses in our study were ineffective. However, many businesses introduced digital responses to alleviate the pandemic's effect. Some of the characteristics of small businesses mentioned in the literature were applicable to the businesses. Some owner/managers discussed the flexibility of small business (as described by Sellitto et al., 2017) and how they were able to react quickly to the pandemic by introducing digital responses. Some described the level of difficulty of introducing new digital technologies due to resource poverty, even when only introducing new e-commerce (Mandviwalla & Flanagan, 2021). This was mainly due to their limited knowledge of how to introduce new digital technologies rather than them having limited time to do so. In fact, some owners commented that the pandemic gave them more time to investigate new digital responses.

Table 3 shows the most common combinations of digital responses for each general sector. The most common combination involved an *adaptation* digital response (shifting existing business practices to online), which allowed the businesses to offer their usual products and services. For consumer goods businesses, this typically meant setting up new e-commerce or online ordering facilities to sell their products online (as found by Mandviwalla & Flanagan, 2021). Some high-end retailers also converted existing face-to-face advice services to online, as noted by Fletcher and Griffiths (2020). Services businesses offered their face-to-face services online (as found by Mandviwalla & Flanagan, 2021; Morgan, Anokhin, Ofstein, & Friske, 2020). Note that some services businesses also needed to set up new e-commerce facilities to support this shift. The bulk products category was the only one where the most common reaction to the pandemic involved a *repurpose* response due to the loss of their B2B business, whereby they switched to offer their products in smaller sizes direct to consumers.

Table 3 also shows that there were differences in digital responses across sectors (Fletcher & Griffiths, 2020), either by the crisis perspective and response, via the addition of new e-commerce/ordering facilities and/or conversion of face-to-face services to e-services.

However, some businesses went further than these common, sector-based responses. Table 4 lists the digital responses for 14 businesses that were more sophisticated. This table includes a new category that we added to Orlikowski and Scott's (2021) digital responses, labelled as a *supplement* response, which refers to the 'special' adaptations we identified in Section 4. In these situations, businesses were faced with pragmatic tensions which meant that they could convert their existing operations to online. However, they also viewed this shift as an opportunity to introduce additional new products and/or services online. The digital responses shown in Table 4 were not apparent in the small business literature. For instance, many consumer goods businesses in our study had adopted new e-commerce facilities to sell (at least some of) their regular offerings online (as found by Mandviwalla & Flanagan, 2021). However, some cafes went further and took the opportunity to add new e-services to complement new products, which took the form of 'kits' that customers could purchase to prepare their offerings at home. The digital responses involved providing instructions on preparing the kits via online videos or live masterclasses. We categorised these businesses as using a supplement response. This can be contrasted with one restaurant (Case #8) where meal kits were the only way they could offer their meals to customers, which we categorised as a repurpose response. There was only one retail business listed in Table 4. The digital response by this vintage clothing business (Case #12) involved adding an online auction as an extra way to sell its existing products, which also provided entertainment for customers during lockdowns (a *supplement* response).

A more sophisticated combination for the health and community services sector involved three fitness businesses switching their face-to-face classes to online (as found by Mandviwalla & Flanagan, 2021). However, these fitness businesses also took the opportunity to introduce *new classes* via e-services during the pandemic. These businesses not only switched their existing offerings to online, but also provided new offerings (a *supplement* response).

A sophisticated solution for the cultural, recreational and personal services sector involved two businesses that experienced

Table 3

Most common digital responses by Google News businesses across sectors.

General Sector	Industry sector	Digital response	New e-commerce or ordering	Converted to e-services
Bulk products	Manufacturing/Wholesale Trade	Repurpose ($n = 5$ of 5)	X	
Consumer goods	Hospitality	Adaptation (n = 2 of 5)	X	
	Retail Trade	Adaptation (n = 13 of 14)	X	X[+]
	Health and Community Services	Adaptation ($n = 16$ of 19)	X*	X
Services	Cultural, Recreational & Personal Services	Adaptation ($n = 12$ of 16)	X*	X
	Communication, Property & Business Services	Adaptation (n = 5 of 8)		X

* e-commerce or online ordering was added if it did not previously exist OR revenue was not already generated otherwise (e.g. by electronic funds transfer).

[+] Some retailers also converted corresponding face-to-face services to online (e.g. advice offered for purchasing high-end fashion or cameras).

Table 4

More sophisticated digital responses by Google News businesses across sectors.

