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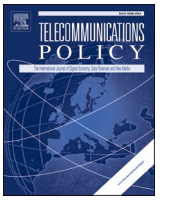

Digital connectivity and the SDGs: Conceptualising the link through an institutional resilience lens

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A B S T R A C T

In this paper we contribute to the discourse on digital connectivity and the Sustainable Development Goals (SDGs) with a focus on low and middle-income countries (LMICs). While digital connectivity has been showcased as a "hidden hero" for restoring societal functioning during the pandemic, the theoretical link between digital connectivity and the achievement of fundamental development objectives as articulated in the SDGs has been under-researched. Drawing on the theoretical lens of institutional resilience, we study how mechanisms of resilience-building through digital connectivity policies within Indonesia, Mexico and South Africa align with the policies in place to attain the SDGs. Adopting the methodology of critical policy analysis, we identify commonalities between the countries in terms of the policy and institutional arrangements for expanding digital connectivity and in terms of national planning efforts for achieving the goals of Agenda 2030. We offer a new conceptualisation about ICTs and the SDGs by bringing to light, through empirical evidence, the lack of alignment between the policy and institutional arrangements for expanding the reach of digital connectivity and the achievement of developmental goals.

1. Introduction

In recent years, policies of international organisations have prioritised ICTs as a key driver for supporting the current global agenda for growth and development as articulated in the Sustainable Development Goals (SDGs). In particular, the focus has been on the connectivity aspect of ICT with various stages of evolution identified in terms of its societal contribution (Kolb et al., 2020). While from the 1970s the focus of digital connectivity initiatives was to extend reach to populations, this later led to new opportunities for people to form their own networks and obtain personalised commercial and public services. With the increasing importance of digital connectivity as a foundational infrastructure for socioeconomic development around the world, a key policy focus has been to nurture the ability of organisations to collect, store and analyse vast amounts of data on customers, employees and citizens to inform decision-making (Parker, Van Alstyre, & Choudary, 2016).

As lead agency of the United Nations responsible for matters related to ICTs, the International Telecommunications Union (ITU) has set the policy agenda for integrating digital connectivity with the SDGs. A key element of this agenda relates to extending reach of digital connectivity which became a particular objective during the COVID-19 crisis. Despite progress made towards achieving the goal of extending digital connectivity, the pandemic exposed how many hundreds of millions more, particularly those who live in low population density or belong to disadvantaged groups have struggled with access that is too slow, too costly, and too unreliable to make a difference to their lives (Naudé & Vinuesa, 2021). The crisis has also exposed the fact that many digital processes remain deeply entangled with physical processes. Indeed, the pandemic has exposed how our increasing reliance on digitalisation has disrupted organisational and social processes in unexpected and extreme ways (Faraj, Renno, & Bhardwaj, 2021). Particularly in sectors where face to face communication was the main form of interaction such as education and health the shift to digital processes has necessitated

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the need for new information processes to be introduced, for example telehealth requires preparation by patients to measure their symptoms, online school education requires information about the degree of support from parents to help children organise online.

In this paper we aim to contribute to the discourse on ICTs and the SDGs with a focus on low and middle-income countries (LMICs). With only 7 years to go, it is likely that Agenda 2030 will not be achieved for many of these countries with integrated multisectoral implementation strategies for the achievement of broad development goals lacking (Siddiqi et al., 2020). Despite the accellerated pace at which digital connectivity has expanded its reach, we argue that the absence of policies and institutional arrangements hampers the availability of reliable and relevant data as well as the capacity to analyse and use it for decision-making aimed at achieving the SDGs. In particular, appropriate policies and institutional arrangements are needed to facilitate greater cross-sectoral alignment in the design and implementation stages of digital connectivity and national planning (IMF, 2020; ITU, 2019).

We frame our study by drawing on and further developing the concept of *institutional resilience* which has gained considerable attention in policy discourse around the SDGs, particularly since COVID-19. During and in the aftermath of the pandemic, the concept has been used to refer to the ability of a social system to deploy ICTs in order to absorb and recover from external shocks and to be prepared to address future uncertainties. The focus of attention has been to provide recommendations and guidelines to governments for integrating digital tools and technologies aimed at building resilient societies and achieving developmental goals (Anderson & De Tollenaere, 2020; Haider, 2021). In the academic literature, however, the concept of institutional resilience has been undertheorised with so far lack of analysis of the institutional dynamics at play in aligning ICTs for attaining the SDGs.

Drawing on the experience of Indonesia, Mexico and South Africa, we aim to contribute empirical insights that can help to augment understanding of aspects of institutional path dependency and institutional change as evolving mechanisms connecting ICTs and the SDGs. The rest of this paper is organised as follows. The next section reviews different perspectives on the theoretical link between ICTs and the SDGs, leading to the proposal of a critical institutional resilience lens to guide policy and practice. Section 3 describes our methodological approach, centred on critical policy analysis. Following such an approach, section 4 reviews national policies and institutional arrangements for digital connectivity and for implementation of SDGs in three representative G20 LMIC countries. In section 5, we analyse our empirical findings through the lens of institutional resilience identifying six key themes that can help integrate the policies and institutional arrangements for promoting digital connectivity towards attainment of the SDGs. Finally, section 6 summarises the paper's contributions and conclusions.

2. Conceptualising the link between digital connectivity and the SDGs

To conceptualise the theoretical link between digital connectivity and the SDGs, it is important to review existing perspectives that have appeared in the interdisciplinary strand of literature under the broad heading of ICT for Development. We undertake a narrative review that affords us the ability of recognising its key *discourses* conceptualised by Avgerou (2008) as sets of shared assumptions on a given topic. Providing an overview of key sources, our review identifies three discourses on ICTs and the SDGs: these are respectively of a historical, positive, and critical nature, and their main assumptions are reviewed below.

- *Historical discourse.* A first discourse seeks to capture the historical dimension of the link between ICTs and the SDGs, especially emphasising how this relation has evolved over time. In a recent editorial, Andersson and Hatakka (2023) note how, to start with, the very notion of sustainability has undergone significant changes over time. Its evolution, from a concept explicitly centred on the environment to one that encompasses multiple dimensions affecting human lives (Hauff, 2007), has also affected the way digital technologies are depicted in relation to sustainable development. As Heeks (2020, cited in Andersson & Hatakka, 2023, p. 2) notes, a new "digital-for-development" paradigm places emphasis on digital roles, digital products and digital business models for "development" where human and environmental dimensions relate to each other.

