Municipal pathways in response to COVID-19: a strategic management perspective on local public administration resilience

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This paper aims to understand the different resilience pathways local governments may take during moments of crisis, specifically focusing on the Covid-19 pandemic. Through survey responses from local administrations in Wallonia, Belgium, we consider how varied contexts led to different strategic resilience pathways. These pathways range from static (i.e., no strategy) to innovative change. Our findings highlight that digital technology solutions may play a role in supporting resilience across the different pathways. Therefore, we then adopt strategic public management literature to suggest propositions for future research to test the specific role that digital technologies play in supporting resilience within local administrations.

Keywords: Covid-19; resilience; strategic management; local public administrations; digital technology

1. Introduction

The Covid-19 pandemic put municipalities at the forefront of containing the virus and protecting citizens (OECD, 2020). Moreover, local public administrations have had to confront new realities in a period of uncertainty, such as social or physical distancing, while still maintaining services to citizens (Janssen & van der Voort, 2020; Maher et al., 2020). Indeed, the Covid-19 crisis has been cited as a “game changer for public administration” (Ansell et al., 2021, p. 2). This context has highlighted the resilience of local public administrations in maintaining operations during a complex time (Sakurai & Chughtai, 2020; Sharifi et al., 2021). The Covid-19 crisis led to widespread loss of human life and economic hardships felt worldwide, but in dealing with this tragedy, a window of opportunity emerged to address existing weaknesses within local public administrations alongside the unprecedented changes implemented to manage the crisis.

In this context, through an exploratory study, we aim to understand the different pathways that local administrations take in the face of critical exogenous events, such as the Covid-19 crisis. In particular, we ask: how did different local administration resilience strategies emerge to ensure the continuation of operations during the Covid-19 crisis? We moreover explore the different conceptualizations of resilience, in order to understand how resilience seen during Covid-19 may change future ways of operating by public administrations.

To answer our research question, we conducted a survey in June 2020, which was sent to all municipalities in the region of Wallonia in Belgium.¹ The survey was constructed according to

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¹ Wallonia is one of the three regions of Belgium.
five themes: 1) the new context created by the crisis, 2) solutions adopted in the face of this new context, 3) factors influencing the implementation of solutions, 4) the new or innovative character of the solutions, and 5) the enduring nature of the solutions. As a result, we are able to characterize a diverse set of pathways taken by local administrations of municipalities to solve given problems in order to ensure continuity of administrative operations.

As a first analytical step in this paper, we classify the survey responses into clear categories to provide an overall snapshot of how local administrations managed continued operations throughout the first wave of the Covid-19 pandemic. Thus, we evaluate how local public administrations seek to match internal capacities to the new context created by the crisis. As a second step, after pre-processing the data, we cluster survey responses to produce several groupings of municipalities that experienced similar situations. The results from the cluster analysis show there are four distinct groups of municipalities with regards to problems faced, actors affected, solutions adopted, and plans to keep solutions after the crisis is over. This reflects the effect of local context on a given pathway, leading us to suggest that there is no singular resilience strategy in response to the Covid-19 crisis, but a multiplicity of local strategies. More precisely, the particular set of solutions chosen by local governments to be resilient in the face of Covid-19 will be linked to their local contexts and will follow different strategic pathways of response to the crisis. The pathways ultimately show the different ways that local public administrations acted strategically in order to be resilient during the Covid-19 crisis.

Moreover, our exploratory study results show that digital technology solutions played an important role in certain clusters. This aligns with emergent literature about local resilience during Covid-19 that highlights the relevance of digital solutions to manage the Covid-19 crisis.
(Kummittha, 2020; Mora et al., 2021). This supports the notion of ‘one-size-does-not-fit-all’ policy, which conveys how local policy-makers do not innovate in a vacuum but design and implement place-based strategies of digital-government innovations, seeking to advance digital technology solutions to what they perceive as the most pressing problems of their territories (Esposito et al., 2021). Therefore, in the discussion we then adopt a strategic public management perspective (Boyne & Walker, 2010) to explain how our initial findings can be framed as propositions for future research to better understand the role of digital technologies in local government resilience for Covid-19.

The rest of the paper is structured as follows. Section 2 provides the background literature on resilience. Section 3 covers the methodology of the survey and subsequent analysis. Section 4 explains the results. Section 5 provides a discussion through a strategic management lens. Section 6 concludes.

2. Literature on resilience

Resilience is a subject treated within several domains, whose origins are said to be in the fields of engineering, biology, and psychiatry (Boin et al., 2010). The term was first coined by engineers to explain how a material can return to its original state after experiencing stress or a shock. After, resilience was also used to describe ecosystems, and their ability to re-establish their equilibrium after a disturbance (Holling, 1973; Shaw & Maythorne, 2013). The use of resilience for studying ecosystems eventually modified the understanding of the concept, as Holling (1996) suggested that ecosystems can in fact evolve following a shock, which results in a new equilibrium. Thus, while the ecological viewpoint considers the possibility of different points of equilibrium (Davoudi et al., 2012; Lambrou & Loukaitou-Sideris, 2021), across these fields of origin, the concept of resilience is however similarly used to show how the object of study (e.g., a material or an ecosystem) is able to overcome shocks (Boin et al., 2010).
In the social sciences literature, the concept of resilience is widely discussed (de Bruijne et al., 2010), and likely due to the multiple disciplines treating the subject, today no agreed-upon definition of resilience exists (Boin & Lodge, 2016). However, reviews of the concept of resilience have been covered in detail in the management of organizations literature (for examples see: Boin & Lodge, 2016; Boin & van Eeten, 2013; Hoegl & Hartmann, 2020; Lengnick-Hall et al., 2011). In this line, we revisit briefly the concept here to discuss the potential ways that resilience was seen for local administrations during the Covid-19 crisis.

