Transforming Public Policy in Developing Countries: A Comprehensive Review of Digital Implementation

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Abstract

This article discusses the process of digitization in the implementation of public policy within developing countries, its critical success factors, challenges, and lessons learned from case studies. Public administration can improve efficiencies, transparency, and effectiveness through the infusion of digital technologies into processes implicated in the making, execution, and evaluation of public policies. Key success factors identified include robust digital infrastructure, clear strategic vision and leadership, effective stakeholder engagement, capacity building, and a supportive regulatory framework. In light of these potential benefits, developing countries experience enormous challenges such as inadequate infrastructure, political instability, socio-political resistance, and gaps in digital literacy. Through a review of empirical case studies from countries such as Estonia, South Korea, China, Bangladesh, and Rwanda, the article identifies key lessons that can inform the digital strategies of other developing nations. The discussion addresses the challenges of sustaining digital infrastructure, including ongoing maintenance costs, the need for continuous technology updates, and the risks of

obsolescence. Furthermore, the article explores the significance of capacity building, public-private partnerships, and evolving regulatory frameworks in ensuring the long-term viability of digital policies. The future directions proposed underscore the necessity of adopting adaptable, resilient, and well-governed digital infrastructures to fully realize the benefits of digital public policy in the context of developing countries.

Keywords: Digital transformation, public policy implementation, public administration, developing countries.

1 Introduction

The digitization of the public policy process is increasingly being recognized as an important strategy to improve governance, public service delivery, and economic development, particularly in developing countries (Heeks, 2002; Margetts and Dunleavy, 2013). By migrating from manual and paper-based operations to digital platforms, governments can perform their administrative functions more efficiently by ensuring data accuracy and reducing corruption through transparency (West, 2004; Davies and Fensome, 2018). In developing countries, where limitations in available resources and bureaucratic ineffectiveness are characteristic, the expected benefits of digitization of public policy processes are particularly notable (Bannister and Connolly, 2014). Furthermore, digital platforms can help to improve citizens' participation for more responsiveness and accountability of government institutions (Bertot et al., 2010).

Some distinct issues that face developing countries and which make the process of digitizing public policy processes both necessary and difficult are discussed below. The main challenging issues include limited technological infrastructures, low levels of digital literacy, and socio-political resistance to the adoption of digital technologies in both developed and developing countries (Avgerou, 2008; Heeks, 2010). The introduction of such systems to public servants used to conventional service delivery often raises skepticism and resistance toward change (Cordella and Iannacci, 2010). Moreover, the lack of a comprehensive approach that would allow for the testing of the long-term effects of digitization initiatives concerning public service delivery and policy outcomes causes an inability to cash in on the full potential of the technologies taking place (Bannister and Connolly, 2014).

Many nations across the world have successfully implemented digital public policy processes, providing valuable lessons for developing countries.

For example, Estonia is renowned for its e-government strategies, which have positioned it as one of the most advanced digital societies globally. In South Korea, the widespread application of ICT in government action has significantly enhanced public service delivery, leading to a notable increase in citizen satisfaction. Similarly, China has successfully leveraged digital technologies to reduce administrative burdens and promote citizen participation. Bangladesh, through its Digital Implementation Monitoring and Public Procurement Project, has improved public procurement performance and citizen engagement. Meanwhile, Lithuania's use of digital tools during the COVID-19 crisis demonstrated the importance of digital infrastructure in public health responses. These examples illustrate how digital technologies, when paired with effective strategies, can transform governance in developing countries.

The selection of these countries – Estonia, South Korea, China, Bangladesh, and Lithuania – was made because they represent successful implementations of digital governance, each offering valuable insights into different aspects of the digital transformation process. These nations, though varying in their socio-political and economic contexts, provide case studies that can inform strategies for other developing countries. From Estonia's advanced digital infrastructure to Bangladesh's strategic vision in public procurement, these examples showcase diverse approaches that can be adapted and tailored to the unique challenges faced by other developing nations seeking to embark on or enhance their own digital transformation journeys.

In Indonesia, initiatives like the Sistem Informasi Pemerintahan Daerah (SIPD) aim to digitize regional government administration and public service delivery. SIPD is a comprehensive digital platform designed to integrate various aspects of regional governance, including planning, budgeting, and reporting, to enhance efficiency and transparency (Bappenas, 2021). However, the implementation has been faced with vast challenges, including technical difficulties in its operation, resistance from public servants, and poor infrastructural support on the digital level that acts as a drawback. The issues faced by SIPD reflect broader problems in the digitization efforts in developing countries, such as the need for comprehensive planning, stakeholder engagement, and sustained investment in capacity building (World Bank, 2020).

Evidence of clear advantages is available, but the adoption and implementation of a digital public policy process in developing countries are seriously challenged. One key issue is the digital divide, whereby which leaves rural and other marginalized populations mostly out of the benefits

accorded by digitization in many economies (Brown and Grant, 2010). For them to succeed, such initiatives need to ensure inclusive digitization that cuts across all strata of society in economies or nations (Bertot et al., 2010). Additionally, a significant barrier to actually implementing and making the systems operational digitally is the fact that public servants and, in general, the population are not adequately digitally literate (Bannister and Connolly, 2014). Therefore, this requires that there be training programs in place for public servants to always be abreast of competencies regarding the management of digital initiatives (OECD, 2016).

This gap is filled in this article, which then discusses a comprehensive review of digitization in public policy implementation in developing countries. Success case studies, critical challenges, and future research directions are presented. A novel aspect of this review is its focus on leveraging existing digital technologies, such as mobile platforms and cloud computing, to enhance public policy implementation, rather than developing new systems from scratch (Heeks and Stanforth, 2007; Andersen and Henriksen, 2006). By examining the experiences of countries like Estonia and South Korea, this paper aims to offer practical recommendations for policymakers in developing nations.

The overall objective of this article is to furnish a comprehensive understanding of the transformative potential of digitization in the public sector and give practical suggestions to policymakers for the appropriate implementation of successful processes in the digital transformation journey. Furthermore, it is discussed that such strategies should be context-specific when responding to particular challenges that are peculiar to developing countries. Specifically, the primary research question that the article addresses reads: "How can digital public policy processes be effectively implemented in developing countries for enhanced governance, inclusivity, and improved delivery of public services?"

2 Literature Review

2.1 Defining Digital Transformation in Public Policy

Understanding the concept of digitizing public policy implementations is crucial for comprehending its potential benefits and challenges. In this regard, the process of digitization is very specific for the adoption and incorporation of digital technologies into the processes and workflows applied by government agencies in the development, execution, and evaluation of public

policies (Bannister and Connolly, 2014; Cordella and Iannacci, 2010). Some of the theoretical perspectives underline the capabilities of digitization in leading to streamlining administrative functions, improvement of service delivery, increase in transparency, and citizen participation, as advanced by Heeks (2002) and Margetts and Dunleavy (2013).

