Smart Local Governments Facing Turbulence: Robust Governance and Institutional Capacities

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Article

Smart local governments facing turbulence: robust governance and institutional capacities

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Abstract: Crisis environments, which are becoming systemic, pose significant challenges to smart government strategies. The paper aims to contribute to academic debate by proposing an analytical framework for examining the institutional capacities of smart government systems in addressing local crises. The paper focuses on the recent approach of robust governance and highlights a set of variables that promote effective smart government: contingency planning capacity, analytical capacity, organizational management capacity, and collaborative capacity. The study presents an analytical model for evaluating the robustness and effectiveness of local smart government systems in crises. One of the significant findings of this study has been the identification of critical indicators that inform institutional capacities of smart government systems. By analyzing these indicators, the proposed analytical framework provides a comprehensive approach to assess the preparedness of smart government systems in dealing with crises. Moreover, it can be used to benchmark the performance of local smart government systems in similar contexts and identify best practices for improving crisis management.

Keywords: Smart Government Strategies; Crisis Environments; Governance Robustness; Institutional Capacities; Effective Local Governance; Evaluation; Indicators Analytical Model

1. Introduction

1.1. Paper Scope and Structure

Climate change, energy, pandemic crisis, economic and social crises or migration, among others, are examples of the significant public issues that pose challenges to public governance in modern societies [1,2]. These issues often transcend political and administrative boundaries, presenting complex and evolving challenges for smart government worldwide. Local environments, where the manifestation of these crises is particularly intense, require institutional and organizational characteristics that enable smart government systems to tackle crises with the highest probability of success [3].

The objectives of this paper are threefold. First, this paper aims to explore how turbulence and crises impact smart government in contemporary local administrations. Second, it seeks to examine the concept of governance robustness and its prerequisites for sustainable smart government strategies to cope with systemic crises. Finally, this paper intends to outline an analytical model that can evaluate the capacities of local smart government strategies in handling crises. The main academic contribution of this paper has been the design of an analytical model of critical indicators that affect these institutional capacities of smart government systems. The application of this organizational and institutional evaluation model provides a comprehensive approach to assessing the preparedness of smart government systems in dealing with crises and the resilience and effectiveness of local smart government systems in risk management. Moreover, the model can be used to benchmark the performance of local smart government systems in similar contexts and identify best practices for improving crisis management. The model can provide insights into the effectiveness of different approaches, and it can help policymakers and administrators develop more effective crisis management strategies and policies. Future studies are needed to explore the

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application of the analytical model and this will enable researchers to identify the strengths and weaknesses of the model and refine it accordingly.

To make a theoretical and practical contribution, the paper is structured into the following sections: First, the following subsection of this introduction reflects on the challenges posed by crisis environments to smart government strategies. The second section introduces the theoretical framework of institutional capabilities for smart government in crisis environments. In the third section, we present our analytical model for the evaluation of smart government robustness strategies. Finally, the conclusion section reflects on the strengths and weaknesses of the model and calls for future research in this area.

1.2. Crisis Environments as a Challenge for Smart Government

Local governments are facing a growing number of crises that are becoming systemic, posing significant challenges to their governance. These crises can range from environmental disasters to public health emergencies, economic recessions, social unrest, and energy crises among others. Such challenges are complex and multifaceted, requiring a coordinated and effective response from local governments to mitigate their impact and prevent further damage. This context is not new for public sector organizations, which have traditionally experienced changes in turbulent environments. Changes are understood as 'situations where events, demands, and supports interact and change with high variability, inconsistency, and through unexpected and unpredictable pathways' [4]. What is new is the consolidation of such turbulence as a habitual, enduring, and not simply transitory characteristic of the environment in which public organizations operate [5].

