

Digital Identification as a Trust Constraint to Inclusive Digital Financial Services: A Comparative Case Study of the Nigerian Ecosystem to the German Model

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Abstract

In an increasingly digital global economy, digital identification (DigiID) is recognized as foundational for financial inclusion and trust in digital financial services (DFS). Nonetheless, in regions like Africa, where nearly 500 million individuals lack identification, DigiID can paradoxically act as a constraint rather than an enabler. This paper explores how digital identification systems—intended to foster institutional-based trust—can inhibit inclusion when implemented in low-trust, low-capacity environments, using Nigeria as a primary case study and Germany as a comparative benchmark. Grounded in Silber’s Constraint Theory of Innovation and a socio-technical trust framework, the study employs a transdisciplinary, theory-informed comparative methodology, drawing on expert interviews, stakeholder insights, and ecosystem analysis. Findings reveal that Nigeria’s centralized DigiID infrastructure, compounded by institutional weaknesses, regulatory incoherence, and data protection gaps, undermines trust and exacerbates exclusion. In contrast, Germany’s decentralized, federated identity model—anchored in strong regulatory oversight and legacy trust systems—achieves financial inclusion with less dependence on digital ID. The analysis underscores the limitations of techno-solutionism and emphasizes the need for context-sensitive, multi-stakeholder governance approaches. Ultimately, the paper argues that without aligning digital identity systems with institutional trust mechanisms and user affordances, their promise for inclusive financial transformation remains constrained.

Keywords: Digital Identification, Trust, Inclusive DFS, Nigeria

Introduction

Identification is enshrined in the United Nations Declaration of Human Rights (Article 6) as a fundamental human right, critical for inclusive socioeconomic development, especially in the contemporary global digital economy (Arner, Buckley and Zetzsche, 2018; Musoni, Domingo and Ogah, 2023). In Africa, despite the proliferation of digital ID systems,

approximately 500 million people still lack any form of official identification (World Bank, 2019). This exclusion is often rooted in foundational identity gaps, which are further compounded by structural deficits such as limited internet coverage and low digital literacy levels. As a result, the reliance on digital identity systems to address systemic issues like poverty, corruption, and exclusion has been criticized as a form of techno-solutionism (Trikanad and Bhandari, 2022), potentially worsening existing inequalities. Within this purview, techno-solutionism refers to the overreliance on technology—especially digital innovations like DigiIDs—as a panacea for complex sociopolitical and economic problems such as poverty, exclusion, and institutional dysfunction. It overlooks the nuanced socio-institutional contexts in which such technologies are deployed. Digital identification in this light can become a constraint on trust, especially when citizens encounter misalignment between technology's affordances and their lived realities. As Anderson and Robey (2017) and Lukonga (2021) argue, technological advancement alone cannot guarantee inclusive prosperity.

This premise is even more compelling when examined through a soft technologically deterministic and engineered explanation—a lens that recognizes the influential role of technological innovation while acknowledging that its outcomes are mediated by social, economic and institutional contexts. Unlike hard technological determinism, which posits that technology autonomously shapes history and society, this softer variant emphasizes that technological systems such as digital identification infrastructure are deliberately designed and deployed within existing power structures, and their impacts are contingent on how they interact with these structures. This perspective is particularly useful for analyzing the political economy of financialization in Africa, where digital financial services are not just technological innovations, but socio-technical systems embedded in broader efforts to formalize, regulate, and extract value from everyday economic life (Breckenridge, 2021).

Classic accounts of technological determinism such as Heilbroner's essay titled "Do Machines Make History?" (1967), or Marx's metaphor that "the hand-mill gives you the feudal lord, and the steam-mill gives you the industrial capitalist" (Smith and Marx, 1994), suggests that innovations drive epochal transformations. Nevertheless, these deterministic views must be tempered by attention to social structures and economic incentives. Here, the Adam Smith School of Thought offers a useful corrective: it highlights that labor productivity—and by extension, technological adoption—is shaped not only by the intrinsic capacities of technology but also by patterns of market demand, income distribution, and broader societal needs. In this light, the diffusion of digital identification systems and their role in financial inclusion are not automatic or inevitable but are engineered responses to socioeconomic imperatives such as improving state capacity, deepening financial penetration, and managing risk within capitalist development models. Thus, a soft technological determinism, grounded in institutional and market dynamics, provides a more holistic account of how digital technologies become instruments of financialization.

The preceding interplay between technology and socioeconomic factors is empirically evident in the Nigerian context. Omotayo (2022), employing an ARDL approach to co-integration identifies income distribution as a key determinant of financialization positively influencing the growth of financial assets relative to GDP. Conversely, macroeconomic factors such as exchange rate volatility, inflation, and real interest rates negatively impact financialization. These findings suggest that without policies that enhance equitable income distribution and macroeconomic stability, the assumed benefits of financialization—and by extension, digital identification systems linked to financial inclusion—may not materialize. In essence, digital ID systems alone, devoid of enabling socio-economic conditions, are insufficient in catalyzing inclusive digital financial transformation. This reinforces the argument that technology adoption must be accompanied by holistic structural reforms to

ensure its alignment with inclusive development outcomes. Based on the preceding observation, optimal technological change must be compatible with the normative social and institutional constraints in order to minimize the risks of technology solutionism (see Allen, 2024). Hence, from an enabling regulatory environment perspective, optimized digital identification, which is a key element of institution-based trust within any financial ecosystem, can be a critical policy foundation for alleviating binding demand- and supply-side constraints that inhibit the development of inclusive digital financial services (DFS) in Africa (see McKnight and Chervany, 2000; Suri and Bhogale, 2019; Pazarbasioglu et al., 2020).

Within the aforementioned purview, the paper compares Nigeria's situation with that of Germany, a more mature digital ID ecosystem, to highlight the differences in trust environments and regulatory effectiveness. While Germany operates a decentralized and federated identity system that is supported by strong institutional trust and coherent data protection policies, Nigeria's centralization of identity systems has raised significant data protection concerns and led to a lower level of institutional trust. This contrast underscores the importance of a well-structured regulatory environment in fostering the institutional trust necessary for digital financial services to thrive. Accordingly, the following three research questions are probed: (1) How is digital identification a trust constraint for inclusive digital financial services in Nigeria? (2) What regulatory and policy options are there to optimize the digital identification system for leveraging broader-based digital financial services in bridging the Nigeria's financial inclusion deficits? (3) What lessons can the Nigerian ecosystem draw from the successes and failures of the German model in engendering institutional-based trust for financial inclusion?

