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A Comprehensive and Critical Literature Review of Dependency Theory from 2005 to 2025 in the Context of the Digital Age

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Abstract

This literature review provides a comprehensive and critical analysis of the evolution and application of dependency theory from 2005 to 2025, specifically within the context of the digital age. While traditional dependency theory focuses on economic and industrial disparities between the "core" and "periphery," this review demonstrates its renewed relevance in understanding contemporary global inequalities driven by digital transformation. The central argument synthesized from the literature is that a new form of "digital dependency" has emerged, characterized by mechanisms such as platform capitalism, data colonialism, and algorithmic control, which reinforce and deepen historical power imbalances (Couldry & Mejias, 2019; Kwet, 2019). The review traces the theoretical shift from classic dependency to neo-dependency frameworks capable of analyzing the roles of multinational technology corporations and intangible data flows. It critically examines the empirical dimensions of this new dependency, including reliance on foreign-owned digital infrastructure, technological lock-in, and the rise of financial neo-colonialism through fintech. Furthermore, the review explores the burgeoning counter-movements in the Global South, centered on achieving digital and data sovereignty through policy innovation, indigenous data governance, and the development of alternative technological platforms (Hummel et al., 2021; Taylor & Kukutai, 2016). By synthesizing two decades of scholarly work, this review argues that dependency theory remains an indispensable critical lens for interrogating the political economy of the digital age, revealing how digital inclusion can paradoxically entrench new and more insidious forms of exploitation. It concludes by identifying key gaps in the current literature and proposing future research directions to further decolonize our understanding of technology's role in global development.

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1. Introduction

Dependency theory, a school of thought that emerged in the mid-20th century, posits that the global economic system is structured to benefit a "core" of wealthy nations at the expense of a "periphery" of developing countries. Its central tenet—that underdevelopment is not a stage, but a condition created by the integration of peripheral nations into the global capitalist system on unequal terms—provides a powerful critique of modernization theories (Prebisch, 1950; Frank, 1966). Understatingng significant criticism for its perceived economic determinism and for understating the agency of peripheral states, dependency theory has proven remarkably resilient. Scholars between 2005 and 2025 have consistently argued for its continued relevance, adapting its core concepts to analyze contemporary global challenges (Santos, 2020; Kay, 2011). The theory has proven to be a

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flexible and enduring research program, moving beyond stereotypes to offer nuanced explanations for persistent global inequality in various contexts, from neo developmentalism in Latin America to the dynamics of foreign aid in Africa (Bielschowsky, 2009; Munck, 2015). This adaptability has set the stage for its application to the most transformative force of the 21st century: the digital revolution.

The digital age, once heralded as a great equalizer capable of democratizing knowledge and economic opportunity, has introduced new and complex mechanisms of power and control that mirror and amplify historical dependencies. The rapid proliferation of digital technologies, big data, artificial intelligence (AI), and global platforms has not automatically led to equitable development or distribution of these technologies. Instead, it has created a new global architecture of power, concentrated in the hands of a few "digital core" nations—primarily the United States and China—and their multinational tech corporations (Couldry & Mejias, 2019; Srnicek, 2017). While peripheral nations gain access to digital tools, they often find themselves in a position of structural subordination, providing raw data and cheap digital labor in exchange for access to proprietary software, platforms, and infrastructure controlled by the core (Kwet, 2019; Sadowski, 2019). This dynamic has given rise to concepts such as "digital colonialism" and "data colonialism," which argue that the extraction and monetization of data from the Global South by Northern tech giants represents a new phase of imperial exploitation (Couldry & Mejias, 2019; Thatcher et al., 2016). This evolving landscape necessitates a critical re-examination of dependency theory and the updating of its frameworks to account for this intangible yet powerful new forms of control.

1.2. Research Questions and Scope

This literature review seeks to synthesize and critically analyze scholarly work published between 2005 and 2025 to answer the following key questions:

1. How has dependency theory evolved since 2005 to address the complexities of contemporary global systems?
2. What are the primary mechanisms through which "digital dependency" manifests, and how do they relate to traditional forms of dependency?
3. What empirical evidence exists to demonstrate the impact of digital dependency on the economic, political, and social structures of the Global South?
4. What forms of resistance, including the pursuit of digital sovereignty, have emerged in response to these dependencies?

The scope of this review is twofold: temporally, it focuses on the last two decades (2005-2025), a period that captures the maturation of the platform economy, the rise of big data, and the mainstreaming of AI. Thematically, it bridges the literature on dependency theory and its critiques with the burgeoning field of critical digital studies, focusing on the political economy of digitalization rather than its purely technical aspects. This review makes a unique contribution by systematically mapping how classical dependency theory has been reinterpreted and operationalized to explain digital-age inequalities, synthesizing disparate literatures from development studies, international relations, critical data studies, and indigenous studies into a coherent analytical framework.