A couple of scholars have offered definitions that capture different dimensions of this transformative process. These definitions emphasize the role that digital technologies play in converting formerly paper-based, traditional processes into efficient digital formats; how ICTs are harnessed for better service delivery; and the wider impact on governance and public administration (Davies and Fensome, 2018; OECD, 2023). Given this, the definitions provided by authors to this effect are summarized in Table 1.

Table 1   Definition of digitizing public policy implementation

Authors	Definition
OECD (2023)	The strategic application of technology and data to redefine the relationship between government and users of public service across all stages of the policy and service cycle, including policy design, implementation, monitoring, and evaluation.
Brookings Institution (2022)	The adoption of digital tools and technologies to enhance public policy responses and citizen engagement in normal and emergencies, such as at the time of the COVID-19 pandemic.
Brown et al. (2021)	Reducing administrative burdens on citizens with the state through ICT applications that enable participation and increase satisfaction.
Davies and Fensome (2018)	Use of digital platforms to carry out administrative tasks with better efficiency, more precision in information, and overall effectiveness and efficiency in public administration.
Kim et al. (2017)	Managing IT-enabled transformation in the public sector for improvement in e-government development, service efficiency, and public involvement.
Bannister and Connolly (2014)	Infusing public policy development, execution, and evaluation processes for an agency into the digital technologies at all levels of government.
Margetts and Dunleavy (2013)	Use of electronic and digital technologies to improve the delivery of public services, and efficiency in service delivery, with added transparency and accountability in governmental operations.
Cordella and Iannacci (2010)	Implementation of e-government initiatives that make use of ICT to deliver public services more effectively.
Heeks (2002)	The act of converting traditional paper-based administrative activities into digital formats.

Sources: Previous Research.

2.2 Implementation Theories

Understanding the theories of policy implementation is essential because it provides various viewpoints on the processes, hurdles, and results linked to integrating digital technologies in public policy (Sabatier and Mazmanian, 1980; Pressman and Wildavsky, 1984). When researchers and policymakers utilize these theories, they gain better insight into the factors that determine the success or failure of digital initiatives, leading to more effective and precise interventions (Hill and Hupe, 2014).

The range of theories underscores the complex nature of policy implementation, involving numerous actors, institutions, and situational elements (O'Toole, 2000). For example, top-down theories focus on the importance of central authorities and clear policy guidelines, whereas bottom-up approaches emphasize the role of local implementers and the need for contextual adaptation (Matland, 1995). Each theory provides distinct insights that can help tackle specific challenges in digitizing public policy, such as ensuring accountability, managing complexity, and encouraging innovation (Winter, 2003; Goggin et al., 1990). This wide-ranging theoretical approach facilitates a deeper understanding of how digital transformations can be effectively managed and sustained within the public sector (Elmore, 1979; Lipsky, 1980).

Top-Down and Bottom-Up Approaches

The top-down and bottom-up approaches to policy implementation offer distinct frameworks for understanding the digitization of public policy. The top-down approach underscores the necessity of clear directives and control from higher levels of government, positing that successful implementation hinges on well-defined policy goals, sufficient resources, and precise implementation guidelines (Pressman and Wildavsky, 1984). Digitization can augment this approach by offering robust digital platforms that facilitate clear communication of policy objectives and efficient resource allocation. For example, digital tools can enable centralized data management and oversight, ensuring consistent application of policy directives across various government levels (Hill and Hupe, 2014).

In contrast, the bottom-up approach emphasizes the crucial role of local implementers and street-level bureaucrats in influencing policy outcomes. Lipsky (1980) contends that these implementers possess considerable discretion and can tailor policies to local circumstances. Digital technologies, such as mobile platforms and cloud computing, can empower local actors by providing them with real-time data, enhanced decision-making tools, and

platforms for feedback, thereby enhancing the responsiveness and adaptability of policy implementation (Bovens and Zouridis, 2002). This perspective recognizes the complexities and variations at the local level, suggesting that effective digitization must accommodate these differences to achieve success (Matland, 1995).

Policy Feedback Theory

Policy feedback theory suggests that public policies have the potential to transform political dynamics and public perceptions, thereby creating a feedback loop that influences future policy development and execution (Pierson, 1993). The advent of digitization can enhance this feedback loop by increasing the transparency of government actions and promoting greater citizen engagement. For example, e-government initiatives offer platforms where citizens can provide feedback on public services, thereby shaping future policy adjustments and enhancements (Margetts and Dunleavy, 2013). This theory underscores the dynamic and iterative nature of policy implementation, emphasizing how digital tools can continuously inform and refine policies through real-time data and citizen input (Sabatier and Mazmanian, 1980).

Implementation as Learning

The concept of implementation as learning perceives policy implementation as a dynamic process where policymakers and implementers continuously learn and adapt (Sabatier and Mazmanian, 1980). Digital technologies can substantially enhance this learning process by enabling ongoing monitoring and evaluation of policy outcomes. Through data analytics and machine learning, valuable insights into the efficacy of various approaches can be obtained, allowing for real-time adjustments and iterative improvements in policy implementation (Heeks, 2002; Janssen and Helbig, 2016). This approach highlights the critical importance of flexibility and adaptability in policy implementation, positing that digital tools can facilitate a more responsive and evidence-based approach to public administration (Hill and Hupe, 2014).

Principal-Agent Theory

Principal-agent theory examines the relationship between policymakers (principals) and implementers (agents), emphasizing issues of information

asymmetry and the necessity for mechanisms to ensure that agents act according to the principals' objectives (Miller, 2005). Digitization can address these challenges by providing transparent and accountable systems that diminish information asymmetry. For instance, digital platforms can track the performance of implementers, ensuring adherence to policy directives and enabling principals to monitor and evaluate implementation processes more effectively (Cordella and Iannacci, 2010). This theory underscores the role of digital tools in enhancing accountability and ensuring that policy implementation aligns with the intended objectives (O'Toole, 2000).

2.3 Historical Evolution of Policy Digitization

The evolution of digitization within public policy reflects a systematic shift from traditional, paper-based procedures to sophisticated digital platforms. This transformation is designed to enhance the efficiency, transparency, and accessibility of government services (Heeks, 2002; Margetts and Dunleavy, 2013). Initially, digitization efforts concentrated on converting existing manual processes into digital formats, with the primary goals of streamlining administrative functions and reducing operational costs (West, 2004). Gradually, the scope of digitization has expanded to include more complex activities such as data management, service delivery, and citizen engagement (Cordella and Iannacci, 2010).