Such a relation between human and environmental dimensions was already reflected in the Millennium Development Goals (MDGs), the eight development goals set by the Millennium Summit of the United Nations for 2015. Underpinned by MDG 1, "Eradicate extreme poverty and hunger", the eight MDGs offered a shared agenda where human dimensions (including education, gender equality, maternal and child health, and combating diseases) and environmental dimensions (ensuring environmental sustainability) were combined. As argued by the UN (2015a), the MDGs have produced "the most successful anti-poverty movement in history", and offered a starting point for the new, sustainable development agenda launched in 2015. According to the by-then UN Secretary Ban Ki-Moon, "we now know that extreme poverty can be eradicated within one more generation (…) the MDGs have greatly contributed to this progress and have taught us how governments, business and civil society can work together to achieve transformational breakthroughs" (UN, 2015b).

As the MDGs started informing the international development agenda, ICT for Development policy and academic discourse began to focus on how the goals would be the priority for the application of ICTs (Heeks, 2005). Core ideas were articulated in the World Development Report 1999, programmatically titled "Knowledge for Development": in advocating knowledge as key to the global development agenda, the World Bank (1999: pp. 2–3) noted how knowledge about *technology*, or know-how, and knowledge about *attributes*, meaning products, processes, or institutions reinforced each other in achieving development. The report's articulation of three concomitant processes – stated as acquiring knowledge, absorbing knowledge, and communicating knowledge – were instrumental in overcoming knowledge gaps (World Bank, 1999, pp. 4–6). Echoing the same argument, the 2001 UNDP Human Development Report titled "Making New Technologies Work for Human Development", argued that technology – especially when provided low-cost for the so-called developing countries – acted as a tool for poverty reduction, a tool whose importance would only have increased with the "information revolution" affecting the whole world (UNDP, 2001).

- *Positive discourse*. The vision of knowledge – and of ICTs as its carriers – as a fundamental maker of "development" informed early understandings of ICTs in relation to development agendas. The core assumptions made by the World Bank (1999) and the UNDP (2001) already paved the way for a discourse that depicted ICTs, and their capability to rapidly convey crucial information, as a core route to the achievement of the SDGs. Such a positive discourse found recognition in two core assumptions made in early writings of the ICT for Development discipline. First, that "development" was to be seen as a positive force for poorer countries, a logic that brought meaning to the idea of ICTs for development (Brown & Grant, 2010). Second, that ICTs inherently brought the potential for "development", however defined, to be achieved. As Walsham and Sahay (2006) put it, "There was at one time some debate as to whether information and communication technologies (ICTs) were relevant to the developing countries, but this debate has been resolved with a clear 'yes' answer. The question has now become not 'whether', but 'how' ICTs can benefit development."

The "yes" answer theorised by Walsham and Sahay (2006) was long reflected in the logics supporting, first, ICTs as instrumental in achieving the MDGs and, thereafter, ICTs – and, more at large, digital technologies – as instrumental in the pursuit of the SDGs. On the one hand, particularistic understandings theorise the relation of technology with specific goals and their targets: in relation to the MDGs, an important example was offered in Clark, Wylie, & Zomer, 2013, who elaborated a specific perspective on the role of ICTs in addressing urban poverty. Similarly, a stream of literature theorises technology in relation to SDG Target 16:9, to achieve "legal identity for all, including birth registration" by 2030. Literature inspired by Gelb and Clark (2013), and recently concretised by the Identity for Development (ID4D) initiative of the World Bank, theorises the importance of "digital identity" for goals of civil registration: and at the same time, Dahan and Gelb (2015) note how achieving such a goal will not impinge on SDG 16 (on peace and institutions) alone, but on the SDG agenda at large. This shows how a positive discourse, viewing ICTs as a force for achievement of the SDGs, finds articulation both in terms of specific goals, and of the broader agenda where the goals are seen as a sum of different targets. Since COVID, there has been much discussion about the role of ICT in supporting a system's ability to cope with and adapt to external pressures for achieving sustainable development. A holistic systems thinking approach to building resilient societies is proposed by some scholars who see ICT as a cross-cutting tool expected to contribute to global challenges, particularly with respect to isolated and remote communities (Clark, MacLachlan, Marshall, & Morahan, 2022; Prieto-Egido et al., 2022). For example, Clark et al. advocate for the introduction of a new SDG called Digital Connection to support the integration of digital technologies into all aspects of societal life.

- *Critical discourse.* It should be noted that, as early as the MDGs were proposed as an articulation of the global development agenda, critical voices were raised in terms of the goals' ability to effectively represent the voices of intended beneficiaries (Clark, Wylie, & Zomer, 2013). Even more fundamentally, critical perspectives emerged on the extent to which the goals effectively synthesised a "development" agenda for all. Heeks (2005) synthesises two sets of critiques: a first one pertains to the ability of the goals to avoid the pitfalls of "hegemony" of which its antecedent, the global neoliberal agenda, was accused, and to which the MDGs were meant to offer a response. A second set pertains, relatedly, to the ability of ICTs to effectively pursue the MDGs: the elaboration of technology from outside the lifeworlds of beneficiaries – elsewhere theorised, again by Heeks (2002), as "design-reality gaps" – resulted, he argues, in rates of failure that make it difficult to theorise the ability of ICTs to pursue the MDGs. ICTs may be, Heeks (2005) concluded, "on the wrong track" in achieving the MDGs, primarily due to the inability of technology designers and policymakers to encompass the world visions of recipients within their intended interventions.

