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Inequality by Code: Algorithmic Governance, Digital Welfare, and the Future of Human Development in India

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Abstract

This paper analyses the development of algorithmic governance in India and its effects regarding human development, inequality, and constitutional rights. As the state implements digital public infrastructures (for example, Aadhaar, direct benefit transfers [DBTs], and the India Stack), a growing number of governance actions in India will be mediated through code. While these infrastructures afford us potential efficiency, they often result in exclusion and obfuscation. Using interdisciplinary research and empirical investigations, this paper highlights the structural inequities in India's digital welfare state that disproportionately affect women, Dalits, Adivasis, and national rural populations. It also notes the misalignment between digital transformation and the Sustainable Development Goals (SDGs), most notably with poverty (SDG 1), inequality (SDG 10), and accountability (SDG 16). The paper concludes with a roadmap for inclusive digital governance anchored in equity-by-design, legal safeguards, and participatory oversight.

1. Introduction: The Digital Shift in India's Developmental State

India's transition from a welfarist state rooted in redistributive justice to a data-driven state underpinned by algorithmic logic is a paradigmatic change in its development model. At the heart of this transition are digital public infrastructure (DPI) institutions such as Aadhaar, Direct Benefit Transfers (DBTs), and the India Stack network, all of which are framed as unambiguous tools for enhancing efficiency, transparency, and prudence. However, this technocratic reconfiguration of governance entails a particular epistemic violence that generates a greater erasure of marginalised populations from the state's data apparatus.

The Indian states of the 21stcentury are steadily being conceived as not being rights providers, but platforms administering entitlements through code. This reimagination has been elatedly embraced as the promise of a digital India and financial inclusion, while ignoring the deeply contradictory realities. On the one hand, platforms like Aadhaar have grown the central government into a direct subsidy beneficiary depositor, where the government claims to have saved ₹2.23 lakh crore by transferring the subsidy directly to over 400 million beneficiaries, by eliminating "ghost" beneficiaries (Government of India, 2023). On the other hand, there are countless studies documenting near and far reaching exclusion from benefits to multiple authentication failures, server issues, or necessary infrastructural access - disproportionately sensitive towards the elderly, women, Dalits, Adivasis, and informal workers (Drèze, 2017; Khera, 2019).

The development paradigm rooted in algorithmic governance must be examined not only in terms of its efficiency as a technology but also in terms of its distributional outcomes. Digital systems are not neutral instruments but carry political and social implications that can further amplify existing structural inequalities (Eubanks, 2018; Noble, 2018). In relation to India's context, algorithmic governance threatens new forms of exclusion—that is, access to welfare is contingent upon being digitally legible—rather than explicit constitutional rights.

This article interrogates the implications of India's transition to algorithmic governance for human development, inequality, and democratic accountability. It contends that unless grounded in ethical design, robust legal safeguards, and participatory oversight, the digital state may exacerbate rather than alleviate the very deprivations it aims to resolve. Framed within the Sustainable Development Goals (particularly SDGs 1, 10, and 16), this inquiry blends data analysis with conceptual critique to offer a policy roadmap for a just and inclusive digital future.

2. Digital Public Infrastructure and the New Social Contract

The emergence of Digital Public Infrastructure (DPI) in India—especially through Aadhaar direct benefit transfers (DBTs) and the India Stack—has changed the nature of engagement between state and citizen. Aadhaar provided a biometric identification that could be linked to platforms, like UPI and Digi Locker, to facilitate direct service delivery in an unprecedented fashion. However, the paradigm of public engagement has changed from a rights-based model to one that is conditional on digital authentication.

The India Stack's key components—Aadhaar, e-KYC, UPI, Digi Locker, and Consent Layer—operate as core enablers of digital governance. These platforms promise paperless, cashless, and presence-less transactions. As of 2023, Aadhaar covers 1.36 billion individuals, with DBTs reaching over 600 million beneficiaries and UPI recording 9.3 billion transactions monthly (UIDAI, NPCI, 2023).

Table 1. Scale of India's Digital Public Infrastructure (as of 2023)

Component	Metric
Aadhaar Issued	1.36 billion individuals
DBT Beneficiaries	Over 600 million
DBT Transfers	₹6.3 lakh crore across 400+ schemes
UPI Transactions	9.3 billion per month
Digi Locker Users	180 million registered users
e-KYC Authentications	90 million+ per month
Aadhaar Auth. Failures	~12% (rural avg.)