Referring to the organizational level, Lengnick-Hall et al. (2011) examined two definitions of resilience. The first emphasizes the ability to rebound and return to a pre-crisis state. This definition focuses on ‘bouncing back’ to the initial equilibrium (Heeks & Ospina, 2019; Mallak, 1998), and thus largely employs coping strategies. The second definition of resilience goes a step farther, suggesting that resilience is not only about returning to the initial state before a crisis or shock occurred. Instead, being resilient means an organization not only manages the shock and adopts solutions to overcome the problems accompanying the shock, but aims to go beyond a simple recovery to build new capacities and capitalize on new opportunities (Lengnick-Hall et al., 2011). This transformative, adaptive view is echoed by Giustiniano et al. (2018, p. 3), who stated that for organizations, resilience is about absorbing shocks and “not only resisting stressors but also learning from them”.

With respect to the public administration field, the concept of resilience has been used to explain how administrations manage crises or extreme events. Beginning with research on the subject dating to the late 1980s in the social sciences domain (Boin et al., 2010; Duit, 2016), Wildavsky (1988) presented resilience as a strategy for dealing with risk and the unanticipated
problems it may cause. At the local level, Shaw and Maythorne (2013) discussed how resilience is understood by local public authorities. The authors find that the concept of resilience is more associated to recovery compared to transformation, indicating that in practice, local authorities tend to align more with the bouncing back definition. However, their research also shows that the potential for transformative resilience is emerging at the local level, and it is being linked to the current modern pressures and risks related to climate change. At the local level, it was moreover recognized that the concept of resilience can be used as an “overarching strategic framework” to break down silos and link different responsibilities across local governments (Shaw & Maythorne, 2013, p. 60). Subsequent studies centered on the local level also focus on the concept of resilience to evaluate its strategic element (Lambrou & Loukaitou-Sideris, 2021; Therrien et al., 2021), often related to the ability to plan for future crises linked to the risks associated to climate change.

Finally, resilience, notably at local levels, has been discussed in the context of Covid-19. Sakurai & Chughtai (2020) emphasize the importance of going beyond a ‘relief-centric’ view, to a proactive approach when we speak of resilience. This proactive approach to resilience relies on adaptation to the current crisis, and then an additional step that transforms an organization into a better functioning, more prepared entity. The literature further suggests that proactive resilience in the context of Covid-19 relies heavily on technology and data-driven solutions (Djalante et al., 2020; Ting et al., 2020).

Thus, both the general literature on the subject and the emerging literature on Covid-19 suggests that local administrations employ solutions to manage crises. These solutions may enable a return to normal operations (‘bouncing back’) or go further to improve future operations as a result of the hardships faced during the Covid-19 pandemic ("bouncing
Due to the novel situation of the Covid-19 pandemic, however, there was no literature found that discusses how the local context may affect the resilience pathways taken as a result of Covid-19. We therefore take an exploratory approach through a survey in order to better understand how local governments develop resilience strategies with contextualized sets of solutions to manage the Covid-19 crisis.

3. Methodology

3.1 Sample

The survey was sent to all the local administrations of municipalities in Wallonia in June 2020. The response rate was 17% (44 out of 262 municipalities). While the low response is viewed as a limit of this study, the sample is representative of the five different provinces of Wallonia, as well as the urban or rural nature of municipalities\(^2\), which have been shown as useful characteristics to gauge representativity in other studies on Belgium (Desdemoustier et al., 2019).

As we have a particular interest in better understanding the resilience strategies during the first wave of Covid-19, we chose Belgium as the empirical setting for our study. Belgium is an appropriate setting due to the sharp effects that Covid-19 had on the country, which demanded action from both federal and local governments (Luyten & Schokkaert, 2021). Indeed, as of June 2019, Belgian had both the highest case-fatality ration and mortality rate per 100,000 people in the world (Desson et al., 2020). While no literature has been found related specifically to local administration responses to Covid-19, due to the impact that the health crisis had on the country, the effects of Covid-19 in Belgium have been widely studied across other domains (for examples, see: Dellicour et al., 2021; Luyten & Schokkaert, 2021; Sannigrahi et al., 2020).

\(^2\) Representation determined through a Chi-Square test with 5% significance level.
Moreover, we chose Wallonia within Belgium due to the particular emphasis the region has placed on local strategies, such as the recovery strategies linked to the changes required alongside the industrial transition (Esposito et al., 2021) or the ‘transversal strategic program’ (*programme stratégique transversal, PST* in French) for local municipal management (Fallon et al., 2016).

### 3.2 Data collection

The survey was constructed according to five themes: 1) the new context created by the crisis, 2) solutions adopted in the face of this new context, 3) factors influencing the implementation of solutions, 4) the new or innovative character of the solutions, and 5) the enduring nature of the solutions. Designing the survey in this manner allows us to evaluate the pathway a municipality takes given the context they face as a result of the Covid-19 crisis. The survey was designed with questions that had an open answer format. Since the situation was largely unprecedented, the purpose for this format was to avoid limiting responses from municipalities by asking them to respond to closed questions that place boundaries on potential answers.