One of the main challenges that local governments face when dealing with crises is the need to adapt quickly to change circumstances. Systemic crises are dynamic and unpredictable and require local governments to be agile in their response [6]. In addition, they often require local governments to work collaboratively with other levels of government and stakeholders in the community to ensure that resources are used effectively and efficiently [7]. Furthermore, local governments must develop a comprehensive understanding of the crisis, including its causes, consequences, and potential risks. They must also be able to communicate this information clearly and effectively to the public and other stakeholders to ensure that everyone is informed and engaged in the response. This requires strong communication and coordination mechanisms that can be deployed quickly in crises [8]. Local governments must also be able to mobilize resources quickly to respond to crises. This includes financial and other resources such as personnel, equipment, and technology. Local governments need to have contingency plans in place that can be activated quickly in crises to ensure that they have the necessary resources to respond effectively [9]. Finally, local governments should be able to learn from their experiences in crises and apply these lessons to future crises. This requires a culture of continuous improvement and learning, where local governments are constantly evaluating their response to crises and identifying areas for improvement [10]. By doing so, they can build greater resilience and better prepare for future crises.

Smart government strategies aim to leverage technology, data, and innovation to enhance governance processes, increase efficiency and effectiveness, and promote citizen engagement [11]. The concept of local smart government involves the integration of information and communication technologies (ICT) into the processes and systems of local government to improve service delivery, promote citizen engagement, and increase transparency and accountability. In an analysis of the key aspects of the local smart government strategy considered in academic literature, Vujković et al. [12] identified the following variables as key elements for its definition: First, the use of ICT to provide citizens with access to government services and information through digital channels, such as mobile applications and websites. Second, the use of data analytics and artificial intelligence supports evidence-based decision-making and predictive analysis for more effective resource allocation. Third, the use of open data promotes transparency and accountability and enables citizens to participate in decision-making processes. Fourth, the adoption of smart infrastructure and IoT technologies improves the quality of life for citizens, reduces carbon emissions, and enhances environmental

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sustainability. Finally, the establishment of collaborative partnerships with local businesses, non-profits, and community organizations to co-create solutions and increase civic engagement [12].

These characteristics are essential to building a local smart government that is responsive, efficient and inclusive, and that can meet the evolving needs of citizens in the digital age. However, crises in the local environment pose significant challenges to smart government strategies, requiring them to adapt and evolve to respond effectively:

First, crises can disrupt the data infrastructure, which is crucial to smart government strategies [13]. For example, natural disasters or cyberattacks can cause data breaches or loss, making it difficult to collect, process, and analyze data. In such situations, local governments must develop alternative methods for collecting and analyzing data to make informed decisions.

Second, crises can exacerbate existing social and economic inequalities, impacting the effectiveness of smart government strategies. For example, public health emergencies such as COVID-19 have disproportionately affected marginalized communities, highlighting the need for smart government strategies to be inclusive and equitable in their approach [14].

Third, crises require local governments to be agile and adaptive in their response, which can be challenging for bureaucratic and hierarchical governance structures [15]. Smart government strategies need to incorporate flexible and responsive governance mechanisms that can be quickly activated in crises.

Fourth, crises require strong communication and coordination mechanisms, both within the local government and with external stakeholders. Smart government strategies must prioritize the development of effective communication channels and collaboration mechanisms that can be deployed quickly in crises [16].

Fifth, crises require local governments to mobilize resources quickly and effectively [17]. Smart government strategies need to incorporate contingency planning and resource mobilization mechanisms that can be quickly activated in crises.

Finally, crises require local governments to develop a comprehensive understanding of the crisis and its potential risks and consequences. Smart government strategies need to incorporate data analysis and risk assessment mechanisms that can provide accurate and timely information about crises [18].

2. Theoretical Framework: Institutional Capabilities for Smart Government in Crisis Environments

2.1. Robustness and Robust Governance

It is relevant to analyze how smart governments may be generating the aforementioned types of responses in terms of adaptation and development of new capabilities to face the contexts of turbulence. In the development of these types of responses within the realm of public policy and management, concepts such as policy robustness or governance robustness have emerged strongly [19, 20, 21, 22, 23]. The inclusion of the term robustness serves to mark differences in relation to resilience, which is widely used when considering strategies developed to address more cyclical crisis moments, in order to incorporate a certain combination of permanence and transformation aimed at offering new responses to environments characterized by turbulence [24, 25, 26, 27].