General Sector	Industry sector	Digital response	New e-commerce or ordering	e-services	
				New e-services	Convert to e-services
Consumer goods	Hospitality	Supplement (n = 2)	X	X	
		Repurpose (n = 1)	X	X	
	Retail Trade	Supplement (n = 1)	X	X	
Services	Health and Community Services	Supplement ($n = 3$)	X* ($n = 1$)	X	X
	Cultural, Recreational & Personal Services	Alternate practice ($n = 2$)	X		
		Repurpose (n = 2)		X	
	Communication, Property & Business Services	Repurpose (n = 3)		X	

* e-commerce or online ordering added if it did not previously exist OR revenue was not already generated by other means (e.g. electronic funds transfer).

existential tensions (Orlikowski & Scott, 2021) because they could not offer or repurpose their existing services. Both businesses switched from services to offering products for sale online (an *alternate practice* response*).* Mandviwalla and Flanagan's (2021) action research project led to a similar outcome for a 'wedding party favours' business that had shifted to sell high-end stationery online.[1] Although we saw no examples of the reverse situation occurring, where retail businesses shifted substantially to offer new e-services, we anticipate this could occur in reaction to crises.

A sophisticated combination for cultural, recreational and personal services, as well as communications, property and business services, businesses included five businesses who were unable to offer existing face-to-face services online. They instead adopted a *repurpose* response and offered new e-services to replace their traditional services. This has not been previously reported in the literature.

To summarise, the digital responses to the pandemic for most of the Google News small businesses could be classified into the most common digital responses for their general industry sector (as per Table 3). However, just over one in five of these businesses also adopted digital responses that went beyond these. The latter digital responses were either reactionary to manage their situation or proactive to take advantage of an opportunity identified because of the pandemic (as described in Table 4).

5.2. How was the organisation of work altered for small businesses because of their use of digital technologies to address the pandemic?

Our study has allowed us to identify a series of patterns among Google News businesses that related to the separate general sectors. In this section, we investigate the second research question regarding how the digital responses by small businesses to the pandemic altered the organisation and performance of work across sectors. One common point across all businesses was that the pandemic caused an immediate loss of revenue due to lockdowns. Beyond this, the organisation and performance of work differed across the general sectors.

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[1] Mandviwalla & Flanagan (2021) provide a brief description of this case, but it is not known if the business had conducted online selling prior to this shift.

5.2.1. Bulk products businesses

The switch to digital technologies involved three major shifts for bulk products businesses:

- *Introduction of e-commerce facilities*. For most businesses, this involved setting up new e-commerce facilities. This was a change for employees used to dealing with B2B payments, likely by electronic funds transfer. In most cases the knowledge required to set up the digital responses was obtained quickly by these businesses.
- *Repackaging of goods into smaller sized quantities, more suited to B2C consumers*. This meant that staff involved in packing larger quantities had to shift their operations to produce smaller package sizes.
- *Working out new methods of product distribution to B2C customers*. These ranged from redeploying existing delivery networks, arranging new pickup points for customers and/or distributing the products via local markets. Each of these involved changes to the normal routines of staff involved in prior distribution approaches.

The key point here is that not only did bulk products businesses need to have the initiative and skills to make these changes to how they operated, but they also had to rely on their staff being flexible enough to undertake them.

5.2.2. Consumers goods businesses

Unlike bulk products businesses, consumers goods businesses retained their existing customers. They mostly needed to find a way to continue serving them during lockdowns.

- *Introduction of e-commerce facilities*. Of the 19 consumer goods businesses in the study, only four had previous e-commerce facilities that they could use to sell to customers. The other businesses had previously accepted in-store payments from customers but had to introduce new online ordering or e-commerce facilities.
- *Working out new methods of product distribution*. Businesses with existing e-commerce facilities were typically better prepared to distribute products to customers via existing processes. For other businesses, curb side pickup became a popular means of distribution, with associated changes introduced to complete these in a safe 'socially distant' manner. New delivery networks, such as couriers, were required when products were delivered directly to customers.
- *Special categories of consumer goods businesses that introduced e-services*. One interesting finding in the study is that seven of the 19 consumers goods businesses also introduced e-services facilities. Three of these businesses were in a similar situation to the high street fashion retailers described by Fletcher and Griffiths (2020), who relied on providing a personalised customer experience alongside their retail products. All these businesses switched to offering these 'added value' services online alongside their pre-pandemic retail offerings so they could replicate their traditional sales processes. This required staff to adapt to the challenges of interacting with customers in this new medium. Interestingly, four consumers goods businesses saw the lockdowns as an opportunity to offer *new* products and associated e-services, such as cafes offering meal kits with online preparation support. Again, all these changes required staff to adapt to the challenges of interacting with customers via a new medium.
- *Design and development of new products*. As described, products such as new meal kits had to be designed and packaged, which were tasks not carried out before the pandemic.

5.2.3. Services businesses

As with consumer goods businesses, services businesses in the study aimed to continue to serve their existing customers after the pandemic hit:

- *Conversion of existing face-to-face services to e-services, and the introduction of new e-services*. Most services businesses converted their existing services to e-services, which meant new challenges because employees had to adapt to the new method of service delivery. This was a major adjustment for the businesses as these services comprised all (or the vast majority) of their offerings.
- *Design and development of new e-services*: The services businesses that introduced new e-services faced additional challenges for employees who were not only using a new medium, but also designing and delivering new customer offerings. As indicated, two services businesses did not continue in their traditional sector. Instead, they adopted alternate practice digital responses, which involved switching from service to retail offerings. This caused an immense upheaval for management and employees in relation to how work was organised and performed as all aspects of these businesses were affected.
- *Introduction of e-commerce facilities*. As noted in the results, the introduction of e-commerce for services businesses varied, depending upon the existing payment/subscription model the business had and whether it could be adapted to e-services.