The research questions in this paper are important because they address the critical challenges of digital identification (DigiID) as a trust constraint to inclusive digital financial services (DFS), particularly in regions like Africa where a significant portion of the population lacks formal identification. The paper highlights that while DigiID is foundational for financial inclusion, it can paradoxically inhibit it in low-trust, low-capacity environments. The research questions aim to explore this paradox by: (a) investigating how digital identification acts as a trust constraint for inclusive DFS in Nigeria. This is crucial because Nigeria's centralized DigiID infrastructure, coupled with institutional weaknesses, regulatory incoherence, and data protection gaps, undermines trust and exacerbates exclusion, leading to issues like a decline in account ownership and account closures. Understanding this constraint is vital for designing effective financial inclusion strategies; (b) identifying regulatory and policy options to optimize the digital identification system for leveraging broader-based DFS to bridge Nigeria's financial inclusion deficits. This is significant because it seeks practical solutions to overcome the identified barriers, emphasizing the need for context-sensitive, multi-stakeholder governance approaches rather than relying solely on "techno-solutionism"; and (c) drawing lessons from the German model's successes and failures in engendering institutional-based trust for financial inclusion. This comparative analysis is important as Germany's decentralized, federated identity model, anchored in strong regulatory oversight and legacy trust systems, achieves financial inclusion with less dependence on digital ID, offering valuable insights for Nigeria and similar developing economies.

The objective of this essay is to critically examine the interplay among digital identification, institutional trust, and inclusive digital financial services, using Nigeria as a primary case study and Germany as a comparative benchmark. The importance of this objective lies in challenging the prevailing narrative that digital ID is an unqualified enabler of development. Instead, the paper aims to demonstrate that without aligning digital identity systems with institutional trust mechanisms and user affordances, their promise for inclusive

financial transformation remains constrained. It seeks to offer a nuanced reconfiguration of digital identification systems as "institution-based trust constraints" rather than neutral technical tools, providing theoretical and empirical depth to understanding trust in financial digitalization.

The general essence of the essay hinges on its argument that optimal technological change must be compatible with normative social and institutional constraints to minimize the risks of techno-solutionism. It underscores that digital ID systems, while intended to foster trust and inclusion, can become barriers when implemented in environments with low institutional trust and capacity. The paper therefore advocates for a comprehensive policy approach that integrates digital identity systems into broader socio-technical and institutional contexts to ensure they function as enablers rather than constraints to financial inclusion, emphasizing that financial inclusion is fundamentally a governance and institutional design challenge. This perspective helps readers understand why the focus is on trust and institutional frameworks rather than solely on technological advancements or other factors, as these are identified as critical binding constraints in achieving inclusive DFS.

Drawing on Silber's Constraint Theory of Innovation, the paper suggests that constraints imposed by digital ID requirements can spur innovation in financial services, particularly in fintech, but only if these constraints are balanced with an effective regulatory environment. The study argues that for digital financial inclusion to be realized, digital identification systems must be optimized within a broader regulatory framework that supports institutional-based trust. This optimization is crucial to overcoming the supply- and demand-side barriers that inhibit access to DFS for underserved populations. The paper further critiques the idea of techno-solutionism—relying on technology alone to solve complex socio-economic issues—by showing how both Nigeria and Germany's experiences illustrate the need for adaptive, context-specific policies that bridge the gap between technological ambition and user realities. In Nigeria, for example, digital IDs are mandatory for many transactions, yet institutional failures and policy misalignments have hindered their adoption and led to financial exclusion. In contrast, Germany's regulatory framework for financial inclusion relies on a combination of digital and traditional know-your-customer KYC methods, demonstrating that financial inclusion can be achieved without an overreliance on digital identity systems. Ultimately, the paper concludes that an optimized digital identity ecosystem, supported by a robust institutional framework, is essential for inclusive digital financial services in developing economies like Nigeria. The study calls for a comprehensive policy approach that integrates digital identity systems into the broader socio-technical and institutional context to ensure that they function as enablers rather than constraints to financial inclusion (see Arner et al., 2018; Agyepong, 2018; McKnight and Chervany, 2000; Pearce et al., 2022; Allen, 2024).

The paper makes several key contributions to the evolving discourse on digital identification, institutional trust, and financial inclusion within digitally transforming economies. A core conceptual contribution of this study is its nuanced reconfiguration of digital identification systems, not as neutral technical tools for financial inclusion, but as embedded trust infrastructures that can function as "institution-based trust constraints." This approach challenges dominant narratives that position digital ID as an unqualified enabler of development and instead surfaces the structural and situational conditions under which digital ID either facilitates or inhibits inclusive digital financial services (DFS). By centering digital ID as a trust-mediating mechanism within broader institutional ecosystems, the paper adds theoretical and empirical depth to the understanding of trust production in financial digitalization processes. The paper breaks new ground by applying Silber's Constraint Theory of Innovation—originally developed in the context of monetary and regulatory innovation—to the domain of digital identification and inclusive DFS. In doing so, it

illustrates how regulatory constraints (e.g., KYC protocols, ID-linked onboarding thresholds) do not merely obstruct innovation but can generate productive tensions that catalyze adaptive and trust-building innovations within low-trust environments. This novel application of Constraint Theory introduces a dynamic understanding of how regulatory and institutional friction can become a driving force for socially meaningful innovation in digital finance. Building on the lens of soft technological determinism, the study offers a critical corrective to the prevalent tech-solutionist ideology that dominates digital financial inclusion discourse. It argues that optimal technological change must be institutionally compatible and socially embedded, thereby highlighting that technical interventions alone cannot resolve systemic deficits in trust, regulation, and equity. This contribution resonates with emerging critiques in Science and Technology Studies (STS) and digital development that call for normatively grounded innovation strategies. The paper proposes a theory-informed conceptual framework that integrates digital identification, regulatory and financial innovation, institutional-based trust, and inclusive DFS. This framework elucidates how institutional mistrust management, regulatory proportionality, and trust-producing mechanisms can jointly shape digital transformation trajectories in financial ecosystems. It offers both an analytical tool for future research and a practical model for policymakers and digital finance stakeholders seeking to design more equitable and trusted DFS infrastructures.

Demand- and Supply-side Constraints: Inclusive Digital Financial Services

Demand- and supply-side constraints refer to the barriers or challenges that hinder the effective provision and adoption of services within a given ecosystem such as digital financial services (DFS). In the context of digital identification in Africa, these constraints can generate significant obstacles to achieving inclusivity and effective access to DFS. In many African countries such as Nigeria, there is a lack of trust in financial institutions and digital systems, partly due to a history of informal financial systems and concerns over data privacy and security. Without effective digital identification, users may feel skeptical about the safety of using digital financial services, especially when their personal information is not verified or secured. Also, many people in Africa, particularly in rural areas, face challenges with low levels of digital and financial literacy. Without proper identification systems that streamline the process of verifying identity and accessing services, individuals may struggle to use DFS, either due to technological barriers or a lack of understanding of how digital financial services can benefit them. Also, cultural factors and social norms may affect the uptake of DFS. In certain regions, the preference for in-person interactions with financial institutions or reliance on informal financial systems could be a major barrier. Without a regulatory framework that acknowledges these behaviors and adapts DFS offerings, the uptake of these services may remain limited. In addition, access to mobile phones, the Internet, and other essential technology needed for digital financial services may be restricted in low-income or rural areas. This technological division makes it harder for certain populations to engage with DFS, even if digital identification systems were in place. The cost of using digital services, including mobile data charges or transaction fees, can also be a demand-side constraint. In many African nations, a significant proportion of the population is financially excluded, with limited access to affordable digital tools that would enable them to engage with DFS.