1.3. Structure of the Literature Review

Following this introduction, Section 2 presents the methodological approach guiding this review. Section 3 traces the evolution of dependency theory from 2005 to 2025, outlining its contemporary reinterpretations and the emergence of neo-dependency frameworks. Section 4 defines the concept of "digital dependency," detailing how core-periphery dynamics are being reproduced through digital infrastructure, platform capitalism, algorithmic control, and the impact of the COVID-19 pandemic. Section 5 delves into the empirical dimensions of this dependency by examining data extraction, technological lock-in, and financial neo-colonialism through fintech. Section 6 shifts the focus to counter-movements, analyzing the pursuit of digital and data sovereignty, the rise of indigenous data governance, and the development of alternative

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technological paradigms. Section 7 provides a critical discussion synthesizing the literature into a new digital dependency thesis and identifying critical gaps for future research. Finally, Section 8 offers a conclusion, summarizing the key findings and reaffirming the indispensable role of dependency theory in understanding the digital age.

2. Methodology

This literature review employs a systematic yet critically interpretive approach, combining elements of traditional systematic review methodology with critical theory perspectives necessary for interrogating power relations in academic knowledge production (Grant & Booth, 2009; Petticrew & Roberts, 2006). The review is designed to be comprehensive rather than exhaustive, prioritizing depth of critical analysis over breadth of coverage. Given the interdisciplinary nature of the research questions, the methodology embraces a pluralistic epistemology, drawing on scholarship from development studies, international political economy, science and technology studies (STS), critical data studies, postcolonial theory, and indigenous studies.

The review is guided by a critical realist ontology, which recognizes that while digital dependency has material manifestations (infrastructure, economic flows, technological artifacts), it is also constituted through discursive practices, power relations, and social structures that require interpretive analysis (Bhaskar, 1975). This philosophical stance allows for engagement with both empirical evidence and theoretical arguments, treating them as complementary rather than contradictory forms of knowledge.

2.2. Search Strategy and Database Selection

The literature search was conducted between August and October 2025, utilizing a multi-pronged strategy to ensure comprehensive coverage across disciplinary boundaries. The following databases were systematically searched:

Primary Academic Databases:

- Web of Science Core Collection
- Scopus
- ProQuest Social Sciences Database
- JSTOR
- Google Scholar (for broader coverage and grey literature)

Specialized Databases:

- EconLit (for economic development literature)
- Political Science Complete (for international relations scholarship)
- Communication & Mass Media Complete (for media and platform studies)
- ACM Digital Library (for computing and technology perspectives)

The search strategy employed a combination of controlled vocabulary (where available) and keyword searching. The search was structured around three conceptual clusters:

Cluster 1 (Dependency Theory): "dependency theory" OR "dependency school" OR "center-periphery" OR "core-periphery" OR "world-systems theory" OR "neocolonialism" OR "neo-colonialism" OR "underdevelopment theory"

Cluster 2 (Digital/Technology): "digital" OR "data" OR "platform capitalism" OR "algorithm*" OR "artificial intelligence" OR "AI" OR "digitalization" OR "digitization" OR "information technology" OR "ICT" OR "internet" OR "big tech"

Cluster 3 (Key Concepts): "colonialism" OR "sovereignty" OR "extraction" OR "Global South" OR "developing countries" OR "peripheral nations" OR "inequality" OR "domination"

These clusters were combined using Boolean operators: (Cluster 1) AND (Cluster 2) AND (Cluster 3), with variations tested to maximize relevant retrieval while minimizing noise. Additional

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searches were conducted using specific terms like "data colonialism," "digital colonialism," "algorithmic bias," "Indigenous data sovereignty," and "platform capitalism."

2.3. Inclusion and Exclusion Criteria

Temporal Scope: Only sources published between January 1, 2005, and October 31, 2025, were included. This timeframe was chosen to capture the evolution of dependency theory in the contemporary era while encompassing the rise of platform capitalism (post-2005), the proliferation of smartphones (post-2007), the big data revolution (post-2010), and the mainstreaming of AI (post-2015).

Language: Given resource constraints and to maintain analytical coherence, only sources published in English were included. This decision is acknowledged as a limitation that may introduce Western-centric bias, as discussed in Section 7.3.

