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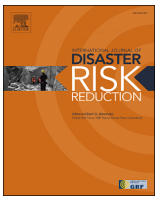

Building organizational adaptive capacity in the face of crisis: Lessons from a public sector case study

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ABSTRACT

While organizations providing critical services to society must have the ability to anticipate and prepare for foreseeable threats, they also need to develop a capacity to adapt in the face of unforeseen challenges and crises. While adaptive capacity becomes manifested in a specific situation through the concrete adaptations carried out by an organization, the preconditions to adapt exist already before a crisis occurs. However, previous research indicates significant knowledge gaps regarding how these preconditions are established and maintained within an organization. Against this backdrop, this paper aims to enhance our understanding of the preconditions necessary to adapt to an unfolding crisis. This is achieved by exploring how adaptations were manifested during the COVID-19 pandemic in a Swedish public sector organization and the factors that contributed to this adaptive capacity. A range of enabling factors for such adaptive capacity are identified, including a high level of trust between roles and organizational levels, a polycentric organizational structure where departments work autonomously while still allowing some degree of central coordination, clear overall objectives, capitalization on previous experience from both minor and major crises, and asset literacy among employees. The paper concludes by discussing some idiosyncrasies of the COVID-19 pandemic that facilitated adaptations. This includes the fact that virtually everyone was both impacted by and actively contributing to responding to the crisis. Finally, the discussion elaborates on the parallels and distinctions when compared to a creeping crisis.

1. Introduction

A wide range of events, including but not limited to pandemics, forest fires, floods, cyber-attacks, and hybrid threats, have the potential to inflict severe damage on human life, the economy, and other societal values. While some events can be anticipated, other events may come more or less as a surprise. Creating a sustainable and resilient society necessitates the continuous development and maintenance of the requisite capacities to prevent, withstand, adapt to, recover and learn from both foreseeable and unforeseeable events [1].

Foreseeable events are typically addressed through anticipatory plans, tools and strategies. This includes, for example, risk and vulnerability assessments, planning, training, and the acquisition of necessary personnel, equipment, and resources to manage identified scenarios and expected circumstances. Unforeseen events, on the other hand, require an organization to have the ability to adapt its activities and responses to situations it has not yet imagined [2]. Working according to pre-established plans is simply insufficient

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to handle surprises and anomalies [3]. Therefore, in addition to possessing an ability to anticipate and plan for predictable stresses and disturbances, an organization must also cultivate an ability to adapt in order to advance resilient performance [1,4].

Increasingly dynamic, complex, uncertain, and ambiguous operational contexts justify a growing need for organizations to develop adaptive capacities [5]. In complex systems, no event recurs in exactly the same way, as systems are continually evolving due to fluctuations and unexpected events [2]. While plans and procedures can provide guidance and support, they can normally not be followed to the letter as they never cover all aspects of an unfolding disturbance or crisis [3,6]. Some scholars even argue that relying too much on planning for predictable disruptions can undermine efforts to foster organizational resilience [5,7,8]. [9]; for instance, list several conditions that inhibit the development of a capacity to adapt and improvise during crises, including an excessive reliance on written rules, excessive specialization of crisis management functions, unrealistic disaster plans, employee fear of repercussions for mistakes, and a tendency to seek technical solutions to social problems.

While adaptive capacity becomes manifested in a specific situation through the concrete adaptations carried out by an organization, the preconditions to adapt exist already before a crisis occurs [10]. However, previous research points to significant knowledge gaps concerning how these preconditions are established and maintained within an organization [11,12]. Despite adaptive capacity being a critical component of organizational resilience, it remains an understudied area within the domain of public sector organizations [13] and according to Ref. [14]; adaptive capacity is commonly seen as a "black box".

In this light, the objective of this paper is to expand the existing body of knowledge about factors that contribute to building adaptive capacity. More specifically, the paper seeks to answer the following research question: what factors contribute to organizational adaptive capacity in the face of crisis? This is achieved through a case study of a Swedish public sector organization during the COVID-19 pandemic with data primarily collected through semi-structured interviews. Against the background that Sweden, in an international comparison, used a distinctive strategy during the pandemic where many public institutions remained open, the adaptations that were carried out and their preconditions are particularly interesting to study. Malmö municipality is selected as the unit of analysis, being Sweden's third largest municipality and with substantial preparedness and planning processes in place prior to the COVID-19 outbreak, albeit with limited plans specifically targeting a pandemic.

The paper is structured as follows: Section 2 outlines the conceptual points of departure, while Section 3 details the methods and materials used. Section 4 introduces the case study, presenting a background and describing preparedness and planning activities conducted before the COVID-19 pandemic, as well as actions taken upon detecting early signals of an impending crisis. Section 5 outlines the range of adaptations made during the pandemic, followed by Section 6 where factors contributing to building adaptive capacity are identified and analyzed. Section 7 discusses the findings, and in Section 8 some concluding remarks are drawn.

2. Adaptation and adaptive capacity

While the creation of plans for managing future predictable events provides a valuable basis for building readiness for these specific scenarios, some future events, often referred to as black swans, perfect storms, or dragon king events, cannot be foreseen [15]. Many scholars have therefore warned against an overreliance on such plans and rhetorically asked: "How can we plan for a phenomenon that, by its very nature, violates the very regular patterns upon which planners rely to prevent it?" [7]: p. 53). This view, where crisis plans sometimes are referred to as "fantasy documents", has instead pointed to the necessity of being able to adapt.