The application of the term robustness in the field of governance has been proposed in terms of "a determined effort to promote effective problem-solving through the strategic design of institutional architecture, providing tools and processes that promote flexible adaptation to difficult conditions and innovative exploration and exploitation of emerging opportunities" [28]. Following this approach, the development of robust governance as a strategy to generate new responses to the turbulent environment requires impacting both the organizational design and the dynamics that may promote the behaviour of the actors in accordance with the transformation model being pursued [20, 29].

The contributions made from different academic perspectives allow characterize the concept of robustness. In political science, the idea of robustness is proposed as the ability of a system to invent

 doi:10.20944/preprints202305.1413.v1

and reinvent public policies when facing new challenges, responding dynamically [30, 31, 32]. From a smart government perspective, the need to define and deploy robust strategies that enable facing turbulence while continuing to generate public value through 'flexible adaptation, agile modification, and pragmatic redirection of governance solutions' is highlighted [28]. From a managerial perspective, attention is focused on configuring flexible organizations based, among others, on collaboration networks and decentralized responses [28, 22]. Boswell et al. [33] emphasize the importance of communication and citizen involvement in designing robust governance to face new challenges (such as climate change, for example).

Based on these approaches, the distinctive feature of the concept of robustness is the ability to achieve a balance between stability and change. Following Ansell et al., 'robust governance systems must be able to change to preserve their functionality despite turbulence (stability requires change); however, to do so, they must provide the scaffolding and infrastructure that help support and generate change (change requires stability)' [19]. In this sense of the concept of robustness, stability should not be understood as rigidity, but as the persistence over time of a function or objective, beyond the challenges that arise. However, the maintenance of this function or objective is likely not to occur in its original form, but it can be revised, expanded, or redefined according to changing circumstances. Similarly, change should not be conceived merely as reactive or incremental, with a will to restore the previous situation, but as an innovative and proactive character orientated towards achieving flexible adaptation that takes advantage of the opportunities of turbulence to revise previous dynamics. In other words, robustness is associated with a smart governmental character that is orientated towards exploring unforeseen developments from turbulence [5]

2.2. Smart Government Strategies for Robust Governance

The development of smart government in crisis environments requires certain strategies associated with both its institutional design and behaviour in relation to the actors involved in the various lines of public action. In the first approach [20], in order to face turbulent environments, it is necessary to have: (a) proactivity (to anticipate scenarios), (b) agility in responses offered both in the short- and medium-term, (c) flexibility to adjust behaviours as well as to relocate strategic resources, and (d) to develop rapid learning of new knowledge that can be immediately applied to the situation being faced.

Following the argument previously presented, current organizational paradigms in public administrations do not allow these requirements to be adequately met, making it necessary to deploy strategies that promote them. From various contributions, a series of strategies have been proposed to develop robust governance [30, 20, 34, 28, 35, 22, 26], among which the following stand out.

1. Scalability is understood as the flexibility to mobilize and demobilize resources, or to reassign them according to the identified needs at each moment, in an agile manner and aligned with the organization's objectives. The flexibility strategy can also incorporate resources from the organization itself or from actors in the environment who are involved in developing responses to turbulence. The development of this strategy requires the generation of trust among the different actors involved, both internally, with reference to different professional groups, and externally, with the network of agents involved in the proposed responses.

2. Experimentation with reference to the exploration and testing of solutions that generates knowledge to configure alternatives' final design to face challenges. This strategy is associated with the development of prototypes of new responses that can be evaluated through testing and reviews before their eventual extension. Considering the temporal challenge of robust governance, short-term responses to face turbulence can also be considered experiments, overcoming incrementalism logic, and deploying tactics to build strategy.

3. The transformation of organizational relationship models (both internal and external) based on coordinated autonomy and the idea of polycentricity, aims to achieve a new distribution of competencies and functions to facilitate a shared commitment. The objective is to promote the emergence of innovative proposals from different actors of the network and encourage their involvement. This strategy proposes to complement autonomy with coordination, which allows for

 doi:10.20944/preprints202305.1413.v1

the identification of the most appropriate responses and eventually their generalization for the rest of the actors involved.