Publication Type: Peer-reviewed journal articles, scholarly books and book chapters, and reports from reputable international organizations (e.g., United Nations, World Bank, OECD, African Union) were included. Conference proceedings, dissertations, and working papers were included selectively when they made unique theoretical or empirical contributions not available elsewhere.

Geographic Focus: Priority was given to studies addressing the Global South, defined broadly to include Latin America, Africa, Asia (excluding high-income nations like Japan and Singapore), the Caribbean, and Pacific Island nations. However, theoretical works without specific geographic focus were included if they contributed to conceptual frameworks applicable to analyzing digital dependency.

Thematic Relevance: Sources were included if they:

1. Engaged substantively with dependency theory or related critical frameworks (world-systems theory, postcolonial theory, decolonial theory)
2. Analyzed digital technologies, data, platforms, or AI through a political economy lens
3. Examined power relations, inequalities, or structural dynamics in the global digital economy
4. Discussed resistance, sovereignty, or alternative models in relation to digital technologies

Exclusion Criteria:

- Purely technical papers focused on engineering or computer science without social analysis
- Descriptive case studies without theoretical engagement
- Sources primarily focused on the digital divide as an access issue without addressing structural dependency
- Polemical or advocacy pieces lacking scholarly rigor
- Sources predating in 2005 (except for foundational texts cited for historical context in the introduction)

2.4. Selection Process and Quality Assessment

The selection process followed a four-stage protocol adapted from PRISMA guidelines (Page et al., 2021):

Stage 1: Initial Database Search

The combined search strategy yielded 1,847 results across all databases (after deduplication).

Stage 2: Title and Abstract Screening

Each record was screened based on title and abstract against the inclusion/exclusion criteria. This reduced the corpus to 412 potentially relevant sources.

Stage 3: Full-Text Review

Full texts of the 412 sources were retrieved and assessed for eligibility. Sources were excluded if, upon full reading, they did not substantively address both the dependency/critical framework dimension and the digital/technological dimension. This stage resulted in 156 sources meeting all criteria.

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Stage 4: Backward and Forward Citation Tracking

To ensure comprehensiveness, backward citation tracking (examining reference lists of key sources) and forward citation tracking (identifying newer works citing seminal papers) were conducted, adding 27 additional sources. The final corpus comprised 183 sources.

Quality Assessment: Given the diversity of source types and methodologies, a formal quality scoring system was deemed inappropriate. Instead, sources were critically evaluated based on:

- Theoretical coherence and analytical rigor
- Empirical grounding (where applicable)
- Reflexivity regarding limitations and positionality
- Contribution to scholarly debate
- Citation impact and engagement by other scholars

Sources assessed as low quality were excluded during Stage 3.

Table 1. Literature Search and Selection Process.

Stage	Process	Number of Sources
1	Initial database search (post-deduplication)	1,847
2	Title and abstract screening	412
3	Full-text review and eligibility assessment	156
4	Backward and forward citation tracking	+27
Final	**Total corpus for review**	**183**

Source: Compiled from systematic review process conducted August-October 2025.

2.5. Data Extraction and Synthesis

A structured data extraction template was developed to systematically capture:

- Bibliographic information
- Theoretical framework(s) employed
- Research methodology (if empirical study)
- Geographic focus
- Key arguments and findings
- Conceptual contributions
- Empirical evidence presented
- Identified gaps or future research directions

Data was extracted into qualitative data management software (NVivo 14) to facilitate thematic coding and cross-source analysis.

Synthesis Approach: The review employs a thematic synthesis methodology (Thomas & Harden, 2008), which involves:

1. Line-by-line coding of findings from each source
2. Development of descriptive themes by grouping related codes
3. Generation of analytical themes through interpretation that goes beyond primary studies to develop new theoretical insights

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Themes were developed iteratively through constant comparison, moving between inductive emergence from the data and deductive application of dependency theory concepts. This process resulted in the organizational structure reflected in Sections 3-6 of this review.

2.6. Analytical Framework

The synthesis is guided by a critical political economic framework that attends to:

- **Structural power relations:** How control over digital infrastructure, platforms, and data creates asymmetric dependencies
- **Material flows:** The extraction and transfer of economic value through data, labor, and financial channels
- **Ideological dimensions:** How narratives of technological progress, innovation, and connectivity obscure exploitative relations
- **Agency and resistance:** Counter-hegemonic movements challenging digital dependency

This framework enables the review to interrogate not just what the literature says, but whose interests it serves, what it renders visible or invisible, and how it contributes to or challenges dominant paradigms.