This means that people and organizations must be able to take on new tasks, solve problems in innovative ways, and restructure or use resources in ways that were not planned for or intended beforehand. Broadly speaking, adaptation can be defined as "adjusting behavior and changing priorities in the pursuit of goals" [10]: p. 438). According to Vert et al. (2021: p. 8) adaptation entails "a modification at any level (individual, social, and/or organizational) of plans, schedules, human behavior, skills, knowledge, goals, use of resources, tasks, roles, ways and means of coordination, relations, norms, etc., as a reaction to adversity".

Adaptive capacity, then, can be seen as the abilities needed to carry out necessary adaptations [16], and an organization's adaptive capacity can be defined as "their ability to continuously design and develop solutions to match or exceed the needs of their environment as changes in that environment emerge" [17]: p. 32). Lyng et al. (2021: p. 2) point out that "while adaptation refers to a specific mechanism or action in response to a particular challenge or change, adaptive capacity refers to the underlying ability of a system, team, or organization to perform adaptations" [12]. argues that adaptive capacity exists before disruptions call upon the need for those capacities: "the ability to recognize and to stretch, extend or change what you are doing or what you have planned, has to be there in advance of adapting" [12]: p. 53). Therefore, organizations must make proactive investments to develop adaptive capacity. Similarly [14], contends that adaptive capacity is a latent organizational feature, and therefore difficult to measure in advance. It is also worth noting that adaptive capacity is not about always changing the organization's planned response, but rather about having the ability to know when available plans are adequate to follow and when it is more adequate to modify or abandon these plans in the face of a changing environment.

Adaptation and adaptive capacity are closely connected to a range of other concepts, such as resilience, flexibility, and agility [18–20]. Moreover, the concepts of adaptation and adaptive capacity are used in several strands of research, ranging from studies on adaptive capacity in relation to climate change to research on organizational adaptive capacity [21], and as indicated by previous paragraphs, the terms can be used in relation to different timescales and on multiple levels ranging from individuals, teams, organizations, and entire societies. This study mainly draws on insights from research addressing organizational dynamics and responses in the face of disturbances and crises, including but not limited to the domains of safety science, socio-ecological systems studies, and disaster risk reduction research.

In the research literature on safety-critical systems, the highly influential studies on high reliability organizations (HROs) underline the need for being prepared to "manage the unexpected" (see for example, [22]. Drawing on insights from studies of high-risk fa-

cilities, such as nuclear power plants and air traffic control, HRO research emphasizes the limits of anticipating future threats, e.g. by advocating a constant preparation for future surprise by remaining sensitive to the possibility of analytical error [23].

More recent research, with clear connections to ideas advanced in HRO research [24], includes insights drawn in the area of Resilience Engineering. In this field, it is assumed that complex socio-technical systems are characterized by constant performance variability, i.e., fluctuations among system variables [25]. While normal work is guided by routines, plans, and procedures, these are typically underspecified in relation to continuous operational variability. As a result, people's ability to adapt and flexibly handle emerging situations are necessary parts of managing both normal deviances and major crises. Although this adaptive behavior most of the time works well to meet the demands raised by a constantly changing work environment, it may sometimes also be mis-calibrated to the situation, which means that adaptations can be both a source of successful outcomes and failures [2,11,26].

Previous studies within the field of safety science have explored how adaptations manifest in socio-technical systems. For example [6], conducted a literature review arriving at a description and model of how adaptation is related to safety. Moreover, from a scoping review of existing literature [27] found five broad themes enabling or impeding adaptation, including 1) resources 2) organizational structure 3) trust, 4) diversity, and 5) experience. While previous research, such as the work by Ref. [28]; has underscored the importance of public institutions developing adaptive capacity, empirical research exploring how to cultivate such capacity in public sector organizations remains limited.

Several ways of differentiating different types of adaptations and adaptative capacities have been suggested in the literature. For example [29], differentiate between short-term and long-term adjustments, while [30] categorize adaptations based on upscaling existing responses, using existing responses in new ways, and developing novel responses [10]. introduces a distinction between “base adaptive capacity”, referring to the kind of adaptive capacity needed to respond to well-known changes, and “extended adaptive capacity”, also called “graceful extensibility”. This latter kind of adaptive capacity refers to “the ability of a system to extend its capacity to adapt when surprise events challenge its boundaries” [10]: p. 435). In essence, this involves the kind of adaptations that goes beyond what the organizational unit has been designed or equipped to handle (see also [17]. Other distinctions that share some similarities with these various types of adaptations include, for example [31], differentiation between dynamic adjustments and adaptive reorganizations. Dynamic adjustments refer to transient and temporary responses required to handle operational fluctuations to respond effectively in the moment. Adaptive reorganizations refer to reflective system improvements, such as redesign or reorganization of tools, processes, or organizational systems.

3. Methods and material

This study adopts a case study methodology, which proves particularly useful for studying contemporary phenomena in their real-world setting [32,33]. The unit of analysis studied is the municipality of Malmö, Sweden, and its response to the COVID-19 pandemic. Malmö, with close to 350,000 inhabitants, is the third-largest city in Sweden, situated in the southern region of the country. The municipality employs approximately 25,000 people and is organized into 14 departments with specific responsibilities ranging from schools and pre-schools, urban planning, and healthcare to maintenance of public streets and facilities. Each department employs one preparedness planner who is responsible for crisis preparedness and response in the department while a central unit in the municipality is responsible for coordinating this work across the municipal organization.

