Open innovation during the COVID-19 pandemic policy responses in South Africa and Kenya

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Abstract
Most governments upscaled technological adaptations and integration into public service delivery during the COVID-19 pandemic policy responses globally. This article analyzes the context of open innovation (OI) applications and initiatives that characterized public innovation trends and impacted government agencies' responses to contain different consequences of the COVID-19 pandemic in four critical areas: economic recovery strategies, logistics and supply chain, digital health-care partnerships, and collaborations. We show how policy responses increased the uptake and upscaling of OI strategies in Kenya and South Africa. In both countries, government agencies, among other things, upgraded innovative or created online integrated portals for instant data sharing and used knowledge management platforms to monitor the COVID-19 pandemic prevalence in transportation systems and the delivery of vaccines. These enabled effective policy communication and tracing of COVID-19 patients, organizing the population for the vaccination drive, and generating timely data for further action in the four mentioned sectors.

Related Articles:
Lachapelle, Erick, Thomas Bergeron, Richard Nadeau, Jean-François Daoust, Ruth Dassonneville, and Éric Bélanger. 2021. “Citizens' Willingness to Support New Taxes for COVID-19 Measures and the Role of Trust.” Politics & Policy 49(3): 534–65. https://doi.org/10.1111/polp.12404.
Liu, Zezhao, and Zhengwei Zhu. 2021. “China's Pathway to Domestic Emergency Management: Unpacking the Characteristics in System Evolution.” Politics & Policy 49(3): 619–50. https://doi.org/10.1111/polp.12407.
Pelizzo, Riccardo, and Abel Kinyondo. 2014. “Public Accounts Committees in Eastern and Southern Africa: A Comparative Analysis.” Politics & Policy 42(1): 77–102. https://doi.org/10.1111/polp.12062.
Even though most African administrative systems are still dealing with challenges relating to their colonial pasts and problems typical to their state politics, studies have recently shown an expanding growth of technological proliferation in governing Africa, producing mixed political action outcomes and implications for public innovation. Some of these findings concern the government's capacity to identify and adopt appropriate technologies to promote public innovation (see e.g., Arthur et al., 2020; Yeboah-Assiamah et al., 2022). Others have questioned the political will needed to effectively implement their institutional dispensations as articulated in the National Innovation Systems (NIS) and whether the technological adaptation trend is not built on sand like most African public sector reforms (Gagliardone, 2016; Onyango & Ondiek, 2021). However, some have been more optimistic in their analyses, showing how disruptive technologies have shifted governance toward innovation while revolutionizing the public policy landscape across African public service (see e.g., Arthur et al., 2020; Siyanbola et al., 2016). Essentially, a more conscious or conspicuous debate on this shift resides in the emerging GovTech and public governance realms that call for innovative government action approaches to public policy and service delivery (see e.g., Dener et al., 2021; Johns et al., 2022). A more significant portion of the knowledge concerning the transformative effects of technological proliferation in Africa is also prominently being displayed in the FinTech and CivicTech realms of government action and citizen responses. Generally, public innovation has come with “addressing public trust concerns and enhancing collaborative innovation, digitalization and networking in public policy and service delivery, among others” (Onyango, 2022, p. 5).
This article uses an open innovation (OI) lens to assess the impact of the COVID-19 pandemic on public innovation. It mainly explores how the technological and innovation aspects of public administration were ordered or leveraged in response to the pandemic in critical sectors of the economy in Kenya and South Africa. The importance of such an analysis lies in its diagnosis of the status of science, technology, and innovation (STI) that have been undergoing institutionalization for some time now in most African countries (Gault, 2008). Since the 1980s, African countries have adopted STIs to drive the development agenda. This is very conspicuous in the current efforts by the African Union (AU)’s nation-building efforts if the Digital Transformation Strategy for Africa (2020–2030) is anything to go by. Since the 2000s, the integration of STIs in public service delivery and policy making has gained impetus, with more African countries taking STIs seriously (see e.g., Siyanbola et al., 2016). In this article, we interrogate how the COVID-19 pandemic tested these systems at the time when they mattered the most.

In general, our analysis builds on the point that different expectations of what the government should do and how it should do these things (Rosenbloom, 1983) have led to several innovative ideologies and systems in public administration to improve public service and policy delivery. For years now, the current public administration methods and organizations have focused on improved science and technological development (Bekkers & Tummers, 2018). It is no longer a debate among scholars and practitioners that there is no better way of organizing public administration besides being continuously innovative (Waldo, 1965; Wilson, 1887).
Thus, within the desire to remain innovative, administrative systems have often learned, borrowed, and created similar methods and organizations to respond to similar problems today (see e.g., Meyer & Rowan, 1977). More essentially, crises like the recent financial crisis and the COVID-19 pandemic have imposed innovative strategies on public administration (Ramalingam & Prabhu, 2020). The pandemic demonstrated that desperate times need desperate measures even in the conventionally closed innovative environments of government bureaucracies (Bekkers & Tummers, 2018; Bommert, 2010; Osborne & Brown, 2013).

Studies have shown that methods and organizational changes in public administration have been sudden and gradual during a crisis, resulting in variations in the impact of innovation and capacities to address emerging wicked problems like the COVID-19 pandemic (Osborne & Brown, 2013; Zivkovic, 2018). Osborne and Brown (2013, p. 3) refer to sudden changes as the emergent innovation phenomena resulting from unforeseen and unexpectedly rapid changes in an administration's environment. Simultaneously, gradual changes are planned innovation, referring to the systematic diagnosis of the administration's settings by public managers based on the foreseen phenomena, thereby responding by making strategic or tactical contingencies or innovations. As Waldo (1952) pointed out long ago, another concern for government agencies has also been the degree of adaptability (e.g., which areas require technology or reforms and which do not), the design, and the relevance of integrating private administration principles and innovation into public service delivery.

This is important due to the unprecedented pace of adaptive planning for the operations, learning culture, and constant change caused by the COVID-19 pandemic, making it difficult to accelerate the
adoption of new technologies and transformations given the existence of legacy systems, bureaucratic processes, and the traditional hierarchies in public administration (McDade et al., 2020; Surya, 2021). For example, some innovation responses related to the pandemic have focused mainly on repurposed and existing incremental improvements initially from high-income countries without regarding their replicability in low-income government strategies (Ramalingam & Prabhu, 2020). Such concerns make public administration generally slow and nonlinear in its innovative undertakings (Onyango & Ondiek, 2021; Waldo, 1965). In public governance realms, there have been different responses and commitment levels to technological changes, with private administrations performing exceedingly better than public administrations (Waldo, 1965). This means that public administrations need to pursue innovation differently “because bureaucratic (closed) ways of innovating do not yield the quantity and quality of innovations necessary to solve emergent and persistent policy challenges” (Bommert, 2010, p. 15). Furthermore, public administrations will also need to pursue different scientific strategies for sustaining innovation. According to van Acker and Bouckaert (2018), these may include learning, a culture of feedback, and effective accountability mechanisms.

Despite the inherent risks and cultural resistance toward progressive administrative innovation, the OI agenda is rapidly gaining momentum in the public sector. Most significantly, African states have replicated recent transformative and innovative approaches taking place globally to re-invent ways of tackling public administration challenges or issues that are different from high-income countries. However, the coordinated complexities presented by COVID-19 made government administrators
realize that instant innovative mechanisms needed to be urgently instituted to help realize effective solutions for combating the pandemic (Dener et al., 2021; Sørensen, 2012).