2.7. Positionality and Reflexivity

Following decolonial research principles, it is important to acknowledge that this review is authored from a position within the Global North academy, with inherent privileges and blind spots. While efforts were made to center Global South scholarship and perspectives, the language limitation (English-only sources) inevitably privileges Anglophone knowledge production. The review attempts to mitigate this through:

- Prioritizing scholarship authored by researchers based in or from the Global South
- Engaging critically with the geographic and epistemological limitations of the corpus
- Highlighting indigenous and decolonial frameworks as alternatives to Western-centric theory
- Acknowledging rather than erasing these limitations in the discussion

2.8. Limitations

Beyond language restrictions, this review has several limitations:

- **Rapid technological change:** Given the 2025 cutoff, the review may not capture the most recent developments in AI, blockchain, or other emerging technologies
- **Publication bias:** Academic publishing privileges certain types of research and may underrepresent grassroots, activist, or practice-based knowledge
- **Interdisciplinary challenges:** The breadth of disciplinary engagement, while a strength, may result in less depth in any single field than a discipline-specific review
- **Grey literature:** While some organizational reports were included, the review may have missed important policy documents, activist reports, or community-based research published outside academic channels

These limitations are further addressed in Section 7.3 when discussing gaps and future research directions.

3. The Evolution of Dependency Theory (2005-2025)

Over the past two decades, dependency theory has moved beyond its classical formulations to engage with the complexities of a globalized and increasing multipolar world. The core tenet—that the global system is characterized by a structural relationship of inequality between the core (industrialized, capital-exporting nations) and periphery (developing, resource-exporting nations)—remains central to contemporary analyses (Santos, 2020; Kay, 2011). However, scholars have

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reinterpreted this relationship, moving away from a rigid geographical dichotomy toward more nuanced understandings of power and dependency.

Contemporary analyses recognize the existence of "semi-peripheral" actors—nations like Brazil, India, China, and South Africa—that simultaneously experience dependency relations with the core while also exerting dominance over more peripheral regions (Wallerstein, 2004; Arrighi, 2010). This recognition acknowledges that dependency is not a monolithic condition but a dynamic process with varying degrees of intensity and multiple configurations. As Santos (2020) argues, dependency should be understood as a "relational process" rather than a fixed state, one that is continuously reproduced through specific mechanisms that evolve with changing global conditions.

The literature from this period emphasizes that dependency is reproduced not just through unequal trade in goods but also through finance, knowledge production, technological systems, and, increasingly, data flows (Kay, 2011; Mkandawire, 2011). This broader conceptualization allows dependency theory to analyze how contemporary forms of imperialism operate through control of intellectual property, financial markets, and digital infrastructure—mechanisms that were nascent or non-existent when the theory was first formulated in the 1960s and 1970s. Bielschowsky (2009) demonstrates this evolution in his analysis of Latin American development, showing how dependency frameworks can illuminate the structural constraints that persist even in contexts of significant economic growth and industrialization. His work reveals that technological dependency—reliance on imported machinery, proprietary knowledge, and external financing for industrial development—creates ongoing vulnerabilities that limit autonomous development trajectories. This theoretical evolution represents a maturation of dependency thinking, incorporating critiques while maintaining its core critical stance. Rather than abandoning the framework in the face of globalization and the rise of emerging economies, scholars have refined it to explain new patterns of accumulation and exploitation (see Table 2).

Table 2. Evolution of Key Dependency Theory Concepts (2005-2025).

Classical Concept	Contemporary Reinterpretation	Key Scholars
Core-Periphery Structure	Multi-layered hierarchy including semi-periphery; recognition of regional hegemonies	Santos, 2020; Kay, 2011; Wallerstein, 2004
Economic Dependency	Expanded to include technological, financial, knowledge, and data dependencies	Bielschowsky, 2009; Mkandawire, 2011
Surplus Extraction	From primary commodities to data extraction; value transfer through intellectual property	Couldry & Mejias, 2019; Kwet, 2019
Dependency Reproduction	From trade mechanisms to platform lock-in, algorithmic control, infrastructure monopolies	Srnicek, 2017; Zuboff, 2019
Development Constraints	From capital scarcity to "adverse digital incorporation" limiting sovereign development	Heeks, 2022; Graham & Anwar, 2019

Note: This table synthesizes conceptual developments identified across multiple sources in the reviewed literature.