### 3.3 Data analysis

For the data analysis, we first prepared the data, which included coding the survey responses into categories. This categorization was carried out through a triangulation process among authors (Yin, 2014). As an example, for the survey question ‘What are the main areas or municipal matters for which you have identified new difficulties or needs?’, we categorized responses into: ‘communication’, ‘reorganization of work’, and ‘distribution of personal protection equipment’. If a municipality cited one of these responses, it is coded as 1 in the dataset, while if it did not cite one of these responses, it is coded as a 0. For most questions, the top three responses were included in the final data set. The exception for this was for the
solutions, where the top five responses were included. The reason for this is that there were stronger and more diverse responses provided for solutions, and to not include them risked losing vital information. This selection process has both pros and cons. The drawbacks are most notably the loss of information that comes with most often taking only the top three responses. However, the advantage is that it reduced the number of categories to consider, which ultimately led to a model with more interpretable results. Moreover, as there were common themes found across the different survey questions, information that was lost for some questions is regained in others. An example is that the category ‘local economy’ was eliminated as a problem caused by Covid-19, since it was not widely cited across all municipalities. However, local economic actors were widely cited, and thus still appear in the scope of defining the context. We also see solutions provided to support the local economy in the subsequent question. Thus, we can show that the reduction of categories used for the cluster analysis does not necessarily lead to a reduction in information captured originally by the survey. Table 1 displays the questions that were asked to survey respondents according to each theme, and how these questions are eventually coded for the analysis.

[Table 1 near here].

In order to determine the pathways taken by the municipalities, we have a second step in the data analysis, which is to cluster survey responses into different groups of municipalities. Adopting a similar approach to Pinto (2019), we use cluster analysis to analyze government strategies in relation to their context. There are several different response categories resulting from the coding exercise. Therefore, we reduce the number of survey respondent categories to more easily interpret our survey data. To do this, we apply a principal component analysis (PCA) for binary data, called logistic PCA. We choose PCA analysis in this case, as it can
reduce the dimension of data while still keeping as much variation as possible from the original data (Jolliffe, 2002). Moreover, dimension reduction through PCA is shown to be beneficial for K-means clustering results (Ding & He, 2004), the method we adopt for the clustering analysis to find the different resilience strategies. For the logistic PCA, we use the logisticPCA R package (Landgraf & Lee, 2015). The standard cut-off range is between 70 and 90% variance explained (Jolliffe, 2006). In order to keep only the most meaningful components, we use the lower end of the scale, ultimately choosing a model with seven principal components accounting for 70% of variation explained. To cluster the principal components, we use a K-means clustering method (Pedregosa et al., 2011). Four clusters were selected based on two approaches for choosing the number of clusters following a K-means analysis (Abdullah et al., 2021): (1) the Elbow method, which aims to show that the number of clusters should be chosen when an additional cluster does not provide a better model (Bholowalia & Kumar, 2014) and (2) the Silhouette method, which provides the closeness of each point in a given cluster with the points in other clusters. In K-means clustering, each observation will fall into one cluster only (Mirkin, 2019), which entails that each municipality will belong to only one cluster in this study.

4. Results

The four clusters, described in detail below, are characterized according to the context, the solutions, the factors influencing the implementation of solutions, the innovative character of solutions, and the enduring nature of solutions of the municipalities that populate each cluster. By innovative character, we mean that a solution implemented due to the crisis was not foreseen before the emergence of Covid-19. We further validate the clusters using excerpts taken from the raw data, cited alongside the description of the clusters. This provides a narrative to better understand which specific actions were taken by the municipalities and why. One
cluster did not implement a defined resilience strategy. However, consistent with the literature, we identify strategies such as bouncing back and bouncing forward. We moreover also identify a strategy that goes further, which we label bouncing beyond. Table 2 provides a summary of information for each cluster pathway.

[Table 2 near here].

4.1 ‘Static’ Cluster

The first group of municipalities can be summarized as a cluster that indicated they were not significantly affected by the Covid-19 crisis, with the exception of the administration employees that deal with citizens regularly or municipal workers. These employees were involved in emergency management. For instance, the Mayor of one municipality said, “There has been a new range of processes to be set up [during the most critical moments].” However, thanks to the support of central government administrations, the setting up of these processes did not pose many problems: “Managing a pandemic is not our core business, our mayors and the officers involved in the emergency management [were under pressure] for 3 months, this is a long period. Fortunately, the federal state supported us, and took charge of all key institutional, administrative, and communication aspects.” Therefore, there was a low overall reference of problems, and the support from the regional or federal governments seemed sufficient to manage the crisis. As a consequence, municipalities in this cluster implemented a weak portfolio of solutions. We also saw that the solutions were largely not technical in nature, such as “the reception of citizens in the municipal administrations by appointment and the installation of physical obstacles like plexiglass protections.” Likely related to the low implementation of the solutions, the municipalities in this cluster did not reference notable barriers or actors as instrumental for the implementation of solutions. Moreover, no solutions
were previously planned, and the solutions will not be kept going forward. As a result, the pathway is named the ‘Static’ cluster to reflect a lack of resilience strategy.