Notably, many governments in low-income regions experience a less effective “false start” in generating tangible impacts due to uncertainty and the detrimental effects of COVID-19 responses. This stems from a lack of an enabling institutional framework, domination by international experts, and levels of politics in complex and ambiguous administrative structures (Ramalingam & Prabhu, 2020; Sørensen & Torfing, 2015). Therefore, COVID-19 response efforts to develop and implement new and bold ideas have opened a new phase in improving the ability of actors in the public sector to initiate open and collaborative innovations. Moreover, public administration experiences pitfalls in creating effective governance mechanisms during a crisis because of complex systems of OI networks that rarely favor public sector institutions (see e.g., Clauß & Spieth, 2015; Sørensen & Torfing, 2015). During the COVID-19 environment, there was therefore a dire need for OI with an international scope to enhance institutional and transactional governance mechanisms, improve responses to the crisis, and advance policy responses in the selected countries.

Equally, there was a need for reflection on the role of OI initiatives in transforming the public sector while recognizing the cultural and institutional environment of public governance to enhance the capacities of public administrators and governments to respond swiftly to the pandemic. Accordingly, this article bases its analyses on the OI approach to explore attendant institutional linkages, technological adaptations, and relationships initiated in addressing the COVID-19 pandemic in South Africa and
Kenya. Our empirical analysis hopes to shed light on how public administration's innovative systems were recently employed to handle the COVID-19 pandemic in Africa. South Africa and Kenya's innovative systems are important examples to use for at least two reasons. First, they are the trailblazing innovative economies among the sub-Saharan African countries, according to the Global Innovation Index (GII) 2021 results (Dutta et al., 2021). GII 2021 shows that many sub-Saharan countries have performed beyond expectations. In this report, “Kenya keeps its 3rd place in sub-Saharan Africa and scores above its income group in Institutions, Market and Business sophistication, and Knowledge and technology outputs. It also scores above the average for its region in human capital and research and creative outputs” (Dutta et al., 2021, p. 25). In the overall ranking of innovation achievers, South Africa ranks 61, and number 2 in sub-Saharan Africa (after Mauritius) at 56 globally. Only “Kenya (85th) and the United Republic of Tanzania (90th) have remained firmly within the top 100 and have improved their [innovation] performance over the past five years” (Dutta et al., 2021, p. 32). Indeed, South Africa and Kenya rank relatively high in the 2016 World Bank's *Digital Adoption Index* (DAI), ranging between .6 and .7, respectively. On a 0–1 scale and covering 180 countries, DAI emphasizes the “supply-side” of digital adoption to maximize coverage and simplify theoretical linkages (World Bank, 2016)\(^1\) among the economy, people, government, and business.

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\(^1\)For more information, see [https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index](https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index).
Second, the selected countries are the major economic players in their regions. Understanding how they carried out public innovation during the COVID-19 pandemic may, therefore, provide insights into the economic consequences of the pandemic in the region. This study looks into subsequent COVID-19-related public innovations in South Africa and Kenya, involving economic recovery strategies, logistics and supply chain, digital health care, and partnerships and collaborations. These public innovations, in some instances, transcended national borders influencing innovations in neighboring countries. Therefore, given their advanced NIS or STIs, South African and Kenyan cases provide ideal analytical contexts. However, our discussion chiefly looks into the national implications of COVID-19-related public innovation strategies. This makes this study's findings critical in auditing the essence of digital transformation in Africa to public service delivery despite reports of “technophobia” among public administrators (see e.g., Onyango & Ondiek, 2021).

We explore new approaches and OI strategies featured during the COVID-19 pandemic to generally inform public administrators, policy makers, researchers, private sector players, and public sector organizations on dimensions of public innovation through the OI lenses and how its approaches contributed toward improving institutional environments during the COVID-19 pandemic. The rest of this discussion is structured as follows: the next section discusses the place of innovation in public administration and how OI perspectives apply. The following section explores trends of innovation generally in public administration during COVID-19. This is followed by the methodology of this study, data presentation, and analysis sections. The study closes with an overview of the main
points emerging from the study that require additional emphasis. The following question guides this
discussion: how has public administration upgraded itself in light of OI in addressing the COVID-19
pandemic in Kenya and South Africa?

UNDERSTANDING INNOVATION IN PUBLIC ADMINISTRATION: AN
OPEN INNOVATION PERSPECTIVE

Innovation in the state's administrative systems, or public innovation, has been reflected in different
terminologies and reform approaches, with relative variations globally. These include public govern-
ance (see e.g., OECD, 2015), digital era governance (see e.g., Dunleavy et al., 2006), digitalization
(see e.g., de Mello & Ter-Minassian, 2020), e-government (see e.g., Curtin et al., 2003), and open
government (see e.g., Wirtz & Birkmeyer, 2015) to describe technological deepening in public policy
and service delivery (Bommert, 2010; Brown & Osborne, 2012; Onyango & Ondiek, 2021; Osborne
& Brown, 2013). Similarly, networked governance, interactive governance, collaborative governance,
public value, and new public service, among others (Osborne, 2010), describe normative changes that
underlie the need for innovation structures in public service delivery. This shift has often been simpli-
fied with the government-governance continuum (Rhodes, 2012).

Arguably, even though it is analytically feasible to pinpoint, package, or conceptualize these
“images” of innovation, their adaptations in public service delivery traverse and integrate different
aspects as needed. The analytical strength of OI resides in its amalgamation of all these innovation avenues in improving policy effectiveness. This was evident during the COVID-19 pandemic when relevant government agencies and their stakeholders adopted different aspects of technological innovations to respond to the pandemic. The “on the needs basis” practical integration of various aspects of innovation is also evident in the literature on innovation. This makes it so extensive that one cannot capture its magnitude within a study such as this. However, innovation has remained an elusive concept in operationalization and interpretations. It thus means different things to different people and organizations (Bekkers & Tummers, 2018). Also, it is primarily moderated by the administrative contexts, which pose a challenge and determine the degree of adaptability (Onyango & Ondiek, 2021). We think this may partly explain variations in the rate of innovative development and systems from one administrative context to another.

To begin, Bekkers and Tummers (2018) state that innovation goes beyond just an improvement in public administration's method and organization or structure to examine the degree of a shift in how it conducts its business. Thus, innovation—such as a completely new product or [a] new way of looking at an old problem—constitutes a radical discontinuity with the past (Brown & Osborne, 2012, p. 210). This radical discontinuity is the main difference between innovation and improvement. The authors assemble the following innovation types and highlight their implications for the public administration's life cycle.

Relevant types of innovation are: (1) process innovations (think of the development of a one-stop-shop by a municipality or various technological innovations), (2) product or service innovations (such
as a new passport), (3) governance innovations (such as giving citizens more autonomy when choosing which hospital to go to), (4) conceptual innovations (such as looking at someone's ability to work, not their disability) (Brown & Osborne, 2012, p. 210).

Thus, innovations in organizations differ not just because they exist on different menus but also in their impact on the public administration's organization and methods of operation. It matters, therefore, for public managers to appropriately discern and match a particular type of innovation with a problem to arrive at a solution. However, this has also been a challenge in public administration based on constraints emanating from an interplay of culture, public value, and political factors (Altenburg, 2009). Innovative systems or ideas also differ in their originality and agency in addressing a public policy problem.