From a supply dimension, constraints include barriers that limit the ability of service providers (e.g., banks, fintech firms, telecommunication operators) to offer digital financial services at scale and to diverse populations. Adequate digital and financial infrastructure such as internet connectivity, banking services, or mobile networks is essential to support DFS. In many African countries, infrastructure limitations such as inconsistent internet coverage, poor

electricity supply, and unreliable mobile networks can prevent effective service delivery. A fragmented or unclear regulatory environment can make it difficult for service providers to innovate and deploy digital financial services. If regulatory frameworks are not aligned with the technological advancements in the digital economy, companies may hesitate to invest in the digital infrastructure required for DFS. A unified, clear, and enabling regulatory environment that includes robust digital identification is needed to ensure consistent service delivery. One significant challenge in DFS is ensuring that systems are interoperable across platforms: e.g., among different mobile money services, banks, and government agencies. Without standardized digital identification and interoperable platforms, users may face barriers in accessing a full range of services. This can limit cross-border transactions and overall inclusivity. Financial institutions and fintech companies face significant regulatory compliance costs, especially when they need to adhere to KYC and anti-money laundering (AML) requirements. If digital identification solutions are not standardized and regulatory frameworks are inconsistent, the costs and operational hurdles can become prohibitive, limiting the expansion of DFS to underserved populations. Cybersecurity and fraud risks are critical supply-side constraints. If there is inadequate protection for digital identity data or if the digital identification system is not robust enough, service providers may face a high rate of fraud or identity theft. This could deter both consumers and businesses from fully embracing DFS. While there is significant potential for innovation in the fintech sector, many companies in Africa face challenges in accessing capital to scale their services. Without a regulatory environment that supports innovation and offers financial incentives or protections, the growth of digital financial service providers could be stifled.

Overall, addressing both demand- and supply-side constraints through optimized digital identification can play a crucial role in enabling the development of inclusive digital financial services in Africa. By improving trust, reducing barriers to access, enhancing security, and creating an enabling regulatory environment, digital identification can unlock the potential of DFS for underserved populations. This paper therefore explores the role of digital identification (DigiID) as a critical constraint in achieving inclusive digital financial services (DFS), particularly in the African context using Nigeria as a case study. It examines how foundational identity gaps, compounded by uneven internet access and low digital literacy, limit the effectiveness of digital ID systems, thereby exacerbating exclusion within the financial ecosystem. Despite the increasing implementation of digital identity schemes across Africa, approximately 500 million people remain without any form of identification, a major barrier to accessing essential financial services. The argument asserts that digital identification, while an enabler in theory, often becomes a binding trust constraint due to mismatched technological affordances and weak institutional frameworks. In the case of Nigeria, the fragmented dual identity system (National Identification Number—NIN and Bank Verification Number—BVN) imposes regulatory burdens that not only reduce the effectiveness of financial inclusion initiatives but also breed mistrust among citizens and financial institutions. This mistrust, coupled with systemic inefficiencies and a lack of regulatory coherence, often leads to exclusion, as individuals are unable to fully participate in the digital economy.

Conceptual and Theoretical Framework

A conceptual framework is assessed on the basis that structural assurance is a key factor that has been established to have a significant influence on trust in the adoption of digital technologies (see Zhou, 2012; Robinson, 2020). This position is more imperative taking into account that while digital technologies are often deployed to engineer private trust by enforcing regulatory rules such as authentication and authorization by digital identity

systems, they are most times weakly embedded in the institutional distrust management frameworks, thereby lowering user confidence (Welch, Hinnant and Moon, 2005; Tolbert and Mossberger, 2006; Bannister and Connolly, 2011; Wolfond, 2017; Bodó, 2021a, b; Zou, 2021; Bodó and De Filippi, 2022; Krishna, Krishnan and Sebastian, 2023; Laux, Wachter and Mittelstadt, 2024). More so, as innovative technologies often consciously resist these institutional distrust management frameworks (Yeung, 2019; Aicha, 2023; Allen, 2024).

The theoretical framework for this article is anchored on Silber's Constraint Theory of Innovation, which is a social theoretical construct that explains how innovation, particularly regulatory and financial innovation, is often catalyzed by the presence of institutional or structural constraints. At its core, the theory posits that economic actors respond creatively to external limitations (e.g., legal, regulatory, technological, or market-based barriers), and that these constraints serve as productive pressures that stimulate innovation, rather than merely hinder activity (Silber, 1983). In this framework, constraints are not necessarily negative; rather, they generate conditions that force firms or institutions to reconfigure business models, develop new technologies, or find alternative pathways to deliver value. In the context of digital identification and financial services (DFS) in Africa, these constraints manifest in several forms. On the supply side, financial service providers face regulatory requirements for KYC compliance, identity verification, and AMI protocols. On the demand side, vast segments of the population lack verifiable identification, access to formal banking infrastructure, or sufficient digital literacy. These structural and regulatory constraints have incentivized governments and fintech firms to innovate around digital identity systems by developing scalable, interoperable, and inclusive ID solutions that enable wider access to DFS while still complying with regulatory demands. Hence, applying Silber's theory here shows how digital ID systems emerge not merely as technological upgrades, but as innovative responses to the institutional pressures of financial inclusion, regulatory oversight, and social equity. These pressures compel actors to engineer solutions that align with legal mandates while expanding the frontier of service delivery. In doing so, constraint becomes the crucible through which trust-enabling, inclusive, and resilient financial infrastructures are forged (Aicha, 2023; Allen, 2024).

Therefore, considering the significant risks of technological solutionism, the rapid emergence of digital identification systems across Africa necessitates a reassessment of social theoretical constructs that explain how trust-producing institutional arrangements and power structures are digitally disrupted and lead to a "new situational normality" (Ifeonu and Ward, 2015; Bodó, 2021a; Allen, 2024). This new normal is best understood through the lenses of soft technological determinism, Silber's Constraint Theory of Innovation and the broader political economy of financialisation are thus imperative. In Lagos, Nigeria's commercial and fintech capital, this "new situational normality" is embodied in how digital identification (particularly the National Identity Number or NIN) has become a regulatory prerequisite for accessing DFS. Here, soft technological determinism plays out in the form of digital ID being framed as a neutral and inevitable solution to trust and inclusion gaps, yet its implementation and effects are mediated by political, economic and infrastructural conditions. The Nigerian state's policy linking SIM registration and bank accounts to NIN since 2020 illustrates this well: while the intent is to enhance financial formalization and security, the uneven rollout of ID infrastructure, especially in low-income and peri-urban Lagos communities, has generated new bottlenecks and exclusions (NIMC, 2021; GSMA, 2022).

This is where Silber's Constraint Theory is especially relevant. In Lagos, the regulatory constraint mandating digital ID has imposed a pressure point on both DFS providers and users. For fintech firms like Flutterwave, Carbon, and Moniepoint, compliance with KYC and anti-fraud rules enforced through digital ID has led to innovation in onboarding flows, API integration with NIMC databases, and biometric verification tools.