4. The promotion of adaptability of norms, preserving the safeguarding of values and stability they provide, but avoiding rigidity and delay in offering new responses. This strategy deploys the balance between stability and change that characterizes robust governance. This strategy implies the continuous evaluation of rules to ensure their validity and added value, simplifying the regulatory framework by eliminating those that no longer add value, and updating the most relevant ones. Additionally, there is also a proposal to encourage the discretion of managers and professionals to interpret the rules, but always based on an adequate understanding of their purpose and the values they imply.

5. Encouragement and training to generate innovative responses, that is, to develop skills for improvisation and rapid learning. This strategy includes stimulating thinking that goes beyond the framework established by the predominant dynamics in the organization (thinking outside the box), for example, by incorporating experts with heterogeneous profiles that facilitate the contrast of perspectives. A strategy that also includes the promotion of improvisation, overcoming environments with excessive regulation or protocols that restrict individual discretion. Along the same line, the strategy can also incorporate rapid learning, with institutional designs aimed at promoting research, reflection, monitoring, and evaluation focused on continuous improvement to learn from the results obtained and the processes that led to them (report culture).

All these strategies to develop robust governance are not exclusive but complementary, and their development depends on several factors (such as public organizational context and situation, the nature of crisis, leadership, resources, among others) that must be analyzed to evaluate their capacity to face turbulence.

3. Analytical Model for Assessing the Robustness of Smart Government Strategies

3.1. Institutional Capacities for Smart Government Robustness

Strategies described in the previous section emphasize an organization's ability to adapt to the challenges posed by turbulence rather than just facing them or recovering from them. The deployment of these strategies in local smart government, on the other hand, reveals their interconnections, highlighting their complementarity and the need to combine them according to the organizational reality or the nature of the turbulence to be faced.

Our analytical proposal posits that to tackle the challenge of crisis environments, local smart governments must possess certain institutional capacities that enable them to effectively diagnose the challenges and select appropriate alternatives to address them, implement them, and subsequently evaluate their impact [36,37]. The analytical model presented in this section, seeks to address the following inquiry: What institutional capacities must be in place as prerequisites for local smart government to ensure consistent strategies to cope with crisis environments? The presented argument underscores the significance of at least four institutional capacities that directly impact the institutional structure of local government actions: contingency planning capacity, analytical and data management capacity, organizational management capacity, and collaborative or network management capacity. To assess these capacities at the local level, our model identifies several critical indicators that inform the presence of these dimensions.

As the United Nations Development Program (UNDP) points out, institutional capacity denotes an institution's ability to (a) perform its activities consistently, manage changes and crises, and maintain performance over time, (b) offer responses that can enhance its areas of operation, and (c) provide a framework for developing the required change [38]. Various academic perspectives exist for analyzing the capacities of public organizations. An initial categorization distinguishes between those that concentrate on public policies and the involved network of actors and those that emphasize the characteristics of public organizations such as the government and administration. This study proposes the concept of institutional capacity, which combines both approaches and assesses them from the viewpoint of local administration.

The notion of governance capacity serves as an example of concepts linked to the public policy approach and the network of actors, encompassing the array of systemic and organizational resources essential for policymaking and its implementation [39, 40]. In addition, the concept of policy capacity denotes the availability, quality, and nature of resources that facilitate the scrutiny of public policies, evaluation of alternatives and their ramifications, and promote strategic decision-making [41]. Moore's classification of policy capacities [42], which is enshrined in the model by Wu, Ramesh, and Howlett [37], recognizes three primary competencies, namely analytical, operational (or managerial), and political. These competencies comprise resources that can be categorized at the individual, organizational, and systemic levels. Consequently, the traditional analytical framework used in public policy analysis arises from the combination of the three types of competencies and their associated levels of resources.

The integration of insights derived from the aforementioned perspectives enables the identification of institutional capacities of local governments to address the challenges associated with formulating, implementing, and assessing policies and programs in local crisis environments. Our analytical model departs from four crucial capacities that have been emphasized by academic literature adapted to the local smart government context: strategic contingency planning capacity, analytical capacity, organizational management capacity, and collaborative capacity.