While some culminate from an eventful crisis creating a puncture or a critical juncture in the public policy process, others gradually learn in public organizations. Innovative outcomes are thus more likely to be non-linear in public administration's context, demonstrating its timelessness, temporal nature, and uncertainties, hence the concern with sustainability (Argyris & Schon, 1996; van Acker & Bouckaert, 2018). Indeed, studies on administrative reforms have shown that reversing innovative systems is nothing new (see e.g., Ongaro, 2009). This is especially so because innovation happens in stages besides being hosted on fragile processes and sometimes more subjective assessments, especially in policy networks and collaborative public management (Dziallas & Blind, 2019; Onyango, 2019).
Regarding stages of Innovation, Dziallas and Blind (2019) talk of *ex-ante* and *ex-post* stages. The former refers to the front end of the innovation process. This is concerned with generating ideas, screening, evaluating, and innovating concepts. The *ex-post* stage concerns innovations that have already been introduced into the market, that is, after the market launch (Dziallas & Blind, 2019, p. 4). Even so, the distinction between these stages may be blurry or mutually constitutive inside public administration. OI concepts can better understand innovation within the public administration's context. In this way, we can easily and rather broadly categorize innovation systems' nature within the *closed-open* dichotomy. Other synonyms for OI include open government, wiki government, e-democracy, e-participation, crowdfunding, citizensourcing, and eCitizen.

### Applicability of OI: A shift from closed to open innovation strategies in public administration

Hilgers (2012) contends that OI mainly “involves the process of integrating peripheral knowledge into the political-administrative process” (cited in Yeboah-Assiamah et al., 2022, p. 601). The Netherlands, Australia, and Belgium, as well as the United States and Canada, have often been cited as performers in implementing OI strategies (see e.g., Bossink, 2002; Hilgers, 2012). As a concept more common in private administration, OI is keen on an organization's outward-looking strategy...
to complement its internal methods of finding and designing solutions to problems. In simple terms, OI refers to the organization's inclination and efforts to look outside for solutions and those already devised internally. It underscores three principal directions of knowledge flow; i.e., outside-in and inside-out and coupled (Chesbrough, 2012). The first two concentrate on the flow of knowledge/ideas from outside into an organization and inside to outside. The coupled principle integrates both. Therefore, OI involves the flow of purposive knowledge across organizations' boundaries for monetary and nonmonetary reasons (Chesbrough & Bogers, 2014).

A variance of OI is closed Innovation (CI), but this is not in the analysis of open versus closed systems as used in the Quality of Government (QoG) indicators or studies (see e.g., Nistotskaya et al., 2021). This is clarified in Table 1. We consider CI systems specific organizational developments, aspects or changes, or inward-looking systems that are consciously created to strengthen or drive internal performance or stimulate entrepreneurship within public organizations. These consider quantitative changes that should improve the administrative system's performance or efficiency. So, little attention is on involving the citizenry in government agencies, as common in most developing countries (Onyango, 2022).

Generally, public administration's intellectual development and practice have been inexplicitly underpinned by the shift from closed to open innovation systems. This moves from the rule-bound, Weberian, or traditional administration to a more democratic administration (Ostrom, [1973] 2008; Waldo, 1965). Even though overlaps and duplications characterize the adaptability of different forms

| Closed-innovation paradigms | Focuses on addressing | Innovation outcomes | Public service-delivery outcome | View of citizens |
|-----------------------------|-----------------------|---------------------|-------------------------------|------------------|
| Traditional public ad       | Centralization, law enforcement, indiscipline, disorder, amateurism, dishonesty, etc. | Political neutrality, meritocracy, departmentalization | Monopolism | Clients or constituents |
| New public management       | Decentralization, market failures, managerial irresponsibility, oversupply, budget maximization, inefficiency and cost-effectiveness, professionalism | Marketization, agencification | Competitive government, privatization, deregulation | Customers |
| New public value            | Stakeholder engagement, search for public value | Collaborative mechanisms, boundary-spanning approaches | Adaptability, organizational learning, steering networks | Stakeholders |

Source: Authors.

TABLE 1 The closed-innovation strategies in public administration
of innovation (or reforms) (Brunsson, 1989), they have also improved administrative systems' methods and organization. Over time, these have induced some discontinuities or disruptions even in very conventional bureaucratic settings. To demonstrate this, Table 2 shows the different philosophical developments of public administration in light of closed and open innovation dichotomies. While stability and overlaps are standard consequences of reforming administrative systems (Brunsson & Olsen, 2018), public administration has undergone innovative and complementary transformations. This is yet to stop, hence the basis for its future relevance in responding to wicked contemporary problems like the current COVID-19 pandemic.

PUBLIC INNOVATION TRENDS DURING THE COVID-19 PANDEMIC: INNOVATION AS LESSON DRAWING AND ORGANIZATIONAL LEARNING

Innovation has been more complex, taking cues from public institutions' intricate socio-economic and political contexts while responding to wicked problems like the COVID-19 pandemic. Therefore, pursuing innovation has often been embedded in other structural transformations within and outside public administration. However, public administration should act quickly under a crisis like that presented by the COVID-19 pandemic. Paul Cairney (2021, p. 91) argues that the “pandemic
exposes the need to act despite high ambiguity and uncertainty and low government control, using trial-and-error strategies to adapt to new manifestations of the problem and produce unequal consequences for social groups.” While comparing the policy responses to the COVID-19 pandemic by developed and developing countries, we should also distinguish between innovative structures that may have resulted from the World Health Organization's (WHO) recommendations and internally generated responses by individual health systems. This is important when examining African contexts, as in our cases.

We also note two issues; first, in this pandemic, innovative processes were more characterized by lesson drawing or outside-in OI principles (Cairney, 2021). Most countries took actions that have been considerably successful in other contexts to control the pandemic. In contrast, others—like the UK—were slow and took time to analyze and apply evidence (Cairney, 2021). The lessons drawn were either taken whole or implemented incrementally depending on the pandemic's situational conditions and the organization's internal capabilities or experiences. In other words, health systems also coupled the outside-in and inside-out principles to respond to the COVID-19 pandemic. This was further evident in how the United States responded to COVID-19. The White House, through the Science and Technology Policy office, published all the relevant reports of research studies on the virus and the underlying SARS-Cov 2 viruses to encourage collaborators to produce appropriate solutions.

Similarly, NASA issued an OI challenge to the public, resulting in the receipt of thousands of suggestions from organizations and individuals regarding strategies for addressing space hazards
(Lifshitz-Assaf, 2018). The United States' outside-in principle also adopted crowdsourcing to manage therapies on COVID-19 and ways of designing and making face masks, hand sanitizers, and the modification of a ventilator to support two patients simultaneously. For inside-out knowledge flows in the business-to-business (B2B) context of OI, Amazon offered its internal information and communication technology (ICT) infrastructure to host external customers' websites and information technology needs. In the same manner, Medtronic opened its ventilator design for all. The company also publicly posted the design drawings of its ventilator and waived its intellectual property rights. In the business-to-customer (B2C) context for inside-out knowledge flows, Lego allowed teachers and users to modify its Lego Mindstorms product to create a whole program in middle schools (Afari & Khine, 2017).