In developing nations, digitization offers a powerful tool to tackle various systemic issues that obstruct effective governance, such as corruption, inefficiency, and lack of transparency (Heeks, 2010). The adoption of digital platforms can greatly reduce opportunities for corrupt practices by limiting human involvement in administrative procedures (Bannister and Connolly, 2014). Furthermore, digitization enhances the accuracy and availability of data, supporting more informed decision-making and policy development (Davies and Fensome, 2018). Digital platforms also promote better citizen engagement, thereby improving the overall responsiveness and accountability of government institutions (Bertot et al., 2010).

2.4 Advantages of Digital Governance

The advantages of implementing digital technologies in public policy are numerous. Foremost among these benefits is the enhancement of operational efficiency. By automating routine tasks, digital technologies significantly decrease processing times and eliminate redundant procedures, thereby ensuring quicker and more efficient service delivery (West, 2004).

For instance, e-government platforms can simplify processes like tax filing, license renewals, and benefit applications, thereby alleviating the administrative load on both citizens and government employees (OECD, 2016).

Yet another noble advantage of digitization is the transparency it creates. Digital platforms facilitate access to government data and processes by the public leading to increased accountability hence reducing corruption opportunities (Bertot et al., 2010). For instance, online portals that allow citizens to track the status of their applications or access government spending reports can enhance transparency and build public trust.

Digitization also leads to more informed decision-making because it gives policymakers the data they need in real time. However, adaptive digital systems can recognize emerging health threats by analyzing the volume of data now obtainable from interconnected technological devices (Davies and Fensome, 2018), The knowledge enables a variety of possible applications including in public health, allowing real-time data to inform responses to health crises or interventions (Bannister and Connolly 2014).

2.5 Key Technologies in Digitization

Key Technologies The digitization of public policy processes in developing economies typically involves three key technologies: e-government, mobile technology, and cloud computing. Such technologies ultimately lead to the streamlining of public administration making it more efficient and effective in terms of service delivery (Bertot et al., 2010; Duncombe and Boateng, 2009).

E-Government initiatives are aimed at providing digital platforms for tasks of various government operations to citizens and reducing administration bureaucracy. The services for which these initiatives entail span from e-filing taxes to digital identity verification and electronic voting systems (OECD, 2016). The implementation of E-Government is often found effective in increasing transparency and accountability in public administration (West, 2004).

Mobile Technologies are important to make access for Digital services of remote and under-served population in developing countries, since they enjoy the widest usage by public (Heeks, 2010). Mobile technologies allow for the provision of vital services such as healthcare, education, and financial services to those who might otherwise be excluded (Duncombe and Boateng, 2009). For example, mobile banking has transformed financial inclusion by enabling people in far-flung regions to obtain various baking services without having a physical presence (Donner and Tellez, 2008).

Cloud computing provides an elastic, cost-effective infrastructure for implementing public policy digitization that can help to manage data more effectively and connect people (Armbrust et al., 2010). It offers governments a way to efficiently store and process large volumes of data, giving them the flexibility to scale services up or down in response to demand (Marston et al., 2011). This also provides support for the integration of different digital services, making overall public policy implementation more effective (Kshetri, 2013).

2.6 Digital Literacy Challenges in Developing Countries

Digital literacy, defined as the ability to effectively use digital tools and technologies, is a critical component of successful digital transformation in public policy. However, in many developing countries, digital literacy remains alarmingly low, posing a significant challenge to the adoption and effective use of digital technologies. Low digital literacy rates can impede the implementation of e-government services, limit citizen engagement, and hinder the broader benefits that digital governance can offer. Addressing this issue is crucial, as it directly impacts the success of digitization efforts in public administration and service delivery (Bertot et al., 2010).

Several studies highlight that digital literacy gaps in developing countries are often exacerbated by low educational levels and limited access to digital training. According to the Digital Divide Theory (Van Dijk, 2006), disparities in access to technology often correlate with social and economic inequalities, creating a vicious cycle where marginalized groups are further excluded from the benefits of digital transformation. In rural areas of many developing nations, for example, access to both technology and the necessary training to use it effectively is often scarce (Heeks, 2010). This lack of digital literacy not only hinders individuals' ability to engage with digital public services but also reduces the potential for these services to achieve widespread adoption and effectiveness.

Furthermore, the Technology Acceptance Model (TAM) developed by Davis (1989) suggests that individuals' perceptions of technology's ease of use and usefulness play a significant role in their willingness to adopt it. In contexts where digital literacy is low, individuals may perceive digital platforms as too complex or irrelevant, resulting in resistance to their use. This resistance can be seen among both public servants and the general population in developing countries, where limited exposure to technology contributes to a lack of confidence in using digital tools (Bannister and

Connolly, 2014). As a result, even well-designed digital initiatives may struggle to gain traction if the population lacks the necessary skills to utilize them effectively.

3 Methodology

The research methodology used in this article is a literature review based on the existing literature and case studies to discuss the digitalization of public policy implementation from a developing country perspective. Systematic reviews are a formal study design for synthesizing research evidence providing viable and insightful results through consolidating all details on the subject (Tranfield et al., 2003). Scopus and Google Scholar were used as sources of comprehensive academic databases to provide data for this review. These resources such as the above can benefit from scrutiny from a wider audience in overseas because these databases cover many international English-language journal articles, thus ensuring that reviews tap into established high-quality academic literature (Falagas et al., 2008). The literature search included studies that were published in English, Peer-reviewed, and specifically addressed digitalization initiatives pertinent to public policy issues from developing countries.

Articles were reviewed for data extraction to identify the main themes concerning digitization in public policy implementation. It featured the technology used and discussed the merits of digitizing as well challenges faced in Digitization and certain aspects of it. Trends and patterns across cases were identified, taking an integrative approach to help develop a comprehensive understanding of the status quo in digitalization countries. The same systematic review methodology has been applied across other disciplines to organize research evidence and help shed light on complex topics. Fink (2014) conducted a systematic literature review of e-learning, in the higher education sector and also reviewed one hundred forty-two articles to interpret how digital learning can be adopted in this form. Similarly, Kitchenham and Charters (2007) conducted a study on systematic review-based methods for evaluating software engineering practices to gain an understanding of the applicability of different techniques and methodologies.

4 Empirical Insights into Digital Policy Implementation

Empirical research on the digitization of policy execution in public policy points to dramatic developments and issues various countries have

faced. According to some studies, digital technologies compositely have a transformative possibility that can improve the delivery of public services, reduce administrative burdens, and better citizens' satisfaction. In China, for example, research conducted recently indicated that applying ICTs has resulted in considerable reductions of this administrative burden for citizen-state interactions, promoting citizens' participation, and increased satisfaction with government services (Brown et al., 2021; Herd et al., 2013).