The first is contingency planning capacity, which refers to a strategic management instrument used to prepare for potential future events or crises. It involves a structured and systematic approach to identify and evaluate risks, vulnerabilities, and potential impacts on an organization's operations, services, and stakeholders. This type of planning allows for the development of alternative courses of action, in case the primary strategy cannot be executed as planned, and includes measures to mitigate, respond, and recover from adverse effects. Strategic contingency planning is an ongoing process that involves continuous monitoring and assessment of the environment, and the implementation of revisions to strategies and plans as necessary. This approach is particularly important in volatile and uncertain environments, where unforeseen events can have significant consequences on an organization's operations, reputation, and sustainability [43]. To achieve this objective, politicians and managers must combine clarity in goal setting with appropriate development at the operational level, reaching all levels of the organization [44]. The development of planning and leadership strategies is based on solid information structures, which are also related to analytical capacity. This enables flexible and adaptable proposals that allow for learning and readjustment, as described by Mayne et al. as a "reflective-improvement capability" [45].

Analytical capacity, the second one, can be related to effectively acquire, manage, and utilize diverse kinds of data and evidence to enhance the decision-making process and improve public action by gaining better knowledge of external context, internal conditions, and performance outcomes [45]. This capacity entails crucial components, such as having professionals with the necessary skills. These professionals should also be linked to a central advisory unit [39,46]. Moreover, the organization needs to establish an appropriate organizational architecture and ensure the availability of devices and processes to obtain and process data and information and subsequently disseminate and utilize them. Information systems that are linked to data collection, processing, analysis, and presentation in various formats to different audiences play a critical role in sustaining analytical capacity [47].

The effective analytical capacity should lead to the implementation of data governance. While the literature provides various interpretations of data governance, there is a general agreement that it involves: (1) recognizing data as an organizational asset that requires management, (2) establishing decision-making responsibilities and associated duties, and (3) establishing guidelines and standards that ensure data quality and appropriate use [48]. Accordingly, data governance is linked to organizational processes that allocate decision-making responsibilities in alignment with the organization's objectives, promoting desirable behaviours that recognize data processing as a crucial asset for the organization [49]. The infrastructure, particularly the technological infrastructure, and human capital, in terms of experience and knowledge, are both essential to this end. In crisis environments, data can be a critical resource for informing decision-making, resource allocation, and

 doi:10.20944/preprints202305.1413.v1

operational planning. Effective data governance in crisis environments requires a clear understanding of the types of data that are necessary and relevant for addressing the specific challenges of the crisis, as well as the sources, quality, and integrity of that data. This involves establishing mechanisms for data collection, storage, sharing, and secure analysis, efficient, and interoperable [50]. Additionally, data governance in crisis environments requires the development of contingency plans for unexpected disruptions to data systems and processes.

Organizational management capacity involves effectively coordinating of resources and activities to achieve strategic objectives [48]. This capacity is linked to pragmatic leadership theory [51,52] and encompasses the management of administrative structures, budgets, human resources, and organizational dynamics. Within this capacity, in the context of a local crisis, the first issue is the configuration of flexible organizational structures and the foresight of positions specialized in risk management. The second issue is related to organizational processes and dynamics, focussing on how they align with the requirements of quick and agile responses. The third issue relates to human resource management, including internal information and communication policies related to risk management, as well as socialization and learning dynamics in this area.

Collaborative capacity is associated with the skills required to foster network activities that involve external actors in the promotion of public action. This capacity is related to the endeavours of cities to engage and motivate multiple formally independent yet interconnected actors, including private businesses and civil society groups [51,52]. Effective deployment of this capacity in crisis environments entails the creation and quick distribution of information among the actors involved in the network, coordination of activities, and protocols of shared decision-making to jointly address urgent challenges. Evaluation of this capacity is based on its scope in terms of breadth (considering the number and type of actors involved, both internally and externally) and depth of the exchange relationships established between them [53]. Collaborative capacity must also include the generation of dynamics involving citizens, sharing of responsibilities, and creation of common objectives, where public managers act as facilitators of networked interaction and mutual learning, stimulate innovation, increase operational capacity, and enhance the legitimacy of public action in times of crisis [54]. This can be promoted through open participation mechanisms that encourage the incorporation of the citizen perspective in the decision-making process. Finally, the capacity for collaboration requires the articulation of a transparency and accountability system in order to be able to account for the actions taken to address the crisis.