Data were primarily collected through semi-structured interviews with a total of 16 respondents (6 male and 10 female) from September to December 2021, while the COVID-19 pandemic was still ongoing. To ensure the inclusion of respondents with particularly important roles in the COVID-19 pandemic, a purposive sampling approach was used (see Ref. [34]. The primary inclusion criterion was that the respondents should be knowledgeable of the adaptations carried out and the preconditions for carrying out these adaptations in their respective departments. Consultations with the central crisis coordinator in the municipality were conducted to ensure an appropriate selection and to assist us in the recruitment of respondents. This enabled us to identify departments that had been severely affected by the pandemic, and subsequently, specific respondents to include in the study. Respondents belonging to departments that were only to a limited extent impacted by the pandemic or with limited knowledge of adaptations carried out were not considered relevant for the study.

Respondents were selected to gain multifaceted perspectives on the COVID-19 response across various hierarchical levels within the municipal organization. Therefore, interviews were conducted both with municipal representatives at the central unit in the municipality with overall responsibility for crisis preparedness and with representatives from the different municipal departments.

More specifically, two crisis coordinators centrally located in the organization were interviewed: one crisis coordinator at strategic municipal level and one crisis coordinator at a lower operational level. Furthermore, 8 preparedness planners from 7 of 14 municipal departments were interviewed. In one of the interviews, three colleagues to one of the preparedness planners, active in the crisis response, also participated. In addition, one person who played a central role in the procurement unit established during the pandemic was interviewed to provide deeper insights and more detailed accounts of this unit. Finally, one respondent from the municipal rescue service and one from the municipal housing agency were included, although these units, from a purely organizational point of view, do not belong to any of the municipal departments.

Prior to the interviews, an interview guide was developed, comprising five main questions: 1) How was your department (or organizational unit) affected by the COVID-19 pandemic? 2) What type of pre-established planning was in place before the COVID-19 outbreak? 3) What type of adaptations were made as a response to the COVID-19 pandemic? 4) What factors enabled and impeded these adaptations? 5) What was the value of the pre-established planning for responding to the COVID-19 outbreak? In addition to these five main questions, several probing questions were used to follow up and elaborate on the respondents’ answers.

In the recruitment process, respondents were contacted per e-mail with a description of the purpose of the interview and the main questions. Prior to each interview, informed consent forms were distributed and approved by all respondents. The interviews lasted for approximately 1 h 30 min with two exceptions: one exceeding 2 h and one shorter than 1 h. All interviews were conducted online due to the ongoing pandemic. All interviews except one were recorded and fully transcribed. For the interview that was not recorded, comprehensive notes were taken by one of the researchers and then shared with and approved by the respondent after the interview.

Interview transcripts were analyzed using thematic analysis in accordance with the guidelines provided by Ref. [35]. Firstly, the full interview transcripts were thoroughly read through and coded using the Nvivo software for qualitative data analysis by one of the authors. Codes were then collated into broader level themes forming coherent patterns by both authors, which were further reviewed and refined and subsequently used in Section 6 to present the analysis of the data. While both authors have significant pre-understanding of factors described in previous studies as contributing to adaptive capacity, as outlined in Section 2, an inductive ("bottom-up") approach was used in the data analysis process in the sense that the themes were identified from the data without trying to fit them within a pre-existing theoretical frame.

In addition to the interviews, a range of reports, such as internal evaluations, were provided by the respondents. Moreover, a workshop with 19 representatives from Malmö municipality was arranged prior to the interviews. The primary objective of this workshop was to gain a comprehensive understanding of the impacts of the pandemic as well as the preparedness activities and adaptations carried out prior to and during the pandemic. The workshop structure comprised group discussions, with three distinct themes discussed for approximately 40 min each, followed by an overall discussion summarizing key insights from each group.

Although the workshop and documents provided insights regarding the COVID-19 response and enabled data triangulation, they primarily served as a basis for constructing questions for the interview guide and informing the selection of interview respondents. Therefore, the findings presented in the paper do not include data derived from document analysis or workshop outcomes; these data sources were rather used by the researchers to enhance their understanding and background knowledge.

4. Case study: background and early signals of crisis

Like many other Swedish municipalities, Malmö was highly affected by COVID-19 with high levels of infection rates and significant fatality rates throughout the different waves of the pandemic. Since our data collection was carried out as COVID-19 was still unfolding, we do not aim to draw conclusions about the cumulative impacts of the pandemic, but rather about how the municipality adapted to the ongoing crisis and the factors enabling such adaptations. We begin by outlining the range of preparedness and planning activities that had been performed prior to the COVID-19 pandemic and the activities undertaken as the first signals of an impending crisis were detected, which are necessary to understand the various adaptations that were made as the pandemic unfolded.

4.1. Preparedness and planning prior to the pandemic

A range of different preparedness activities had been carried out prior to the outbreak of the pandemic. The most relevant activities, which are briefly summarized in subsequent paragraphs, include 1) a (largely forgotten) pandemic-specific assessment and plan, 2) the development of generic crisis response plans, 3) the performance of Risk and Vulnerability Assessment (RVA), and 4) planning with respect to generic functions.

Firstly, our interviews revealed that none of the representatives from the municipal departments expressed that they had performed pandemic-specific assessments or planning prior to the COVID-19 outbreak. However, the coordinator at the central unit highlighted that a comprehensive pandemic risk assessment de facto had been conducted and a pandemic preparedness plan had been developed approximately 10 years before the COVID-19 outbreak. Clearly, this work was not present in the organizational memory, indicating some challenges in achieving sustainable effects of preparedness activities. In addition, an assessment had been conducted a few years before the COVID-19 outbreak focusing on a potential Ebola outbreak. Although the Ebola scenario did not exactly mirror the characteristics of the COVID-19 pandemic, some of the general findings from this prior work served as a starting point for the COVID-19 response, in particular in relation to the municipality's legal obligations in situations involving the spread of contagious diseases.