Yet, for low-income users—particularly those without NIN or with biometric mismatches—the same constraint creates access barriers. These constraints, while limiting, also catalyse adaptation and innovation. For instance, some fintechs have partnered with last-mile agents to help onboard digitally marginalized users, reflecting how constraints under institutional pressure can drive targeted innovation.

Moreover, from the financialization perspective, the Lagos case illustrates how digital ID transforms identity into a financial instrument—a means of risk categorization, credit scoring, and user verification that enables the expansion of finance into new segments of the population. In doing so, the very infrastructure of DFS becomes tethered to a state-mediated identity regime, reinforcing what Breckenridge (2021) terms the monetization of identity in Africa’s digital economy. Trust, traditionally cultivated through human relationships or local financial intermediaries, is now reconstituted through algorithmic systems and compliance protocols, thereby producing a new digital trust order governed by technical infrastructures and data legibility. Thus, the “new situational normality” in Lagos is not just a change in how services are accessed; it is also a deeper socio-technical transformation in the logics of trust, inclusion, and value creation, all shaped by regulatory constraint, technological mediation, and the expanding circuits of digital financial capitalism. Understanding this through a multi-theoretical lens allows for a more grounded and critical perspective on the promises and pitfalls of digital ID as a policy lever for financial inclusion in Africa.

Within the preceding purview, fintechs can develop innovative financial products and services that bridge financial exclusion amidst regulatory constraints imposed on the market on the basis of digital identification and in the process enhance institutional-based trust within the contextual ecosystem. This conceptual premise is illustrated in Figure 1. Nonetheless, trust engendering socio-technical systems are embedded within social contexts that are structured by entrenched normative practices, power structures and institutional relationships (see Davison and Martinsons, 2016; Khraisha and Arthur, 2018; Nissenbaum, 2020; Laux et al., 2024). How then does this contextual framework guide the interrogation of digital identification as a binding institutional-based trust constraint for inclusive digital financial services in Nigeria in comparative to the successes and failures of a more mature digital ID ecosystem such as that of Germany? Within the aforementioned purview, I assess the process clarity and regulatory proportionality of digital identification in Nigeria in relation to risks of delivering inclusive digital financial services comparative to the German model (see Aicha, 2023). In addition, I compare the influence of the emerging financial services technology (fintech) ecosystem on digital identification uptake in Nigeria in relation to the German ecosystem (see Mader et al., 2022).

With respect to the conceptual model (Figure 1), a comparative country assessment of the Nigerian digital identification ecosystem in relation to inclusive digital services provisioning is based on a theory-informed, case-focused approach. This interpretive framework gleans in-depth insights from stakeholder practices and perceptions in the DFS ecosystem, complemented by expert informant interviews and document analysis. At the core of this inquiry is the interrogation of digital identification as a form of regulatory and financial innovation, and how it functions as both an enabler and a constraint on the development of institutional-based trust within the Nigerian financial services sector, particularly in contrast to the German model.

Within this analytical frame, Institutional Mistrust Management Frameworks are defined as the formal and informal governance arrangements, regulatory protocols, and social mechanisms designed to mitigate institutional distrust and foster trust-based engagement with digital identity systems. In the Nigerian context, such frameworks include, for instance, the Central Bank of Nigeria’s tiered KYC regime, the Nigeria Data Protection Regulation (NDPR), and institutional actors such as NIMC (National Identity Management Commission)

and consumer protection units in regulatory agencies. These mechanisms aim to balance the trust deficit by introducing legal safeguards, identity access tiers, and recourse mechanisms—especially for underserved populations. Nevertheless, they often face resistance or circumvention by digital innovations that prioritize scale and efficiency over participatory accountability, thereby deepening mistrust or exclusion.

By anchoring this analysis within Silber’s Constraint Theory of Innovation, the study posits that such mistrust frameworks generate productive constraints that can optimize regulatory innovation by compelling actors to design more inclusive, trusted and legitimate solutions. Similarly, using the lens of soft technological determinism, the analysis recognizes that while digital identification systems are technologically deterministic in shaping financialization and access, their actual impact on inclusion is mediated by socio-political context, public trust, and institutional capacity.

Thus, the framework in Figure 1 explicitly links (a) Regulatory and Financial Innovation (via Digital ID systems) as catalysts of inclusive digital transformation, (b) Institutional-based Trust as a precondition for citizen engagement with DFS platforms, and (c) Inclusive DFS as the policy objective constrained or enabled by the trust environment and regulatory design. This interplay is interrogated through a comparative analysis of Nigeria and Germany, with particular focus on how institutional trust management, via tier-based identity access regimes (e.g., the CBN’s KYC levels vs. Germany’s eID system), shapes the trajectory and effectiveness of digital financial inclusion.

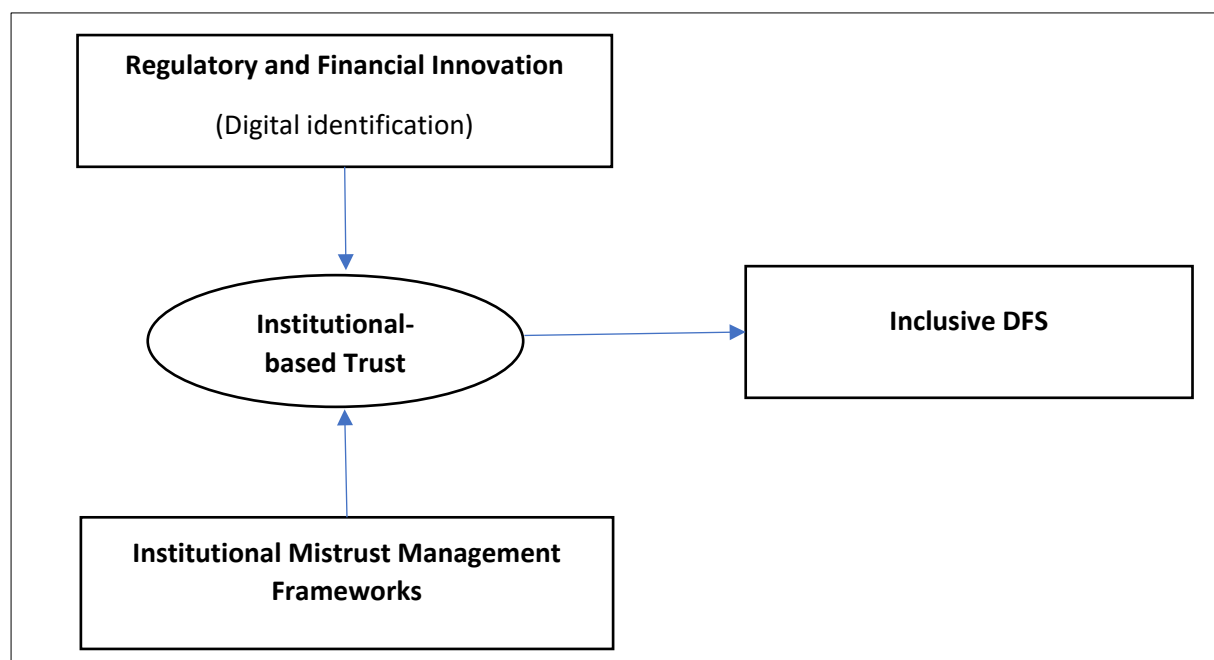


Figure 1: Conceptual and Theoretical Framework
Source: Self-generated by the Author