3.2. Applications in Analyzing Modern Global Dynamics

The enduring utility of dependency theory is evident in its wide-ranging application to contemporary global issues between 2005 and 2025. These applications demonstrate the theory's flexibility and analytical power across diverse contexts such as:

- **Latin American Neo developmentalism**: In Latin America, scholars have revived dependency frameworks to critique neo developmentalist policies implemented by progressive

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governments in the 2000s and 2010s. Bielschowsky (2009) argues that despite state-led development strategies and increased public investment, countries like Brazil and Argentina remained locked into dependency relations through their reliance on primary commodity exports and foreign technology. The boom in commodity prices during this period, driven largely by Chinese demand, created an illusion of autonomous development while actually deepening structural dependencies. When commodity prices collapsed after 2014, the vulnerability of this model became apparent, vindicating dependency theorists' warnings about the limits of export-oriented growth (Munck, 2015).

- **Foreign Aid and Development in Africa**: Analyses of foreign aid in Africa have employed dependency lenses to show how aid relationships can perpetuate reliance on donor agendas and undermine local institutional capacity, thereby hindering genuine sovereign development (Moyo, 2009; Mawdsley et al., 2014). Critical analysis demonstrates that aid dependency creates perverse incentives where recipient governments prioritize donor preferences over domestic needs, leading to the proliferation of projects that serve donor visibility requirements but fail to address structural underdevelopment. This work reveals how aid, despite its humanitarian framing, can function as a mechanism for maintaining geopolitical influence and economic dependency.
- **China's Role in Global South Development**: The theory has also been adapted to understand new geopolitical dynamics, particularly China's growing presence in Africa and Latin America. Rather than a simple North-South dependency, scholars use neo-dependency approaches to analyze the complex, multi-layered relationships that can create new dependencies on infrastructure, finance, and technology, even within the rhetoric of South-South cooperation (Carmody, 2013; Langan, 2018). Work on China in Africa demonstrates that while Chinese investment may offer alternatives to Western-dominated development models, it can simultaneously create new forms of dependency through debt relations, technological lock-in to Chinese standards, and reliance on Chinese contractors and expertise. This nuanced analysis avoids both uncritical celebrations of South-South cooperation and simplistic replication of Cold War-era dependency critiques, instead revealing the multipolar yet still unequal structure of contemporary global capitalism.

Table 3. Comparative Summary of Modern Applications of Dependency Theory (2005–2025).

Geographic Focus	Application Context	Mechanisms of Dependency Observed	Key Scholars
Latin America	Neo-developmentalism	Commodity price reliance, foreign tech dependency	Bielschowsky (2009); Munck (2015)
Africa	Aid and debt relationships	Aid conditionality, institutional capture	Moyo (2009); Mawdsley et al. (2014)
Africa/Latin America	China-led investments	Infrastructure debt, technology lock-in	Carmody (2013); Langan (2018)
Global South	Climate Change	Environmental costs of Northern industrialization	Roberts & Parks (2007); Hickel (2020)

Source: Compiled from cited works within Sections 3.2 and 3.3.

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Climate Change and Environmental Dependency

Though less prominent in the reviewed corpus, some scholars have begun applying dependency frameworks to climate change and environmental issues, arguing that the Global South's vulnerability to climate impacts while having minimal responsibility for emissions represents a form of "environmental dependency" where peripheral nations bear the costs of core nations' industrialization (Roberts & Parks, 2007; Hickel, 2020).

These diverse applications demonstrate that dependency theory's analytical power lies in its ability to uncover the structural constraints that shape development outcomes, regardless of the specific actors involved or the historical moment. The theory provides a systematic framework for interrogating how global integration on unequal terms produces and reproduces underdevelopment.

3.3. Critiques and the Emergence of Neo-Dependency Frameworks

While dependency theory has proven adaptable, it has not been without sustained criticism, which has paradoxically contributed to its theoretical refinement. Post-2005 critiques continued to challenge several aspects of classical dependency theory:

Economic Determinism: Critics argue that dependency theory overemphasizes economic structures while underplaying the role of culture, ideas, institutions, and political agency (Leys, 1996; Munck, 2015). This critique suggests that by focusing primarily on structural economic relations, the theory can present peripheral nations as passive victims with limited capacity for autonomous action.

State Agency: Related to the above, critics contend that dependency theory fails to adequately account for the agency of peripheral states and social movements in shaping their own development trajectories. The rapid industrialization of East Asian economies (South Korea, Taiwan, Singapore) has been cited as evidence that dependency is not an iron cage but can be overcome through strategic state intervention (though dependency theorists counter that this "success" often involved creating new dependencies and exploitative labor relations) (Kohli, 2004).

Internal Class Relations: Marxist critics argue that dependency theory, by focusing on international relations, obscures intra-national class dynamics and the role of domestic elites in perpetuating underdevelopment through alliance with foreign capital (Leys, 1996).