6. Theoretical contribution

COVID-19 lockdowns imposed by governments worldwide meant that many small businesses lost revenue. Small businesses are key to the economic and personal wellbeing of millions of people. This emphasises the need for insights into how small businesses in different industries survived the pandemic by introducing digital responses. Despite this, there are limited studies that describe the nature of digital responses by small businesses. The main theoretical contribution of this paper involved the integration of crisis-related concepts from Orlikowski and Scott (2021) and Gkeredakis et al. (2021) into the initial version of our novel conceptual framework (see Section 2.3). Neither Orlikowski and Scott (2021) nor Gkeredakis et al. (2021) had applied their concepts empirically to established small businesses. We used the framework to analyse the nature of digital responses by small businesses identified in Google News. We

were able to identify differences between general sectors, based on our findings and cross-case analysis. Our second theoretical contribution was to extend Orlikowski and Scott's (2021) digital responses by adding a new *supplement* response category. This response occurs when a small business shifts its existing operations online and also takes the opportunity to introduce new products and/or services. This is shown in an updated version of our framework in Table 5.

The *supplement* response category is an important addition to the framework because it is the only digital response that captures the duality of Gkeredakis et al's (2021) concepts of disruption (shifting existing offerings online) *and* opportunity (introducing new products and/or services). Orlikowski and Scott's (2021) concepts capture how small businesses can use an adaptation digital response to address pragmatic tensions during crises by moving their existing offerings to online. The new *supplement* response category is valuable because it reveals additional, nuanced digital responses that small businesses could use to address pragmatic tensions. This includes small businesses taking the opportunity to introduce new products and/or services online, in addition to moving existing offerings online.

Other academics could apply the framework in a similar manner we have to investigate digital responses by small businesses during crises. One example would be conducting positivist studies to test the framework empirically with a larger sample of businesses. Another is investigating the three general sectors used in this study in greater levels of granularity. For instance, researchers could examine how the nuanced contexts of each sector might influence digital responses, such as differences between small businesses in recreational versus personal services. A third example would be determining if and how the concepts in our framework apply to technology adoptions outside of crises. For instance, researchers could investigate if the four digital response categories apply when small businesses transition to digital technologies and, if so, due to what (non-crisis) reasons. The latter studies would be limited to digital transitions involving interactions between small businesses and customers. This is because the framework does not investigate the digitisation of internal business processes carried out, say, for efficiency purposes.

7. Practical contribution

This paper has demonstrated the resilient nature of small businesses during COVID-19 lockdowns. There are potential lessons to be learned by small businesses still affected by the lockdown and/or those that face similar challenges in the future. This is especially the case where a crisis compromises the ability of small businesses to deliver products and/or services and their capacity to receive orders and payments from customers. Table 6 is derived from the updated conceptual framework (Table 5) and our general sector analysis. It offers suggestions to support small businesses in separate generic sectors with regards to how they could react to crises such as the pandemic by using digital responses. The table notes the different tensions the businesses in different general sectors may face and outlines potential digital responses. The table also summarises the subsequent changes in work organisation, including the effects on product/service design and packaging, as well as alterations to how offerings can be distributed.

Other natural hazards such as fire or floods can disrupt traditional markets (Chang et al., 2022). Digital responses may assist small businesses to manage these situations. We believe that Table 6 would be useful to small businesses facing any crisis that disrupts their markets. For example, Nguyen, Pyke, Gamage, De Lacy, and Lindsay-Smith (2022) examined factors that influenced the recovery of Australian small tourism businesses from both bushfires and the pandemic. They found that the presence of *planned resilience*, or planning for potential crises *before* they occur, was positively linked with the perceived speed of businesses' revenue recovery. Ideally, businesses would plan for such eventualities in advance of a crisis. However, our study revealed that many small businesses identified in Google News acted after the pandemic occurred by introducing previously unplanned digital responses. Nguyen et al. (2022) referred to this as *adaptive resilience*. Thus, we believe that small businesses could apply the insights from Table 6 as part of proactive resilience planning, or even as an adaptive response after a crisis hits. Small businesses interested in planned resilience could identify which tensions are relevant to their market, and then pre-plan digital responses and associated changes to work organisation. They can then enact the plan in the event of a crisis. Other small businesses could use Table 6 similarly to plan their adaptive response during a crisis. Table 6 may provide a useful taxonomy by which researchers can classify digital responses to crises.

Table 5
Updated small business digital response classification framework.