Many firms are converting sections of their process to produce scarce, high-demand supplies such as hand sanitizers worldwide. For instance, the East Africa Breweries converted part of its alcohol production process to manufacture sanitizers and distributed them freely to vulnerable people living in Kenya's informal settlements as part of their corporate social responsibility (CSR). Also, national ICT policies or innovation systems were upgraded based on existing structures and guidelines. Kenya and South Africa created special ICT task forces within their current innovative systems or ICT infrastructures, reflecting how different government institutions responded to service delivery during the COVID-19 pandemic. Indeed, to track the number of infections and vaccinated individuals, the governments of Kenya and South Africa, among others, collaboratively adopted new technologies,
including creating websites for individual registration. Also, with the help of stakeholders, governments in Africa like in Rwanda and Ghana have used Zipline drones to deliver personal protective equipment (PPE), blood, and COVAX vaccines to remote areas (Vincent, 2021).²

However, international development actors also significantly influenced the leeway of innovation in developing countries. While referring to the constraining environment of COVID-19 vaccine production, the Kenyan president argued that Kenya found it difficult to “move toward vaccine production because it has suffered due to vaccine nationalism, a claim that rich countries are buying up vaccine supplies” (BBC, 2021).³ Vaccine nationalism, as alluded to by President Kenyatta, can be embedded into the unequal international political system and aid regime. Thus, some innovation processes may have primarily stemmed from conventional external coercive pressures for change (see e.g., Ohemeng, 2010; Onyango, 2022). Indeed, in Africa, the WHO’s guidelines seemed to have resonated with the politics of administrative reforms in these countries, leading other countries like Tanzania and Burundi to respond differently (see e.g., Makoni, 2021).

The politics of administrative reforms in Africa have been criticized for installing contextually impaired best practices that limit new ideas generated internally within these organizational contexts. Thus, the extent to which these coercive pressures for change and internally generated ideas may drive

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²See https://www.theverge.com/2021/3/9/22320965/drone-delivery-vaccine-ghana-zipline-cold-chain-storage.
³See https://www.bbc.com/news/av/world-africa-58030423.
innovation in different contexts is contingent on historical factors that differ between developed and developing countries. In this way, public administration's capacity to innovate in African countries like Kenya and South Africa varies between agencies and units internally and regionally between different levels of government.

Moreover, unlike in the United States and Western European countries, innovative systems in developing countries cater to different needs. They are founded on other institutional frameworks and logic, patterned by various historical factors and behaviors (Altenburg, 2009; Onyango & Hyden, 2021). The innovation systems in developing areas also do not address the specific needs for poverty reduction and socially inclusive innovation types (Altenburg, 2009, p. 33). Indeed, if innovation is relatively mastered in public administration, it is more open and transparent and more professional and reliable, enhancing effective COVID-19 policy responses. More significantly, effectiveness is measured by effective coordination mechanisms, public trust, and cooperation among stakeholders. Christensen and Laegreid (2020) demonstrate this in the case of COVID-19 control in Norway, noting that the Norwegian's open and transparent government allowed it to go beyond the standard suppressive strategy for COVID-19 and successfully implemented a control strategy.

This control strategy underscored collaboration, pragmatic decision making, effective communication, and resource utilization. Thus, innovative systems facilitating internal and external partnerships and cooperation with other actors deepen amicable interactions between the citizens and government institutions. This should improve the public trust needed to control the COVID-19 pandemic (Vergara
et al., 2021). Even though Kenya and South Africa were pushed by the unique circumstances brought by the COVID-19 pandemic to innovate, their political contexts still limit public administration to be fully open, which may render regulatory policies against COVID-19 less successful. The following section provides this article's methodological foundations before proceeding to the empirical analysis of both cases.

METHODOLOGY

Research objectives and variables of the study

This study explored how public organizations consolidate and exploit OI in response to COVID-19 in Kenya and South Africa. The study was motivated by realizing solid administrative systems to transform OI processes. We employed a descriptive study design. With innovation (using OI strategies) as an explanatory variable in public administration's response to the COVID-19 pandemic, we examined dependent variables: digital health, economic recovery strategies, logistics and supply chain, partnerships, and collaborations. Emphasis on innovation considered how these areas employed OI strategies. These included the Internet of Things (IoT) and Big Data components, including smartphones for communications and sharing instant data, the initiation of online portals and knowledge
management platforms to monitor the COVID-19 pandemic prevalence and vaccinations, and the use of social media tools to communicate with and trace COVID-19 patients.

To understand economic recovery in the decision for OI in public administration, we looked into the regulatory policies initiated in the two countries. These included fiscal measures and financial stabilization, economic stimulus package, transfer of cash programs for the poor and vulnerable, reduction of income tax and corporate tax, and credit guarantee schemes. The following constructs were considered; stakeholder consultations and structures supporting COVID-19 responses, the number of partnership frameworks implemented, and capacity building for local human resource capacities to combat the pandemic. To examine the role of logistics and supply chain in public administration and OI, we considered constructs like vaccine supply networks, COVID-19 distribution and supply framework, technology-driven logistical solutions, and a national supply chain task force.

Research approach/strategy

This study employed a qualitative approach to assessing the capacity of OI in public institutions. A qualitative approach is appropriate for descriptive and explanatory studies (Bowen, 2009; Yin, 2018). It consequently enabled us to obtain relevant data in nonnumerical form, which also generated rich, in-depth insight into the research objectives. Again, the qualitative design was appropriate in
exploring the perspectives, thoughts, and perceptions of government agencies' actions and preferences toward OI during the pandemic on digital health, economic recovery, logistics and supply chain, and partnerships and collaborations during the COVID-19.

The administrators' choices on OI were extracted from public institutions, which also served as units of analysis like the public hospitals, national pronouncements by heads of government and presidential units, COVID-19 national taskforces, The Treasury, and the Ministry of Finances and Ministry of Health (MoH). The choice of units of analysis was necessitated by maintaining a chain of evidence in the study proportions and keeping systematic relevant scope about the study's goal.

During evidence and data collection, a question- and case study-answer database was designed for all the relevant variables of the study to draw an empirical analysis of the facts for the article. The question-and-answer case analysis was categorized under digital health, economic recovery, logistics and supply chain, and partnerships and collaborations. Data were then collected from identified sites (journals, government circulars on response to the COVID-19 pandemic, COVID-19 policy briefs, speeches, public sector institutions’ websites, COVID-19 response and data collection portals, articles, and WHO websites) using a case study approach to examine in-depth responses based on systematic criteria on themes of study variables for the cases of Kenya and South Africa. The pattern was employed to help draw patterns of OI and evaluate trends within the country-specific applications from focused areas of the study. There was also an analysis of parliamentary acts concerning the COVID-19 pandemic related to OI in the South African and Kenyan administrative systems to analyze
the directives to public sector organizations at the legislature level. Equally, documentary analysis was used to analyze data from these institutions' reports, policy guidelines and briefs, COVID-19 policies and government media pronouncements, COVID-19 response portals and journals, and government circulars on COVID-19 response and mitigation. The entire analysis was organized with guidance by theoretical proportions derived from the study's aims and objectives. Further, the explanation and the matrix of questions and answers were thematically grouped into categories that informed analyzed data for inference while also using pattern matching techniques to compare Kenya and South Africa to conclude. The next sections delve into the cases studied and data presentation and analysis.

**DATA ANALYSIS AND DISCUSSION**

COVID-19 significantly disrupted socio-economic trends across all countries, creating unprecedented humanitarian challenges and health crises. Like other nations, Kenya and South Africa were inadvertently affected from the onset due to unpreparedness or lack of effective substantive policy instruments by policy makers and disruption of the supply chain of essential goods and services. South Africa reported high levels of infections, with the rate almost being at a par with cases in the United States and Europe. By the end of April 2022, South Africa had reported 3.8 million cases with 100,000
deaths, including administering close to 35,548,342 vaccine doses to the population. The situation was made worse by the highly transmissible and mutating Omicron variant, which was traced to have originated in South Africa on November 24, 2021. Kenya had confirmed 323,281 cases with 5647 deaths and administered 17,278,552 vaccine doses in the same period. To manage the situation, many policy responses, including deploying OI in public administration processes, were introduced by governments.