Many variables may affect success factors associated with the digitization of public policy implementation. For example, a study on the implementation of digital government initiatives in the South has concluded that robust infrastructure, sharp strategic vision at the initiation stage, and good stakeholder engagement are two essential conditions for successful implementation (Kim et al., 2017). In the United States, it has been documented that infusing AI into public service provision may increase fairness and service efficiency, reducing psychological costs for citizens (Barnes and Henly, 2018).

Digitalization of the governmental services of Estonia has brought into focus the interoperability and the integration of data for the designing of seamless, efficient public services. The success in implementing reasonably complete e-government – digital identity and online voting – TestClass/E: mines a supportive regulatory framework and strong political will (Kitsing, 2010). This is also reflected in research on the Digital Implementation Monitoring and Public Procurement Project of Bangladesh, which states that digital tools play a very important role in enhancing public procurement performance and engaging citizens (OECD, 2023).

The different studies underline the fact that different elements of digitization interact. For example, research on how digital tools could strengthen the state's policy responses to the COVID-19 crisis in Lithuania showed the need for robust digital infrastructures and strategic implementation (Bozeman and Youtie, 2020). Another study in Africa on how potential digital skills gaps interact with the effectiveness of initiatives on digital transformation underlines the need for targeted capacity-building programs (Brookings Institution, 2022).

The differences across these articles reflect a variety of different contexts and approaches toward digitization in the implementation of public policy. Be it studies stress technological aspects and immediate benefits, while others emphasize broader social and administrative effects that call for more specific strategies to emphasize local conditions and stakeholder involvement.

5 Critical Success Factors

The integration of digital technologies into the development, execution, and evaluation of public policy enhances efficiency, transparency, and effectiveness in public administration. This transformation exploits digital tools to render lean and sharp public service delivery in terms of governmental operations (Margetts and Dunleavy, 2013; Heeks, 2002). Not only does it embrace the adoption of new technologies, but also promotes and redesigns organizational processes and structures in this reshaping towards better service to the citizens (Cordella and Iannacci, 2010). According to West, 2004, digitization is the use of ICT to transform the tasks of public administration, forcing better internal efficiency and quality in external services. At the same time, Davies and Fensome (2018), add that it is the systematic application of ICT to public administration to improve internal efficiencies and external service quality.

It is the digitization of public policy implementation that has called for the much-needed role of stakeholders. With a view to adoption and sustainability, there needs to be stakeholder engagement and effective collaboration amongst the government, private sector partners, NGOs, and Citizens in any digital initiative (Kim et al., 2017; OECD, 2023). These stakeholders are involved clear setting of goals and ensure the interoperability of digital systems; that is, it provides an enabling environment for digital transformation (Bertot et al., 2010). In the absence of active involvement from its stakeholders, digital initiatives are likely to meet a lot of resistance or fail to address the needs of the public. This would result in more inclusive and participatory policy-making processes through the effective engagement of stakeholders. The involvement of the different categories of stakeholders will enable the government to consider their needs and concerns toward the enactment of more equitable and effective public policies. It can also enhance the legitimacy and accountability of digital initiatives, as stakeholders would wish to use and believe in systems that they have had an input in designing (Bryson et al., 2014).

Besides stakeholder engagement, the building of a basic yet robust digital infrastructure is core to the successful digitization of public policy implementation. High-speed connectivity, a reliable power supply, and advanced ICT infrastructure are essential for any deployment and functioning of digital platforms (Heeks, 2010; Kim et al., 2017). For instance, South Korea has been able to get ahead in its many successful digital government initiatives through

its advanced ICT infrastructure. Digital infrastructure also encapsulates hardware, software, and network resources operating a system digitally. This kind of infrastructure has to grow in scale and resiliency to become sustainable to the rising demands of digital services and withstand cyber-attacks. Indeed, infrastructure paid for or invested in now will yield long-term dividends in improved public service delivery, economic growth, and better national security (World Bank, 2016). Furthermore, it is the well-established public-private partnership that can provide much-needed importance to the building and maintenance of robust digital infrastructure by discovering resources and expertise between the two sectors (Lee et al., 2012).

Moreover, one needs a clear vision that inspires, motivates, and acts as the driving force to lead digitization. Justifiably stated, strategic planning provides the scope in which the digitization efforts would be accomplished in a cohesive manner and tandem with broader goals of governance (West, 2004). That forefronts the place of leadership in championing digital initiatives to drive organizational change, hence forming a central constituent of successful digital transformation (Margetts and Dunleavy, 2013). Digital transformational leadership involves setting clear goals, making needed resources available, and nurturing a culture of innovation within public institutions. Such influential leaders are in a hold position to explicitly express the digitization advantages and motivate the stakeholders to be open to change. Such leaders resist opposition and strive for the successful and smooth execution of digital undertakings (Garrity and Sanders, 2019). Moreover, digital service improvement can continuously be driven by leadership in case at least a learning and feedback culture within the public service can be enabled, as identified by Kotter (2012).

Additionally, there has to be constant capacity building and training for public servants and citizens so that they can acquire some of the skills in managing and utilizing digital systems. The training intends to close the gaps in any digital skills and thus actuates full exploitation of digitization advantage (Brookings Institution, 2022). Capacity building is therefore the way to solve the problem of change resistance and guarantee that the digital initiative is long-lasting. Capacity building entails not just technical training but also developing managerial and strategic skills for leading digital transformation efforts. Training should be carried out on the overall understanding of digitization by public servants and its implications in issues involving data privacy, cybersecurity, and digital ethics (Madsen, 2016). Additionally, continuous professional development should be embraced to maintain the pace of the fast-changing digital world. Equally important is the need to provide digital

literacy programs for citizens so that they can carry out activities relevant to using digital services and participating in the digital economy (UNESCO, 2018).

Finally, a supportive regulatory framework is inevitable for the proper functioning and maintenance of digital systems. Clear regulations and policies spell out guiding principles on data privacy, cybersecurity, and interoperability standards in the successful deployment of digital initiatives, according to Kitsing (2010). For instance, in Estonia, strong backing by regulatory provisions secures data and allows system interoperability in its comprehensive e-government system. The regulations should themselves be flexible enough to move at the same pace as the fast-changing digital environment and emerging threats. In other words, a proactive orientation in the regulation can reduce the risks associated with digital shifts or transformations, such as personal data breaches and cyber-attacks. Further, international cooperation on regulatory standards could help increase the efficiency of digital interventions by achieving interoperability and cross-border collaboration, as attempted by the (European Commission, 2020). This will further involve stakeholder engagement on the part of the makers of the policy to ensure regulations remain all-inclusive and represent the varied needs in society (Bannister and Connolly, 2011).