Digital response to crises (Orlikowski & Scott, 2021)		Crisis perspective (Gkeredakis et al., 2021)	
Tension	Digital response	Disruption (shift existing practices online)	Opportunity (introduce new products/services with digital technologies)
Pragmatic	**Adaptation** (existing practices continue)	Digital technology solution involving existing product/service	No
	Supplement (existing practices can continue but the business takes the opportunity to also offer new products and/or services)	Digital technology solution involving existing product/service.	Additionally, digital technology solutions involving new products or services (within existing sector)
Tactical	**Repurpose** (capacity repurposed to produce new products and/or services)	No	Digital technology solution involving new products and/or services (within existing sector)
Existential	**Alternate practice** (alternative practices displace existing practices; reorient strategic direction)	No	Novel/different ways of doing things. Involves new products and/or services in a new business direction

Table 6
Breakdown of typical general sector digital responses.

General Sector	Cause of tensions (loss of revenue)	Digital response	Characteristics of typical digital response			
			New e-commerce facilities	Converted to e-services or new e-services	Product/service alterations	Physical distribution of product/ service
Bulk products (Manufacturing [some], Wholesale Trade)	Business client operations cease	Repurpose	Yes	No	Smaller packaging for B2C customers	Establish new distribution networks, customer pickup and/or use local markets
Consumer goods (Hospitality, Retail Trade)	Customers unable to visit premises to make purchases	Adaptation or Supplement	Yes, if not previously implemented	No, except: -for high-end retail (convert existing support services) -new e-services where new opportunities are identified	No [adaptation], unless redesigning products (such as meal kits) or introducing new products [supplement]	Establish new distribution networks (where needed); curb side pickup
Services (Health and Community; Cultural, Recreational & Personal; Communication, Property & Business)	Customers unable to visit premises to receive services	Adaptation or Supplement	No, unless existing subscription or invoice model is not suitable	Yes: -convert existing e-services -new e-services where new opportunities are identified	No [adaptation], unless new e-services are designed [supplement]	N.A.

8. Conclusion, limitations and future research

This research has shown how resilient small businesses can be in unprecedented times. Small businesses are the backbone of economies and make up a large proportion of employment. Many small businesses compromised by COVID-19 lockdowns were able to use digital responses to react effectively to the crisis. We presented the results of our analysis of Google News 'success' stories and websites of small businesses in different general sectors. This culminated in a conceptual framework, and corresponding table of digital responses, that theorises and describes the nature of small business digital responses and the associated changes to the organisation of work. We anticipate that the table of digital responses could be applied by small businesses before a crisis occurs, but our study suggests that it may be useful to small businesses that only react to a crisis.

The research has several limitations. Most of the small businesses analysed are from North America. As mentioned earlier, the business cases were also drawn from Google News stories, so were sourced from those businesses who were prepared to speak of their successes in dealing with COVID-19 lockdowns. This might mean they have a more entrepreneurial attitude than typical small businesses. Finally, some industry sectors were not (highly) represented in the sample. Future research can determine if this was because their businesses were not affected by the crisis, not able to introduce the digital responses we identified and/or did not require digital technologies to respond to the pandemic.

Future research in this area may also include exploring more small businesses outside North America, and in greater numbers, to extend and validate the conceptual framework. Research needs to determine if the digital responses persisted post-lockdown, as well as examine any impacts of multiple waves of pandemic lockdowns that occurred around the world. This is important as this paper only examined initial digital responses to the pandemic. As already suggested, the challenges small businesses face when introducing digital responses during crises could be investigated further. Finally, future studies could compare the digital responses used by small businesses who had undertaken proactive resilience (versus adaptive resilience).

CRediT author statement

The nature of small business digital responses during crises.

Craig Parker: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing- second and final draft, review and editing.

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Appendix 1: Decision process for determining inclusion of cases in the study

Google news article	Website analysis Google: during-pandemic Web archive: pre pandemic	Was the digital response an innovation?
Article discusses use of e-commerce	Confirmed by finding no e-commerce on pre-pandemic site and new e-commerce facility on website during pandemic	Yes. New e-commerce (or ordering) aspect to digital response
	E-commerce found on pre-pandemic website, so it was not considered to be a 'new' adoption of digital technologies	No innovation aspect to digital response
Article discusses adoption of e-service*	Confirmed by website analysis, with face-to-face services converted to e-services	Yes. Existing face-to-face service converted to new e-service
	Confirmed by website analysis, with new services being created to operate as e-services	Yes. New e-services added as part of digital response
Article discusses adoption of e-commerce (if not, we still checked to see if e-commerce existed)	No e-commerce found on pre-pandemic or during-pandemic websites	No e-commerce aspect to digital response
	e-commerce for booking and/or paying for face-to-face services already existed on pre-pandemic websites	No e-commerce aspect to digital response
	No e-commerce on pre-pandemic websites. Added to during-pandemic websites to book/pay for e-services	Yes. New e-commerce (or ordering) aspect to digital response