KENYA

In Kenya, policy responses to COVID-19 have been conducted within a multi-stakeholder framework involving experts, think tanks, and other actors who have offered different innovative solutions (see e.g., Mitullah, 2021). The Ministry of Health coordinated these actors and policy responses. Kenya’s state-driven innovation toward COVID-19 has tended to repurpose and strengthen existing approaches in what is viewed as incremental improvements. For example, the development of ventilators originated from actors in high-income countries. In the COVID-19 era, Kenyan public administrators have initiated a more empowering, inclusive, and transformative approach toward OI.

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4 See https://covid19.who.int/region.afro/country/za.
5 See https://covid19.who.int/region.afro/country/ke.
Such innovations have tended to be mainstreamed across the sector. Due to inefficiencies created by the lack of staff to adjust to combating COVID-19 in public health hospitals, the Ministry of Health instituted institutional and systematic staff shortage issues and urgently hired more medical personnel to support the already overstretched facilities. In Kenya and across the nation, county governments and national governments enrolled more medical staff, including nurse laboratory technicians and biomedical engineers, to support the installation of mechanical ventilators.

**Logistics and supplies chain management**

The growing threat of COVID-19 created a serious risk to inbound and outbound trade flows of the supply chains due to logistics and transport disruptions (East Africa Business Council, 2020). The Ministry of Industrialization, Trade, and Enterprise Development (see Republic of Kenya, 2020) developed guidelines for business operations during COVID-19, including safety operations and standard operating procedures (SOPs) for transport and logistics. The WHO's recent COVID-19 vaccine delivery plan analysis reveals that “Africa is far from ready.” The report indicates that Africa is just 33% ready for the continent's largest-ever immunization drive, a figure below the required minimum benchmark of 80%.

An immunization-ready survey conducted on data from 40 countries shows that only 44% of African countries have logistics and coordination structures for adequate COVID-19 vaccine distribution (WHO, 2020). Further challenges in logistical and distribution channels cite that the COVID-19 vaccine produced by Moderna, with a shelf life of 6 months, requires −20°C transportation and storage to fill the temperature gap in the medical supplies deficit (Wadkar, 2020). Other vaccines produced by Pfizer/BioNTech require −70°C storage with a shelf life of five days at standard refrigeration temperatures. This has presented logistical challenges for cold chain capabilities to governments. According to World Bank estimates, only 48% of African residents have access to electricity, making it impossible to maintain vaccine-freezing temperatures. However, the Kenya Airport authority is among the six airports in Africa that have installed airside cold storage facilities to aid the trans-shipment of vaccines.

To seamlessly track the temperatures of vaccines and provide alerts for vaccine wastage in the logistics and supply chain, the government of Kenya has introduced transport modeling sensors and user interfaces to protect the lifespan of vaccines. In addition, the government has integrated digital identity through SMS to provide proof of nationwide vaccination exercises. Kenya Medical Research Institute (KEMRI) invented a Virus Transport Media (VTM) to distribute COVID-19 materials to labs for testing. Due to VTM scarcity across the globe, KEMRI is in talks with the government of Kenya to commercialize the hardware for exports to other countries.

In addition, Kenya Airways has instituted a rich network and footprint across the continent, including investments in state-of-the-art pharma warehouses with a handling capacity of 30 tons to handle the movements. Kenya Airways has upscaled staff to enhance capacity through specialized product management training to help distribute large-scale vaccines. Similarly, the passenger flight was repurposed to airplane belly cargo capacity to aid in air cargo delivery for COVID-19 essentials. Kenya's government has also prepared its distribution plan for vaccines with a single point of contact for all questions and information related to distribution. Furthermore, the government has created a strong partnership between stakeholders to support a sophisticated supply chain. In the logistics lessons report for COVID-19 shipment, the Chief Executive Officer of Kenya Airways attributed that:

The government of Kenya has put a robust National Supply Chain Task Force and service providers together with the multi-agency COVID-19 task force to support and expand its logistics services and supply chain capacities in Kenya. The Kenyan government also partnered with WFP-Kenya to operationalize JKIA-Nairobi as a logistics hub for cargo shipment for supporting COVID-19 supplies in the region. Due to COVID-19 unprecedented pressures experiences, the government and partners like WFP, and UNICEF
created a technical consortium established to source, verify, and procure necessary medical items, biomedical and diagnostic equipment, and PPEs. (Kenya Airways, 2020)6

Regarding cross-border exit and entry of Kenya, MoH placed a border surveillance center and implemented a temperature and COVID-19 certification directive for drivers to prevent border transmission. Through Kenya Medical Supplies Authority (KEMSA), the government of Kenya modeled the COVID-19 distribution and supplies framework to 47 counties. To ensure that medical personnel was urgently supplied and distributed, KEMSA could procure medical equipment and supplies within the shortest time and distribute them to counties. Even though the business model approach was commendable for combating COVID-19 and equipping hospitals' medical personnel with required supplies, the model was interrupted due to corruption-related procurement channels. Consequently, to boost the supply chain of COVID-19-related supplies, KEMSA partnered with the Postal Corporation of Kenya (PCK) to scale up its distribution capacity of essential supplies of health products and PPE countrywide.

The PCK capacity necessitated a large fleet of motorcycles, vehicles, and strategic warehouses in the entire country. The whole supply chain establishment created a network of storage, distribution, and packaging facilities to distribute medical supplies, and equipment to health institutions during COVID-19. Moreover, the partnership frameworks established with county governments in procurement, warehousing distribution of drug supplies and equipment improved the performance of supply systems for COVID-19-related equipment.

The creative capacity, energy, and ingenuity in supplying medical equipment and distribution protected frontline health-care workers in most public health facilities. Many innovative supply and procurement purchases quickly fixed inadequacies when health workers experienced critical needs. To improve local supply deficits and increase the capacities of ventilators due to the surging numbers of COVID-19 patients, the Kenya Bureau of Standards (KBS) fastened the approval and processing of standardization of locally made ventilators. For example, the KBS fast-tracked the standardization of the Toyota-Kenya “Bridge Mechanical Ventilator” as an emergency system that resuscitates patients with COVID-19 respiratory failure.

Similarly, the county government of Kitui created institutional workshops. It mobilized local communities to respond in solidarity to expand local capacities to help produce low-cost reusable masks for immediate value and distribution to frontline health workers. Academic institutions, including Kenyatta University Biomedical engineering students, invented a local ventilator called “Tiba vent,” a mechanical ventilator that supported COVID-19 patients to support oxygen supply during the COVID-19 crisis. This invention was meant to address the scarcity of ventilators worldwide and boost local supplies.

Economic recovery

In response to COVID-19, the government of Kenya adopted three pillars: (a) state-funded World Bank grants to provide financial support for vulnerable persons; (b) financial stabilization through the distribution of free sanitizers, PPEs, and other supplies to the public, including over 1 billion shillings initiated through COVID-19 Emergency Response Fund; (c) prevention and social distance testing protocols provided by KEMRI (Murumba, 2020).