(Sources: UIDAI, NPCI, Ministry of Finance, 2023)

Despite these achievements, digital exclusion remains a pressing issue. In rural India, only 48% of women use the internet (IIPS, 2021). Aadhaar failures due to connectivity or biometric mismatches are more common in states like Bihar and Odisha (Khera, 2019). A PM-KISAN cash transfer study in Rajasthan revealed decreased food intake among urban poor when cash replaced grain rations, due to price fluctuations and financial illiteracy (Raghunathan et al., 2020).

Digital infrastructure, thus, mediates entitlement but also risks conditionality, where access is determined by system compatibility rather than human need. The new social contract privileges the digitally visible while marginalising the offline and undocumented—raising concerns around justice and inclusion.

3. Algorithmic Inequality: When Neutral Code Produces Biased Outcomes

Algorithms, often seen as neutral tools, reflect the biases and assumptions of their creators and the socio-political environments in which they operate (Eubanks, 2018; Noble, 2018). In India, Aadhaar-based biometric authentication has created new forms of exclusion. A 2021 CAG report revealed that **15% of genuine beneficiaries in Jharkhand** were denied PDS rations due to fingerprint mismatches and connectivity failures. Nationally, biometric authentication failures affect 8–12% of users, especially rural elderly and manual workers (Rukmini, 2021).

Algorithmic sorting in schemes like PMAY or ration databases often excludes individuals due to income misclassification or lack of digitised records. Groups like single women, tribal communities, and migrants—those least likely to be formally documented—face the highest risks of "technocratic ghosting."

Predictive analytics based on SECC data adds another layer of opacity, as individuals are denied benefits without understanding the algorithmic criteria. Such non-transparency violates the right to be heard under Article 21 of the Constitution.

Table 2. Algorithmic Exclusion in Indian Welfare Schemes

Scheme	Exclusion Rate	Affected Groups	Source
PDS in Jharkhand	15%	Rural elderly, SC/ST households	CAG (2021)
MGNREGA Payments	10–13% delays	Women, seasonal workers	LibTech India (2022)
DBT for LPG Subsidy	9% missed	Migrants, tenants, rural poor	MoPNG (2022)

Ration Card Deletions	12–18%	Urban poor, single women, Adivasis	Khera (2019); Rukmini (2021)

(Sources: CAG, 2021; LibTech India, 2022; MoPNG, 2022; Khera, 2019; Rukmini, 2021)

Globally, similar patterns exist. Predictive policing in the U.S. has disproportionately impacted minority communities (Angwin et al., 2016). In Kenya, biometric voter registration caused disenfranchisement due to faulty kits. These parallels show that algorithmic inequality is a structural issue, not a glitch.

In India, digital systems often place the burden of compliance on citizens, assuming high digital literacy and uninterrupted connectivity. The outcome is a governance model that rewards data conformity and penalises informality—further marginalising the very groups welfare aims to support.

4. The Datafication of Development: Measuring Lives in Numbers

India's digital welfare systems rely heavily on quantification, turning complex human needs into narrow eligibility metrics. While tools like the Human Development Index (HDI) aim to capture multidimensional well-being, algorithmic systems often depend on incomplete or outdated administrative data, missing the nuance of lived experiences (Taylor, 2017).

For instance, land ownership records are used to determine eligibility for PM-KISAN, excluding tenant farmers who make up over **30% of cultivators** (NSSO, 2019). Similarly, students are denied scholarships because Aadhaar-linked bank accounts are inactive or wrongly mapped (MoE, 2022). These exclusions highlight the disjuncture between database logic and ground-level deprivation.

Table 3. Disconnects Between Algorithmic Criteria and Development Realities

Scheme	Eligibility Proxy	Excluded Groups	Source
PM-KISAN	Digitised land records	Tenant farmers, sharecroppers	NSSO (2019); World Bank (2023)
Scholarships	Aadhaar-linked bank accounts	Rural students, first-gen learners	MoE (2022)
PMAY	SECC socio-economic scores	Migrants, informal households	Telangana Survey (2022)
Ujjwala Yojana	BPL + Aadhaar	Widow-headed/ single-person homes	Khera (2019)

(Sources: NSSO, 2019; MoE, 2022; World Bank, 2023; Telangana Survey, 2022; Khera, 2019)

Such exclusions reflect what scholars term "data poverty"—the structural inability of the marginalised to engage meaningfully with digital systems (Taylor, 2017). Moreover, surveillance-driven models erode dignity and trust. As Lyon (2018) argues, systems designed for care often double as instruments of control.