Methodology

This study adopts a transdisciplinary, theory-informed and case-focused comparative country assessment to interrogate the role of digital identification as a regulatory and institutional trust constraint in delivering inclusive DFS, with particular reference to Nigeria and Germany. The approach draws on the preceding conceptual framework to frame the socio-technical analysis of the contextual digital identity systems and their governance

implications. A qualitative, interpretive methodology was employed to collect in-depth stakeholder perspectives and practices within the Nigerian digital ID and DFS ecosystem. This included semi-structured expert and key informant interviews, document analysis, and an ecosystem validation workshop. The goal was to triangulate perspectives across institutional, regulatory, technical and consumer dimensions. A purposive sampling strategy was used to identify 12 key stakeholders across both contexts based on relevance, institutional affiliation, and experiential expertise. These included: ecosystem regulators, DFS providers, financial inclusion policy experts, and technical infrastructure providers (digital ID solution vendors, and mobile network operators involved in eKYC).

The interview protocol was guided by three thematic pillars based on the research questions – (1) Institutional Trust Constraints: How do identity systems mediate trust in DFS platforms? (2) Regulatory Proportionality: To what extent does the tier-based KYC regime (e.g., CBN’s three-tier framework) balance risk-based compliance with access to low-income users? (3) Comparative Learnings: What lessons can be drawn from the German identity model (e.g., Germany’s eID framework, GDPR-driven trust regime) in enabling inclusive DFS via institutional trust mechanisms?

In addition to interviews, the following data sources were also analyzed: Regulatory Documents: CBN KYC and licensing circulars; NDPR guidelines; NIMC Act and Strategic Roadmap; Policy Reports and Position Papers: Publications by the Central Bank, World Bank (e.g., ID4D), GSMA, and Alliance for Financial Inclusion (AFI); Academic and Grey Literature: Peer-reviewed articles on digital identification and financialization; sectoral diagnostics; donor-funded project evaluations; News Archives and Media Commentary: Coverage on NIN-SIM linkage challenges, DFS outages, and fintech regulatory tensions. Preliminary findings were presented at a multi-stakeholder validation workshop held in Lagos which allowed participants to provide feedback, clarify divergent interpretations, and contextualize stakeholder narratives. In comparing Nigeria to Germany, the analysis used a process-tracing approach to examine how institutional trust is mediated through digital ID regimes. This multi-sourced, theory-informed methodological strategy allows for a context-sensitive and comparative understanding of how digital identification both enables and constrains the delivery of inclusive DFS within institutionally trust-deficient environments.

Comparative Analysis

The analysis here is divided into two subsections for the sake of perspicuity. The first subsection deals with trust environment for digital IDs vis-à-vis normative practices, power structures and institutional relationships; the second subsection pertains to inclusive digital financial services policy environment. Both subsections compare the cases of Nigeria and Germany.

Trust Environment for Digital IDs: Normative Practices, Power Structures and Institutional relationships: Nigeria-German Comparison

Nigeria’s identification scheme project has been historically pegged on the complex development challenge of trusted identity verification-on-demand for public and private services. In the contemporary era, the country is transiting from a duplicative, federated identification approach to a top-down, centralized foundational-based identity system (see World Bank, 2016; Maduekwe, Banjo and Sangodapo, 2017; Gelb and Metz, 2018; Faboye, 2022; Oliha and Iyoha, 2023). While the former approach requires a more complex institutional governance mechanism, it allows for more inclusion in relation to services usage, as it does not require a more complex central database identity verification (see Bhandari et

al., 2021). The latter approach engenders a higher level of trust due to enhanced security in the KYC protocol. This understanding is imperative in assessing the transitional potential of addressing inclusionary deficits within the country's emerging identification ecosystem.

In particular respect to inclusionary deficits, with the policy transition to a centralized digital identity system, Nigeria's NIMC Act 2007 mandated a compulsory use of the foundational National Identification Number (NIN) for certain transactions in the country. This provision included the opening of personal bank accounts, consumer credit transactions, and the purchase of insurance policies (Federal Republic of Nigeria, 2015), thereby constraining citizen user agency for these transactions (see Bhandari et al., 2021; Okunoye, 2021; 2022). More so, the centralization of NIMC database within Nigeria's digital identity ecosystem poses significant data protection challenge as a single point-of-failure, with imperatives for breeding further mistrust in an already low-trust institutional environment (McGrath, 2016; Okunoye, 2022). Remarkably, in this respect, the NIMC Act 2007 does not include any representative of the Nigeria Data Protection Commission (NDPC) on the Governing Board of the NIMC. While the NDPC was established much later with the enshrinement of the Nigeria Data Protection Act 2023, this lacunae within the NIMC Act poses mistrust imperatives for data protection institutional oversight (see Andrade, Monteleone and Martin, 2013; Okunoye, 2021; Giannopoulou, 2023; Musoni et al., 2023).

In contrast, Germany operates a decentralized and federated identity system that relies on an e-ID (Rieger, 2009; Vossaert et al., 2013; Van Staden and Bidwell, 2024). The German DigiID ecosystem comprises various IDPs and relying parties (RPs) that function within a federated trust framework, enabling the issuance and utilization of digital identity services (World Bank, 2022). IDPs enroll users, verify their identities, issue and manage credentials, authenticate users, and confirm their authentication status to relying parties. RPs, which are usually government agencies or private companies, depend on the credentials and authentication methods provided by an IDP to verify users, facilitate transactions, or grant access to systems and information. A Trust Services Framework as specified within the European Union (EU) eIDAS. Regulation provides assurance to compliance with predefined standards, formalize evaluation procedures, and outline the roles and responsibilities of all parties involved in the ecosystem in relation to the associated risk levels of varying transaction types (Temoshok and Abruzzi, 2018). This framework provides the foundational trust environment that enables users to sign in once into the identification system and be able to access multiple unrelated resources. According to an interviewee, "This system is in part due to the intermediation effects of the decentralized private-sector organizational structure within the country's identification network. While this approach is more susceptible to fraud than the other systems, a high level of security is assured due to a high assurance level according to EU eIDAS Regulation" (personal interview conducted by the author, 2025). Another interview states that "The public ID ecosystem in Germany is hybridized; there is no centralized databased but distributed across the localities" (personal interview conducted by the author, 20-25).

Furthermore, Germany's data protection and privacy regime is more coherent than Nigeria's with regards to digital ID credentials being non-mandatory if a passport is held (Rissanen, 2010). Moreover, the absence of a centralized database for e-IDs is a key feature that enhances data protection. As allowed by national laws and within the framework of the EU eIDAS regulation, firms have a degree of flexibility in choosing the information sources used to fulfill their KYC requirements. For instance, while official identification documents like passports (for individuals) are commonly used to verify customer identities, EU regulations do not prohibit firms from using other reliable and independent documents, data, or information. This is permitted if the firm can justify to the relevant authority that the chosen sources are appropriate for the level of risk associated with the specific business

relationship or transaction.