6 Challenges in Developing Countries

Low levels of digital literacy pose a significant challenge for developing countries, as they hinder the effective implementation and widespread adoption of digital public policies. This issue is particularly acute in regions with limited educational resources and access to digital training, creating a barrier that exacerbates existing socio-economic disparities and undermines efforts to achieve inclusive digital transformation. Alongside these literacy challenges, the implementation of public policy in a digital way in developing countries faces additional, equally daunting obstacles. Chief among these is the inadequacy of digital infrastructure. Many developing nations struggle with weak internet connectivity and unreliable power supplies, and often lack access to advanced ICT infrastructures necessary to sustain digital platforms (Heeks, 2010). This digital divide is particularly pronounced in rural and underserved communities across Africa and South Asia, where access to the internet and digital services remains scarce. According to the Brookings Institution (2022), this infrastructure gap severely hampers the effective dissemination of e-government services and other digital initiatives,

further complicating the path to digital transformation (Donner and Tellez, 2008).

To address the digital literacy challenges in developing countries, a systematic and multi-faceted approach is essential, particularly in regions with low educational levels and limited access to digital training. Digital literacy is a critical barrier to the successful implementation of digital public policies, and its gap is often exacerbated by socio-economic factors, especially in rural areas. One effective strategy is the development of community-driven digital literacy programs. These initiatives focus on training local populations in basic digital skills through community centers or local educational institutions. For example, the "Digital India" initiative includes the establishment of Common Service Centers (CSCs) in rural areas, providing digital training to underserved populations (Nedungadi et al., 2018). These centers serve as hubs where citizens can access government services online and receive necessary training on using digital tools.

Moreover, mobile technology offers a scalable solution to digital literacy challenges, especially in areas where access to computers is limited. Mobile-based learning platforms can deliver training content to remote regions, as demonstrated by the "mLearning" initiative in Kenya, which leverages mobile phones to deliver educational content to learners in rural areas, significantly improving digital literacy rates (West, 2012). Public-private partnerships (PPPs) have also proven to be successful in expanding digital literacy. Collaborations between the public sector and private enterprises can facilitate access to technology and training, ensuring that even the most marginalized groups can develop digital skills. An example of this is the "Samsung Tech Institute" in Brazil, which partnered with local governments to provide digital literacy training in underserved communities (Samsung, 2017).

Long-term strategies for enhancing digital literacy should also include integrating it into the educational curriculum. Countries like South Africa have introduced digital literacy as a subject in schools, ensuring that the younger generation is well-equipped to navigate the digital world. This approach has been instrumental in raising the overall digital competency of the population over time (Isaacs, 2007). The effectiveness of these initiatives can be understood through the lens of the Technology Acceptance Model (TAM), which posits that perceived ease of use and perceived usefulness are critical to the adoption of new technologies (Davis, 1989). By making digital tools accessible and demonstrating their practical benefits, these

programs increase the likelihood of technology adoption among low-literacy populations.

Furthermore, the Digital Divide Theory (Van Dijk, 2006) suggests that addressing disparities in digital access is crucial for social and economic inclusion. The systematic strategies discussed align with this theory as they aim to bridge the gap between digitally literate and illiterate populations by making training and technology more accessible. Implementing these strategies in developing countries can significantly enhance digital literacy, thereby supporting the broader goals of digital public policy and governance.

While enhancing digital literacy is a critical step toward bridging the digital divide, it must be complemented by strong strategic vision and leadership to ensure the cohesive implementation of digital initiatives. The absence of clear strategic vision and leadership is a large barrier to the digitization process. Strategic planning with the backbone of strong leadership will help keep the digitization process aligned with wider governance objectives for its cohesive implementation (West, 2004). Frequent changes in ruling discredit, in most developing nations, long-term digital strategies and initiatives that usually result in inconsistent and fragmented implementation (Kim et al., 2017).

In addition, socio-political resistance from government agencies, private sector partners, and citizens, combined with a lack of collaboration, like socio-political resistance and unwillingness to collaborate, acts as an obstacle to implementing effective stakeholder engagement. Stakeholder engagement is a crucial aspect of the creation of a collaborative environment, solving concerns, and putting in place an enabling environment for the enactment of digital transformation (Bertot et al., 2010). However, public servants who subscribe to conventional practices that make them resistant to change and the limited involvement from both the private sector and the public due to socioeconomic or political factors act as barriers towards digitization (Cordella and Iannacci, 2010).

Furthermore, capacity building and continuous training remain critical to equipping public servants and citizens with skills to manage and use such technology systems (Heeks, 2002). It is in that light that the digital skills gap has been mentioned as one of the major challenges facing the successful implementation of digital initiatives in developing countries. While many public servants are short of the technical capacity to run and maintain digital platforms, low levels of public penetration or digital literacy in the population have set limits on the actual use of digital services.

A supportive regulatory framework is another important factor for the success of implementing and maintaining these digital systems. There has to be clear regulation in terms of personal data protection, cybersecurity, and interoperability standards that ensure secure yet efficient digital initiatives (Kitsing, 2010). Such comprehensive regulatory frameworks in most developing countries lack support for digital transformation and have brought out challenges to data protection and system interoperability (OECD, 2023).

For instance, the case of the implementation of the Sistem Informasi Pemerintahan Daerah in Indonesia showcases these challenges very well. Even while one of SIPD's main goals was supposed to be digitizing regional government administration and the delivery of public services, it was riddled with numerous problems. Technical difficulties and undeveloped digital infrastructure rendered the system less effective than expected (Bappenas, 2021). What is more, the smooth adoption of SIPD has been slowed down by public servants' resistance to change and a lack of proper training (World Bank, 2020). These challenges call for comprehensive planning, stakeholder involvement, and sustained investment in capacity-building to eliminate constraints to successful digitization in developing countries.

7 Successful Digital Governance Case Studies

Several countries have successfully implemented digital public policy initiatives, providing valuable insights for developing nations. The Estonian e-government system demonstrates that strong political will and a facilitative legal environment are the most important facets of digital infrastructure. Estonia has built up a sophisticated ICT infrastructure that gives fast-speed access to the internet to its population. The continuous political support, imbued with the government's vision, has enabled the rapid application of working digital platforms in different government services. The regulatory framework of Estonia recognizes data security and system interoperability as the prerequisite factors for the success of e-government initiatives in the country (Kitsing, 2010).