Appendix 2: Small business case summaries

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
1	USA	**Bulk Products** Wholesale/ Restaurant food supplier	Demand dropped dramatically; Adjusted to sell resealable bags of food direct to customers. Advertised direct to customers via Facebook; Orders placed via a form on Google Docs.	Opportunity (direct to consumer)	Repurpose	New online ordering	No e-services
2	Australia	**Bulk Products** Wholesale/ Supplies meat to restaurants	95% of business to high end restaurants shut down; Switched to selling direct to customers (including redirecting deliveries). Implemented a retail e-commerce platform to support the customer switch.	Opportunity (direct to consumer)	Repurpose	New e-commerce	No e-services
3	USA	**Bulk Products** Wholesale/ Black/green tea suppliers	Start-up supplier to restaurants (who shut down a few days before product rollout); switched to offer B2C; requiring smaller packaging quantities. Setup a website and online store to support direct sales.	Opportunity (direct to consumer)	Repurpose	New e-commerce	No e-services
4	Canada	**Bulk Products** Wholesale/ Food supplier to restaurants	Lost income due to restaurant shutdown. Altered to sell to consumers directly, but also added in groceries and some meals from local restaurants in business. Built an online shop. Revenue increased and they were able to hire extra staff.	Opportunity (direct to consumer)	Repurpose	New e-commerce	No e-services
5	USA	**Bulk Products** Wholesale/ Organic farm supplying restaurants, markets, etc	Most of the business' clients closed (restaurants, farmers markets) – altered to sell direct to customers by adding pick-up points and deliveries. Set up a new website with online store.	Opportunity (direct to consumer)	Repurpose	New e-commerce	No e-services
6	USA	**Bulk Products** Manufacturing/ Brewery	Lost most sales to businesses (not all as they served some grocery stores that remained open). Switched to B2C. Launched a new website with e-commerce with an online shop to allow B2C sales	Opportunity (direct to consumer)	Repurpose	New e-commerce	No e-services
7	USA	**Consumer goods** Hospitality/ Café	Cafe shut down; continued selling ingredients online. Developed 'distance dining' kits for customers to prepare their own meals, using live Instagram stories to provide chef's plating instructions for the kits.	Disruption/ Opportunity (online plating instructions)	Supplement	Existing e-commerce	New e-services
8	Australia	**Consumer goods** Hospitality/ Restaurant	After shutdown, set up e-commerce offering meal kits delivered to customers. Head chef offered classes delivered via YouTube on how to prepare the meals.	Opportunity (online classes)	Repurpose	New e-commerce	New e-services
9	USA	**Consumer goods** Hospitality/ Café	After shutdown the business offered home delivery and curb side pickup of meals and groceries. Introduced e-commerce for ordering; Conducted online 'DIY barista' classes to assist people to make quality coffee at home.	Disruption/ Opportunity (online classes)	Supplement	New e-commerce	New e-services
10	Canada	**Consumer goods** Hospitality/ Pub	Pub was closed. Shifted to takeout and make-at-home meals and groceries. Created a new online ordering portal for customer orders.	Disruption	Adaptation	New online ordering	No e-services

(*continued*)

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
11	USA	**Consumer goods** Hospitality/ Ramen restaurant	Restaurant was shut down; switched to curb side pickup; added grocery items for pickup. Introduced online ordering to support this.	Disruption	Adaptation	New online ordering	No e-services
12	USA	**Consumer goods** Retail Trade/ Online vintage clothing and items store	Store front was closed; Set up temporary online store and auctions on Instagram for specific items (adding entertainment and excitement for customers).	Disruption/ Opportunity	Supplement	New e-commerce	New e-services (e-auction)
13	USA	**Consumer goods** Retail Trade/ Jewellery Boutique	Closed physical store. Built website to sell products online. Used a third-party online service where loyal customers could buy gift cards to use later (for a temporary influx of cash).	Disruption	Adaptation	New e-commerce	No e-services
14	USA	**Consumer goods** Retail Trade/ Bakery (cookies)	Before being closed had been planning to introduce an online sales/ delivery option. Thus, they added online sales during lockdowns.	Disruption (planned change)	Adaptation	New e-commerce	No e-services
15	USA	**Consumer goods** Retail Trade/ Cheese shop with other speciality items	Physical store closed. They had been planning for e-commerce, so this was adopted. Also offered general products (eg groceries, toilet paper) on their website.	Disruption (planned change)	Adaptation	New e-commerce	No e-services
16	USA	**Consumer goods** Retail Trade/ Haberdashery (store)	Owner had been thinking of adding e-commerce. This was exacerbated by the crisis. After store closed down, they switched immediately to e-commerce and delivery as an alternate sales avenue.	Disruption (planned change)	Adaptation	New e-commerce	No e-services
17	USA	**Consumer goods** Retail Trade/ Bakery	When the bakery closed the business added a third-party online platform to sell products. Used existing employees for delivery to keep them employed and to avoid high delivery costs.	Disruption	Adaptation	New e-commerce	No e-services
18	USA	**Consumer goods** Retail Trade/ Bakery	Had to close both of their physical locations. Set up an e-commerce facility. Already had 121 k Instagram followers that they were able to inform. Noticing people were making bread from home, they designed and sold kits for making bread, bagels, cookies, etc. at home.	Disruption	Adaptation	New e-commerce	No e-services
19	USA	**Consumer goods** Retail Trade/ Sells fabric, quilt kits, etc. direct to public	Shop shut down, so changed to delivery (and pick-up when regulations allowed). Built an online website and payment system to handle orders and queries.	Disruption	Adaptation	New e-commerce	No e-services
20	USA	**Consumer goods** Retail Trade/ Gift shop	Shop closed. Quickly set up a new e-commerce facility to sell products.	Disruption	Adaptation	New e-commerce	No e-services
21	Canada	**Consumer goods** Retail Trade/ Craft Brewery with retail space	Retail space shut down. Had to reconfigure to sell remotely, changing from selling by the glass to selling in bottles. Set up a website to sell bottled product online to customers.	Disruption	Adaptation	New e-commerce	No e-services
22	USA	**Consumer goods** Retail Trade/ High end athletic shoes	Physical shop closed – so they increased pick-up and delivery options. Adjusted to take orders via email, Instagram and Facebook (and text and phone).	Disruption	Adaptation	New online ordering	No e-services