4.2 ‘Bounce Back’ Cluster

The second group of municipalities largely saw problems associated with personal protection equipment (PPE) distribution and the local economy, and thus focused on directly addressing these issues. For instance, the Emergency Planning Coordinator of one municipality says, “Fear, there was fear of contamination among our employees. The number of people, including both citizens and employees, that is usually present in the physical spaces of the municipality is high, thus increasing the risk of contamination. For this reason, we needed to be provided with protective equipment.” For the local economy, municipalities in this cluster cited solutions that included fiscal measures such as “the reduction of waste taxes by 25%”, “the abolition of the tax on drinks and tobacco”, and “the abolition of the municipal tax for the occupation of public land by bars, coffee shops, and restaurants.” Since the second theme included a question that asks if technology was used in at least one of the solutions adopted to respond to the Covid-19 pandemic (see Table 1, question 2c), findings also emerged on this subject. Indeed, the solutions for this cluster included digital logistic solutions – such as “the setting up of an online sales platform to support local traders in the home delivery of their services and products”, as well as financial incentives to stimulate the internal demand of municipal economies such as “prepaid electronic cards of 30€ to households based in the municipality or 10% bonus on the purchase of vouchers issued by local businesses.” As these are punctual problems that did not greatly impact the functioning of the internal administration, the implemented solutions were not foreseen, and do not require continuation after the crisis is over. In effect, the municipalities falling into this group implemented a resilience strategy that aims to bounce back from the Covid-19 crisis. For this reason, we label this group the ‘Bounce Back’ cluster.
4.3 ‘Bounce Forward’ Cluster

The third group of municipalities mostly faced issues about the reorganization of internal administration work. The social distancing measures imposed by the central government meant that the “existing spaces became too small for the number of employees usually present in the municipal rooms.” As far as front-end activities are concerned, e-counters were introduced in order to enable the remote exchange of documents between the administration and citizens, which “has made it possible to continue to manage requests for social assistance. In the social services department, we have introduced the electronic transmission of documents much more extensively than usual. In addition, we have also arranged online meetings by videoconference with the users.” Thus, the municipalities implemented a variety of solutions to continue working while respecting physical distancing constraints. These same measures have additionally had important implications for the conduct of key decision-making processes of municipal administrations such as “city council meetings that could no longer be held in attendance.” There was also a reference to external “communication problems mainly towards citizens.” Indeed, social media communication solutions (for example, Facebook posts) were developed “to better inform citizens.” “The acquisition of videoconference equipment was important to accomplish these changes” but, in addition to technical equipment, soft skills were important too as, in the emergency context of Covid-19, “working from home had to be set up through informal organization heavily based on trust relationships between employees.” While these municipalities largely focused on working from home solutions to manage the situation brought on by Covid-19, these types of solutions were in some cases planned before the crisis. Therefore, we can see an acceleration of working from home solutions, which often implicated the use of digital technology. Therefore, we name the resilience strategy here the ‘Bounce Forward’ cluster.
4.4 ‘Bounce Beyond’ Cluster

For the final cluster, we can characterize it as a group of municipalities that faced several important problems due to Covid-19. There were problems arising from “the organization of online meetings during the confinement period and the setting up of new working from home processes.” There were also communication problems, such as “communicating with citizens and managing fake news in social media.” As explained by the Director General of a municipality, communication with citizens was not an easy task as “responding to citizens’ questions without any reference to FAQs is not our usual job. Often there was not adequate information provided by the central government to answer citizens’ questions.”

Notwithstanding the difficult context, these municipalities responded with a broad portfolio of solutions and implicated leaders, notably the Director General, to combat these problems. All municipalities provided financial and/or logistic support for the local economy – such as “the reduction or abolition of diverse taxes for local businesses in the hospitality, restaurant, and coffee shop industries”, and “to set up a platform enabling restaurants and coffee shops to deliver their products directly to clients’ homes.” Communication solutions were also strongly implemented, such as “setting up a call center for citizens” and “sharing information with citizens through social media and websites.” There were additionally working from home solutions that involved “not only the purchase of new ICT equipment, but also the integration of new homeworking practices in the administrative law of our city.” Finally, municipalities adopted streaming solutions to allow for city council meetings at a distance, but also “to stay connected to our citizens.” In total, this group seems to be experiencing a positive ‘disruption effect’ related to the new solutions, and notably their technical nature, since this cluster has a net gain in municipalities that had not foreseen these solutions but will now keep them.

Moreover, as cited in the responses above, the implementation of these solutions involved a
change in organizational processes that are envisioned to be kept in the long term. As a result, this pathway is named the ‘Bounce Beyond’ cluster.

5. Discussion

Clustering the survey results defined pathways that municipalities in Wallonia took in order to manage the Covid-19 crisis and ensure the continuation of operations. It must be noted that the timing of resilience – meaning either before, during, or after a crisis – is important (Meerow et al., 2016; Therrien et al., 2021). Here we can see what municipalities have done during the crisis and extrapolate from the responses what they plan to do after.

Moreover, it emerged from our survey results that digital technologies may play a role in the resilience of local administrations, even after the crisis period is over. To consider this finding in more detail, we view and discuss the results of our study through a strategic management lens, and then suggest propositions, related to the role that digital technology may play, to test for future research based on the three strategies we identified. We support the logic for these propositions with findings from recent literature on the Covid-19.

The debates on resilience in the public administration domain developed above are, in part, in response to a ‘new normal’, which includes transboundary crises (Boin & Lodge, 2016), such as Covid-19 (Weible et al., 2020). As developed above in the review of the resilience literature, this linkage is anchored in the notion that resilience acts as a strategy to manage disasters and crises (Boin & Lodge, 2016; Wildavsky, 1988). It is for this reason that we largely adhere to the literature on strategic public management to view our results. However, research on crisis management is at times used to enrich the arguments made in this paper, as the two fields are linked and even complementary (Preble, 1997).
Boyne and Walker (2010) propose that organizations adopt strategies to reach given objectives. Strategies in the public sector can be seen as a means to improve public service performance, and ultimately administer better services. Moreover, it has been argued that public strategies can help deal with problems caused by surprising and uncertain events, such as the Covid-19 crisis (Ansell et al., 2021). When faced with an exogenous shock or crisis, organizations may embrace strategic change. This change leads to a “rebalancing of strategic priorities and stances as organizations seek to match their internal capacities to the external environment” (Boyne & Walker, 2010, p. S190).