The four capacities described have distinct impacts on the strategies and activities facing a crisis environment, but they are mutually dependent on one another. Consequently, they should be viewed as an integrated whole that, through their interplay, serves as a prerequisite that reinforces local authorities to improve smart systems of governance to tackle the issues posed by the local crisis.

3.2. Identification of Indicators for Each Analyzed Institutional Variable

To develop an analytical framework and measure these capacities at the local level, our model proposes a set of key indicators for each capacity. Each of the proposed indicators is in turn an enabler of one of the five Smart government strategies for robust governance described in section 2.2 of the paper (Scalability, Experimentation, Polycentricity, Norm adaptability and Learning).

Variable 1. Contingency planning capacity

Indicators:

1.1. Contingency planning and protocols: Existence of contingency plans or protocols for crises that prioritize the development of anti-crisis actions over the execution of routine plans or programs.

This indicator identifies the existence of contingency plans or protocols for crises. Such plans prioritize the development of anti-crisis actions over the execution of routine plans or programs. The development of such plans enables local governments to proactively respond to crises, ensuring the continuity of essential services, minimizing damage, and reducing the impact of the crisis on the local community [55]. . As both planning and protocols inform about resource redistribution and reflects knowledge derived from previous tests and prototypes, this indicator is closely related to both scalability and experimentation smart government strategies for robust governance.

 doi:10.20944/preprints202305.1413.v1

1.2. Policy makers trained in risk management: Existence of policymakers with training and/or experience in risk management or crisis management.

This indicator identifies the existence of risk and crisis management experience in the organization's management structure. Policymakers with training or experience in risk management or crisis management are essential due to the critical role they play in developing and implementing effective policies and procedures to face it [56]. The existence of such policymakers informs local government capacities to identify potential risks and develop strategies to mitigate them. Furthermore, they can develop contingency plans and protocols for crisis situations, thereby ensuring that they are well-prepared to handle any unexpected events that may occur. Due to content and dynamics associated with training and/or experience in risk management, this indicator is a key factor to inform about learning smart government strategy.

1.3. The allocated budget: Existence of a budget linked to contingency plans to ensure that anti-crisis actions can be developed.

The indicator identifies the degree of flexibility about budget allocation decisions. Specifically, it evaluates the extent to which sufficient resources are allocated to anti-crisis planning action programs, highlighting the prioritization of such allocations. The indicator serves to identify the capacity to effectively mobilize resources, particularly through the prioritization of adequate financial resources for the implementation of action programs [57]. The existence of a budget linked to contingency plans is essential to all smart government anti-crisis strategies and as indicator, it especially related to scalability strategy for robust governance.

Variable 2. Analytical capacity

Indicators:

2.1. Organizational Data units: Existence of specialized data analysis and management units within an organization, staffed with adequate human resources to effectively obtain, manage, and leverage data and evidence.

Data is a crucial component of enhanced decision-making processes and the advancement of public action to combat crises. This indicator serves to identify the presence of a specialized organizational unit or professional team equipped with analytical skills, sufficient resources, and appropriate levels of organizational support. By providing insight into the ability of public organizations to access, manage, and apply data and evidence of diverse origins to bolster decision-making processes, this indicator facilitates an understanding of the extent to which a team of skilled professionals, legitimized across organizational hierarchies, can contribute to this effort [58,59]. Due to the role related to specialized data analysis and management units in terms of knowledge sharing and promotion and supervision activities, this indicator informs about coordinated autonomy strategies of smart government for robust governance.

2.2. The information system: Availability of a robust information system that effectively acquires, processes, disseminates, and leverages data and information.

This is critical for informed decision-making processes. This indicator identifies the presence of reliable information systems that support data collection, processing, analysis, and presentation in appropriate formats to diverse stakeholders, thereby promoting analytical capacity. It aligns with a key variable highlighted in the academic literature concerning the development of planning and leadership strategies grounded in robust information structures. This affords flexibility and adaptability, enabling learning and adjustments in public policies at the local level. Overall, this indicator provides insight into the existence of an effective organizational architecture that supports redundant systems that can be activated in the event of a data infrastructure disruption [60]. Even the availability of a robust information system is essential for all smart government strategies, scalability becomes one of the highlighted initiatives to be informed by this indicator.