Secondly, generic crisis response plans had been developed for each municipal department before the COVID-19 outbreak. In addition, a response plan had been developed centrally for the municipality. These plans detailed the decision-making structures for both the municipality and its departments during times of crisis. However, as further elaborated in Section 5.2, most municipal departments decided not to activate their plans but rather implement an adapted decision-making support structure.

Thirdly, before the pandemic outbreak, the municipality had initiated a Risk and Vulnerability Assessment (RVA) process, in compliance with the legal obligation mandated for all Swedish municipalities, as outlined in other publications by the authors [36–38]. Notably, none of the departments explicitly considered pandemics within their RVAs. Nevertheless, certain elements of these assessments were regarded as valuable for the COVID-19 response. For example, one of the main benefits of the RVA process was its ability to provide insights into which commitments that were most critical for the departments to maintain vis-á-vis which commitments could be given lower priority in the face of a crisis. Respondents expressed that this facilitated the crisis response since discussions concerning principles for prioritizations had already been initiated as part of the RVA process. In addition, respondents claimed that the RVAs had contributed to creating awareness and mental crisis preparedness.

Fourthly, a range of generic preparedness activities that proved relevant for the COVID-19 response were in place before the outbreak. For example, the municipal departments with responsibilities for healthcare had implemented various routines aiming to ensure a certain standard of hygiene and procedures aiming to contain various contagious diseases, such as the influenza virus. These routines and procedures were essential also in the COVID-19 response. Moreover, the central coordinating unit had carried out an

analysis of their legal responsibilities in various crisis situations. Finally, some departments had analyzed the effects of high levels of staff absence (independent of cause) whereas other departments had analyzed the possibility of staff working more extensively from home. Yet, the capacity of the IT infrastructure had not been sufficiently developed before the COVID-19 outbreak to enable this.

4.2. Signals of an impending crisis

In addition to the range of activities described above conducted before any signals of a looming pandemic were detected, several actions were triggered by reports from other countries that were affected at an early stage (e.g. China and Italy). These reports were used as signals of an impending crisis, which means that for Malmö municipality, COVID-19 corresponded to a slow-onset crisis. In addition, once cases of infection were discovered in Malmö, they initially increased at a rather slow pace. To some extent, this enabled the municipality to engage in preparedness and planning activities while the event was still unfolding, e.g. by planning for escalation.

One of the activities undertaken by the central coordinating unit, as clear signals of a pandemic were spotted, was to initiate monitoring activities aimed at understanding the developments in other countries and the actions taken by Swedish authorities. This was carried out by, for example, attending press conferences arranged by the Swedish government. In addition, the previously mentioned pandemic-specific assessment and planning were reviewed.

Activities to prepare the municipality for the potential of rapid escalation were also initiated. This included scenario planning, where the central coordinating unit developed three scenarios with varying conditions, e.g. different levels of staff absence. These scenarios were subsequently disseminated to the departments, where contingency plans were developed. In particular, departments with responsibilities related to care and education made extensive planning. For example, they prepared for scenarios in which schools might need to close, addressing factors like how to prioritize if only a limited number of children would attend childcare facilities or if only a handful of primary schools remained open.

All departments analyzed how they would deal with the absence of personnel, either if key personnel, or a large portion of the staff, would be absent. In particular, this included how to move staff between different units, requiring departments to make inventories of staff competencies. This was crucial to determine if they could be used for other tasks, e.g. for tasks that required special education or licenses. Finally, a range of other inventories were also carried out to be able to plan the municipal response. For example, this included inventories of the number of elderly persons and persons with special needs, serving as vital information for vaccination programs. Additional inventories were undertaken to identify employees who needed to work from the office versus those who could work remotely from home.

5. A range of adaptations – from dynamic adjustments to adaptive reorganizations

Given Sweden's unique approach in an international context, where many public institutions remained open during the pandemic, it is particularly compelling to examine the adaptations made and the underlying conditions that enabled them. As the COVID-19 pandemic reached Malmö, a range of adaptations were made which are briefly described in this section. The structure of the section is influenced by the distinction between dynamic adjustments and adaptive reorganizations proposed by Ref. [31]; where the former label here refers to temporary responses required to respond effectively to disruptions and fluctuations in the organizational setting, while the latter refers to the transformative reorganization or redesign of organizational processes or structures. These descriptions are followed by an analysis of underlying conditions that enabled adaptations, i.e. factors needed for building adaptive capacity, presented in Section 6.

5.1. Dynamic adjustments

One of the most common adaptations included the transition from a physical presence to a digital environment. Examples include online meetings, online teaching of high school students, virtual showings of rental apartments, and online training sessions. For many employees, this transition was seamless, while some faced challenges due to limited computer skills. Moreover, in the early phases of the pandemic, the IT infrastructure was severely undersized, which called for a substantial expansion before many tasks could be undertaken remotely. For example, employees handling software where sensitive personal information about caretakers was stored were initially not able to access this software when they worked from home.

While most adaptations to some extent aimed at reducing the spread of disease by undertaking activities through other means, such as transition to an online format, some adaptations included physical distancing and protection. Examples include the use of larger premises and fewer participants in training sessions, use of protective equipment in services where this was previously not used, separation of entrance and exit routes in public premises, increased level of outdoor education in pre-schools, and increased distance between market traders. Moreover, in many departments, a common pre-pandemic staffing strategy was to use a pool of staff shared among multiple units. However, as mentioned in Section 4.2, staff rotation between units was no longer a viable strategy due to the risk of disease transmission, resulting in challenges in ensuring adequate staffing levels in some departments.