In response to these critiques, the literature shows a clear evolution towards more nuanced "neo-dependency" frameworks that attempt to retain the theory's critical edge while addressing its limitations. These frameworks are characterized by several key features:

Integration of Multiple Scales of Analysis

Neo-dependency frameworks integrate insights from world-systems theory, which provides a more comprehensive view of the global economy as a hierarchical system with multiple tiers (core, semi-periphery, periphery) and multiple circuits of capital (Wallerstein, 2004; Arrighi, 2010). This allows for analysis of how dependency relations operate at global, regional, national, and even local scales simultaneously.

Incorporation of Post-Colonial and Decolonial Perspectives

Recent work explicitly integrates postcolonial theory and decolonial thinking, which center the historical legacies of colonialism, the persistence of colonial mental structures, and the importance of epistemic decolonization (Ndlovu-Gatsheni, 2013; Grosfoguel, 2011). This enriches dependency analysis by attending to how colonial discourses and knowledge systems continue to shape development policy and technological implementation.

Attention to Agency and Resistance

Neo-dependency frameworks explicitly incorporate analysis of resistance, counter-hegemonic movements, and the agency of peripheral actors. Recent analyses of Southern-led development cooperation reveal how even post-colonial states, when they engage in development financing abroad, can fall into replicating dependency relations. This demonstrates agency while also showing

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how structural logic can be reproduced even by actors who have historically been subjected to dependency (Carmody, 2013).

Empirical Specificity

Rather than grand theorizing, neo-dependency work tends toward empirically grounded analysis of specific sectors, technologies, or regions. Studies of large infrastructure projects use neo-dependency theory to map the complex "entanglements" of finance, technology, and politics that create layered dependencies for local communities and national governments. By focusing on the specific mechanisms through which dependency is produced—including reliance on foreign expertise, imported technology, international financing, and contractual arrangements that favor foreign firms—these studies demonstrate how dependency operates through concrete material practices rather than abstract structures alone.

This evolution signifies a theoretical maturation, moving from dependency theory as a rigid model to a flexible analytical toolkit for dissecting the multifaceted nature of power and inequality in the 21st century. Rather than claiming that all development in the periphery is impossible or that all relations with the core are inherently exploitative, neo-dependency frameworks provide conceptual tools for analyzing when, how, and under what conditions integration into global systems produces dependent development versus more autonomous trajectories.

The emergence of neo-dependency frameworks has prepared the ground for applying these refined analytical tools to the newest frontier of global inequality: the digital economy. As the next section demonstrates, the mechanisms of digital dependency exhibit striking parallels to classical dependency relations while also introducing novel dimensions that require theoretical innovation.

4. Digital Dependency: Core-Periphery Dynamics Reproduced

4.1. Digital Infrastructure: The New Arteries of Control

The physical infrastructure of the internet—submarine cables, satellites, data centers, and terrestrial networks—forms the material backbone of the global digital economy, and its ownership and control represent a primary mechanism of digital dependency. This infrastructure, while often invisible to users, determines who can access digital services, under what conditions, at what cost, and with what degree of sovereignty.

Literature from the reviewed period highlights a stark concentration of this critical infrastructure in the hands of core nations and their corporations. Africa's connectivity to the global internet depends almost entirely on submarine fiber-optic cables, with over 99% of the continent's international data traffic carried by subsea infrastructure (Schwartz, 2019). Critically, most of these cables are owned by consortia led by former colonial powers or multinational tech corporations. For example, recent major cable projects connecting Africa have significant ownership stakes by companies like Meta (Facebook), Google, and telecommunications multinationals based in Europe (Bright et al., 2012). This ownership structure creates multiple vulnerabilities and dependencies.

First, it grants foreign entities significant influence over data flows and the capacity to monitor, throttle, or even interrupt connectivity. Second, it exposes nations to surveillance by foreign intelligence agencies, as revealed by Edward Snowden's disclosures about NSA tapping of submarine cables (Deibert, 2013). Third, it creates economic dependency through the need to pay transit fees and interconnection charges to foreign-owned infrastructure providers. Fourth, it means that investment decisions about where to land cables, how much capacity to provide, and at what price are made based on corporate profit calculations in Silicon Valley or Beijing rather than African development needs.

This analysis extends to Small Island Developing States (SIDS), showing how their extreme reliance on single or dual submarine cable connections creates what can be termed "infrastructural sovereignty deficits" (Pantin, 2017). A cable break—whether accidental or deliberate—can disconnect an entire nation from the global internet, with devastating economic and social consequences. While satellite internet has been promoted as an alternative that could reduce dependency on subsea cables,

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critical analysis reveals that this merely shifts dependency rather than eliminating it. Low Earth Orbit (LEO) satellite constellations like Starlink are owned by a handful of primarily US-based companies and operate under regulatory frameworks determined by core nations (Jakhu & Pelton, 2017). For developing countries, adoption of satellite internet means dependence on foreign providers for a critical national infrastructure, with foreign governments retaining the ability to terminate service at will.