In South Korea, the deep penetration of ICT in governance is the epitome of strategic planning and the influence of stakeholders on successful digitization. It is strategic vision, coupled with advanced digital infrastructure, that has facilitated the implementation of e-government services, which in turn enhanced public service delivery and citizen satisfaction in South Korea. Indeed, the collaborative environment sculptured out of the engagement with

stakeholders, among them private sector partners and the citizenry, has kept digital transformation alive (Kim et al., 2017).

Administrative burdens have been radically reduced, and there is enhanced citizen participation and satisfaction in public policymaking. China has had successes in this field, which can be attributed to the fact that it is striving with robust digital infrastructure, a clear strategic vision, and seemingly effective capacity-building and training programs. It is very important to the improvement in efficiency and effectiveness of public services that the government commitment to digital transformation coupled with continuous investment in digital infrastructures (Brown et al., 2021; Herd et al., 2013).

The Digital Implementation Monitoring and Public Procurement Project in Bangladesh is one example of how digital tools can improve public procurement performance and engage citizens. The move toward the digitization of public procurement in Bangladesh has been led by a clear strategic vision coupled with strengthened stakeholder engagement. The success of the project demonstrated the need for continual capacity building and a supportive regulatory framework as enabling conditions for the effective implementation of digital initiatives (OECD, 2023).

Finally, Lithuania's digital tools in the COVID-19 crisis show that a solid digital infrastructure is essential, and strategic implementation is key while responding to emergencies in public health. The digital platforms put in place in Lithuania provided an avenue for effective responses reflecting the value of having a distinct strategic vision and strong leadership as driving forces of digital transformation. The efforts also serve to underscore the importance of having comprehensive regulatory frameworks to ensure data protection and system interoperability (Bozeman and Youtie, 2020).

8 Insights from Case Studies for Developing Countries

The case studies of Estonia, South Korea, China, Bangladesh, and Lithuania provide valuable insights that can inform the digital transformation efforts of other developing countries. While these countries operate in unique sociopolitical and economic contexts, the core strategies that have driven their digital successes can be adapted and applied in various developing contexts. One critical factor consistently highlighted is the importance of robust digital infrastructure, which serves as the foundation for successful digital public policy implementation. For instance, Estonia's well-developed digital infrastructure has enabled the country to implement advanced e-government services, making it a global leader in digital governance (Kitsing, 2010). This

demonstrates that investments in infrastructure, even in resource-constrained settings, are crucial for driving digital transformation (OECD, 2016).

Another important lesson is the significance of stakeholder engagement. The involvement of multiple stakeholders – including government agencies, the private sector, and citizens – has been a key factor in the success of digital initiatives in South Korea and Bangladesh. In South Korea, a clear strategic vision combined with effective stakeholder collaboration has resulted in increased citizen satisfaction and enhanced public service delivery (Kim, Pan, and Pan, 2017). This model of inclusive engagement can be adopted by developing countries to ensure that digital policies reflect the needs and expectations of diverse populations, thereby increasing the legitimacy and sustainability of such initiatives (Bryson, Crosby, and Bloomberg, 2014).

Strategic planning is another critical element emphasized across these case studies. Long-term digital strategies, such as those employed in China, have been instrumental in maintaining the momentum of digital transformation initiatives. These strategies provide a clear framework for implementation, ensuring that digital policies remain aligned with broader governance objectives and can adapt to the evolving technological landscape (Brown, Zhang, and Herd, 2021). As noted by Margetts and Dunleavy (2013), a clear strategic vision is essential for the success of digital-era governance, as it enables countries to navigate the complexities of policy implementation and technology integration.

The experiences of these countries also underscore the need for capacity building, both in terms of technological expertise and digital literacy. For developing countries, investing in capacity-building programs for public servants and the general population is vital to ensure the successful adoption and implementation of digital initiatives. Continuous training programs, as seen in Bangladesh's public procurement digitalization, can help overcome resistance to change and improve the effectiveness of digital governance (OECD, 2023). This highlights the importance of sustained investments in human capital to complement technological advancements.

In summary, while the socio-political contexts of Estonia, South Korea, China, Bangladesh, and Lithuania differ from those of many developing countries, the lessons from their digital transformation journeys are highly transferable. Key strategies such as developing robust digital infrastructure, engaging stakeholders, strategic planning, and capacity building can be adapted and applied to a wide range of developing nations, helping them overcome common challenges in the digitization of public policy.

9 Sustainability and Implementability of Digital Policies

The long-term sustainability and implementability of digital policies in developing countries present significant challenges that must be carefully considered to ensure the continued success of digital transformation initiatives. One of the primary obstacles is the ongoing maintenance and operational costs associated with digital infrastructure. In many developing countries, the initial implementation of digital systems is often supported by international donors or temporary government initiatives, which may not provide adequate provisions for the long-term upkeep of these systems. For example, a study by Heeks (2010) highlights that while donor-funded projects can jumpstart digital transformations, they frequently fail to plan for sustainable funding models that ensure these systems can be maintained and upgraded as needed. Without sustained investment, the digital infrastructure risks falling into disrepair, leading to inefficiencies or even complete system failures over time.

Additionally, the need for continuous technology updates poses another significant challenge. Digital technologies evolve rapidly, and systems that are cutting-edge today may become obsolete within a few years. This issue is particularly pressing in developing countries, where financial constraints often limit the ability to invest in the latest technologies. As a result, digital systems in these regions may lag behind, reducing their effectiveness and potentially widening the digital divide further. For instance, in many African nations, digital infrastructure that was modern a decade ago is now outdated, and efforts to update these systems are hindered by a lack of resources and technical expertise (Donner and Tellez, 2008). This situation underscores the importance of adopting flexible and scalable technologies that can be easily upgraded or integrated with new innovations without requiring complete overhauls of existing systems.

The threat of obsolescence is further compounded by the rapid pace of technological advancement. As new technologies emerge, older systems may no longer be supported by vendors, leading to security vulnerabilities and operational inefficiencies. This issue is particularly problematic in countries where digital literacy and technical expertise are limited, making it difficult for local personnel to manage and update systems without external assistance. A study by Bwalya and Mutula (2016) on digital transformation in government points out that without a strategic approach to technology lifecycle management, developing countries risk investing in systems that may become obsolete before they fully deliver their intended benefits. Therefore, a key aspect of sustainability in digital policy implementation is the establishment

of policies that anticipate and plan for the eventual replacement or upgrading of technology.