Lastly, one way of adapting to an unfolding crisis is to change priorities, where specific critical activities are given precedence over others. In its most radical form, this strategy entails a complete cancellation of certain activities or a postponement to a later stage. Several examples of this adaptive behavior were described by the respondents. For example, the annual city festival was canceled for two consecutive years, meaning that the staff responsible for this event were given other tasks. Smaller-scale examples include the cancellation of social activities for homeless people. As a result, some employees were given partly or fully new tasks. For example, in one department, a dedicated “COVID bus” was devised, equipped with a separation between the driver and patient to enable transportation of infected patients to a special “COVID accommodation”. Other examples include employees who were tasked with testing and infection tracing. The municipal rescue service normally spends 20 % working time on duties other than operational rescue oper-

ations, such as training sessions and maintenance of equipment. As a way of changing priorities, this time was fully devoted to securing available staff for rescue operations.

5.2. Adaptive reorganizations

While a large number of small-scale adaptations were made across all departments, the establishment of a special "COVID accommodation" mentioned in the previous section and the necessary logistical arrangements needed for transporting patients to this unit are examples of more significant transformative adaptations calling for redesigns and restructuring of the municipal organization.

One of the most prominent adaptive reorganizations that took place included the establishment of a centralized procurement unit. Prior to the pandemic, procurement of protective equipment was conducted in each department separately. However, from the early phases of the pandemic outbreak, it became clear that a shortage of supplies challenged many departments. As a way of creating a more specialized and efficient procurement function, while avoiding hoarding and competition between departments, the centralized procurement unit was established.

Several factors contributed to this unit's establishment. Firstly, it was challenging to maintain an up-to-date inventory of available protective equipment across various departments without central coordination. Secondly, suppliers contacted employees in numerous departments with offers of various protective equipment. Establishing the centralized procurement unit effectively channeled these offers to a single point of contact. Connected to this unit, several additional services were created, such as storage and distribution of the equipment to the departments.

Another example of an adaptive reorganization involved the operation of school canteens, which transformed due to the shift to online teaching. Since the municipality retained the responsibility for providing lunch to pupils, a substantial reorganization and centralization effort took place. This adaptive reorganization gave rise to the consolidation of a limited number of canteens where pupils could pick up take-away lunches.

As described in Section 4.1, most municipal departments did not activate the crisis response plan developed before the pandemic. Instead, they implemented an adapted decision-making structure. Compared to the pre-planned and more formalized crisis response plan, the adapted decision-making structure offloaded the ordinary management level in the departments and thereby practically allowed the departments to continue their ordinary activities at the same time as the effects of the pandemic were managed. This was essential to provide sustainable decision-making and operations in the departments over time. The decision-making support structure was tailored to the needs of the COVID-19 event in terms of the competencies involved (typically HR, law, medical expertise, and communication) and had a close interaction with the management level.

6. Factors contributing to building adaptive capacity

As described in the previous section, a range of adaptations were made on multiple levels of the municipal organization. Respondents were asked to elaborate on what factors and conditions contributed to (enabled or impeded) the municipality's capacity to adapt to the unfolding crisis. In this section, an analysis of factors contributing to building adaptive capacity is presented, structured according to the themes derived from the empirical data.

6.1. Polycentric organization

The municipality's way of organizing can be seen as an instance of polycentric governance, often argued to be essential for adaptive capacity and resilience [39,40]. Organizations with polycentric governance are "characterized by multiple centers of decision-making that operate semi-independently but with the ability to interact and affect one another" [41]. In the case of Malmö, the municipal departments are largely autonomous with responsibility for distinct areas, such as urban planning, schools, pre-schools, elderly care, etc. While the central department has a coordinating function, it has limited decision-making power on behalf of other departments. Rather, decisions spanning departmental borders need to be taken in a consensus-oriented process involving the department heads. Coordination is facilitated by networks on multiple levels: both on the level of department managers and on the lower level among the preparedness planners within each department. During the pandemic, these existing networks were effectively leveraged to ensure a synchronized response, both vertically and horizontally, aligning with the point raised by Ref. [10] about the importance of coordination across multiple echelons or layers as well as across scopes of responsibility for enabling adaptations.

The advantage of polycentric governance lies in achieving both the benefits of centralization – in terms of achieving coordinated actions – and decentralization – in terms of sensitivity to local contexts and the idiosyncrasies of different organizational units [39]. Furthermore, although decentralization often also leads to quicker response, centralized control is sometimes necessary, especially when there is a common but finite good that is demanded by many parts of the organization. One example of centralized control in Malmö's COVID-19 response was the centralized procurement unit, described in Section 5.2, where the centralized control enabled prioritizations of protective equipment from a systems perspective – in this case prioritizing healthcare and social care commitments.

A few years before the outbreak of the pandemic, the municipality had restructured its crisis management structure by moving away from continuously training a large group of people capable of taking over decision-making power from the ordinary management structure to handle extraordinary events. Instead, an approach was established that focused on creating capabilities to handle everyday events in the regular organization and to scale up if necessary to handle larger events. The guiding principle of this approach was to maintain, as far as possible, the same people and functions to handle everyday disturbances as well as crisis events. On this basis, the organizational structure during the pandemic response was similar to the ordinary organizational structure, but with the addition of a central function for direction and coordination represented by a few department heads and accompanied by an adapted deci-

sion support structure. In this way, decision-making on the level of the municipality as a whole occurred through negotiation and agreement between department heads.