A critical discourse persisted when the SDGs were introduced in the two perspectives – particularistic and centred on the whole goals' agenda – enunciated above. In terms of specific goals, doubts have been raised on the extent to which ICTs can be implicated, as Mills (2015) puts it, in the mission of "leaving no one behind" that characterises the SDGs. Centering her work specifically on SDG 5, to "achieve gender equality and empower all women and girls", Mills (2015) notes how the very phrasing of the goal takes a heteronormative, cisnormative perspective that ultimately erases the views of people identifying as transgender, non-binary or adopting a non-traditional gender role (Wyers, 2024). A stream of critique that spans across different SDGs centred on the role of "digital identity" as a route to achieving SDG 16 as well as other goals which require recipients of services to provide biometric identification. As Fisher (2022) poignantly notes, the ID4D orthodoxy neglects the prominent rates of exclusion that digital identity has generated around the globe (Khera, 2019). Such exclusions result, argue Masiero and Arvidsson (2021), into "degenerative outcomes" that affect not only the intended recipients of digital identity, but more at large the policies of social protection to which such forms of identity are supposed to be functional. Most relevant is the notion of adverse digital incorporation, theorised by Heeks (2022) as "inclusion in a digital system that enables a more-advantaged group to extract disproportionate value from the work or resources of another, less-advantaged group." While older understandings of ICT4D saw the problem in the "digital divide", established in terms of the haves and have-nots of technology access, the discourse on adverse digital incorporation illustrates how harm can, in the present day, result from inclusion into digital systems rather than exclusion from them. If this is so, the very assumption of ICTs as a force for achievement of the SDGs is problematised: ICTs can themselves result in harm, as opposed to the theorisations of "ICT for development" that the early days of the discipline postulated. The notion of adverse digital incorporation is hence the cornerstone of a critical discourse, which affects at large the way the role of technology in pursuing the SDGs is theorised.

The three narratives reviewed above have shaped the current discourse on ICTs and the SDGs in two important ways. First, with the growing pace of digitalisation across the world, the historical and positive discourses have supported the notion that ICTs play a pivotal role in the attainment of a more holistic set of goals aimed at achieving the 2030 Agenda for Sustainable Development. Second, the critical discourse highlights how both access to and absence of digital connectivity can reinforce the structural impediments that

implicate specific categories of individuals as well as distort the trajectory of public policy making. A so far neglected aspect of the current discourse on ICTs and the SDGs relates to the institutional aspects that need to be considered for linking two different policymaking cycles: one related to ICT, the other related to development policies. In recent years a small amount of research has focused on the role of institutions in building resilient societies for achieving the SDGs, for example as exemplified by Vyas-Doorgapersad (2020) in their analysis of institutional challenges at different governmental levels in South Africa.

In this paper, we aim to strengthen theoretical understanding of institutional resilience as an important concept to further understanding of the articulation and dynamics of policy-making in relation to the implementation and use of ICTs for attaining the SDGs. This includes both the establishment of structures and mechanisms for executing policies and the enactment of organisational practices at operational level (Ostrom, 2008). We consider resilience building as part of a socially-embedded process of path dependency and institutional change that can expose important but so far under-studied aspects related to digital connectivity and achievement of the SDGs. Path dependence tends to emphasize that choices made at specific points in time determine future trajectories within a system in terms of resource allocation, functionality and regulation (North, 1990; Ostrom & Basurto, 2011). As Sjostedt (2015) notes, while the concept is often used to conceptualise stability rather than change, it is important to recognise its dynamic nature. In particular, the processes that are responsible for the genesis of an institution may be different from the processes responsible for its reproduction because of a variety of contingent events. For example, changes in ideologies, power relations or resources can trigger new institutional design for achieving sustainable development (Duit, 2015). As Skostedt (2015) argues, institutions are more than rules and are also driven by endogenous dynamics, for example as a result of how policies and rules are interpreted and actioned on the ground. Recognising the political drivers of institutional change within each contextual setting would provide insights into the struggles inherent in linking two major policy directives – i.e. policies aimed at extending equitable digital connectivity, and policies aimed at achieving the SDGs. Moreover, a focus on endogenous institutional change processes within a country context can help to highlight the importance of local formal and informal institutions which shape political behaviour and outcome.

Fig. 1 illustrates how an institutional resilience lens places focus on the mechanisms that connect digital connectivity with the goal of achieving the SDGs, namely the policies, institutional arrangements and organizational practices at different levels of society.

We articulate our research question as.

2.1. How can an institutional resilience lens help conceptualise the link between ICTs and the SDGs?

Following a description of our methodology, we present the findings of a critical policy analysis for digital connectivity from three G20 LMIC countries.

3. Methodology

The idea for this paper emerged as a result of a report the authors were commissioned to write for the ITU on digital connectivity and the SDGs. The report involved reviewing the policies and institutional arrangements among five G20 countries as they relate to (i) extending the reach of digital connectivity, and (ii) working towards attainment of the SDGs in a mix of high income countries and LMICs in different regions. Our initial selection, agreed upon with the ITU, included Italy, UK, Mexico, South Africa and Indonesia, all countries that (i) engaged connectivity policy innovation during the COVID-19 pandemic and (ii) presented the same innovation in the light of Agenda 2030. The publication of the report encouraged us to write this paper that would extend existing scholarship on ICTs and the SDGs in the context of LMICs. Our motivation came from recognition that much of the research conducted on this topic has so far focused on identifying attainment of the SDGs in terms of output parameters rather than in terms of processes of change at institutional level and in terms of local practice (Carmody, 2024; Qureshi, 2023).

To elicit the key mechanisms of institutional resilience-building towards the SDGs, this paper draws on the digital connectivity and SDG implementation policies of Indonesia, Mexico and South Africa. Our selection of countries is motivated by two criteria: first, all three countries qualify as LMICs, and have outlined clear strategies in the pursuit of the SDGs and the targets associated with them. Second, all these countries have digital connectivity policies that are clearly articulated in their national governance strategies, making it possible to identify, for each, publicly available documents to inform the policy analysis conducted here. While informative on digital

Fig. 1. Conceptualising the link between ICTs and the SDGs through an institutional resilience lens.

connectivity policies, Italy and the UK do not articulate "development" objectives as LMICs do, which has led us to focus on the three remaining countries on which our report had been conducted. It should be noted, in addition, that the three country cases all reflect the proposition of institutional resilience at the centre of our research question: at the same time, they do so through highly contextualised approaches, which enabled us to explore multiple routes through which a common purpose of institutional resilience could be attained.

To answer our research question, we adopted the methodology of critical policy analysis. Critical policy analysis is described by Diem, Young, Welton, Mansfield, & Lee, 2014 as a form of study where "the focus is upon exposing inconsistencies between what policy says and what policy does, particularly in terms of power relationships in society". An especially important aspect of the same methodology lies in its ability to understand equity in policy contexts, and simultaneously, make sense of its negation: as argued in a further evolution of the same method (Diem & Brooks, 2022), critical policy analysis offers incisive critiques of policy processes, both in absolute terms and in relative ones that enable comparison across contexts. It is the coexistence of an absolute and a relative aspect of the methodology that enables us to see the cases in their independent value, and at the same time, to draw parallels and comparisons across them (Diem & Brooks, 2022).