(*continued*)

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
23	UK	**Consumer goods** Retail Trade/ Fashion designer with 2 stores	Stores closed. Switched to selling solely online - e-commerce was already running but had not been used greatly. Introduced a digital version (previously face-to-face) of their fashion advice service on Facebook.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
24	USA	**Consumer goods** Retail Trade/ Bookstore that runs book club meetings	Bookshop shut down, but they already had an online site that customers could continue to order from and added curb side delivery; Replaced face-to-face book club meetings with online Zoom meetings.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
25	Australia	**Consumer goods** Retail Trade/ Sells high end cameras. Relies on 1-to-1 service	Its two stores closed down. It already had an online store but had lost its ability to work one-to-one with customers to personalise their experience. They had been considering an online video service where team members could explain and demonstrate the equipment, so they introduced that.	Disruption (planned change)	Adaptation	Existing e-commerce	Converted to e-services
26	USA	**Services** Health and Community Services/ Sensory gym for kids	Lost main business of one-to-one therapy with children; looked for other ways to offer classes and created educational products for parents and therapists. Offered some therapy classes and educational resources online.	Disruption/ Opportunity	Supplement	No e-commerce	Converted to e-services/ New e-services
27	USA	**Services** Health and Community Services/ Spin (cycling) studio	Business closed. Rented bikes to customers, offered online classes and new workouts for those without bikes. Already had e-commerce.	Disruption/ Opportunity	Supplement	Existing e-commerce	Converted to e-services/ New e-services
28	USA	**Services** Health and Community Services/ Fitness studio	Studio closed. Created 'at home studio exercise kits' to sell online. Created on-demand workout videos, and Instagram Live sessions and stories of benefits of exercise. Added e-commerce to support this.	Disruption/ Opportunity	Supplement	New e-commerce	Converted to e-services/ New e-services
29	USA	**Services** Health and Community Services/ Cycling studio	Had to shut down traditional business; Switched to renting studio bikes to customers to take home. Supported bike renters with free online classes.	Disruption	Adaptation	No e-commerce	Converted to e-services
30	USA	**Services** Health and Community Services/ Interval training workouts	Studio closed down. Instead offered videos for members. Videos uploaded to Vimeo and password protected for members. The owner spent much more time on social media after the pandemic hit to "nurture" his long-term membership.	Disruption	Adaptation	No e-commerce	Converted to e-services
31	USA	**Services** Health and Community Services/ Counselling service targeting alcoholics	Moved existing support guides to online access. For example, one of these guides allow users to find places offering 'mocktails'.	Disruption	Adaptation	No e-commerce	Converted to e-services
32	USA	**Services** Health and Community Services/ Offer robotic programming for schools, etc.	Classes previously held in customer venues (for exmaple, schools). Adapted curriculum to offer via Zoom, using materials children can often find at home (but could not offer robotic programming).	Disruption	Adaptation	No e-commerce	Converted to e-services

(*continued*)