2.3. Data-driven decisions: Existence of organizational processes that facilitate data-driven decision-making aligned with anti-crisis policy objectives.

This indicator assesses the capacity of an organization to generate its own data, drawing from diverse departments and external actors, and establish systematic processes that enable decision-making based on these data and evidences. An essential element in assessing analytical capacity lies

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in establishing guidelines and standards that ensure the quality of data and appropriate utilization [48]. The existence and results of data-driven decision-making processes is a key indicator to inform about smart government strategies such as developing skills for improvisation and rapid learning and to enhance relationships model (both internal and external) for robust governance..

Variable 3. Organizational management capacity

Indicators:

3.1. Coordination systems: Existence of systems for the coordination, negotiation, and exchange of information between internal units, that promote cross-cutting actions, in order to define new strategies and monitor the adopted actions.

This indicator assesses the capacity of an organization to respond to the requirements of its anti-crisis strategy by evaluating its internal processes and dynamics. It measures the ability of different units to adapt and streamline their activities to promote the development of cross-cutting policy actions in turbulent environments [61]. Coordination, negotiation, and information exchange between internal units are among the key issues identified by this indicator. It provides insight into the organization's coordination and communication abilities and how effective is the collaboration between units. This indicator is essential to inform about coordination autonomy strategies for robust governance.

3.3. Flexible personnel management: Existence of specific actions in terms of communication, training, and skills development associated with risk management, and adaptability in terms of personnel allocation according to the emergence of unforeseen needs.

The effective management of risk in local government requires specific actions aimed at improving communication, training, and the development of skills associated with risk management and adaptability [62]. This indicator highlights the importance of such actions and how they contribute to ensure that the appropriate volume of human resources is allocated to address unforeseen needs. The existence of these actions can enhance an organization's ability to respond quickly and effectively to crises by adapting to changes in circumstances as they arise. This includes the identification of critical skills and the development of programs aimed at improving these skills among staff, as well as the provision of appropriate personnel to support crisis response. The development of such actions can help establish a culture of robustness within local government organizations, promoting effective decision-making and enhancing the overall capacity to manage risk. Flexible personnel management concreted in the abovementioned actions is a key indicator for smart government strategies such as scalability and learning, and also to encourage innovative responses.

3.4. Regulatory flexibility: The ability to adapt norms and regulations to the needs arising from the crisis.

This indicator highlights the importance of the governments capacity to adjust the legal framework to respond effectively to the crisis. The ability to adapt to changing situations is key to ensure that regulations are not a hindrance but rather a facilitator in addressing the challenges posed by a crisis. It is necessary to establish mechanisms that allow for a flexible response and adaptation to the specific circumstances of each situation. The regulatory framework must be designed in a way that enables it to be modified quickly to respond to the challenges presented by crises [59], while maintaining its coherence and consistency with the overall objectives of the policy. Effective communication with stakeholders, such as citizens, private sector actors, and civil society, is also crucial to ensure that regulatory changes are understood and implemented correctly. This indicator is essential to inform about norm adaptability robust governance strategy that aims to safeguard of values and stability they provide, but avoiding rigidity.

3.5. Encouraging experimentation: Existence of experimental programs integrated into management strategies, such as pilot tests, living labs or experiments.

This indicator assesses whether local governments have implemented such experimental programs in a systemic way as part of their management strategies, and if they are integrated into their policy-making processes. Experimental programs allow local governments to develop and test new solutions in real-life situations, which can lead to better problem-solving approaches and

 doi:10.20944/preprints202305.1413.v1

improve service delivery [63]. The integration of such programs into management strategies ensures that they are used to their full potential and their outcomes are applied systematically. The existence of such programs is, therefore, a crucial indicator of the local government's innovation capacity and its readiness to engage in experimentation and innovation in a dynamic and evolving environment, as smart government strategies for robust governance.

Variable 4. Collaborative capacity

Indicators:

4.1. The management of external networks: The presence of a clear and articulated approach to managing the network of external actors to be able to quickly coordinate anti-crisis actions.