It should be noted that multiple routes, beyond that proposed by Diem and Brooks (2022), exist to the execution of critical policy analysis. An alternative approach has been developed by Hajer (2006), whose study of the living institutions of the European Union analyses political processes through the concepts of discourse, dramaturgy and deliberation. This work builds on Hajer's (1995) previous study on how discourses shape up in politics: as such, it provides one route to approaching policy analysis that could have been applied to the domain of the digital. Mindful of this body of research, we have embraced Diem and Brooks's (2022) methodology as a result of its focus on policy in action, which specifically illuminates coherence, or gaps, between policy's promises and its actual implementation. Ability to assess the translation of policy into action has been essential to answering our research question, and to contribute to the expanding body of literature on ICTs and the SDGs.

Following Taylor's (1997) approach to the method, we have selected a set of sources from the digital connectivity policy of each of the three countries in the study, drawing on their official websites and public communications. Table 1 below lists the official websites and publications consulted country-wise for data on policies and institutional arrangements for digital connectivity and for implementing the SDGs (full citations provided in the reference list).

We then refined the dataset through discussion between the authors and partners at ITU to arrive at the full documental dataset. In doing so, we specified relevance criteria for inclusion of sources in the policy dataset, selecting materials that.

(i) explicitly articulated digital connectivity policies;
(ii) considered the same policies in relation with development objectives;
(iii) engaged sustainability in their policy framing, notwithstanding the lexical variations that the term may acquire through the cases.[1]

We then analysed the data in response to our research question. To do so, we drew on our initial conceptualisation of institutional resilience to identify mechanisms through which digital connectivity policies aim to achieve resilience. This involved analysing texts to identify how resilience was built in the strategies in point, and how it informed the actions taken. Drawing on this first stage of the analysis, a second stage allowed us to answer the question by identifying the set of mechanisms adopted within the three countries.

4. Findings

4.1. Policies and institutional arrangements for digital connectivity in the G20

Digital connectivity policies and institutional arrangements in our three countries of focus should be seen within the framework of G20s current agenda. Within such an agenda, an overall imperative is to boost the deployment of high quality and cost-efficient digital connectivity by implementing a sound regulatory and policy framework taking into account country differences and priorities (OECD, 2021b). The OECD Broadband Portal reveals that overall the pandemic has spurred the uptake of high-speed broadband subscriptions with users upgrading their connections in order to improve upload and download speeds to work and study from home. Extant reports reveal that the G20 has enacted two main clusters of policies and regulations for addressing digital connectivity divides (OECD, 2021a).

- *Overarching policies and regulatory measures to expand connectivity.* A first cluster pertains to policies promoting broadband deployment through diverse routes: *promoting competition and investment* and *reducing network deployment costs* are identified by OECD (2021a) as the two main routes to expand digital connectivity. The promotion of competition and investment and the simplification of essential infrastructural deployment are seen as main tools to expand high-capacity communication networks, which is supposed to have trickle-down effects to rural areas where connectivity levels may be systematically lower than urban areas.

[1] The paper's authors speak English and Spanish, but not Indonesian, which may constitute a limitation in interpreting documents from this country.

Table 1
Official websites and publications consulted for the findings.

	Digital Connectivity	SDG implementation
Indonesia	OpenGovAsia, 2021; World Bank, 2021, Republic of Indonesia, 2021a	Republic of Indonesia, 2021b,2022; UNDESA, 2020, 2021
Mexico	OECD, 2019; International Trade Administration, 2021; Barry, 2018; AltanAltán Redes, 2021	UN, 2021; Govt of Government of Mexico, 2018,2021; IISD, 2020; Govt of State of Government of the State of Oaxaca, 2020; UNDESA, 2020; Monitor, 2022
South Africa	ITU, 2022; Briggs, 2021; US Trade and Development Agency, 2021	Republic of South Africa, 2019,2020; United Nations Global Compact, 2022; African Monitor, 2017; UNDESA, 2020

- *Tailored policies and regulation to close connectivity divides in rural and remote areas.* The report by OECD (2021a) recognises that, in areas where broadband coverage or service quality is systematically lower, governments may need to engage additional interventions to close existing access gaps. Our analysis zooms in on different types of such interventions that involve technical interoperability between different entities including: public private partnership (PPP) initiatives to bridge the digital divide, public funding to expand connectivity beyond urban areas, and a range of last-mile interventions deployed to extend connectivity across areas where broadband coverage or service quality is systematically lower.

Our analysis reveals that these policies, while holding a common matrix as detailed here, have acquired different traits across the different countries of implementation. Below we use critical policy analysis to review digital connectivity policies in Indonesia, Mexico and South Africa focusing on the country specificities that such policies reveal.

4.1.1. Indonesia

Our policy data reveal that Indonesia has witnessed an accelerated adoption of internet-enabled services during the COVID-19 pandemic, which, as noted by the country's Ministry of Health, is likely to boost the country's digital economy growth with positive effects on the public sector (Republic of Indonesia, 2021a). Questions have, however, been raised on the equality of effects from such policies with OpenGovAsia (2021) reporting that while some agencies and service providers in the country have rapidly and successfully shifted to the digital, others are still "experimenting to discover what works best for their users". The timing and focus of such experimentation will be crucial for its success rates.

Following Diem et al.'s (2014) approach to critical policy analysis, data illuminate, however, several inconsistencies between policy and reality. According to the World Bank (2021) report "Beyond Unicorns: Harnessing Digital Technologies for Inclusion in Indonesia", access inequalities remain a problem in the country's digital connectivity landscape. Against the backdrop of the COVID-19 pandemic, the World Bank (2021) report indicates three priorities.

(1) *Overarching policies* are detailed in terms of boosting digital connectivity and universal access to high quality internet. This needs to be done through efforts such as improving clarity of regulations around the sharing of telecom infrastructure.
(2) *Tailored policies* that aim to ensure that the digital economy works for everyone, with particular attention to unconnected, vulnerable groups. This, the report argues, can be supported by logistics and greater investment in relevant skills for the digital era.
(3) Finally, *a blend of overarching and tailored policies* emerges from the report. The third priority identified in the report is to use technologies to build a more digital-friendly society: this involves providing better public services, improving the quality of citizen-state interactions, and building overall trust in the digital world.