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
33	USA	**Services** Health and Community Services/ Spin studio	Classes shut down; offered home rental of their studio bikes and spin shoes and live streamed/ recorded classes to customers. Already had e-commerce.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
34	Australia	**Services** Health and Community Services/ Fitness and dance instructor	Gyms shut down; delivered classes from home studio. Scheduled classes provided online – some charged, some free. E-commerce already existed to book sessions.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
35	USA	**Services** Health and Community Services/ Fitness studio	Traditional business closed; offered some classes remotely - some free online classes plus also live Zoom classes for people who had maintained ongoing memberships. E-commerce already existed.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
36	USA	**Services** Health and Community Services/ Fitness studio	Had to cancel face to face classes; replaced them with low-cost, family friendly workouts. Developed the capability to deliver short workouts digitally. E-commerce already existed.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
37	USA	**Services** Health and Community Services/ Fitness studio	Classes shut down; initially launched 'at home' workout videos but replaced these with live streaming classes (more like traditional offering). They had monthly recurring members who were grateful for any contact. E-commerce already existed.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
38	Australia	**Services** Health and Community Services/ Fitness Studio	Studio closed. First moved personal training online, then fitness classes. Both personal one-on-one sessions and fitness classes offered on Facebook Live. E-commerce already existed.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
39	Hong Kong	**Services** Health and Community Services/ Fitness studio	Group sessions in studio stopped, but they could keep one-to-one sessions operating. They converted their regular programs to offer them online. Added an online shop for selling merchandise to existing e-commerce function.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
40	New Zealand	**Services** Health and Community Services/ Offers STEM education programs to schools	Regular business closed; redesigned programs to deliver online. Offer weekly online STEM adventures for schools.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
41	USA	**Services** Health and Community Services/ Barre fitness studio	Studio closed. Offered online sessions for existing members and shorter sessions to attract new members. Added e-commerce. Had to learn how to shoot and upload videos to Instagram.	Disruption	Adaptation	New e-commerce	Converted to e-services
42	Canada	**Services** Health and Community Services/ Yoga classes	Studio classes stopped; switched to offering online classes, free at first, but later charged for these. E-commerce added to accommodate this.	Disruption	Adaptation	New e-commerce	Converted to e-services
43	USA	**Services** Health and Community Services/ Yoga classes	No in-studio classes; Cancelled monthly memberships and replaced them initially with the ability for people to donate and register for Zoom classes. Some previous members who had moved away re-joined. Online	Disruption	Adaptation	New e-commerce	Converted to e-services

(*continued*)

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
			donations were set up via a third party; then an online registration system was implemented.				
44	USA	**Services** Health and Community Services/ Yoga classes	No in-studio classes; Live classes were offered on Zoom and new online memberships were created. Also introduced online 'areas' for people to socialise in as they would normally. New e-commerce booking system set up.	Disruption	Adaptation	New e-commerce	Converted to e-services
45	USA	**Services** Cultural, Recreational & Personal Services/ Supply characters to birthday parties	Usual business diminished. Offered some free services, but eventually set up a website selling children's clothing, with e-commerce to complement it (effectively converting the business to retail).	Opportunity (selling children's clothing)	Alternate practice	New e-commerce	No e-services
46	Australia	**Services** Cultural, Recreational & Personal Services/ Manage bars and 'pop up' activities at events	Business shut down. Used their liquor license to set up a new business for online alcohol sales and delivery service. Staff became delivery drivers instead of event managers. New e-commerce was added for online sales.	Opportunity (selling alcohol online)	Alternate practice	New e-commerce	No e-services
47	Switzerland	**Services** Cultural, Recreational & Personal Services/ holiday camps and parties	Physical business closed down. They decided to stay in touch with existing customers by preparing weekly videos of craft activities and running quizzes. Weekly videos uploaded to YouTube, and quizzes ran on Facebook.	Opportunity (weekly craft activities/ quizzes)	Repurpose	No e-commerce	New e-services
48	Australia	**Services** Cultural, Recreational & Personal Services/ Bridal services (makeup and hair)	Went from being booked out 12–18 months in advance to virtually all services cancelled. Created a new online makeup and hair video series to differentiate the business. Upskilled video production skills to create a YouTube channel to show 'tricks of the trade'.	Opportunity (show people how to do own hair/ makeup)	Repurpose	No e-commerce	New e-services
49	USA	**Services** Cultural, Recreational & Personal Services/ Student tutoring service	Had previously offered face to face tutoring with printed materials that had taken years to perfect. With the virus, the business introduced online one-to-one sessions. Extra materials for students who wanted extra work was made available on Google Drive.	Disruption	Adaptation	No e-commerce	Converted to e-services
50	USA	**Services** Cultural, Recreational & Personal Services/ Wedding planner	Bookings for weddings plummeted. They were unable to show their venue to potential clients, so set up virtual tours. At least people could get an idea of the space for future bookings. Zoom or Facetime used for tours.	Disruption	Adaptation	No e-commerce	Converted to e-services
51	Canada	**Services** Cultural, Recreational & Personal Services/ Music school	Had previously conducted face to face lessons. Shifted to delivering online lessons but this did not work for everything, for example teaching string ensemble groups. Payment via bank account (not e-commerce).	Disruption	Adaptation	No e-commerce	Converted to e-services
52	USA	**Services** Cultural, Recreational & Personal Services/ Music School	School closed. Continued lessons remotely. Used video conferencing to continue one-to-one lessons.	Disruption	Adaptation	No e-commerce	Converted to e-services