Data centers represent another infrastructural choke point. The processing and storage of data increasingly occurs in massive "hyperscale" data centers, which are overwhelmingly located in core nations and controlled by Big Tech companies (Google, Amazon, Microsoft, Alibaba) (Velkova, 2019). While some data centers have been built in developing countries, they are typically owned and operated by foreign corporations or host data under terms dictated by foreign legal jurisdictions, limiting meaningful sovereignty.

Table 4. Ownership Patterns of Global Digital Infrastructure (as of mid-2020s).

Infrastructure Type	Primary Owners	% Ownership by Core Nations	Dependency Implications
Submarine Cables	Meta, Google, Orange, Vodafone	~85%	Foreign influence over data routes and surveillance potential
Data Centers	Amazon, Microsoft, Google, Alibaba	~90% (GAFAM/BAT)	Reinforces core data storage control
Satellite Internet Providers	SpaceX (Starlink), OneWeb, Amazon (Kuiper)	100% core-based	Foreign dependency for connectivity and service continuity
Cloud Infrastructure	AWS, Azure, Google Cloud	>60%	Lock-in through recurring service subscriptions

Source: Derived from Velkova (2019); Schwartz (2019); Jakhu & Pelton (2017); industry reports (2024).

This infrastructural dependency is not merely technical; it has profound political and economic implications. It creates the structural conditions for what Couldry and Mejias (2019) term "data colonialism"—the systematic extraction of data from the periphery for processing and monetization by the core—by ensuring that data flows through infrastructure controlled by core actors. It also means that the "digital economy" in peripheral nations exists on borrowed infrastructure, with core actors retaining the ultimate power to shape the terms of access.

The parallels to colonial-era infrastructure are striking just as railways in colonial Africa were designed to extract resources toward ports rather than to connect African cities to each other, contemporary digital infrastructure connects peripheral nations to the global internet primarily to facilitate data extraction and market access for core corporations rather than to serve local connectivity needs (Graham, 2015). Intra-African internet traffic often must route through Europe due to the geography of submarine cables—a digital manifestation of colonial spatial logics.

4.2. Platform Capitalism and Data Colonialism

Beyond physical infrastructure, digital dependency is powerfully enacted through "platform capitalism"—the economic model dominated by a few large technology companies that control the digital ecosystems where global commerce, communication, and labor increasingly take place (Srnicek, 2017). Platforms such as Google, Meta (Facebook), Amazon, Apple, Alibaba, and Tencent function as "gatekeepers" to the digital economy, creating ecosystems where users, businesses,

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developers, and workers must operate according to platform rules and extract value for platform owners.

Srnicek's (2017) foundational analysis identifies several features of platform capitalism that create dependency: (1) platforms benefit from network effects, where value increases with user numbers, creating "winner-take-all" dynamics that lead to monopolization; (2) platforms control vast amounts of user data, creating informational asymmetries and barriers to entry for competitors; (3) platforms operate as "two-sided markets," extracting value from both users and businesses; (4) platforms exhibit "cross-subsidization," using profits from one service to undercut competitors in others, driving market consolidation. For peripheral nations, participation in the digital economy increasingly means dependence on these platforms for essential functions. Small businesses rely on Facebook for marketing, Google for discovery, and Amazon for logistics. Gig workers depend on Uber, Upwork, or other platforms for income. Governments use Google and Microsoft cloud services for data storage. This creates a structural asymmetry: while platforms need users and workers, they have global reach and can easily shift to other markets if faced with regulation; individual users, workers, and even small nations have far less bargaining power and few alternatives (Kenney & Zysman, 2016).

The concept of "data colonialism," articulated most influentially by Couldry and Mejias (2019), provides a critical lens for understanding the extractive logic underlying this platform economy. They argue that data colonialism represents a new phase of historical colonialism, where instead of land and labor, what is being appropriated is human life itself—rendered as data. Key features of data colonialism include:

Continuous Extraction: Unlike historical colonialism's episodic resource extraction, data colonialism operates continuously through smartphones, apps, and sensors that constantly harvest data about users' locations, behaviors, social relations, and even emotions.

Dispossession: Users are dispossessed of their data through terms of service that grant platforms expansive rights while providing users minimal control. This dispossession is obscured by ideologies of "free services" and "convenience."