Within each department, direction and coordination were mainly executed from the top, with the establishment of an adapted support structure in many departments. This was especially the case in the initial phases of the pandemic and concerning major decisions. At the same time, however, a large number of adaptations were made at the front end in the departments. For example, school principals made decisions about how to adapt their daily operations without a need for approval from the management level in the school department. This kind of self-organized behavior was often reported back to the management level and spread to the rest of the department. As explained by one respondent, the "what" was decided by top management, while the "how" was decided among frontline staff, corresponding to what [22] call "deference to expertise" (as opposed to "deference of hierarchy"), which they argue is a characteristic of organizations with the capacity to manage the unexpected.

6.2. Asset literacy

Redundancies of human and tangible resources that can be called upon in unexpected situations are often stressed in the literature to enable adaptation [5]. This is potentially challenging considering most organizations today are slimmed and highly specialized. However, redundancies, buffers, and slack can be achieved also in slimmed organizations. An example from the Malmö COVID-19 response was the recognition that the municipality had both highly time-critical and less time-critical commitments. For instance, long-term development and oversight tasks could be temporarily deprioritized, freeing up additional staff to support commitments that were more time-critical. It is essential to acknowledge that relegating certain commitments to a lower priority in the long term may lead to adverse consequences. However, this strategy significantly facilitated short-term adaptations. A special instance of this, described in Section 5.1, was the organizational arrangement within the municipal rescue services, where firefighters spent 20 % of their work time on preventive activities and other non-time-critical duties before the COVID-19 pandemic. When instances of extensive sick leave among firefighters occurred, this buffer was leveraged by temporarily reducing the time allocated to less time-sensitive activities to prevent a decline in capacity for far more time-critical operational commitments.

In addition to having access to resources in an organization, the organization must also be aware of the resources and have abilities to mobilize them [42]. refer to such ability as "asset literacy" and argue that this contributes to adaptive capacity. This calls for asset mapping and awareness-raising activities both before and during a crisis. In the case of Malmö, asset mapping took place within the RVA process and several asset inventory activities were carried out during the COVID-19 response. For example, these activities included compiling inventories of employees' competencies to explore the potential for reassigning staff as needed. Consequently, anticipatory processes can provide better conditions for adaptation.

Uncertainty regarding the allocation of costs for unplanned actions may hinder adaptation, especially when time pressure is high. In the case of Malmö, several respondents mentioned that there was an attitude among decision-makers toward postponing discussions of economic responsibilities to a later point in time. For example, a central crisis coordinator mentioned: "We have received clear signals [from politicians] that economic resources will be solved later". Most likely this attitude made adaptations quicker than otherwise would have been the case.

6.3. Trust, engagement, and empowerment

Trust was expressed by respondents as an essential factor for adaptation, and this is also echoed in the scientific literature – e.g. by Ref. [5]. It was pointed out that while trust is necessary to deal with unexpected disturbances and crises, this is not something that emerges suddenly; rather, it is cultivated in the course of daily operations long before a crisis materializes.

To stop the spread of the disease, everyone realized that a collective effort was required, and many respondents mentioned a spirit of "togetherness" as an essential precondition for adaptation, i.e. that the entire municipality worked together across administrative borders. In this regard, trust was described as a fundamental element. Moreover, trust was described as an important factor on multiple levels: among department heads, between department heads and subordinates, and between civil servants and politicians. Concerning the political level, it was emphasized that the political leadership in the municipality has remained the same over a long period, which has contributed to an established trust between politicians and civil servants.

Moreover, throughout the entire pandemic, politicians refrained from stepping in and directing the civil servants' management of the pandemic in detail, which maintained trust. One respondent pointed out that if politicians had begun to decide on matters that are within the responsibilities of civil servants, the trust needed for making adaptations would have been undermined. The same person underlined that if employees feel there is room to handle situations in novel or non-routine ways without repercussions, it becomes easier to be flexible and adaptive as well (cf [43]. This reflects what [10] refers to as an expression of initiative, described as a necessary enabler for adaptation.

Both trust and engagement were described as important for creating an organization where everyone, including both frontline staff and managers, felt urged to try new work practices. During the interviews, it was pointed out that management contributed to an encouraging culture and empowerment of staff where people felt ownership and mandate to handle the situation themselves, without too many pointers. In this way, management avoided stifling employees' creativity with overly tight control and instead created room for action at the employee level.

A related factor enabling adaptations was a shared sense of the seriousness of the situation. No one could hide from the pandemic; it was present both in people's professional and private lives. Since an outbreak could occur anywhere at any time, everyone became engaged in a different way than they might have been in other events. Moreover, several respondents expressed a mutual concern for each other. For example, this was manifested by the fact that the urban planning department, which was only mildly affected by the pandemic, dedicated an entire division to 3D printing of protective masks for those departments that needed this equipment. This

constitutes an example of an enabling factor for adaptation that [10] refers to as reciprocity, i.e. when an organizational unit sacrifices some of its resources to help another organizational unit, without any immediate benefit to its unit apart from a recognition of the benefit to both units in the longer run with regards to some common overarching goal.

6.4. Capitalizing on previous experience

One enabling factor for the ability to adapt, highlighted in the interviews, relates to the municipality's previous experiences of crisis and the presence of an organizational memory. The municipality has faced many events that necessitated adaptation and change. In particular, several respondents referred to the 2015 refugee situation, during which the municipality received several thousand refugees within a few months. This event seriously challenged the municipality's ability for quick action and adaptation. The event seems to have developed the municipality's readiness to adapt, and to some extent assured employees that the organization possesses a capacity for adaptive behavior that can be exploited when crises occur.