To address these challenges, some countries have adopted policies that focus on building resilient and adaptable digital infrastructures. For example, Estonia's e-government strategy includes provisions for regular updates and continuous improvement of digital systems, backed by a robust legal and regulatory framework that ensures long-term sustainability (Kaizer, 2024). Similarly, South Korea has implemented a strategic approach to digital governance that emphasizes the importance of ongoing investment in technology and infrastructure, coupled with continuous capacity-building efforts to ensure that public servants and citizens alike can adapt to new digital tools (Kim et al., 2017). These examples highlight the importance of strategic foresight and the need for policies that not only focus on the immediate implementation of digital systems but also consider their long-term viability.

10 Future Directions in Digitizing the Implementation of Public Policy

As the landscape of digital public policy continues to evolve, it is imperative for developing countries to adopt forward-looking strategies that address the multifaceted challenges associated with digitization. The future of digital public policy implementation must focus on building resilient, adaptive, and sustainable digital infrastructures, alongside ensuring the effective governance of these systems.

One of the critical areas for future development is the emphasis on sustainable digital infrastructure. As highlighted in previous sections, the longevity and effectiveness of digital policies are heavily reliant on the robustness of the underlying infrastructure. Developing countries must prioritize the creation of digital systems that are not only technologically advanced but also adaptable to future innovations. This includes the strategic planning for continuous upgrades and the incorporation of flexible architectures that can integrate new technologies without necessitating complete overhauls. The experience of Estonia, as documented by Kitsing (2010), serves as a valuable model in this regard, where a strong regulatory framework supports regular updates and the continuous improvement of digital systems. Such frameworks ensure that digital policies remain relevant and effective in the face of rapid technological advancements.

Strategic foresight and leadership will also play a pivotal role in the future of digital public policy. The absence of clear strategic direction has

been a significant barrier in many developing nations, leading to fragmented and inconsistent digital initiatives. Moving forward, it is essential for governments to establish long-term visions that align with broader governance objectives. These strategies must be resilient to political changes, ensuring that digital transformation efforts are sustained across different administrations. South Korea's strategic approach to digital governance, which emphasizes continuous investment and stakeholder engagement, demonstrates the importance of having a clear and stable vision for digital transformation (Kim, Pan, and Pan, 2017). Future policies must therefore incorporate mechanisms that safeguard against political instability, ensuring the continuity of digital initiatives.

Another critical direction is the integration of capacity-building programs. As digital technologies become more complex, there is an increasing need for skilled personnel who can manage and adapt these systems. Continuous training and capacity-building initiatives are essential to equip public servants and citizens with the necessary skills to effectively engage with digital platforms. As Bwalya and Mutula (2016) point out, without such capacity-building efforts, developing countries risk falling behind in the digital era, unable to fully capitalize on the benefits of digital transformation. Future policies must therefore include comprehensive plans for ongoing education and training, ensuring that the workforce remains competent in the face of rapidly evolving technologies.

Public-private partnerships (PPPs) will also be crucial in driving the future of digital policy implementation. Given the financial constraints faced by many developing countries, collaborations with private enterprises can provide the necessary resources and expertise to support digital initiatives. These partnerships can also facilitate the transfer of knowledge and technology, helping to bridge the gap between the public sector's needs and the private sector's capabilities. The success of such collaborations in countries like Rwanda, as documented by Ndahiro (2020), underscores the potential of PPPs in enhancing digital literacy and infrastructure. Future policies should therefore actively encourage and facilitate such partnerships, leveraging the strengths of both sectors to achieve sustainable digital transformation.

Finally, regulatory frameworks must evolve to support the dynamic nature of digital technologies. As digital systems become more integrated into public administration, the need for robust data protection, cybersecurity measures, and interoperability standards will become increasingly critical. Future policies must not only address current challenges but also anticipate future risks, creating a regulatory environment that is both flexible and comprehensive.

The proactive regulatory approaches seen in Singapore's Smart Nation initiative (Chin, 2019) offer a blueprint for how developing countries can craft regulations that keep pace with technological advancements while ensuring the security and efficiency of digital systems.

In conclusion, the future of digitizing public policy in developing countries hinges on the adoption of sustainable, adaptable, and well-governed digital infrastructures. Strategic foresight, continuous capacity building, strong public-private partnerships, and evolving regulatory frameworks will be essential components of this journey. By learning from global best practices and tailoring strategies to local contexts, developing countries can overcome the challenges of digital transformation and fully realize the potential of digital public policy.

References

Andersen, K. V., and Henriksen, H. Z. (2006). E-government maturity models: Extension of the Layne and Lee model. *Government Information Quarterly, 23*(2), 236–248.

Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., … and Zaharia, M. (2010). A view of cloud computing. *Communications of the ACM, 53*(4), 50–58.

Avgerou, C. (2008). Information systems in developing countries: A critical research review. *Journal of Information Technology, 23*(3), 133–146.

Bannister, F., and Connolly, R. (2011). The Trouble with Transparency: A Critical Review of Openness in e-Government. *Policy & Internet*, 3(1), 1–30.

Bannister, F., and Connolly, R. (2014). ICT, public values and transformative government: A framework and program for research. *Government Information Quarterly, 31*(1), 119–128.

Bappenas. (2021). *Evaluasi Implementasi SIPD di Indonesia*. Jakarta: Bappenas.

Barnes, R., and Henly, J. (2018). Unfair treatment and psychological costs in street-level bureaucracies. *Public Administration Review, 78*(4), 556–566.

Bertot, J. C., Jaeger, P. T., and Grimes, J. M. (2010). Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Government Information Quarterly, 27*(3), 264–271.

Bovens, M., and Zouridis, S. (2002). From street-level to system-level bureaucracies: How information and communication technology is transforming administrative discretion and constitutional control. *Public Administration Review, 62*(2), 174–184.

Bozeman, B., and Youtie, J. (2020). *Socio-technical capital and the high-tech economy: Human skills, technical knowledge, and organizational practices. Cheltenham*, UK: Edward Elgar Publishing.

Brown, A. E., and Grant, G. G. (2010). Highlighting the duality of the ICT and development research agenda. *Information Technology for Development, 16*(2), 96–111.

Brown, C., Zhang, Y., and Herd, R. (2021). China's digital economy: Opportunities and challenges. *OECD Economic Surveys: China, 2021*(1), 89–104.

Bryson, J. M., Crosby, B. C., and Bloomberg, L. (2014). Public Value Governance: Moving Beyond Traditional Public Administration and the New Public Management. *Public Administration Review, 74*(4), 445–456.

Bwalya, K. J., and Mutula, S. M. (2014). *E-Government: Implementation, adoption and synthesis in developing countries*. Walter de Gruyter GmbH & Co KG.

Cordella, A., and Iannacci, F. (2010). Information systems in the public sector: The e-Government enactment framework. *Journal of Strategic Information Systems, 19*(1), 52–66.