Strategy can be a broad concept (Johnsen, 2016), that does not necessarily need to be a written strategy document. Indeed, for municipalities, strategy can be viewed as a series of individual decisions that, when combined, contribute to successful municipal management (Knutsson et al., 2008). Concretely, strategy may be defined as an approach to aligning the aspirations and the capabilities of public organizations or other entities in order to achieve goals and create public value (Bryson & George, 2020; Ferlie & Ongaro, 2015). Thus, in the context of our research, we view municipal strategic change during the Covid-19 crisis as the decisions implemented in order to manage continued internal administration operations in the face of an exogenous shock.

Moreover, the most recent literature on public strategies in the context of turbulent problems – defined as “surprising, inconsistent, unpredictable, and uncertain events” (Ansell et al., 2021, p. 1) – suggests that aiming for resilient solutions that simply recover from shocks like Covid-19, but do not go farther, may not be the appropriate solution for a variety of reasons. This is because these types of events may be unpredictable, and in order to mediate future shocks, the
public administration system must adapt (Ansell et al., 2021). Thus, it is important to consider, in addition to the different pathways local administrations take to navigate external shocks or crises, how the local administration may strategically adapt as a result of Covid-19 in a more permanent manner.

When considering the strategies that local administrations adopt in this context, we emphasize the local context of each municipality. For the purposes of this paper, the context is viewed as the main problems experienced and the main actors, internal and external to the administration, affected during the Covid-19 crisis. Depending on how the organization reacts to external shocks, such as the Covid-19 crisis, will depend on the context (Janssen & van der Voort, 2020; Kummitha, 2020). Our results indeed showed how municipalities took different pathways to manage the crisis according to the local context.

In addition to the configuration of solutions used in certain strategic pathways, our survey results indicated that technology played a role. This follows previous research on the use of digital technologies by public administrations in the context of Covid-19, which has highlighted the importance of how relevant actors perceive the use of a given digital technology for their context (Mora et al., 2021). Technological adoption – and specifically the appropriate use of a digital technology for a given local situation – for the purposes of increased resilience is seen across scales, for both rural (Young, 2019) and urban contexts (Deal et al., 2017; Serre et al., 2013). Digital technologies have also been used by local governments to promote resilience in times of a crisis or to manage an external shock (Boyd & Juhola, 2015; Mora et al., 2021; Pike et al., 2010; Sakurai & Chughtai, 2020). Moreover, the strategic management literature tells us that technology has helped organizations continue to function in uncertain
situations or during shocks and crises across different contexts (Akpan et al., 2020; Linden, 2021; Papadopoulos et al., 2020).

For three cluster pathways, ‘Bounce Back’, ‘Bounce Forward’, and ‘Bounce Beyond’, we saw how strategies enabled local administrations to act resiliently and continue to function during the Covid-19 crisis. For each of these cases, there was a technological element that supported this resilience. For instance, in the case of the ‘Bounce Back’ cluster, these municipalities used digital technology to navigate the Covid-19 crisis, but as most of the problems were linked with the distribution of PPE and/or actors in the local economy, these were rather punctual in nature. Technology was called upon in strategic responses, but it was not foreseen and will not be kept going forward. The ‘Bounce Back’ cluster can be viewed as resilient to the extent that the municipalities were able to offer support to return to a situation similar to before Covid-19.

This is furthermore supported by findings from previous studies on Covid-19. For instance, Sharifi et al. (2021) found that technologies helped local areas bounce back as they provided support to burdened staff and provided new methods to ensure continuity of tasks. It is also suggested that without technologies, it would not have been possible to replace in-person activities in local areas (Mouratidis, 2021) and that technology enabled the continuation of work activities while respecting distancing regulations (Teng-Calleja et al., 2020). For this reason, we suggest the first proposition to test:

Proposition 1: Digital technology solutions can be used strategically to support the resilience of public administrations vis-à-vis the Covid-19 crisis, enabling local administrations to ‘bounce back’.
For two clusters, ‘Bounce Forward’ and ‘Bounce Beyond’, we saw how the strategies enabled municipalities to not just return to the pre-crisis status, but also improve certain ways of operation. Moreover, for these two clusters, there was a certain level of technological acceleration. This aligns with the literature, as resilient organizations are able to positively adapt during crisis situations, they also can change quickly and on short notice (Lengnick-Hall et al., 2011). Therefore, the local governments using digital technology solutions to support the resilience of public administrations should attempt to adapt rapidly. As the management of modern pandemics relies on digital technology solutions (Kummitha, 2020; Sakurai & Chughtai, 2020), this may mean an acceleration in adoption of technology if the solutions are not already in place. Indeed, this suggests that municipalities who have previously planned or thought of implementing new technologies might advance their timeline in order to cope with Covid-19.

For the ‘Bounce Forward’ cluster and ‘Bounce Beyond’ cluster pathways, there is evidence that previously planned solutions were implemented more rapidly than intended as a result of the Covid-19 crisis. These clusters both end up keeping a set of solutions from the Covid-19 crisis. However, there are still distinctions between the two groups, as the ‘Bounce Forward’ cluster is more focused on the re-organization of work and working from home, while the ‘Bounce Beyond’ cluster is more focused on digitalization generally (and to a lesser extent communications). Thus, the ‘Bounce Forward’ cluster experienced issues with the reorganization of work, and thus implemented solutions to address these problems. However, many of the solutions were planned, and as a result, most will be kept going forward. Thus, there was an acceleration effect. The ‘Bounce Beyond’ cluster also shows evidence of acceleration in this way, since some measures related to working from home, digitalization,
and communication were previously planned, but there is a supplementary finding related to this group of municipalities.