Inclusive Digital Financial Services Policy Environment: Nigeria-German Comparison

Nigeria's DFS ecosystem is driven by a bank-led model. In this case, the banks are the primary drivers of digital financial products and services business models (see Claessens and Rojas-Suárez, 2020; Raji, 2020). The Nigerian DFS ecosystem is undergirded by a tiered KYC regime that encompasses both foundational and functional identification. The NIN serves as the foundational identity instrument and the Bank Verification Number (BVN) is the main functional identity instrument for financial services. While low-value financial transactions (Tier 1: Daily transaction limit of N50,000 a maximum hold of N300,000; no international transactions) require either the NIN or BVN, medium-value (Tier 2: Daily transaction limit of N200,000; a maximum hold of N500,000; no international transactions) and high-value (Tier 3: No transaction and hold limit) transactions require both the NIN and BVN for identity verification and authentication. According to the National Financial Inclusion Strategy (2022), financial services are inclusive when "adult Nigerians have easy access to a broad range of financial services that meet their needs at affordable costs. The services include, but are not limited to, payments, savings, credit, insurance, pension, and investment products." Therefore, notwithstanding current transitions and in deference to the contextual definition of financial inclusion, the country's digital identification system remains fragmented in relation to an inclusive DFS environment, as there is not yet a single identifier, with the existence of both the single-purpose BVN and the foundational NIN for tiered financial transactions (see Perlman and Gurung, 2019; Monye, 2021). This position is imperative, considering that as at 2023, the NIMC has attained nearly 90 percent adult coverage for the NIN and, therefore, a single-purpose identification instrument for the financial services sector becomes somewhat redundant (see Pearce et al., 2022). More so, the almost 90 percent adult coverage for the NIN has not significantly improved formal financial inclusion; yet at about 50 percent in the country, with insignificant impact on the opening of bank accounts by the financially underserved or unserved, but has conversely, even led to a decrease in account ownership (see CBN, 2018; Ogochukwu, 2019). In addition, commercial banks in Nigeria closed more than two million bank accounts in the first quarter of 2024, with more bank accounts are at the risk of being shut down with the recent policy directive of the CBN in relation to the NIN and BVN since March 1, 2024.

Comparatively, Germany has 99 percent of its population integrated into formal financial systems (Ebimoghan, 2020). An interviewee stated the following: "We have a law in Germany [which states] that every citizen needs to have a basic bank account that enables inclusion in financial services" (personal interview, 2025). Nevertheless, the maturity of the German financial services market is not mutually congruent on the use of digital IDs. The country's financial services market, while mature, is not fully leveraging digital IDs for broad inclusion, but rather for digital transformation and efficiency. Also, while Germany boasts high financial inclusion, the adoption of digital IDs is lagging, presenting a mismatch between financial inclusion and its digital maturity. In addition, while the country has a national eID system, its usage remains relatively low compared to other adjacent countries, indicating a gap in digital maturity.

In the German context, as with the Nigerian ecosystem, financial inclusion is primarily bank-led, but anchored on strong regulatory mandates, a well-established financial infrastructure and a relatively high financial literacy rather than widespread adoption of digital IDs. The legal requirement for every citizen to have access to a basic bank account ensures that virtually the entire population is integrated into the formal financial system. This

policy-driven inclusion guarantees access to essential financial services regardless of an individual's digital identity status. Additionally, the availability of traditional KYC processes (such as in-person verification or postal identity checks) support financial inclusion even in the absence of a fully mature digital ID landscape. In essence, it is the regulatory environment and legacy systems, rather than digital ID adoption, that are the primary enablers of financial inclusion. This condition highlights a critical distinction: in Germany, financial inclusion is legally assured and procedurally facilitated irrespective of the digital maturity of identification systems.

Nevertheless, while digital IDs are not the primary driver of financial inclusion in Germany, they are playing a role in facilitating government initiatives to support digitalization and innovation in the financial sector. Within this purview, Germany is planning to introduce a national digital identity wallet as part of the European Union Digital Identity (EUDI) Wallet scheme to drive the useability of its eID. According to an interviewee,

The German DigiID process has been ongoing for about 10-15 years now. However, it has not been a very successful story in terms of mainstream adoption. There are not many use cases for the eID, and for even the use cases it does provide such as address registration and update, as well as taxation purposes, the traditional ID system provides the same level of support. And so, I can't be bothered with the hassle of getting an appointment at the Citizens Office to get a new pin code, install the app and reset everything again. So, people in that sense don't consider it easy and beneficial. In the above respect, the EUDI Wallet has a lot of appeal to make things easier. Digitalization of the ID system does not make much sense if there is no significant markup in value proposition with respect to its use cases in relation to the inconvenience of legacy ID system migration. In procedural terms, the people who design these digital systems and structures don't necessarily have a sense of the live realities of the people who are accessing it, so there is always a risk of a mismatch of what policymakers and technologists are designing and what people are actually in need of. Infrastructure overhaul projects of any kind often come up with many problems that you cannot foresee when you start out with it (personal interview, 2p025).

Although the high-level assurance (LoA) standards for the EUDI Wallet promote trust and interoperability, they may inadvertently exclude unbanked or underserved populations by failing to calibrate proportional KYC requirements to actual financial risk. This issue underscores the importance of proportionality in KYC, particularly for inclusive finance. As one expert noted, KYC is most impactful "where it is worth doing"—i.e., in high-risk corporate contexts—not necessarily for marginalized individuals with low-risk profiles. Another Interviewee critically noted the following: "The role of wallets to reduce KYC costs is recognized as great for the banks, but that just demonstrates their myopic view of society. Where is the 'social responsibility' they purport to care about so much?" (personal interview, 2025). This skepticism reflects broader concerns that financial institutions, especially banks, see wallets mainly as tools for fraud reduction, KYC, and AM compliance. While these goals are important, they do not equate to a public interest approach to identity infrastructure. An interviewee put it this way: "We all know why digital identity is so important to banks... but they are not interested, nor should they be, in the 'Societal Good'... They are commercial entities" (personal interview, 2025). Digital wallets, when properly designed, can go beyond financial services—serving as a secure, user-controlled interface for a broad range of civic

and social services. Nonetheless, relying on banks as primary providers risk narrowing the scope of this infrastructure to their commercial priorities. As another expert summed up: the following: “That is why their interest in wallets is mainly limited to fraud reduction, KYC and AML... But wallets are so much more... making life easier and safer for citizens in many day-to-day activities—not just banking related” (personal interview, 2025).