Despite the range of connectivity policies introduced in Indonesia, digital access gaps remain. The share of Indonesian adults with access to the internet was 51% in 2019, albeit that increased from only 13% in 2011 (World Bank, 2021). The report provides optimism that Indonesians who are connected to the internet are among the most engaged populations in the world, spending as many as 6-h a day online and being ready to adopt e-government. However, fragmentation of data and an untapped potential of digitality, with substantial areas of the country still not covered by a broadband connection, are vulnerabilities that emerge across our data.

Recommended by the World Bank (2021) report is also the development of a national digital identity framework, which will enable Indonesians to prove their identity securely online and include a law on personal data protection that is backed by an independent oversight body. Concerns have been raised on the fairness of digital identity infrastructures and in particular Privacy International (2021) and Fisher (2022) have shown the severe vulnerabilities that these infrastructures entail, producing detrimental outcomes for users. Against this backdrop, a reorientation from a narrow focus on e-government to a more comprehensive national digital transformation agenda should be seen in the light of fairness towards users (Masiero & Bailur, 2021).

4.1.2. Mexico

From 2013, Mexico has embarked on a deep reform of digital connectivity policy. The country opened up its market, lifted restrictions on foreign direct investment in telecom and satellite communication services, and achieved a digital switchover in 2016. Reforms have resulted in lower prices in mobile broadband with a decrease from 69% to 81%, and this has supported the provision of higher quality communication services (OECD, 2019). Mobile broadband subscriptions more than tripled between 2012 and 2016, with the addition of 50 million new ones. This meant more revenue for telecommunication and broadcasting players, who achieved

16% growth between 2011 and 2016 (OECD, 2019).

In June 2021 Mexico had 84.1 million Internet users, representing 72% of the population over the age of six. Policy-reality inconsistencies emerge, however, even here. The country presents high disparity in terms of the type of devices used to connect: 96% of Mexico's Internet users connect through a smartphone, and active smart phone users in the country are 88.2 million (International Trade Administration, 2021). The country features amongst the three most competitive mobile app markets in the Americas with Brazil and the USA, both in terms of users and of frequency of use of mobile apps. According to national data, cloud storage was expected to grow by 30% in 2021, which largely exceeds the expected 12% growth of the ICT industry (International Trade Administration, 2021).

The Internet has been a right in Mexico since the nation's Constitution was amended in 2013 to guarantee universal online access (Barry, 2018). Yet, in spite of market competitiveness, access inequalities persist. According to OECD (2019) estimates, only approximately 70% of the Mexican population used the Internet in 2018. To get more citizens online, the government of Enrique Peña Nieto invested nearly US$1 billion in its "Mexico Conectado" initiative since 2013, which added broadband connections to libraries, schools, hospitals and other public facilities nationwide, particularly in poor and rural areas (Barry, 2018).

One of the most important tailored policies is *Red Compartida*, a broadband wireless 4.5G voice and data network whose infrastructure and connectivity enhance the 700 MHz spectrum at a reasonable price for users. According to its providers, the main purpose of Red Compartida is to contribute to closing the digital divide and easing the adoption of information technologies in urban and rural areas, reaching regions that currently lack connectivity (Altán Redes, 2021). Altán Redes, the public-private partnership that manages the project, has recently announced a four-year extension to fulfil its coverage goal of 92% of Mexico by 2028 (International Trade Administration, 2021).

The Mexican Government is in the process of defining Internet-related policies and regulations on issues such as cybersecurity, server localisation, and data privacy. Austerity measures taken by the current administration have impacted public spending on technology, with the federal budget allocated to ICT declining by 75% in 2019 over the previous year. State budgets decreased by nine percent in 2021 (International Trade Administration, 2021).

4.1.3. South Africa

South Africa is one of the most connected countries of the African continent, with a percentage of Internet users that grew steadily from 16% (1 million) in 2005 to an estimated 63% (4.9 million) in 2021 (ITU, 2022). Despite a well-developed and extensively written digital agenda, policy-reality inconsistencies persist in this national context. According to Briggs (2021), 36% of South Africans remain unconnected to the Internet as of January 2021, and the country ranks 97th in the world for broadband speed and 136th in the world for data affordability.

In 2021 the South African Minister of Communications and Digital Technologies published the Draft National Data and Cloud Policy, partially in the wake of recovery from the COVID-19 pandemic. The Draft Policy encourages universal access to broadband connectivity, access to data and cloud services, seeks to eliminate regulatory barriers and enable competition in the data and cloud sector. It also seeks to implement effective measures to ensure the security of cloud infrastructure, create institutional mechanisms to govern data and cloud services, and promote research, innovation and technological developments in relation to the cloud.

In relation to universal access and service delivery obligations, the Draft Policy recommends a government-backed digital platform and for all South African citizens to be provided with an online identity in order to receive services more easily. The discourse on digital identity is again relevant here, with the caveats highlighted by Privacy International (2021) in relation to the establishment and maintenance of national digital identity schemes. Research by Breckenridge (2014) has highlighted the colonial roots of a "biometric state" in South Africa, highlighting the problematic implications of a trend towards digital identity that takes a more marked biometric turn over time (cf. Breckenridge, 2019; Koenig, 2024).

At the same time, independent providers are involved in the digital connectivity effort. Dark Fibre Africa (DFA), a wholesale open-access fibre infrastructure and connectivity provider, is working to expand reliable and affordable internet access and digital services to underserved populations outside the major urban centres. DFA seeks to bridge South Africa's digital divide in partnership with North American industry, and has recently signed an agreement with the US Trade and Development Agency for this purpose (US Trade and Development Agency, 2021). The partnership is motivated by the vision that investing in secure and reliable connectivity will also strengthen the resiliency of South Africa's economy.

A similar effort is made by Project Isizwe, a non-profit organisation that aims to empower low-income communities by offering uncapped Wi-Fi for R5 (0.31 US$) a day. Iziswe's model leads local communities to own their digital infrastructure, offering low-cost connectivity in areas where public and private networks do not reach.[2]

4.2. Policies and institutional arrangements for implementing the SDGs in the G20

Policies and institutional arrangements aimed at SDG attainment in our three countries of focus have been aimed at several key areas.

[2] https://www.projectisizwe.org.