In addition to experiences dealing with large-scale events, several respondents pointed out that the municipality is continuously faced with smaller events that require an ability to adapt. Both managers and employees are used to dealing with difficult situations practically every day. This capability was seen as an enabling factor for adaptation, which echoes the findings presented by Ref. [5]. For example, one respondent expressed that if you work in the municipality, you have to be flexible, regardless of whether it's a pandemic or other event, as there are lots of small crises occurring all the time. Another respondent described an organizational culture in the municipality that is focused on solving urgent problems, and that the organization de facto may be better at solving urgent problems than strategic ones.

The municipal rescue services emphasized their unit's highly solution-oriented nature, with the majority of staff occupying operational roles where they do not know what their day will look like when they come to work. Similarly, respondents from other departments, like the Service Department, also explained that one enabling factor for adaptation stemmed from a culture that, for better or worse, is actionable and flexible where the department wants to meet emerging and changing needs. This culture has consistently focused on being able to deliver to the department's customers, i.e. to other departments, although these quick adaptations sometimes have been achieved at the expense of a lack of documentation. In this way, one of the cornerstones of being able to adapt was a spirit embedded in the department that quick actions and major changes are nothing new or extraordinary. Rather, the ability to adapt was described as a fundamental part of the department's mission, and by having cultivated a habit of adaptation, the department has also developed an ability to do so quickly. One respondent reflected that this capacity, to some extent, was enabled by the fact that Malmö municipality is a large municipality with plenty of resources to draw on, but by extension, that corresponding adaptations could have been more challenging in smaller municipalities.

6.5. Clarity of objectives, conditions, and boundaries

A recurring theme in the interviews related to the importance of staff having a clear view of organizational objectives and prevailing conditions as well as the boundaries within which the organization operates. Having a common vision, direction, objectives, or sense of purpose is often also pointed out in the literature, e.g. Refs. [28,44]; where the main argument is that it enables the coordination of organizational units as opposed to a situation where units are self-organizing but where they risk working at cross-purposes [45]. In addition to working to achieve a sense of togetherness, described in Section 6.3, the central coordinating unit in Malmö quickly made decisions concerning the overall direction for the municipality and its departments – so-called “decisions in large”. Importantly, these decisions did not provide a detailed blueprint for the lower organizational levels but rather clarified the boundaries for the actions taken at different levels of the municipality. Similarly, many departments circulated weekly digital newsletters to their staff providing information about what was going on in the municipality, what department-wide decisions had been taken, and what restrictions the staff had to adhere to. This constituted a way of communicating the overall direction and boundaries for the response, which is also stressed by Ref. [42] as a critical factor in ensuring a common understanding among staff in the organization.

Respondents also stressed the importance of insights concerning the organization's capacities, vulnerabilities, and available resources as well as understanding the boundaries for actions induced by regulations. For example, one respondent reflected “We have to know our regulations and our resources, but we cannot make plans for everything … You should follow the law but be creative”. A parallel can be drawn to the literature where [42]; for example, argue that situational awareness (i.e. knowledge of what is happening on multiple levels of the organization, including its threats and opportunities) adds to adaptive capacity.

7. Discussion

7.1. Adaptation and adaptive capacity in crisis response

The results from this study concerning factors contributing to adaptive capacity corroborate several of the findings reported in previous work from related fields and contexts. For example, our findings confirm the benefits of adopting a polycentric governance structure where multiple decision centers operate with a certain degree of autonomy but with the ability to interact with each other and coordinate across multiple scales [10,39]. Our findings also support several of the factors enhancing organizational resilience that have been reported by Refs. [5,21]; such as empowerment of employees, the role of motivated and committed staff, and the importance of a culture characterized by tolerance for failure where staff feel safe to test and share new ideas. Other factors enabling adaptations and adaptive capacity, as highlighted in previous studies and identified in our analysis, include the importance of drawing on experience [6,38] and the role of learning, both within and between crises [46]. Additionally, the role of networks and social capital as factors enhancing coordination and providing shared access to resources is consistent with our findings [39]. Our results

thus suggest that these factors, many of which to date have been presented with limited empirical grounding, are applicable also in the context of public sector organizations studied in this paper.

In addition to echoing the findings of previous studies, we also find aspects that, to our knowledge, have been given scant attention in the literature related to adaptive capacity. For example, many respondents referred to a feeling of "togetherness" as a factor enabling adaptation. Togetherness refers to the sense that almost everyone in some way was affected by the pandemic, which facilitated adaptations aiming at minimizing the spread of the disease. The related term "reciprocity", suggested by Ref. [10]; refers to situations where one organizational unit assists another unit without any immediate return, apart from contributing to a shared overall goal. One of the most compelling examples of reciprocity found in this study was the 3D printing of face masks. Based on these findings we argue that adaptations are particularly likely to occur in crisis events characterized by a shared sense of being affected. In the case of the COVID-19 pandemic – unlike most other crises – virtually everyone simultaneously became both a potential victim (due to the risk of infection) and a response actor (by taking measures to reduce the risk of spreading the infection). Further studies are needed to explore this aspect in greater depth.