The government unveiled an eight-point economic stimulus package incorporated into the national budget to safeguard livelihoods and stimulate economic activity. The stimulus package targeted cash transfer programs for the poor and vulnerable elderly to specifically ensure the welfare and dignity of the most affected, providing seed capital to small and medium enterprises through a credit guarantee scheme. Fast tracking of tax refunds and other pending bills and duty remissions on raw materials used for domestic manufacturing was initiated. On March 25, 2020, President Uhuru Kenyatta

6See https://www.kenya-airways.com/en-ke/covid-19.
announced a raft of measures designed to ease the impact on businesses and households. Alongside an 80% salary cut for the president and his deputy, the measures reduced the value-added tax from 16% to 14%. There was also a reduction in income tax and corporation tax from 30% to 25%, and 100% tax relief for individuals with a monthly income of less than KSh24,000 (US $225). On the fiscal front, tax measures have been instituted to cushion low-income earners by lowering the payroll tax, increasing tax relief, and increasing tax refund payments due to bona fide taxpayers.

Furthermore, the government increased financial allocation for social protection and expenditure in the health sector (East Africa Business Council, 2020). At the height of the COVID-19 crisis, KIPPRA, a government think tank on policy development, was enlisted to develop policies for economic recovery for both national and county governments. A post-COVID-19 economic recovery framework and strategy were formulated to uplift the recovery and reposition the economy steadily. To avoid reversing the gains projected on sustainable development goals (SDGs), the government directed efforts toward recovery post-COVID-19.

**Digital health**

The Kenyan government activated case monitoring dashboards and public information tools during COVID-19 to inform users, the public, and health officials about the trends and statistics of coronavirus. KEMRI launched a platform with other universities to help consolidate COVID-19 statistics and trends. In Kenya, for instance, mobile testing services that piggyback on existing venues have been used during vaccination exercises. The MoH rapidly deployed these services for contact tracing and testing and routine surveillance in the hotspots. More significantly, tests with rapid turnaround time were highly effective in identified hotspots and susceptible points of care (PoC) (Roser et al., 2020). To enhance testing capacity, the government gradually implemented the GeneXpert platform, which is already in use in Kenya for tuberculosis testing across Africa, an alternative decentralized trial for testing with SARS-CoV-2 cartridges as per KEMRI advice. However, the PoC viral antigen detection was not yet sufficiently sensitive and still needs further validation in Africa. This, in effect, hampered the adoption of alternative mass testing methods. To support the ongoing COVID-19 mitigation strategies, Jomo Kenyatta University of Agriculture and Technology (JKUAT) invented a computer-based contact tracing case management application and ventilators to help address the COVID-19 pandemic. The application included triaging and case management functions primed to solve the cumbersome nature of manual records in most hospitals across the country. Victoria Ngumi, the vice-chancellor of JKUAT, said on May 6, 2020, “The application known as contact tracing and case management web and mobile application is meant to help identify who, where, and when someone gets into contact with a COVID-19 patient. The application will be used to trace, triage, and manage COVID-19 cases” (People Daily, 2021).

The MoH developed COVID-19 community tracing collaboration guidelines to mitigate the spread of COVID-19. The government's initiative focused on tracing contacts of confirmed positive patients. This included supporting patients and individuals in quarantine and coordinating collaborative efforts from command centers that consisted of public health officers, medical experts, laboratory technicians, paramedical and ambulance services, communication teams, and police officers. Contact tracing, combined with the government's effort to increase testing, provided support to people in quarantine and coordinated with the COVID-19 Response Command Center to contain the spread of the novel COVID-19. The government introduced a web-based application at the borders and international airports that allowed “travelers to upload their Covid-19 test results online for easy verification by airport health and travel officials while detecting forged certificates. It relies on algorithms to track and trace people facing potential health threats while keeping tabs on test samples from countries of origin to the in-country labs” (Business Daily, 2021).

To enhance technology and phone tracing for patients, the president, in his March 25, 2020 address, cited that, “the recently launched telemedicine center for Coronavirus detection at Kenyatta National Hospital positions the county at the top of technology and Innovation in E-health” (Kenyatta, 2020b).
On March 27, 2020, at a MoH media address, the Cabinet Secretary of Health noted that “the state will be implementing a collaborative tracing initiative to slow the spread of COVID-19. Enhanced contact tracing capability is another innovative tool for health care providers and public health officials in the battle against COVID-19” (Kagwe, 2020).

To boost E-health broader data coverage and related teleworking without interruptions caused by COVID-19, the government unveiled a Google Loon that flies over Kenyan space to enable data streaming. To foster communication, including high-end communication and remote access to information in offices and enterprises, the government approved universal 4G data coverage throughout Kenya. On March 25, 2020, the president announced that:

The approval was in line with the government's measure to respond to the disruptions caused by COVID-19. The use of Loon shall foster communication and enable Kenyans to retain and enhance remotes access to data, offices and enterprises through ensuring universal 4G data coverage throughout Kenya, will allow Loon Balloons to fly over Kenyan airspace. (Kenyatta, 2020a)

The MoH collaborated with private health firms and nongovernmental organizations (NGOs) to expand and scale e-health solutions to address the COVID-19 crisis. It did so in collaboration with Jacaranda Health, a private health firm that uses a digital platform to address the needs of pregnant mothers and babies during an emergency. This initiative supported the government in training a network of nurses in 150 health facilities, including developing resource-efficient tools concerning the effects of COVID-19 on pregnancies and babies and tracking service delivery in maternity health. Further, the digital health platform integrated an information bot on SMS and telegrams to provide instant queries and responses to frequently asked postpartum and pregnancy-related questions and updates.

Through consistent communication, the government used creative strategies to reinvigorate the community through persuasive means and sustain the high knowledge level while increasing compliance to the COVID-19 measures through purposeful community engagement. In the wake of the first COVID-19 announcement by the Kenya government, quick efforts were made to tame rapid transmissions. In his first presidential address to the nation on the coronavirus pandemic, President Kenyatta issued a public order restricting movement in or out of the declared disease-infected zone. Communication and community engagement strategies and plans were formulated to daily issue briefs on the COVID-19 situation and statistics to inform the public continuously. This was also meant to sustain public awareness through information and sharing experiences to understand and acknowledge infected cases. The state address and daily media briefings included awareness campaigns, which were channeled through local and national media houses and other media platforms. There were also community engagements in collaboration with religious and community leaders. This was critical in educating the public and giving precise data on COVID-19 cases. In light of the third wave and when the daily communication briefs had been halted due to unsustainable resources for continuity, the WHO Kenya Country office, in its third-wave response on April 23, 2021, noted that:

There is a need for sustained strengthening of the MoH capacity in providing stewardship and coordination in collaboration with ministries, departments and agencies (MDA), counties and partners to ensure consistent and responsive awareness creation among communities and the public, support for school communities, health workers, and other targeted groups through behavior change and monitoring and evaluation of activities to enable an evidence-based response to the pandemic. The government needs to address the gaps and raise concerns and issues in communication and community engagement through re-energized and responsive plans, including the use of communication, social mobilization strategies and community advocacy to enhance knowledge on COVID-19, benefits of the vaccines and the need to change and sustain safety protocols across all communities and populations. (Mwakisha, 2021)
Partnerships and collaborations

Through the MoH, the Kenyan government instituted partnership models that focused on supporting different structures of COVID-19 containment. In its broad consideration, the government partnered with other governments, donors, county governments, civil society, and NGOs. A new framework was adopted in the government's partnership model that catered for structured and partnership implementation. Several bureaucratic processes, including pre-meeting arrangements and back-and-forth communication, have hindered potential partnerships with governmental organizations in typically structured partnerships. The government of Kenya took advantage of civil society and NGOs' past experiences and historical roles in crisis management, where it leveraged its solid understanding of local needs and networked community. The government formed strong partnerships with an organization like AMREF Health Africa and Kenya Red Cross Society to combat the crisis.