- Establishment of a high-level legal and regulatory framework for implementing the SDGs involving the creation of a new structure or the adaption of existing mechanisms and committees with the overall purpose of integrating the goals within the pre-existing national planning apparatus.
- The role of sub-national and local government in SDG implementation responding to the UN's localisation strategy for implementing the 2030 Agenda and bringing contextual knowledge, experience, data and practices to strengthen SDG coordination at national level.
- Development of SDG monitoring, evaluation and reporting mechanisms that go beyond measuring targets and achievements to understand how policy intent and instrumentation link to outcome. The Voluntary National Review (VNR) process introduced in 2016 has been designed to create a dialogue to identify good practices and challenges towards this end.
- Establishing mechanisms for the inclusion of a range of non-governmental stakeholders in SDG implementation, monitoring and evaluation through presentation of the VNR to the UN High Level Political Forum for Sustainable Development with participation through multi-stakeholder participation.
- Combining policies and institutional arrangements for SDG implementation with e-government at national and subnational level. Since early 2020, the global pandemic has reinvigorated the role of e-government with open government data portals established to promote interoperability between government departments for increased transparency and accountability in the provision of basic services.

Our analysis reveals that different countries have demonstrated policy intent to implement the SDGs, although there are variations in the strategies employed. In this section, we follow our critical policy analysis approach (Diem et al. 2014) by moving from planned policy action to a review of effective, real policy arrangements undertaken in the different countries.

4.2.1. Indonesia

Since 2017, Indonesia's National Development Planning Agency (Bappenas) coordinates the country's SDG strategy through the estabishment of institutional mechanisms at national and sub-national levels (Republic of Indonesia, 2022). The country's national strategy promotes inclusivity by setting up partnership platforms with non-governmental stakeholder groups for SDG implementation, monitoring and evaluation. Philanthropic and business organisations are also increasingly providing financing support for implementing sustainable programmes as part of their business strategy (Republic of Indonesia, 2021b). In terms of academic input, 23 SDG Centres of Excellence are currently established in universities across the country engaged in research and public outreach activities. Indonesia's Voluntary National Review (VNR) process was introduced in 2017 with subsequent reviews conducted in 2019 and 2021 involving consultation with stakeholders on partnership platforms, with oversight by the country's supreme audit institutions (UNDESA, 2021). At subnational level, voluntary reviews were conducted for the first time in 2021 in 13 provinces, 9 cities and 3 regencies.

In parallel with policies and institutional arrangements for implementing the SDGs, Indonesia's e-government drive has ranked the country high on the EDGI index (UNDESA, 2020). Over the past five years there has been widespread dissemination of information available on government websites and attempts to motivate citizen participation in government through online interaction (UNDESA, 2021). In 2019, the Ministry of National Development hosted an SDG dashboard on its central website providing information about indicator targets and achievements disaggregated to province level. Since 2020, social distancing has driven online interaction in a variety of application areas exposing the need for capacity building within local governments that are responsible for the majority of service delivery in Indonesia.

The quality of services and the use of digital tools and technologies varies between regions due to lack of institutional capacity in at least three dimensions (Suwarno & Wati, 2020). First, despite the drive towards e-participation and the One Data Indonesia policy introduced in 2019, there is a general reluctance of public institutions to genuinely share agenda setting and decision-making powers (Maail, 2018). Second, local government leaders often set ambiguous rules to regulate the integration of data centres in terms of enforcing standards and practices across organisations (Republic of Indonesia, 2021b). Third, not every province has a local SDG Centre of Excellence to serve as a hub to support local government in integrating planning, implementation and evaluation of the goals with e-government interventions. This is particularly important given Indonesia's recent policy focus on collecting and using village-level SDG data.

4.2.2. Mexico

Mexico has assumed a proactive regional leadership role in the 2030 Agenda process. The National Council for the 2030 Agenda chaired by the President was established in 2017 as the highest decision-making body charged with developing the country's national strategy for achieving sustainable development. The Council connects executive, legislative and judiciary branches of the federal government with public and private sector stakeholders at local government level into thematic SDG clusters (UN, 2021). The aim of this collaborative effort has been to ensure continuity across administrations in terms of national development planning independently of any political changes that may occur (Government of Mexico, 2021).

Mexico has a rich and vibrant civil society which has participated in the negotiation process for defining relevant SDGs. The private sector is diverse consisting of MNCs, large and small companies and cooperatives and several working groups having formed partnerships with the government to advance the 2030 Agenda. In 2020, to respond to the challenge of reduced public funding, the government introduced mechanisms to incorporate sustainable criteria into its financial regulations making Mexico the first country in the world to issue a sustainable sovereign bond to support expenditure for projects directly linked to the SDGs (IISD, 2020). Participation of academic institutions and research organisations in the implementation of the Agenda has also increased (Breuer & Spring

2020). At sub-national level, the public sector is represented by 32 states each having a local council which monitors and follows-up on the progress of the Agenda and is integrated by five multi-stakeholder committees including academics, local universities, municipal representatives and CSOs. Mexico was also among the first countries to present its VNR to the UN in 2016 and two further VNRs have been published in 2018 and 2021 plus one Voluntary Subnational Review by Oaxaca state (Government of Mexico, 2018, 2021; Government of the State of Oaxaca, 2020).

As a high ranker on the EGDI Index (UNDESA, 2020), the efforts of the Mexican government have been directed towards building a stronger system of digital government under the coordination of the National Digital Strategy of the Office of the President. The idea of open government began to develop in Mexico in 2001 leading to the creation of a large number of government websites including a massive data portal with open public access from across government. For example, Mexico City has developed a publicly availble digital platform for following up on the general development plan of the capital (UN, 2021). However, while open government scores have been high in terms of transparency, this is less the case when openness is measured in terms of allowing citizens to have influence over decision-making processes (Cejudo, Michel, Sobrino, & Vazquez, 2018). The 2021 VNR has gone some way to create complementary mechanisms for inviting a diversity of voices beyond the formal space of the National Council and its working committees, e.g. indigenous communities, territories and muncipalities (Government of Mexico, 2021).

However, the Mexican government is concerned because many advocacy groups are foreign-funded through bilaterial partnerships such as GIZ Mexico and other alliances resulting in global interference with national development processes (Monitor, 2022). For example, these alliances have tended to mobilise advocacy groups for pursuing globally-driven agenda rather than supporting the country's own public policies aimed at poverty reduction, social mobility and violence against women (Villanueva Ulfgard, 2019). A second issue relates to the aim of supporting a localisation agenda for attaining the SDGs. Territories and municipalities need their own dedicated space in the National Council as there are specific issues they face in working towards Agenda 2030related to resource allocation, career structure of local administrators and the need for disaggregated data to evaluate the impact of public policies on different local societal groups (Government of the State of Oaxaca, 2020; Government of Mexico, 2021).