False negatives—eligible persons being excluded—undermine the legitimacy and equity of welfare. When citizens become invisible in databases, their developmental rights are suspended. Addressing these failures demands a shift from techno-determinism to people-centered policymaking.

5. Constitutionalism and the Crisis of Inclusion

The rise of algorithmic governance in India has profound constitutional implications. As biometric and digital systems mediate access to welfare, core rights—dignity, equality, and liberty—are being redefined by system design. The Supreme Court's 2018 judgment in *K.S. Puttaswamy v. Union of India* affirmed privacy as a fundamental right but allowed Aadhaar's use in welfare, creating a paradox: protecting informational autonomy while enabling surveillance-prone infrastructure (Bhatia, 2019).

Redressal remains a major gap. Excluded citizens face complex, often inaccessible grievance channels. Fragmented systems for schemes like MGNREGA or pensions leave individuals with limited avenues for appeal, violating Article 14 and the principles of natural justice.

Table 4. Constitutional Implications of Algorithmic Welfare Practices

Digital Practice	Rights Implicated	Legal Tensions	Source
Aadhaar-based Exclusion	Article 21 (Life, Dignity), Article 14	No due process, opaque denials	Khera (2019); Bhatia (2019)
Mandatory Biometric Seeding	Article 19 (Autonomy), Article 21	Compelled consent undermines bodily autonomy	Puttaswamy (2018); Eubanks (2018)

Algorithmic Targeting	Article 14, Article 38 (Social Justice)	Non-transparent exclusion violates equality	Taylor (2017); Noble (2018)
Grievance Void	Article 32 (Remedy), Article 21	No effective recourse or explanation	Drèze & Khera (2022); LibTech (2022)

(Sources: Khera, 2019; Bhatia, 2019; Eubanks, 2018; Taylor, 2017; Noble, 2018; Drèze & Khera, 2022; LibTech India, 2022)

This erosion of accountability shifts power from legal institutions to opaque digital systems. The Constitution envisioned a state rooted in rights and remedies. Algorithmic exclusion bypasses both. Without legal safeguards like algorithmic audits, right to explanation, and offline fallback mechanisms, the promise of digital governance collapses into systemic injustice.

6. SDGs and Ethical Digital Governance

India's digital welfare regime intersects closely with its SDG commitments, particularly SDG 1 (No Poverty), SDG 10 (Reduced Inequality), and SDG 16 (Justice and Institutions). While digital tools have improved scale and delivery, they also pose ethical challenges when exclusion, opacity, and inequality persist.

SDG 1: No Poverty Though DBTs improve delivery speed, authentication errors undermine access. A World Bank (2023) study found that over **40% of beneficiaries in Bihar and Jharkhand** faced Aadhaar-related disruptions, risking poverty persistence.

SDG 10: Reduced Inequality Digital inequality mirrors social divides. NFHS-5 reports **only 33% of rural women** have internet access, limiting their engagement with digital welfare platforms (IIPS, 2021).

SDG 16: Institutions and Justice Opaque algorithms without legal safeguards violate principles of transparency. India lacks enforceable laws for algorithmic accountability or data protection, diverging from OECD and UN digital governance norms.

Table 5. India's Digital Welfare and the SDG Framework

SDG Target	Digital Practice	Governance Gap	Source
SDG 1.3: Social Protection	Aadhaar-enabled DBTs	Exclusion due to authentication failures	World Bank (2023); Khera (2019)
SDG 10.2: Empowerment	DPI platforms, e-services	Gendered, regional access disparities	IIPS (2021); NSSO (2019)
SDG 16.6: Accountable Institutions	Algorithmic targeting	Lack of transparency, no audit mechanisms	Taylor (2017); Drèze & Khera (2022)

(Sources: World Bank, 2023; Khera, 2019; IIPS, 2021; NSSO, 2019; Taylor, 2017; Drèze & Khera, 2022)

To align with the SDGs, India must embed fairness and participation into digital policy. International norms—like the UN's Digital Cooperation Roadmap and OECD AI Principles—advocate transparency, equity, and human rights. India must translate these into enforceable legal frameworks to ensure its digital future remains inclusive.