Considering this challenge, the separation between base identity (a sovereign function) and digital identity (a digital credential layer) becomes critical. Models vary widely: India’s Aadhaar, for example, merges base and digital identity into a centralized biometric system that underpins a vast range of financial and social services. Despite implementation challenges and privacy concerns, Aadhaar has enabled substantial fraud reduction and improved service delivery—saving an estimated USD 5 billion annually. Conversely, countries like Germany and Nigeria have kept foundational and functional identities separate, often to the detriment of systemic efficiency and user inclusion. In sum, while Germany’s strong regulatory mandates and infrastructure guarantee financial inclusion without heavy reliance on digital IDs, Nigeria’s fragmented dual-ID regime has yet to achieve similar outcomes despite increasing digital ID penetration. The lesson here is not that digital IDs are unnecessary, but that they must be embedded within a comprehensive, user-centered policy framework that recognizes the continuum among inclusion, convenience, and regulatory proportionality. A harmonized, yet context-sensitive approach, particularly one that balances digital innovation with traditional verification methods and meaningful use cases, is essential to build DFS ecosystems that are truly inclusive. According to an Interviewee, “The BVN in Nigeria is going to be phased out at some point...” (personal interview, 2025), indicating attempts to streamline identity governance. Yet, the dual-ID structure persists, thereby delaying progress.

Beyond Techno-solutionism: Rethinking Digital Identity as a Tool for Financial Inclusion

On the basis of the preceding comparative analysis of the Nigerian and German DFS ecosystems, the conceptual lens of techno-solutionism reveals critical insights into the promises and pitfalls of DigiID systems as instruments for financial inclusion and institutional trust. The Nigerian case elucidates an instance of mismatched affordances and institutional failure with its dual identity regime and fragmentation. The tiered KYC requirements reinforce exclusion rather than inclusion, especially among the underserved, despite near-universal adult NIN coverage. In the context of prevalent institutional weakness and redundancies, repetitive KYC checks and non-interoperable data systems reveal a deep mistrust among financial ecosystem players. The imposition of policies (e.g., mandatory NIN-BVN linkage) without resolving systemic institutional issues (privacy, enforcement, data quality) is a classic example of techno-solutionism. As an industry expert notes, “The problem is even less of digital ID as a silver bullet, but more of the failure of institutions” (personal interview, 2025). Consequently, the impact of this techno-solutionist framing is the decline in account ownership and over two million account closures, which point to a distrust-induced withdrawal where digital ID becomes a binding trust constraint instead of an enabler. In this perspective, there is a mismatch between technological ambition and the lived realities of users—a failure to engineer congruent institutional trust structures. This situation aligns with the soft technological determinism critique (Smith and Marx, 1994; Heilbroner, 1967), whereby technology is mistakenly assumed to drive history but, in practice, social demand and institutional readiness shape adoption outcomes. As Omotayo (2022) notes, in the Nigerian context, institutional capacity, not just tech deployment, is also central to sustainable financial inclusion.

In comparison, the German case elucidates a cautious technological adoption anchored on legacy trust systems that mirror policy-driven financial inclusion without tech-dependency. In this case, citizens still prefer legacy systems due to inconvenient user experience and minimal added value—a direct contradiction to techno-solutionist assumptions. Highlighting institutional coherence and adaptive complexity, Germany's evolving push for an EUDI Wallet reflects efforts to reconcile legacy and digital systems, but unanticipated infrastructure challenges and misaligned user needs crystallize the limits of engineered solutions in complex adaptive systems (see Johnson, 2018). In reference to embedded trust and procedural mismatch, while Germany's institutions are relatively trusted, designers of digital systems lack contextual awareness, leading to a disconnection between systemic potential and user adoption—a more benign form of techno-solutionism. A comparative synthesis of both contexts is summarized in Table 1.

Table 1: Comparative Synthesis of the Nigerian and German Ecosystems (Status)

Category	Nigeria	Germany
<i>Identity Infrastructure</i>	Fragmented (NIN and BVN)	Unified but underutilized eID
<i>Institutional Trust</i>	Weak, low regulatory enforcement	Strong, trusted systems
<i>Driver of Financial Inclusion</i>	Tech-led, fragmented identity schemes	Policy-driven inclusion via legal mandates
<i>Techno-Solutionism Impact</i>	High – DigiID imposed as solution to exclusion, backfires due to institutional failure	Moderate – DigiID optional, limited value proposition but with ongoing cautious integration (EUDI Wallet)
<i>Public Adoption</i>	Coerced, resisted, and exclusionary	Voluntary, low uptake due to UX/incentive mismatch
<i>Adaptive Capacity</i>	Low – poor foresight and institutional rigidity	Medium – facing legacy integration tension, but with institutional flexibility

Source: Self-generated by the Author

Nigeria's Tiered KYC Regime: A Binding Trust Constraint for Inclusive DFS?

In relation to the development of innovative financial products and services that help to bridge financial exclusion, Nigeria's bank-led policy environment puts financial technology companies (Fintechs) at a disadvantage (see Raji, 2020). This is with respect to the significantly higher compliance burden on them with respect to the mandatory KYC requirements that are often repetitive for the same entities relative to the much larger banks that already control a majority of the financial services market (see Klosters, 2018; Dalberg, 2021). The redundant-tiered KYC process is a clear indication of mistrust between financial ecosystem players with respect to proprietary data interoperability and the persisting weak institutional quality with respect to data governance (see Witoelar, Wicaksono and Mangunsong, 2021). This institutional void leads to the continuous imposition of distortionary digital identification policies that constrain the provision of inclusive digital financial services and has therefore become a trust constraint as citizens cannot find congruent innovation affordance with technology-driven solutionism, and have less trust in the emerging financial services ecosystem (see Arner et al., 2019; Tafotie, 2020; Khan and Jaffar, 2021). According to an industry expert interviewed with respect to the preceding

situation,

The problem is even less of digital ID as a silver bullet, but more of the failure of institutions. We have poor data practices. We have little enforcement of privacy rules. Yet, we keep pushing these ID programs and new ID schemes. And what we end up doing is creating actually a reinforcement of the systems that allow these things to be abused at scale. Ideally, a reform of the identity management system should begin with a fundamental improvement of the institutions that manage these issues (personal interview, 2025).

A constraint is binding if it significantly lowers the agency of a systemic actor to optimize affordance in relation to other contextual factors, thereby inducing inequality within the system. In the context of digital identification, this constraint does not only limit ID system adoption, it also significantly lowers the realization of systemic access to inclusive DFS. A key attribute of such a phenomenon is the preponderance of attempts to bypass such constraints by systemic supply-side actors who are affected (see Hausmann, Klinger and Wagner, 2008). Prior to more recent regulatory enforcements by the CBN, *Palmpay*, *Opay*, *Moniepoint* and several other Fintech companies bypassed KYC requirements for Tier 1 accounts exceeding financial transactions limits. Another indicator of the bindingness of the KYC constraint is the situation whereby excluded borrowers from the formal financial services sector seek credit in the largely unregulated informal markets even at higher interest rates—a critical symptom of exclusive unmet demand (see Ibe, 1990; Ali et al., 2017; Claessens and Rojas-Suárez, 2020; Omede, 2020).