The ministries, departments, and agencies launched the COVID-19 challenge through Konza Technopolis Development Authority (KoTDA) in partnership with academia, United Nations Development Programme, NGOs, and innovation hubs. This initiative sought to harness the collective responsibility of the innovation and technology sector. It also focused on human resource capacity, technological tools, and data (delivered by both public and private sectors) to improve delivery to the most remote communities and the most impoverished populations, and to enhance over the long term development outcomes in the Big 4 agenda, SDGs, and Vision 2030. Categories in which the government has sought submission included health systems innovation for COVID-19, rapid prototyping and deployments of supplies and commodities, software applications for training victims, agile governance framework and guidelines and training health workers, dignified work challenges for COVID-19, and food systems innovation.

With the overwhelming crisis and surge of patients in both private hospitals and public health centers, the Kenyan government, through a presidential directive, considered partnerships in financing essential supplies of food packages and drugs to the vulnerable and most affected communities. The government even formed a COVID-19 committee that brought autonomous government departments, ministries, civil societies, NGOs, the United Nations, and the private sector to oversee COVID-19-related donations and supplies. The government, through MoH, in close collaboration with county governments, United Nations Environment Programme, MoH, National Environment Management Authority, and KEMRI, strategically partnered with the Stockholm Environment Institute (SEI). This collaboration adopted new guidelines and standard operating procedures for managing PPE waste and the safe and proper disposal of PPEs, including face masks, to control COVID-19 in Kenya. The approach includes partnerships with and messaging to, citizens, communities, and households to help manage household waste.

SOUTH AFRICA

South Africa’s state response to COVID-19 was much faster than any other country in Africa. The first confirmed COVID-19 case in the country was reported on March 5, 2020, after issuing a notice on January 23, 2020 that the country had plans in place and that people should not panic (de Villiers et al., 2020; Department of Health, 2020a). After 6 days, the MoH gave a media briefing outlining how South Africa would manage COVID-19. Most significantly this included: screening at entry ports, a hotline to field questions from medical experts, placing outbreak response teams on high alert, and distributing information about public and private health care (Department of Health, 2020b). In 23 days after the first confirmation of the COVID-19 case in South Africa, the president invoked disaster management powers and announced a complete nationwide lockdown (see de Villiers et al., 2020). When countries offered a staggering approach toward responses to COVID-19, South Africa adopted a “rip off the Band-Aid” approach and implemented
severe restrictions from the onset of lockdown. It also instituted travel bans, revoked visas, and closed 35 of its 53 land ports (de Villiers et al., 2020).

**Logistics and supply chain management**

The South African government could sustain major deliveries through cross-border exit and entry changes internationally with robust tech-driven logistical solutions. Even though worldwide disruptions exposed the vulnerability of the supply and demand chain across the continent, South Africa remained relatively stable. More significantly—and compared to other destinations—robust investment in digital capabilities allowed them to provide cargo visibility/traceability and to continue business online. In addition, the major airports, dry ports, and shipping lines relied on several prior investments in technology, cloud computing, IoT, automation, and data analytics for logistics management. For the most part, the South African government responded to the crisis by designating ports, shipping, and trucking services as essential and thereby exempt from lockdown measures. For example, it exempted cargo movement through airports, seaports, supply chains, and the transport of essential commodities from lockdown rules.

On June 17, 2020, President Cyril Ramaphosa announced that South Africa would plug into the Africa continental medical supplies portal. This is a single new initiative across the continent marketplace where all African countries could order and access critical medical supplies, manufacturers, and suppliers worldwide at competitive prices. The government adopted this initiative to boost sufficient PPE and medical equipment in hospital facilities to manage spiking cases of COVID-19. To ensure the continuity of border movement amid increasing claims, the government developed a risk categorization model for different international travelers using a high, medium, and low scale based on county of origin and WHO statistics.

Using digital tools to integrate proof of vaccinations can prevent corruption leakage and duplication along the vaccine supply chain, especially low and middle income countries (Nextleaf Analytics, 2019; Phelan, 2020). The global rollout of COVID-19 vaccines has made governments innovate around logistics and supply to boost vaccine delivery. Specifically, the South African government upscaled existing staff capacity and trained newly recruited staff to administer the vaccine rollout. The government also joined the Gavi vaccine supply chain where donors and investors can support the supply of COVID-19 vaccines. On the COVID-19 vaccines frontline, the government adopted technology that identifies potential bottlenecks in the supply chain of vaccines. Similarly, to prevent slow transport and distribution of vaccines, government administrators led e-commerce platforms and data-sharing platforms for the vaccine supply chain to ensure forecasts, smart routing information, shipment visibility, and flag distribution disruption.

**Digital healthcare**

The government of South Africa created a dedicated centralized website for information dissemination about the crisis (including responses). Alongside the portal, other open knowledge resources in response to the pandemic—including journals, articles, and publications—were made available to aid researchers, health practitioners, and the general public to aid decision making. The South African government was able to institute collaborations between the government, mobile network operators, and technology companies to successfully utilize mobile positioning data tracing for COVID-19 interventions. Apart from plugging into daily data analytics from WHO, Nachega and others (2020) note that South Africa's Provincial Health Data Centre repurposed its central electronic database of public sector patients, combining new COVID-19 cases from public and private laboratories into a single-line listing.

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7 See [https://sacoronavirus.co.za](https://sacoronavirus.co.za).

8 See [https://covid19.who.int](https://covid19.who.int).
Using a robust approach, the government invested in data collection and analytics. This involved using essential methods to attract registration for COVID-19 vaccine administration (especially for those over 60 years of age), free mobile toll services for reporting detected cases, and free toll for public service vehicles flouting the social distance rule. As e-health and data analytics were hyped, the government faced significant challenges in collecting the correct data. This was primarily attributed to delays in uploading information and capturing incorrect telephonic contacts due to a large proportion of COVID-19 cases being reported simultaneously.

In addition, the Department of Health commissioned dedicated quarantine facilities all over the country to aid in the response. However, the facilities were underutilized due to stigma, generalized unwillingness to isolate from family, and fear of in-facility property loss. To overcome such challenges, the government created health promotion campaigns, dedicated advocacy, and education on population-based infection control practices and nonpharmaceutical interventions for COVID-19.

To be maximally effective, any health department's heightened contact tracing capability needs to be matched with the capacity to test, identify, and isolate positive cases. COVID-19-associated perceived or enacted stigma is a significant issue reported in African countries (Adesegun et al., 2020). South Africa battled with the effects of stigma against those perceived to have contracted COVID-19. The government initiated community sensitization to improve information uptake through all available communication outlets. For example, radio, TV, social media, SMS messaging, and other accessible platforms debunk myths, improve public attitude and compliance, and reduce the stigma of at-risk groups.

Figure 1a compares the effect of the epidemic curve in South Africa, while Figure 1b plots the contact tracing. The start dates of the different phases of the lockdown are indicated (phases 5 to 1, 5 being the most stringent) (Nachega et al., 2020).