7. Policy Recommendations: Toward an Inclusive, Accountable Digital State

To make digital welfare truly inclusive, India must go beyond efficiency narratives and adopt a rights-based governance model. The following reforms are critical:

1. **Enact Strong Data Protection Law** Fast-track legislation ensuring user consent, data minimisation, and purpose limitation, with added safeguards for welfare databases (Bhatia, 2022).
2. **Ensure Algorithmic Transparency** Mandate public registers disclosing algorithmic logic, inputs, and oversight. Establish an independent commission for audits and redress (Taylor, 2017).
3. **Strengthen Offline Redressal** Enable accessible grievance redress through local ombudsmen. As LibTech India (2022) shows, lack of fallback options worsens exclusion.
4. **Design Inclusive DPI** Platforms must support regional languages, visual/audio modes, and be co-designed with marginalised communities (UN, 2021).
5. **Expand Targeted Digital Literacy** Scale up initiatives like PMGDISHA, focusing on SC/ST and women, who lag significantly in digital literacy (NSSO, 2019).
6. **Institutionalise Social Audits** Conduct independent reviews of exclusion patterns in Aadhaar-linked schemes. Use local surveys and public audits to ensure oversight.

Table 6. Social Audit Framework for Digital Welfare

Component	Method	Indicator	Source
Inclusion Accuracy	Sample + biometric checks	Error rates, mismatch rates	LibTech India (2022); CAG (2021)
Algorithmic Fairness	Technical audit + reviews	Bias by gender/caste/ location	Taylor (2017); Noble (2018)
Redress Efficacy	Case tracking audit	Resolution rate, wait times	Drèze & Khera (2022)
Access Infrastructure	Field mapping	Urban/ rural service density	NSSO (2019)

(Sources: LibTech India, 2022; CAG, 2021; Taylor, 2017; Noble, 2018; Drèze & Khera, 2022; NSSO, 2019)

These reforms can make DPI more accountable and people-centric. India's digital leadership must reflect constitutional values—equity, transparency, and justice—not just technological prowess.

8. Conclusion: Rethinking the Political Economy of Code

The digitalisation of India's welfare architecture is not merely a question of technological innovation—it is a paradigmatic reordering of the political economy of inclusion. Algorithmic governance, when divorced from constitutional accountability and ethical oversight, risks transforming welfare into a conditional, opaque, and exclusionary system. What emerges is a regime where access to fundamental rights and services is determined not by need or citizenship, but by digital legibility and system compatibility.

This article has shown that while Digital Public Infrastructure (DPI) offers undeniable gains in scale, speed, and precision, it also reproduces and amplifies existing inequalities—be they regional, gendered, caste-based, or economic. The technocratic ideal of governance by code, unbridled, has the potential to facilitate the silent disenfranchisement of millions. Disenfranchisements resulting from biometric mismatches, algorithmic invisibility, and infrastructural divide are not errors but systemic attributes of technologies built without participatory processes.

India's commitment to digital leadership must also reckon with global ethical norms. While the EU's AI Act and Brazil's General Personal Data Protection Law establish binding norms for fairness, accountability, and redress, India still lacks an enforceable algorithmic governance framework. Aligning with the UN Roadmap for Digital Cooperation and the OECD AI Principles demands stronger institutional mechanisms at home.

To achieve the vision of participatory and fair development that is enshrined in its Constitution and reiterated in its global commitments through the Sustainable Development Goals, India must take a complete turn in its approach to digital governance. This turn must prioritise equity, hard-code rights, and include the democratisation of the design and governance of digital systems.

In rural Jharkhand, a 70-year-old widow was denied her monthly ration for three consecutive months because her fingerprints failed to authenticate at the PDS shop. Her case is not an exception—it is a preview of a digital future that may exclude the most vulnerable unless ethics, empathy, and equity are hardcoded into public infrastructure.

If India's digital future is to be just, it must be governed not by opaque algorithms, but by the clarity of constitutional rights.

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