4.2.3. South Africa

South Africa has mostly relied on its existing coordination mechanism for integrating its development policies with the SDGs while also creating a new Inter-Ministerial Committee led by the Cabinet in 2019, new working groups and a National Development Stakeholders Forum (Republic of South Africa, 2019). These mechanisms have involved public and private sector stakeholders from within the country with resource support from international and regional organisations. For example, the UN Global Compact Network South Africa conducted extensive dialogues with private firms on their integration of SDGs into business practices (UN Global Compact, 2022). Civil society organisations also have a forum led by Africa Monitor where dialogue and information sharing with respect to SDG implementation is undertaken (African Monitor, 2017). The VNR process in South Africa has been conducted once at national level in 2019.

Despite legislation, policies and mechanisms, there has been limited economic development in post-conflict South Africa. The resultant high unemployment rate in the country constrains the ability of the large number of rural municipalities to become financially viable to provide public services thereby perpetuating the rural-urban divide (Reddy, 2018). Moreover, municipal politicisation and a corruption culture are endemic within local government and lead to frequent service delivery protests (Picard & Mogale, 2015). While public accountability channels have been created with meetings advertised and scheduled, these forums have tended to be used to distribute information on government established structures, systems and procedures to community members rather than as a space for discussion and dialogue aimed at addressing local priorities (Kumar & Balwanth, 2015).

A high ranker on the EDGI index (UNDESA, 2020), e-government has gained significant ground in South Africa. The SDG Hub is an online platform hosted by the University of Pretoria with a mandate from the Department of Science and Innovation to collect and categorise relevant research from university repositories related to the SDGs with brief analyses to inform policy on the integration of SDGs with national plans. Open Government Partnership (OGP) first endorsed in 2011 has become prioritised in the OGP 4th National Action Plan 2020–2022 (Republic of South Africa, 2020) showcasing efforts to work with young data innovators to facilitate public participation, for example with the eThekwini Municipality EDGE Portal (https://economy.edge.durban). Notwithstanding these recent achievements and with market pressures to engage with the global economy, equitable and sustainable service delivery at the muncipal level remains a recurrent challenge. Local government has made some progress post 1994 and some municipalities have performed well, despite constraints. However, as noted earlier, policies are needed to address the spatial pattern of inequities in work and skills across South Africa, particularly in rural muncipalities where greater support is required for informal sector employees and for the provision of temporary safety nets through public works programmes. In essence, there is need to introduce institutional mechanisms to nurture and sustain local government politically, managerially and financially in order to achieve inclusive sustainable development within the country as a whole. First, new ways need to be introduced to enforce the regulation in a way that addresses the corruption culture within many muncipalities in the country while at the same time educating local communities to demand accountability from public officials. Second, despite technocentric reforms for opening of government data in South Africa, much of the granular-level data on public spending, procurement and contracting is simply not available which contributes to a lack of real time monitoring both by government and civil society. Moreover, there is low awareness of its value in enhancing civic engagement especially in peripheral urban areas and rural municipalities (Bello, Akinwande, Jolayemi, & Ibrahim, 2016).

5. Analysis

In this section, we draw on our conceptualisation of institutional resilience to offer a critical policy analysis of digital connectivity and the SDGs. While taking into account the diversity of the three countries reviewed, several common lines can be identified in terms of the enactment of policies reviewed in this study.

We identified such commonalities as being driven by an underlying ideology of technological advancement and digital solutions having potential to significantly accelerate progress towards sustainable development. This idology has been responsible for the formation of new institutions and adaptation of existing ones. In all three countries overarching policies constitute the core of national efforts towards digital connectivity: paradigmatically, the Draft National Data and Cloud Policy in South Africa seeks to eliminate regulatory barriers and expand connectivity while in Mexico and Indonesia, connectivity policies put into place over the years have backed the resilience of livelihoods generated over the Internet during the COVID-19 pandemic. In parallel, tailored policies and regulations to close connectivity divides in rural and serve remote areas have been enacted as part of inclusive development agenda across the three countries to support specific sectors and communities that suffer from marginalisation. The different countries offer varied examples of how market failure is being addressed based on the establishment and adaption of institutional arrangements that promote competition in the delivery of digital connectivity services. In the countries studied, governments are creating an enabling environment for private investment and innovation in digital connectivity to fill financing gaps and improve network quality (OECD, 2021a,b).

For example, in South Africa, independent providers such as Dark Fibre Africa and Project Isizwe to promote inclusion through connectivity to underserved communities, an effort mirrored by the Mexican case of Red Compartida built to close the digital divide at a reasonable price for users.

At the same time, our data shows how the functioning and practice of formal and informal institutions has triggered endogenous changes in the landscape of digital connectivity and the SDGs. For example, accelerated adoption of internet-enabled services in Indonesia during COVID depended on previous agency competences at national and sub-national levels. Similarly, despite the appeal of digital identity platforms in enabling citizens to receive services more easily, emergent lobby groups in Indonesia and South Africa have raised concerns about the detrimental consequences for marginalised communities. In Mexico, despite the country's high overall rate of internet penetration and its focus on market comptitiveness, high levels of inequalities in access persist as a result of a large informal sector. In turn, this is influenced by changes in usage of digital technology, for example the higher reliance on mobile data and smartphones leading to a growing market for affordable mobile devices and prepaid data plans.

In terms of the policies and institutional arrangements for implementing the SDGs, between 2016 and 2019 all three countries have followed G20 guidelines to establish high level legal and regulatory frameworks for integrating the goals into national planning frameworks. Interestingly, each country has tended to draw on existing national planning processes with suitable adaptations although challenges were noticeable in relation to how organisations interoperate when coordinating across sectors, and between hierarchical levels. Similarly, the G20 policy on localisation has been responsible for the genesis and continuation of the VNR process in the countries we studied although there were differences noticeable due to administrative capacity and prevailing socioeconomic and political contextual factors. The localisation agenda has also resulted in innovative efforts to establish coordination between NGOs, philanthropic and business organisations to stimulate innovative programmes for economic and social development. The UN SDG agenda relies heavily on an ideology of measurement through data use that reflects a broader trend towards evidence-based approaches in global development efforts to track progress and ensure accountability. This ideology has resulted in the eemergence of new institutions at the local level called SDG centres to support the focus on metrics for policymaking.