This indicator identifies the public organization capacity to manage the network of external actors effectively. This is achieved through establishing communication channels with different organizations, including public, private, and third-sector actors, for the exchange of ideas and best practices that can be applied to the development of local anti-crisis initiatives [62]. The concrete evidences of this indicator inform about transformation of organizational relationship models strategy for robust governance.

4.2. Citizen participation and accountability: Participatory mechanism as antennae or sensors of situations that could lead to social crises and to face it and existence of accountability and transparency systems on the design, implementation and evaluation of anti-crisis programs.

This indicator evaluates the organizational ability to integrate citizens' perceptions and evaluations into the diagnosis and the decision-making process. In this regard, the collaborative capacity must encompass the establishment of dynamics that engage citizens, sharing of responsibilities, and the generation of common goals. The promotion of open participation mechanisms that encourage the integration of the citizen viewpoint in the policy process reinforces this approach. Therefore, a transparent governance model is necessary to promote this critical perspective, while promoting the legitimacy of government action despite the crisis [64]. As in the previous case, this indicator is essential to provide evidences of organizational relationship model changes as smart government strategy for robust governance.

4. Conclusions

Local governments must deal with an environment where crises are becoming systemic. Turbulent environments pose significant challenges to smart governance strategies. They require local governments to be agile, adaptive, inclusive, and equitable in their approach, with flexible and responsive governance mechanisms in place. Strong communication and collaboration mechanisms, contingency planning, and resource mobilization mechanisms are also crucial. Smart government strategies must incorporate data analysis and risk assessment mechanisms to provide accurate and timely information about crises. By doing so, local governments can develop effective crisis management strategies and ensure the safety and well-being of their communities.

The proposed analytical framework provides relevant insights to inform about local smart government capacities to deal with crisis situations. Through the set of indicators described in the previous section, the analytical framework allows us to identify how each of the four institutional capacities has contributed to the local government's ability to design, execute, and assess effective anti-crisis policy actions. While these capacities do not guarantee the success of such policies, they represent a necessary prerequisite for smart local governments to address the challenges generated by turbulent environments.

In order to deploy the analytical framework based on the identified indicators, we propose to combine different research methods to examine a specific system, namely, the anti-crisis strategy promoted by a local administration. Through an in-depth collection of data from various sources, such as policy documents, strategic action plans, monitoring and evaluation reports, and web-based information systems, in addition to conducting in-depth interviews and group meetings, we can inform the above-mentioned indicators to assess smart government strategies for robust governance.

The objective of this paper is to develop this analytical framework for examining the institutional capacities of smart government systems in addressing crisis situations. The study has highlighted the

need to explore the various capabilities that these systems possess, including contingency planning capacity, analytical capacity, organizational management capacity, and collaborative capacity. In doing so, the paper has contributed to the body of knowledge on crisis management in the context of smart government systems. The institutional organizational model presented in this paper provides a valuable tool for evaluating local smart government robustness. By considering the organizational and institutional characteristics of the system, the model allow us to identify areas of strength and weakness and provide insights into the effectiveness of different strategies and policies. Moreover, it can be used to benchmark the performance of local smart government systems against other systems in similar contexts and identify best practices for improving crisis management.

One of the significant contributions of this study has been the identification of critical indicators that affect the institutional capacities of smart government systems. These include the availability of technological infrastructure, the quality of human resources, and the effectiveness of the governance framework. By analyzing these indicators, the proposed analytical framework provides a comprehensive approach to assess the preparedness of smart government systems in dealing with crisis. Crisis environments require local governments to develop a comprehensive understanding of the crisis and its potential risks and consequences. In our analysis, we have attempted to define and study how smart government strategies need to incorporate data analysis and risk assessment mechanisms that can provide accurate and timely responses to crisis situations.

Although the proposed analytical framework has the potential to contribute significantly to the field of crisis management, further research will be necessary to validate and improve its effectiveness. While institutional capacities are prerequisites for effective anti-crisis policy at the local level, their impact on the success of these policies requires further investigation. Future research can build upon this study by validating the proposed framework and identifying areas for improvement. Finally, the goal is to apply this analytical model to enhance the preparedness of smart government systems in addressing crises, thereby contributing to the safety and well-being of society through robust governance responses.

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