The notion that Covid-19 accelerated digitalization is also widespread in the recent literature. Sharifi et al. (2021, p. 18) found that technologies enabled adaptation and that the “pandemic appears to have accelerated the digitalization trend faster than previous predictions”, while Mikhaylova et al. (2021) suggested that Covid-19 triggered a rapid uptake of digital innovation. In an overview of 21 countries and their digital responses linked to Covid-19, Meijer et al. (2020) found that several countries saw an acceleration of digitalization amongst public administrations. This was the case even in situations that had experienced significant barriers to digitalization previously, due to either legal reasons or the culture of civil servants. From these insights and the findings of our study, we thus suggest Proposition 2:

Proposition 2: The Covid-19 crisis can accelerate the adoption of digital technology solutions, as local administrations use these solutions in resilience strategies. This acceleration enables municipalities to ‘bounce forward’.

In addition to the notion of administration improvements and the accompanying technological acceleration, more substantial strategic changes have been seen as a result of Covid-19 (Wirtz et al., 2020). For example Kamal (2020) explains how Covid-19, despite its disruptive nature, has led to an accelerated uptake in digital communication and teaching platforms, amongst other innovations, while Kudyba (2020, p. 286) suggests that the “pandemic introduced a Y2K type of disruption to many organizations”. The nature of work in some public administrations has now changed and the initial reaction to the crisis in terms of how to provide services and to operate provided benefits to administrations (Posselt, 2021). These changes were made to
adjust rapidly to the Covid-19 situation but may in fact become permanent fixtures among organizations.

This linkage draws on work related to Digital Era Governance (DEG). DEG suggests that “Instead of electronic challenges being seen as supplementary to conventional administrative and business processes, they become genuinely transformative” (Dunleavy et al., 2006, p. 480). Indeed, for public administrations, DEG suggests the main implication of digitalized tools or processes in fact come from the accompanying changes in the organization, and not the digital technology itself. Here we draw parallels, as the uptake in new, unplanned digital technology solutions due to the Covid-19 crisis have the potential to shift ways of operating in local public administrations as they ‘bounce beyond’, even if the technology itself is not viewed as a radical solution.

From a different angle, Covid-19 also spurred several innovations related to smart city technologies among local governments in response to the crisis (Kummitha, 2020). Such solutions include new epidemiological systems based on data platforms (Kang et al., 2020) or innovative technology deployment, like big data analytics, to minimize the spread of the virus and support crisis management (Hassankhani et al., 2021). As a result, we propose Proposition 3:

Proposition 3: The Covid-19 crisis can create a positive ‘disruption effect’ for the adoption of digital technology solutions, as local administrations use these solutions in resilience strategies that, as they are in response to an unforeseen crisis, were not

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3 For the purposes of this paper, we consider any solution that was not planned prior to Covid-19 that emerged because of the crisis as innovative. In this context, however, there is evidence to suggest that many of the innovations were related to digital technologies.
previously planned. This innovative uptake of digital solutions enables municipalities to ‘bounce beyond’.

Based on our survey results, and findings from the literature, these three propositions allow us to theorize different strategic pathways of municipal responses to Covid-19 where local governments mobilize digital technologies as a solution to the crisis, represented in Figure 1. We suggest these propositions for future research as the crisis comes to a close.

Figure 1: Three strategic pathways of municipal responses to Covid-19, as well as the static case that represents no change. The x-axis represents the effect of Covid-19 on a given municipality, and the y-axis represents the type of resilience seen due to Covid-19. The time $t$ is during Covid-19, while time $t+1$ is after Covid-19. Source: Authors’ elaboration.

6. Conclusion

Crises are often a catalyst for change. Resilient administrations are, at a minimum, able to adapt to the new circumstances, and, in some cases, are able to learn from the difficulties experienced to innovate and improve for the future. To this effect, this paper reveals the different strategic pathways that local administrations in Wallonia, Belgium took in face of the Covid-19 crisis in order to act resiliently. A particular emphasis has been put on the steps taken to ensure the continued operations of local administrations, and how this may affect their means of operation
after Covid-19 passes. Our findings contribute to the nuance of the concept of resilience, as we saw how strategic pathways led to different responses by the municipal administrations.

These pathways reflect different responses to different local contexts. This shows how external shocks, such as pandemics, have varied impacts on local contexts in terms of the problems experienced by local administrations. Because of the range of impacts felt, municipalities will embrace a variety of solutions that suit their needs. The pathways moreover show that a greater response in terms of number and variety of solutions implemented is linked with the level of disruption caused by the crisis. Indeed, where there were widespread issues affecting numerous or important actors within the local administrations, we saw that more solutions, and more solutions that are intended to be long-lasting, were implemented. These solutions were additionally often associated with digital technology. In contrast, when municipalities did not experience significant difficulties in managing the crisis associated with the Covid-19 pandemic, they did not implement solutions to manage the crisis. This suggests that technological solutions may be particularly useful when local administration operations are significantly disrupted. However, in order to confirm these initial insights, future studies will be needed to test the specific propositions proposed in the discussion.