Discussion and Conclusion

The evolution of the digital ID ecosystem in Nigeria and its prospects to catalyze the country's socioeconomic development is well documented, but there has been less attention paid to the trust imperatives that such a system presents for vulnerable communities that face discrimination in leveraging it to access inclusive DFS. This article highlights the bindingness of such constraint in the Nigerian ecosystem in contrast to the more advanced German model with a view of identifying opportunities for regulatory innovation with respect to its mistrust management framework around issues of inclusion, interoperability, and oversight, as well as private sector-led technological innovation.

Within the digital institutional infrastructure domain, the research spotlights the imperatives of a binding institutional-based trust constraint for user affordance in the adoption of technological innovation within largely informal market contexts. This perspective underscores the imperative of a harmonized and simplified KYC regime, considering the predominantly cash-based context of its DFS maturity where a large proportion of the market is still being limited to basic access to transaction accounts (see Pazarbasioglu et al., 2020). Within this purview, enhanced competition within the country's current bank-led DFS model will allow financial services innovators such as Fintechs to more appropriately assess the usefulness of their product and services in relation to the range of outcomes they wish to realize while lowering regulatory arbitrage.

Comparatively, from a policy orientation and financial inclusion standpoint, Nigeria's DFS ecosystem is bank-led, guided by a tiered KYC regime based on both foundational (NIN) and functional (BVN) identity systems. While the policy intent aligns with financial inclusion goals, defined broadly in the National Financial Inclusion Strategy (2022), the actual implementation reflects a fragmented and duplicative digital identity framework. The requirement for both NIN and BVN in higher-tier transactions illustrates operational

inefficiencies and systemic redundancies. Germany similarly operates a bank-led model but achieves near-universal financial inclusion primarily through strong legal mandates (e.g., legal right to a basic bank account) and robust financial infrastructure. Notably, financial inclusion in Germany is not heavily reliant on digital ID adoption, and traditional KYC methods are still functional and trusted. In contrast, while both countries follow a bank-led model, Germany achieves high financial inclusion through institutional trust and regulatory coherence, whereas Nigeria's model is undermined by institutional fragmentation and overreliance on multiple identity systems without trust-enabling integration.

With respect to the role and maturity of digital ID systems, the dual identity framework—NIN (foundational) and BVN (functional)—complicates the DFS ecosystem. Despite nearing 90% adult coverage for NIN, financial inclusion remains stagnant (~50%). Rather than enabling access, the fragmented ID landscape has constrained it, even contributing to account closures and exclusion, especially following recent regulatory enforcement requiring both IDs. Whereas digital IDs in Germany remain underutilized in financial services, yet financial inclusion thrives. Traditional KYC channels (e.g., postal ID, in-person verification) are well-established and legally accepted. This low dependency on digital ID illustrates a system where inclusion precedes digitization, not the reverse. Contrastingly, in Nigeria, digital ID is treated as a prerequisite for access, yet its weak institutional foundation has made it a barrier rather than an enabler. Also, Germany's inclusion-first approach ensures access regardless of digital ID status, reflecting flexibility in ID-dependent KYC.

In relation to institutional trust and data governance, The DFS ecosystem in Nigeria is plagued by weak institutional quality, poor data practices, and a lack of interoperable data systems. These deficiencies lead to mistrust among ecosystem actors, a compliance burden for fintechs, and policy distortions that reinforce exclusion. The quotes from the interviewee highlight that the core issue is institutional failure, not the absence of digital ID per se. Germany benefits from strong institutions, enforceable data protection laws, and trustworthy governance frameworks (e.g., GDPR), which ensure that even without a centralized digital ID system, financial services remain accessible and trusted. In addition, Germany's financial inclusion is built on institutional trust and effective governance, whereas Nigeria's efforts are constrained by systemic institutional weaknesses, leading to an exclusionary digital ID regime.

With reference to innovation and ecosystem dynamics, Nigeria's bank-led model imposes asymmetric compliance burdens on fintechs compared to established banks, generating an uneven playing field. The redundant and fragmented KYC processes inhibit innovation and discourage fintech-led inclusion strategies. For Germany, fintechs operate within a clear regulatory environment, and innovation is supported by predictable compliance expectations and trust in the system. The legacy infrastructure does not hinder fintech development as severely as in Nigeria. In contrast, Nigeria's regulatory asymmetry stifles fintech innovation, while Germany's institutional clarity and regulatory fairness support balanced ecosystem growth. A summary analysis with respect to ecosystem outcomes is represented in Table 2.

In conclusion, while both Nigeria and Germany operate bank-led DFS ecosystems, their outcomes diverge sharply due to differences in institutional quality, regulatory design, and digital ID integration. Germany demonstrates that strong institutions and inclusive policies can sustain financial inclusion without heavy reliance on digital ID. Conversely, Nigeria's attempt to anchor inclusion on a fragmented ID system without the foundational support of institutional trust has led to exclusionary outcomes, underscoring the need for a reform-first, technology-second approach to identity and inclusion. While no two countries are identical in approach with respect to their particular market contexts, the contrast between

Nigeria and Germany reinforces the argument that technology must be embedded in robust institutional frameworks and aligned with social norms and lived experiences to be effective. Digital ID, without trust-building structures, risks becoming a “binding trust constraint” rather than a tool of empowerment. As such, financial inclusion must be understood not only as a technological problem but fundamentally as a governance and institutional design challenge.

Table 2: Comparative Synthesis of the Nigerian and German Ecosystems (Outcomes)

Dimension	Nigeria	Germany
<i>Model</i>	Bank-led, tiered KYC with NIN and BVN	Bank-led, legal mandate for account access
<i>Digital ID Dependency</i>	High, with fragmented ID infrastructure	Low, with reliance on traditional KYC
<i>Financial Inclusion Level</i>	~50% adult inclusion despite high ID coverage	~99% population inclusion with or without digital ID
<i>Institutional Quality</i>	Weak data governance, low trust, poor enforcement	Strong institutions, clear data protection (GDPR), high trust
<i>Fintech Environment</i>	High compliance burden, limited interoperability	Balanced regulatory environment conducive to innovation
<i>Impact of ID on Inclusion</i>	Redundant ID systems hinder inclusion; ID is a barrier	ID not essential to inclusion; strong systems make ID optional

Source: Self-generated by the Author

In addition, the theoretical implication of the analysis is that while Nigeria exemplifies the risks of techno-solutionism when DigiID systems are deployed in a low-trust, institutionally fragile environment, with detachment from user realities, Germany illustrates a cautious engagement with digital ID, showing that legacy systems and institutional robustness are often more critical than technology for achieving social goals like financial inclusion. In both contexts, DigiID as a standalone tech fix is insufficient—true progress requires institutional alignment, policy coherence and user-centered design. Notionally, the paper’s conceptual framework offers a substantive model for regulatory and technological innovation in the development of trustworthy, inclusive DFS within a low trust institutional environment beyond techno-solutionism. In this respect, the institutionalization of technology-mediated trust necessitates internal trust guarantees, embedded within appropriate internal distrust management systems (see Bannister and Connolly, 2011; Bodó, 2021a).

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