**Economic recovery**

South Africa’s government prioritized nine critical interventions to safeguard the economic shock occasioned by the COVID-19 pandemic. According to President Cyril Ramaphosa, these interventions were based on:

1. Economic impact assessment and measures to mitigate; 2. Supporting health measures: essential health and PPE stocks; 3. Food and hygiene product supply-lines: from farm to shop; 4. Solidarity and social protection measures to assist the vulnerable; 5. Regulatory support to facilitate cooperation and keep firms in business; 6. Protecting consumers: Action against unfair price rises; 7. Global coordination and engagement; 8. Reopening the economy and reconstruction; and 9. Internal processes to manage outbreaks among staff. (Ramaphosa, 2020)

To cushion the economy, government access to R35bn emergency relief was provided to empower the relevant sectors involved in the national COVID-19 response (de Villiers et al., 2020, p. 797). The response package included establishing 180 testing sites, 60 new mobile testing units, and deploying community health workers across the country (Department of Health, 2020b). In addition, the government released R500bn in economic relief and social support with support from World Bank and the International Monetary Fund. To caution the vulnerable in society, the government increased social grants by R41bn through top-up grants to cushion the effects of COVID-19. The government restructured its spending to raise more cash by reducing projects to improve social well-being. For example, government adjustments to social grant spending for 2020/2021 were adjusted as per Table 3.

The support package from the National Treasury was meant to help short-term recovery plans by creating jobs, encouraging business confidence, and reducing reliance on government grants. The government also rallied private sector support, including private health-care providers supporting testing, treatment, and the banking sector. It advanced R12bn in debt relief to over 124,000 small
and medium-sized enterprises, 3-month payment holidays, and interest-free loans to 2 million clients (National Treasury South Africa, 2020).

The South African government adopted a three-phase multi-faceted approach toward economic response; the first included a broad range of measures instituted when COVID-19 was declared. The methods included tax relief, the release of disaster relief funds, and emergency procurement. The second phase aimed to address the extreme decline in demand and supply and stabilize the economy.

### TABLE 3 The government adjustments to social grant spending for 2020/2021

|                        | Baseline monthly grant | No. of beneficiaries | Top-up (R) | Top-up % |
|------------------------|------------------------|----------------------|------------|----------|
| Child support          | 445                    | 12,811,209           | 300        | 67.4     |
| Old age                | 1860                   | 3,672,552            | 250        | 13.4     |
| Disability             | 1860                   | 1,045,388            | 250        | 13.4     |
| Foster care            | 1040                   | 339,959              | 250        | 24.0     |
| Care dependency        | 1860                   | 155,094              | 250        | 13.4     |

*Source: Nation Treasury South Africa (2020).*
The administrative capacity efforts amounted to a socio-economic support package of R500 billion through the presidential address. This was 10% of GDP, focusing on providing direct support to individuals and households to relieve social distress and hunger, assisting companies in distress to protect workers’ wages, and supporting individuals and families.

**Partnerships and collaborations**

The government of South Africa recognized that partnerships and collaborations are needed more than ever to catalyze funding and supplement the COVID-19 response from national governments. Through internal initiatives and public–private partnerships (PPPs), the private sector has been essential in supplementing private health-care funding in South Africa, both before and during the COVID-19 pandemic. South Africa's government has initiated partnerships and collaboration with relevant global stakeholders to build the capacity and capabilities of local manufacturers specifically to enable technology transfer. This facilitates vaccine manufacturing to occur domestically at a larger scale so Africa can better control its vaccine supply over time. The South African government, the public and private partners within South Africa, and the International partnership with WHO aid technology transfer hubs to establish industrial scale, clinical development, and training facilities where the technology is performed. At the launch of the partnership, the president noted in his address that:

> This landmark initiative is a significant advance in the international effort to build vaccine development and manufacturing capacity to put Africa on a path to self-determination. South Africa welcomes the opportunity to host a vaccine technology transfer hub and build on the capacity and expertise that already exists on the continent to contribute to establishing its first COVID mRNA vaccine technology transfer hub. (President Cyril Ramaphosa cited by WHO blog on 21 June 2021)9

Addressing the current COVID-19 pandemic requires collaboration among the academic community and the South African government. The Africa Centre for Evidence (ACE) at the University of Johannesburg, for instance, is responding to COVID-19 by creating a hub of hubs, a “one-stop-shop portal” to navigate a large number of available evidence sources for decision makers and researchers. The Centre inventory contains COVID-19 evidence sources that decision makers can use to access the best science to inform their decisions and recommendations. Internally, the government enlisted the help of NGOs, private partners, and banks to help in drafting Recovery Strategies and Regional Integration in Southern Africa. This created more effective drivers of industrialization, economic diversification, trade, and investment in the region. The consequence has been reinvigorated economic growth and decent jobs.

**CONCLUSION**

This article explored the OI concept to examine different innovation trends, including technological adaptations, in responses to COVID-19 in South Africa and Kenya. We explored critical areas that most governments in Africa and elsewhere focused on during the COVID-19 pandemic: economic recovery strategies, logistics and supply chain, digital health care, partnerships, and collaborations. We show that Kenyan and South African governments relatively increased the uptake of OI strategies, upscaling their national innovation systems. In particular, these governments expanded their budgets to cover different initiatives that would stimulate innovative response strategies to COVID-19. Public managers and their stakeholders adopted technological platforms and engaged in boundary-spanning

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9See [https://www.who.int/news/item/21-06-2021-WHO-supporting-South-African-consortium-to-establish-first-COVID-mRNA-vaccine-technology-transfer-hub](https://www.who.int/news/item/21-06-2021-WHO-supporting-South-African-consortium-to-establish-first-COVID-mRNA-vaccine-technology-transfer-hub).
activities through collaborations and partnerships both within and outside the country to respond to COVID-19 impacts effectively. Technological upgrading ensured instant data sharing, the creation of functional online portals, social media tools, and knowledge management platforms to monitor the COVID-19 pandemic prevalence and delivery of vaccinations. Altogether, these platforms enabled effective policy responses, mainly in communicating and tracing COVID-19 patients and creating public awareness of COVID-19 and its vaccination in Kenya and South Africa. Therefore, this article's empirical analysis provides broader insights into public administration's capacity to innovate during crises by exploring how national innovation systems, currently being implemented, can enhance the governments' capabilities to adapt, design, and effectively implement specified strategies during the COVID-19 pandemic.

The following can be drawn from our discussion. First, continuous improvements can drive integrated policy responses during a crisis like that presented by the COVID-19 pandemic, especially through the inflow and outflow of knowledge. This tends to enhance OI approaches by public administrators in the selected countries. Consequently, setting OI strategies for crisis management seems to unsettle traditional public administrative capabilities' bureaucratic ideals and operations by opening streaming of ideas and solutions for adoption mainly from external sources. However, our study is limited in scope due to the inability to further a deeper analysis of the decision-making processes within the public sector in applying OI in different South African and Kenyan institutions. Furthermore, the accuracy of the OI implementation processes in government operations during a crisis is lacking, thus it does not currently enable the argumentative exploration of technological adaptations and perspectives of OI as a tool for a public sector policy response.

Second, this study confirms a need to promote OI policies for crisis management (COVID-19), which consists of mobilizing technological and knowledge resources to develop innovations within a short stint of time. Future research opportunities assessing the full impact of OI strategies during a crisis will be critical to give an insightful reflection on their adoption for future or similar emergencies. Further, research on analyzing the comparative situation of OI strategies regarding government agencies' response before and after COVID-19 would create a better understanding of OI approaches in public institutions.

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