The lessons learned from these findings therefore suggest that technology, to a certain point, may help strategically implement solutions that weather crises and can improve local administrations in the long run. Concretely, when a crisis interrupts the ability of a local administration to carry out operations, technological solutions can support resilience. The results also suggest that leaders within public administrations have a strong role to play in guiding strategic change and can ensure long lasting benefits from decisions taken during moments of uncertainty.
From these results, two main recommendations can be considered. First, in the current context where more crises and unpredictable serious events are forecasted for the future, local administrations can begin to strengthen their technical capacity and infrastructure. Fortifying a local administration with these basics will increase preparedness, and the ability to react in a timely manner with locally appropriate solutions. Second, leadership was noted as an important aspect of the resilience of the ‘Bounce Beyond’ cluster pathway. This underscores the need for leaders in local administrations to consider strategic plans for future events. In line with the different conceptualizations of resilience, these suggestions could help municipalities not only bounce back to the initial state or bounce forward to an improved state, but also bounce beyond, where improvements are implemented, but also the capacity to manage difficult situations is increased through newly adopted solutions and practices.

Some limits to our research should be highlighted. As our survey was carried out in only one region, the results may not be applicable for other contexts that differ greatly from the situation in Wallonia. The survey also had a response rate of only 17%. Second, this survey was done in June 2020, when we did not know the extensive nature or duration of Covid-19, and before the subsequent waves of cases came. Thus, as previously mentioned, this study therefore presents initial insights only. In order to complement these findings, follow-up work is needed after the pandemic is over, ideally among a broader set of municipalities. Also, we focused only on the results from the survey. Future studies could investigate if other variables, such as existing technology infrastructure or urbanization levels, had an impact on public administration resilience during this time.
Despite these limits, this study provides insight into the pathways that municipalities took when responding to the Covid-19 crisis, particularly with respect to ensuring the operation of the local administration in order to continue to provide services and support to the local society. This paper contributes to understanding how local public administrations react in times of crisis, and specifically adds to the literature on this subject related to strategic management in the context of public administrations. This has moreover provided new insight and future propositions to test about how technology can support local government resilience during moments of crisis, and the long-lasting effects of acting resiliently. In effect, this provides understanding about how municipalities can ‘bounce beyond’ as a result of crises.
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<table>
<thead>
<tr>
<th>Theme</th>
<th>Question(s)</th>
<th>Coded survey response categories (binary)</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The context</td>
<td>1a. Has your municipality been confronted with one or more problems caused by Covid-19?</td>
<td>1b. The main areas or municipal matters that are facing new difficulties or needs</td>
<td>1b-1: Communication 1b-2: Reorganization of work 1b-3: Personal protection equipment (PPE) distribution</td>
</tr>
<tr>
<td></td>
<td>1b. What are the main areas or municipal matters for which you have identified new difficulties or needs?</td>
<td>1c. The main internal actors affected by Covid-19</td>
<td>1c-1: Personnel who work directly with the population 1c-2: Municipal workers 1c-3: Mayor or Director General</td>
</tr>
<tr>
<td></td>
<td>1c. Who are the actors most affected by Covid-19 within your municipality internal to the administration?</td>
<td>1d. The main external actors affected by Covid-19</td>
<td>1d-1: Health personnel 1d-2: Local economy (e.g., stores, hospitality sector) 1d-3: Elderly and/or isolated population and retirement homes</td>
</tr>
<tr>
<td></td>
<td>1d. Who are the actors most affected by Covid-19 within your municipality external to the administration?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The solutions</td>
<td>2a. Faced with the problems mentioned above, has your municipality developed or is it in the process of developing solutions?</td>
<td>2b. The main solutions implemented</td>
<td>2b-1: Financial and/or logistics support for local economy 2b-2: Communication solutions 2b-3: Working from home solutions</td>
</tr>
<tr>
<td></td>
<td>2b. Can you list and provide details for these solutions in a few words?</td>
<td>2c. If the solutions were technical in nature</td>
<td>2b-4: Video-conferences, virtual reunions 2b-5: Live-streaming of municipal meetings</td>
</tr>
<tr>
<td></td>
<td>2c. Have you used digital technologies/applications in the implementation of at least one of these solutions?</td>
<td></td>
<td>2c-1: Implementation of at least one solution that was technical in nature – if technology was present in (at least one of) the solution(s).</td>
</tr>
<tr>
<td>3. Factors influencing \ implementation of solutions</td>
<td>3a. What are the departments and people (specify their function) mobilized within the administration to implement these solutions?</td>
<td>3a. The main departments in the local administrations who implemented solutions</td>
<td>3a-1: Director General 3a-2: ICT department 3a-3: Communication department</td>
</tr>
<tr>
<td></td>
<td>3b. What are the hindrances/obstacles you experience in implementing these solutions?</td>
<td>3b. The main obstacles experienced in implementing solutions</td>
<td>3b-1: Technical skills 3b-2: Time 3b-3: Financing</td>
</tr>
<tr>
<td></td>
<td>3c. Did you call on actors outside the administration for the implementation of these solutions?</td>
<td>3c. If an external service provider was called on to help with the implementation of services</td>
<td>3c: If an external service provider was called to help with the implementation of technology</td>
</tr>
<tr>
<td>4. Innovative character of solutions</td>
<td>4a. Was the development of the solutions already planned before Covid-19?</td>
<td>4a. If the solution was already planned before Covid-19</td>
<td>4a-1: Working from home solutions 4a-2: Digital solutions (e.g., Video-conferences, virtual reunions) 4a-3: Communication solutions</td>
</tr>
<tr>
<td>5. Enduring nature of solutions</td>
<td>5a. Do you plan to maintain at least one solution beyond the Covid-19 situation?</td>
<td>5a. If the solution will be kept beyond Covid-19</td>
<td>5a-1: Working from home solutions 5a-2: Digital solutions (e.g., Video-conferences, virtual reunions) 5a-3: Communication solutions</td>
</tr>
</tbody>
</table>

Note: We do not code if (yes or no) the municipality experienced problems, since this will be largely be captured by the other categories (as a no across all categories) or if (yes or no) the municipality developed solutions, since this will be largely be captured by the other categories (as a no across all categories) (referring to questions 1a and 2a, respectively). Category 2c was coded slightly differently from the original question since the external service provider, when called upon, was overwhelmingly used for technological purposes.
Table 2: Descriptions of each cluster according to their survey responses. For each point, the percentage of municipalities in a given cluster are in parentheses. N/A means ‘Not applicable’.