(*continued*)

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
53	USA	**Services** Cultural, Recreational & Personal Services/ Music school	Face to face shut down; replaced with online recorded tutorials and personal remote lessons.	Disruption	Adaptation	No e-commerce	Converted to e-services
54	USA	**Services** Cultural, Recreational & Personal Services/ Arrange parents to mind other children	Business shut down due to social distancing; Altered to allow parents to provide remote supervision of homework for other parents who were working from home. This allowed the coordination of homework supervision sessions online between parents.	Disruption	Adaptation	No e-commerce	Converted to e-services
55	USA	**Services** Cultural, Recreational & Personal Services/ Ballet School	Studio was shut down; Switched to teaching ballet classes via Zoom. *E*-commerce already existed to book face to face sessions.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
56	Germany	**Services** Cultural, Recreational & Personal Services/ Creative art workshops	Could not run face to face events; instead delivered art materials to people's homes and ran live streamed online tutorials.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
57	USA	**Services** Cultural, Recreational & Personal Services/ sewing classes and private lessons	Main business closed down. Switched instead to offering classes remotely. Also added classes on making face masks, which lead to requests for them to make masks as well (not a digital technology innovation). Added Zoom capability for lessons.	Disruption	Adaptation	Existing e-commerce	Converted to e-services
58	USA	**Services** Cultural, Recreational & Personal Services/ Wedding, Event and Floral planners	Some events were cancelled, some were postponed. Moved to offer some of their products online (mostly floral arrangements). Set up new e-commerce for new products. Offered some online consultations for future events.	Disruption	Adaptation	New e-commerce	Converted to e-services
59	UK	**Services** Cultural, Recreational & Personal Services/ Wine tasting events	Face to face tastings in bars, hotels and restaurants were stopped. Altered to offer home tasting packages online; supported by wine tasting videos via their website.	Disruption	Adaptation	New e-commerce	Converted to e-services
60	USA	**Services** Cultural, Recreational & Personal Services/ Food tasting tours	Could not run tasting tours in place, so teamed with restaurants to deliver meals to clients. An online link was provided to a video discussing the food, chefs, and the local area.	Disruption	Adaptation	New e-commerce	Converted to e-services
61	USA	**Services** Communication, property & business services/ Coworking space	Coworking spaces shut down; instead setup online liaisons between entrepreneurs. Now works with local partners to provide virtual events (for example, meetings between entrepreneurs) and video tips for working from home.	Opportunity (virtual events)	Repurpose	No e-commerce	New e-services
62	USA	**Services** Communication, property & business services/ Coworking space	Coworking spaces shut down; instead provided COVID-19 support resources for members. Ran a free online conference on responding to COVID-19; created an online resource centre for coping with the virus.	Opportunity (support resources)	Repurpose	No e-commerce	New e-services
63	Australia	**Services** Communication, property & business services/ Media and	All work stopped – changed tack from media training to offer an online course 'Making Virtual Meetings Work' to avoid typical	Opportunity (online course)	Repurpose	No e-commerce	New e-services

(*continued*)

#	Country	General Sector/ Business description	Digital technology response classification and description	Crisis perspective	Digital response	e-commerce status	e-services status
		presentation training company	pitfalls. Also took the opportunity to upskill with online courses.				
64	USA	**Services** Communication, property & business services/ Music Studio, for professionals	Studio shut down. Moved to online, assisting musicians to operate their home studios. This resulted in more customers. They provided the software and equipment for musicians to collaborate online.	Disruption	Adaptation	No e-commerce	Converted to e-services
65	Australia	**Services** Communication, property & business services/ Property Management services	Most services shut down, for example showing properties and property maintenance. Introduced remote 3D inspections to simulate the actual experience.	Disruption	Adaptation	No e-commerce	Converted to e-services
66	USA	**Services** Communication, property & business services/ Real Estate	Moved to virtual dealings with clients: such as home tours and open houses. Luckily, the business had just moved to work with a new brokerage that had 'virtual agent' software.	Disruption	Adaptation	No e-commerce	Converted to e-services
67	USA	**Services** Communication, property & business services/ Business incubator	Could not meet face to face, so moved to remote meetings. All incubator businesses and advisors were meeting online. The business also began to use their coworking space to produce face shields for local hospitals. They had a 3D printer, used to produce the face shields (not a digital technology innovation).	Disruption	Adaptation	Existing e-commerce	Converted to e-services
68	USA	**Services** Communication, property & business services/ Coworking space and wellness courses for entrepreneurs.	Shut down face to face space; devised new programs which mirrored the physical location – virtual spaces, meditation; skill building; even DJ sets. Online courses run daily using Zoom and Vimeo.	Disruption	Adaptation	New e-commerce	Converted to e-services

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