Another factor that has been given limited attention in previous studies about adaptation and adaptive capacity relates to temporality. In the review conducted by Ref. [5] on factors enhancing organizational resilience, it is concluded that a majority of the papers focus on "acute, often catastrophic shocks to the system". However, the response studied in this paper unfolded over a more extended period, with a relatively slow onset. In this regard, a parallel can be drawn to the concept of creeping crisis [47]. argue that a creeping crisis is characterized by both a slow onset and slow closure, where both the beginning and end of the crisis are blurry. More specifically, a creeping crisis has a long incubation period which typically gets insufficient attention despite the occurrence of precursor events, e.g. due to difficulties in agreeing on the potential threat. In addition, negative impacts gradually develop over time rather than burn out fast. Although a slow onset, slow closure crisis might be viewed positively because it "provides authorities with a precious commodity: time to act" [47], it often gives rise to significant managerial challenges as time to act "does not matter unless the threat is given enough attention" [47].

Globally as well as nationally, it is clear that COVID-19 could be labeled a creeping crisis that, in its early stages, received limited and delayed attention. In Sweden, for example, the National Corona Commission criticized the government and the Public Health Agency for their slow response, especially concerning measures to contain the spread of the disease, which were considered insufficient and lacking precaution. The question one might ask, is whether the same conclusions can be drawn for the local COVID-19 response by the municipality of Malmö. Based on our findings, this seems not to be the case. What we can see is that Malmö made use of the incubation period as an opportunity to gain a better understanding of the potential impacts of the pandemic, available resources to address it, and the benefits that could be drawn from preparedness and planning activities carried out prior to the pandemic outbreak. Hence, what we see is that a proactive attitude was adopted in the municipality where planning and foresight took place as the pandemic unfolded. However, it is worth noting that there were also instances where challenges were addressed more reactively, such as the need to rapidly increase the capacity of the IT infrastructure to enable staff to work from home. Our data also indicates that different units in the organization have different cultures when it comes to being proactive as opposed to solving emerging challenges more or less ad hoc.

Another temporal issue of creeping crises is their prolonged duration. A typical challenge concerns whether the organization can continue to adapt to changing environments over time, which is sometimes referred to as sustained adaptability [10]. Since this study took place as COVID-19 was still unfolding, we cannot make definite claims about how the organization studied in this paper endured over time. However, one aspect that seems to have affected the response and adaptations was that the pressure from the pandemic on the organization was not constant throughout. The pattern of the pandemic was a series of waves with surges in new cases followed by declines, enabling the organization, at least to some extent, to recover and re-mobilize. We believe, although our data does not allow us to conclude with certainty, that a prolonged crisis with constantly high pressure would be much more difficult to respond to over time.

A third temporal aspect relates to the fact that giving attention to crisis response naturally diverts attention from other tasks or activities, while possibly also increasing the workload for the staff. Adapting is often about changing priorities [10]. In the case studied here, less time-critical commitments were put aside to deal with more short-term needs. However, there are limits to how long such altered priorities can be sustained. The consequences of not performing less-time critical tasks may accumulate and ultimately give rise to significant negative outcomes. Hence, during creeping crises, organizations need to be able to deal with the short-term needs triggered by the crisis itself, but also be able to continue carrying out its broader set of commitments or have the ability to resume long-term commitments while simultaneously dealing with the short-term needs. In this study, we could see a conscious effort of trying to balance the short-term and the long-term needs, although it may be too early to know for certain what the long-term consequences will be. For example, the adapted decision-making support used in several departments was implemented since the preplanned structure would not have been possible to sustain over time and would have overloaded and exhausted key decision-makers. Furthermore, it is notable that prioritizations sometimes vary across different departments. For example, the Department of Labor and Social Support canceled several activities with physical attendance targeting persons with special needs to limit disease transmission. In contrast, the Municipal Housing Agency continued to meet tenants in person since they considered physical meetings providing great value to the tenants. Which of the two approaches represented the most suitable balance between short- and long-term needs, or between continuing to offer municipal services of high quality and limiting the spread of the disease is not possible to say based on our data; however, a more consistent approach might have been feasible.

7.2. Future work

Several avenues for further research can be identified. Firstly, many of the factors highlighted as influential to adaptive capacity are based on the views of a rather small sample of practitioners and their perceptions may be based on an incomplete understanding of what shapes behavior and what fosters adaptation. Furthermore, our findings are derived from a single case study. Given that the determinants of adaptive capacity may be highly context-specific (see Ref. [48] for a similar argument), conclusions drawn from other case studies may look different. Therefore, there is a compelling need for continued empirical research, especially in the domain of public sector organizations, aiming to find out what factors can be generalized. We echo the view proposed by Ref. [49] that more empirical research is generally needed on the work carried out by safety and crisis management professionals.

Secondly, in this paper, we have presented factors influencing adaptive capacity essentially as being independent; however, their relationships are much more complex. One factor may be, fully or partially, a precondition or an effect of other factors. To improve adaptive capacity in organizations, a more systemic understanding of how these factors influence each other is needed. In addition, different levels of organizations are also interrelated where higher levels provide the conditions for adaptation at lower levels. In future research, we intend to address these interdependencies through more extensive case studies that explicitly map how various organizational levels can impact one another, generating more or less favorable conditions for organizational adaptations.

8. Conclusion

Despite the importance of organizations developing an ability to adapt to unexpected crises, relatively little research has explored which factors give rise to such adaptive capacity, especially in public sector organizations. In this paper, several factors that contribute to building adaptive capacity were identified and investigated, including a high level of trust across roles and organizational levels; a polycentric organizational structure where departments work autonomously while still allowing some degree of central coordination; clear overall objectives; capitalization on previous experience from both minor and major crises; and asset literacy among employees. Future studies are needed to further explore the generalizability of these findings, as well as the relative importance and interrelation between the factors identified in this study.

CRediT authorship contribution statement

Alexander Cedergren: Writing - original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Henrik Hassel:** Writing - original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

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

Data availability

Data will be made available on request.

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