<table>
<thead>
<tr>
<th>Clusters Pathways</th>
<th>Static Cluster</th>
<th>Bounce Back Cluster</th>
<th>Bounce Forward Cluster</th>
<th>Bounce Beyond Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>12 municipalities</td>
<td>11 municipalities</td>
<td>12 municipalities</td>
<td>9 municipalities</td>
</tr>
<tr>
<td><strong>The context</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Administrative actors in contact with citizens affected (67%)</td>
<td>- Problems with distribution of PPE (67%)</td>
<td>- Problems with reorganization of work (50%)</td>
<td>- Problems with communication (88%)</td>
<td></td>
</tr>
<tr>
<td>- Municipal workers (e.g. cleaning staff) (67%)</td>
<td>- Local economy negatively impacted (91%)</td>
<td>- Problems with reorganization of work (67%)</td>
<td>- Director General and Mayor affected (89%)</td>
<td></td>
</tr>
<tr>
<td>- Problems with work (91%)</td>
<td>- Local economy negatively impacted (91%)</td>
<td>- Problems with communication (67%)</td>
<td>- Administrative actors in contact with citizens affected (56%)</td>
<td></td>
</tr>
<tr>
<td>- Elderly and/or isolated people and retirement homes (56%)</td>
<td>- Director General and Mayor affected (89%)</td>
<td>- Administrative actors in contact with citizens affected (56%)</td>
<td>- Elderly and/or isolated people and retirement homes (56%)</td>
<td></td>
</tr>
<tr>
<td><strong>The solutions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Weak portfolio of solutions, largely not technical in nature</td>
<td>- Support for local economy (fiscal, financial, or logistic) (73%)</td>
<td>- Virtual solutions (75%)</td>
<td>- Support for local economy (fiscal, financial, or logistic) (100%)</td>
<td></td>
</tr>
<tr>
<td>- Support for local economy (fiscal, financial, or logistic) (73%)</td>
<td>- Technology in solution (91%)</td>
<td>- Working from home (58%)</td>
<td>- Communication solutions (67%)</td>
<td></td>
</tr>
<tr>
<td>- Technology in solution (91%)</td>
<td>- Virtual solutions (75%)</td>
<td>- Communication solutions (50%)</td>
<td>- Working from home (67%)</td>
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<tr>
<td>- Technology in solution (92%)</td>
<td>- Virtual solutions (75%)</td>
<td>- Communication solutions (50%)</td>
<td>- Streaming of municipality meetings (56%)</td>
<td></td>
</tr>
<tr>
<td>- Technology in solution (100%)</td>
<td>- Virtual solutions (75%)</td>
<td>- Communication solutions (50%)</td>
<td>- Technology in solution (100%)</td>
<td></td>
</tr>
<tr>
<td><strong>Factors influencing the implementation of solutions</strong></td>
<td>N/A</td>
<td>- Lack of finance (45%)</td>
<td>- Lack of technological competencies and infrastructure (67%)</td>
<td></td>
</tr>
<tr>
<td>(Supporting factors, barriers)</td>
<td></td>
<td>- Director General support solutions (55%)</td>
<td>- ICT department support (67%)</td>
<td></td>
</tr>
<tr>
<td>- Lack of finance (45%)</td>
<td>- Director General support solutions (55%)</td>
<td>- ICT department support (83%)</td>
<td>- Lack of technological competencies and infrastructure (67%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- ICT department support (100%)</td>
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<tr>
<td><strong>Innovative character of solutions</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>- Working from home (25%)</td>
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<tr>
<td>(Previously planned solutions)</td>
<td></td>
<td></td>
<td>- Working from home (11%)</td>
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<tr>
<td>- Working from home (25%)</td>
<td>N/A</td>
<td>N/A</td>
<td>- Digital solutions (83%)</td>
<td></td>
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<tr>
<td>- Digital solutions (83%)</td>
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<td></td>
<td>- Digital solutions (56%)</td>
<td></td>
</tr>
<tr>
<td>- Communication solutions (25%)</td>
<td></td>
<td></td>
<td>- Communication solutions (33%)</td>
<td></td>
</tr>
<tr>
<td>- Communication solutions (25%)</td>
<td></td>
<td></td>
<td>- Communication solutions (33%)</td>
<td></td>
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<tr>
<td><strong>Enduring nature of solutions</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>- Working from home (83%)</td>
<td></td>
</tr>
<tr>
<td>(Solutions to be kept past Covid-19)</td>
<td></td>
<td></td>
<td>- Working from home (22%)</td>
<td></td>
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<tr>
<td>- Working from home (83%)</td>
<td>N/A</td>
<td>N/A</td>
<td>- Digital solutions (78%)</td>
<td></td>
</tr>
<tr>
<td>- Digital solutions (50%)</td>
<td></td>
<td></td>
<td>- Digital solutions (78%)</td>
<td></td>
</tr>
<tr>
<td>- Communication solutions (17%)</td>
<td></td>
<td></td>
<td>- Communication solutions (33%)</td>
<td></td>
</tr>
</tbody>
</table>