Davies, R., and Fensome, K. (2018). Digital transformation in government: Balancing efficiency and inclusivity. *Public Management Review, 20*(4), 577–597.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319–340.

Donner, J., and Tellez, C. A. (2008). Mobile banking and economic development: Linking adoption, impact, and use. *Asian Journal of Communication, 18*(4), 318–332.

Duncombe, R., and Boateng, R. (2009). Mobile phones and financial services in developing countries: A review of concepts, methods, issues, evidence, and future research directions. *Third World Quarterly, 30*(7), 1237–1258.

Elmore, R. F. (1979). Backward mapping: Implementation research and policy decisions. *Political Science Quarterly, 94*(4), 601–616.

European Commission. (2020). *Shaping Europe's Digital Future*. Publications Office of the European Union.

Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., and Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. *The FASEB Journal, 22*(2), 338–342.

Fink, A. (2014). *Conducting Research Literature Reviews: From the Internet to Paper*. Sage Publications.

Garrity, E. J., and Sanders, G. L. (2019). Information Systems Success Measurement. *Foundations and Trends in Information Systems, 3*(1), 1–94.

Goggin, M. L., Bowman, A. O. M., Lester, J. P., and O'Toole, L. J. (1990). *Implementation theory and practice: Toward a third generation*. Scott Foresman & Co.

Heeks, R. (2002). Information systems and developing countries: Failure, success, and local improvisations. *The Information Society, 18*(2), 101–112.

Heeks, R. (2010). Do information and communication technologies (ICTs) contribute to development?. *Journal of International Development, 22*(5), 625–640.

Heeks, R., and Stanforth, C. (2007). Understanding e-Government project trajectories from an actor-network perspective. *European Journal of Information Systems, 16*(2), 165–177.

Herd, R., Brown, C., and Zhang, Y. (2013). The Role of China in the Global Economy. *OECD Economic Surveys: China, 2013*(1), 110–129.

Hill, M., and Hupe, P. (2014). *Implementing public policy: An introduction to the study of operational governance.* Sage Publications.

Isaacs, S. (2007). ICT in education in South Africa. *Survey of ICT and Education in Africa: South Africa Country Report*, *21*, 15–54.

Janssen, M., and Helbig, N. (2016). Innovating and changing the policy cycle: Policy-makers be prepared!. *Government Information Quarterly, 33*(1), 99–106.

Kaiser, Z. A. (2024). Smart governance for smart cities and nations. *Journal of Economy and Technology*, *2*, 216–234.

Kim, S., Pan, G., and Pan, S. L. (2007). Managing IT-enabled transformation in the public sector: A case study on e-government in South Korea. *Government Information Quarterly, 24*(2), 338–352.

Kim, Y., Pan, S. L., and Pan, G. (2017). Examining the role of IT in e-government development: A case study of South Korea. *Journal of Global Information Technology Management, 20*(1), 25–50.

Kitchenham, B., and Charters, S. (2007). *Guidelines for performing systematic literature reviews in software engineering*. Technical report, EBSE Technical Report EBSE-2007–01.

Kitsing, M. (2010). Explaining the e-government success in Estonia. *Digital Government Innovation in Challenging Times*, 120–136.

Kshetri, N. (2013). *Cloud computing in developing economies*. IEEE Computer, 46(10), 60–63.

Lee, S. M., Olson, D. L., and Trimi, S. (2012). Co-innovation: Convergenomics, Collaboration, and Co-creation for Organizational Values. *Management Decision, 50*(5), 817–831.

Linders, D. (2012). From e-Government to we-Government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly, 29*(4), 446–454.

Lipsky, M. (1980). *Street-Level Bureaucracy: Dilemmas of the Individual in Public Services*. Russell Sage Foundation.

Madsen, S. R. (2016). Strategies for Developing and Training Leaders: An International Perspective. *Advances in Developing Human Resources, 18*(3), 273–285.

Margetts, H., and Dunleavy, P. (2013). The second wave of digital-era governance: A quasi-paradigm for government on the Web. Philosophical Transactions of the Royal Society A: Mathematical, *Physical and Engineering Sciences, 371*(1987), 20120382.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., and Ghalsasi, A. (2011). Cloud computing – The business perspective. *Decision Support Systems, 51*(1), 176–189.

Matland, R. E. (1995). Synthesizing the implementation literature: The ambiguity-conflict model of policy implementation. *Journal of Public Administration Research and Theory, 5*(2), 145–174.

McKinsey Global Institute. (2013). *Lions go digital: The Internet's transformative potential in Africa.* McKinsey & Company.

Miller, G. J. (2005). The political evolution of principal-agent models. *Annual Review of Political Science, 8*, 203–225.

Nedungadi, P. P., Menon, R., Gutjahr, G., Erickson, L., and Raman, R. (2018). Towards an inclusive digital literacy framework for digital India. *Education+ Training*, *60*(6), 516–528.

OECD. (2016). *Digital Government Strategies for Transforming Public Services in the Welfare Areas*. OECD Publishing.

OECD. (2023). *Digital Government Review of Bangladesh: Enhancing Service Delivery and Citizen Engagement.* OECD Publishing.

O'Toole, L. J. (2000). Research on policy implementation: Assessment and prospects. *Journal of Public Administration Research and Theory, 10*(2), 263–288.

Pierson, P. (1993). When effect becomes cause: Policy feedback and political change. *World Politics, 45*(4), 595–628.

Pressman, J. L., and Wildavsky, A. (1984). *Implementation: How Great Expectations in Washington Are Dashed in Oakland; Or, Why It's Amazing that Federal Programs Work at All.* University of California Press.

Sabatier, P. A., and Mazmanian, D. (1980). The implementation of public policy: A framework of analysis. *Policy Studies Journal, 8*(4), 538–560.

Samsung. (2017). Samsung Tech Institute: A model for public-private partnerships. *Samsung Electronics.*

Tranfield, D., Denyer, D., and Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge using systematic review. *British Journal of Management, 14*(3), 207–222.

UNESCO. (2018). *Digital Literacy in Education: Capacity Building and Certification.* UNESCO Publishing.

Van Dijk, J. A. (2006). Digital divide research, achievements and shortcomings. *Poetics*, *34*(4–5), 221–235.

West, D. M. (2004). E-Government and the transformation of service delivery and citizen attitudes. *Public Administration Review, 64*(1), 15–27.

West, D. M. (2012). *Digital schools: How technology can transform education*. Brookings Institution Press.

Winter, S. C. (2003). Implementation perspectives: Status and reconsideration. In B. G. Peters & J. Pierre (Eds.), *Handbook of Public Administration* (pp. 212–222). Sage Publications.