Formal and informal institutions within each country context have played an important role in the direction of change with respect to how the SDGs have been implemented. For example, despite Indonesia's focus on village level SDG data, its legacy of poor local government capacity has affected the regulation of standards and practices within the local data centres and their integration with developmental goals. In the case of Mexico, the country's history of vibrant civil society has meant that it was one of the first countries to introduce the VNR in 2016 at national and sub-national levels as well as open government initiatives in 2001. Mexico's formal and informal institutions have been a source of endogenous strength in terms of triggering innovative mechanisms to support the achievement of the SDGs such as as the sustainable sovereign bond. In contrast, South Africa's legacy of limited economic development has posed challenges for the creation and evolution of innovative formal and informal institutional arrangements necessary for the attainment of the SDGs. The situation of the country remains poor with limited economic development, high unemployment and a huge informal sector making it difficult for financially-viable internet-enabled service provision to the public. Finally, despite local SDG centres representing endogenous institutional change in all three country cases, real time data analysis that can be fed back to policy makers and planners is hampered by the lack of quality disaggregated data and local capacity.

Our findings reveal that each of the three representative countries has created its own local narrative for how digital connectivity can help attain progress towards achieving the SDGs according to its history and contextual circumstances. At the same time, our study has identified generic themes as a result of endogenous changes that are occurring within countries for building institutional resilience towards the Agenda 2030policy mandate. Drawing on our conceptual framework, we demonstrate how building institutional resilience is about the vision and enactment of government policies within different arms of government. As our cases show, overarching and tailored digital connectivity policies are aimed at addressing special circumstances and therefore invoke different institutional arrangements. Three main types of issues emerge from our evidence. First, market failure is addressed by policies aimed at providing and expanding connectivity in diverse ways which range from promoting competition, to price regulation with the state acting as provider. Second, inclusion has been a major mandate of all governments particularly since COVID-19 with a variety of measures put in place such as universal service coverage, sharing of networks between different operators to ensure reliable connectivity and policies to

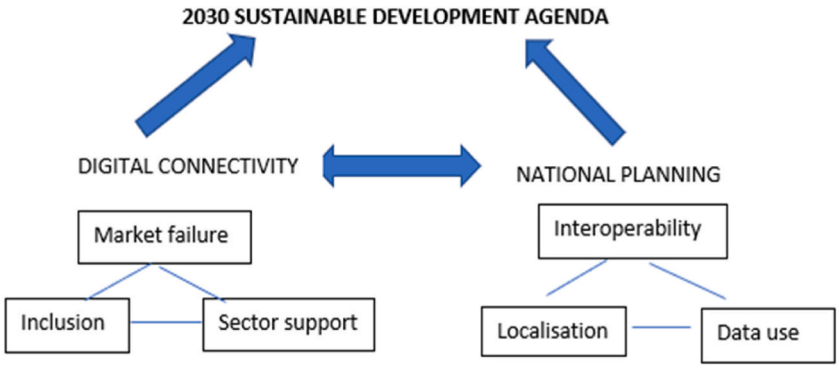

Fig. 2. Building Institutional Resilience for the 2030 Agenda.

trigger local economic development. Third, sector-specific policies have been implemented by countries in order to address special circumstances, for example by boosting the availability of quality broadband to connect all school and health facilities for which focused national-level plans have been implemented.

In terms of the enactment of national planning policies and institutional arrangements for attaining the SDGs, our study reveals that interoperability surfaced as a generic issue as different arms of government and civil society organisations worked towards integrating the SDGs with national planning. Aside from technical interoperability concerns addressed by digital connectivity policies, interoperability between different arms and levels of government raise issues related to organisational practices and institutional norms. This challenge also holds important implications for a second key issue, namely addressing the localisation agenda as integration at provincial and municipal level has suffered from lack of resources and capacity. Despite concerned efforts at the policy level to establish structures for localising the implementation of the SDGs, the harnessing of local knowledge needs to be supported through the establishment of networks between academic institutions and local government agencies in all areas. Moreover, there is need to facilitate participation of communities in a way that enables spaces for deliberation and improved channels for holding government to account. Finally, we found that usage of data was compromised even at higher echelons of the government because of differences between methodologies used for data collection across departments and because of the lack of availability of quality disaggregated data that could be used by local governments and municipalities for policy analysis on specific societal issues.

Based on our study, Fig. 2 illustrates the key themes that we propose can support the building of institutional resilience for the promotion of Agenda 2030.

6. Concluding remarks

The SDGs are acknowledged as providing the best possible global framework for societal transformation in terms of long-term inclusive growth and development (UNDESA, 2021). Our contribution in this paper has been to propose a focus on building institutional resilience for attainment of the 2030 Agenda. While our report has focused on three middle-income developing countries, the need for building institutional resilience is more profound for low income developing countries where resources are limited.

Digital connectivity has enabled rapid dissemination of information and has expanded social connections in large-scale networks. Moreover, rapidly evolving technologies like AI can usher in new opportunities but it is up to us to steer them towards human development. Eventually, however, it is the socioeconomic and political choices we make about where we direct innovation and for what priorities that lead to tangible improvements in the lives of people (Heeks et al., 2022). At a technological level, institutional resilience involves studying how to develop capacity of policymakers and administrators to assess the positive and negative effects of digital solutions, particularly new and emerging technologies in order to decide on their deployment and to resolve issues during implementation. At a managerial level, an institutional resilience perspective supports research that aims to identify how to measure improvements in policy and decision-making in terms of improved quality of public services. This requires identifying and developing skills within government for process studies to achieve critical and reflective learning. Finally, at a political level, this perspective invites investigation of how to cultivate a culture of public service within the administration that is value-driven and institutionalised across all levels of government and society. This can be augmented with forms of critical policy analysis centred on the revelation of hegemony, as those inspired by Gramsci (1971). We hope that our paper paves the way for further research on the processes implicated in institutional resilience-building through digital connectivity both at the level of individual SDGs and for attaining broader developmental agenda in different contexts.

Declaration of competing interest

We confirm that we are not in a situation that can give rise to a conflict of interest with respect to this manuscript submission to Telecommunications Policy.

CRediT authorship contribution statement

Shirin Madon: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Silvia Masiero:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

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