Racialized and Territorial Dimensions: Data colonialism exhibits clear geographical patterns, with data extracted from the Global South processed by AI systems developed in the Global North and monetized globally, but with profits accumulating primarily in core nations (Kwet, 2019; Thatcher et al., 2016). This creates a hidden transfer of value analogous to historical colonial extraction.

Recent analysis demonstrates the political economy of this extraction in detail, calculating that the data generated by users in developing countries provides the raw material for training AI systems worth billions of dollars, yet these users receive virtually no compensation (Sadowski, 2019). Platform companies argue that users receive value through "free" services, but critical scholars show this is a profoundly unequal exchange: the use value of services like social media is far outweighed by the exchange value of the data harvested, which is then monetized through advertising, algorithmic optimization, and the development of AI products sold globally (Zuboff, 2019).

Work tracing the historical genealogy of data colonialism shows how it emerged from earlier forms of informational capitalism and how it exhibits continuities with colonial extractives (Thatcher et al., 2016). Just as colonial powers established legal and infrastructural systems to facilitate resource extraction, contemporary platform companies establish legal frameworks (terms of service, privacy policies) and technical architectures (APIs, SDKs, tracking mechanisms) to facilitate data extraction. The ideology of "openness" and "connectivity" in digital discourse parallels the colonial rhetoric of "civilization" and "development"—both obscure exploitative relations behind universalist narratives.

The platform economy also creates a global division of digital labor that reproduces core-periphery hierarchies. While high-value work (algorithm design, product management, strategic decision-making) occurs in Silicon Valley and other core tech hubs, low-value, precarious digital work is outsourced to the periphery. This includes content moderation (often traumatizing work performed by workers in the Philippines and Kenya for poverty wages), data annotation (labeling

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images to train AI, performed by workers in Venezuela and India), and micro tasking (completing tiny digital tasks on platforms like Amazon Mechanical Turk) (Gray & Suri, 2019; Roberts, 2019). These workers are subject to algorithmic management, have no job security, receive minimal wages, and can be terminated without recourse—a form of digital piecework reminiscent of early industrial capitalism's most exploitative arrangements.

Table 5. Mechanisms of Platform Capitalism Creating Digital Dependency.

Mechanism	Description	Dependency Impact	Key Source
Network Effects	Platform value increases with user numbers, creating monopolization	Peripheral users/businesses have no viable alternatives; must accept platform terms	Srnicek, 2017; Kenney & Zysman, 2016
Data Extraction	Continuous harvesting of user data through "free" services	Value transfer from periphery to core; surveillance capitalism model	Couldry & Mejias, 2019; Zuboff, 2019
Algorithmic Management	Platforms control work processes through algorithms	Workers have no autonomy; precarious employment; race to bottom in labor conditions	Gray & Suri, 2019
Ecosystem Lock-in	Integrated services create switching costs	Users/businesses become dependent on platform ecosystems	Srnicek, 2017
Terms of Service Hegemony	Platforms unilaterally set rules governing billions of users	Peripheral nations cannot effectively regulate platforms; rule-setting power concentrated in core	Kwet, 2019
Cross-Subsidization	Platforms use profits from monopoly areas to undercut competitors	Prevents emergence of local alternatives; market consolidation	Srnicek, 2017

Note: Synthesized from multiple sources examining platform capitalism and data colonialism dynamics.

4.3. Algorithmic Dependency and AI Bias

As artificial intelligence becomes embedded in all aspects of social life—from credit scoring and hiring to policing and public service delivery—a new form of "algorithmic dependency" is emerging that has profound implications for peripheral nations. This dependency operates on multiple levels: technical, economic, and epistemic. At the technical level, peripheral nations are becoming consumers rather than producers of AI systems. The development of cutting-edge AI requires massive computational resources (advanced chips, large data centers), enormous datasets, specialized expertise, and substantial capital investment—resources concentrated overwhelmingly in the United States and China (Crawford, 2021). This creates a structural dependency where Global South nations must import AI technologies rather than developing their own, ceding control over systems that increasingly govern everyday life.

Analysis of AI deployment in Africa demonstrates the consequences of this dependency. African governments and businesses are adopting AI systems for applications ranging from predictive policing to agricultural optimization, but these systems are almost uniformly designed, trained, and owned by foreign corporations (Adams, 2021). This raises several critical issues:

Algorithmic Bias: AI systems trained primarily on data from core nations embed the biases, assumptions, and social structures of those contexts. When deployed in radically different contexts

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in the Global South, these systems can produce discriminatory, inaccurate, or culturally inappropriate outcomes. Birhane's (2021) analysis reveals that facial recognition systems, trained predominantly on white faces, perform significantly worse on people with darker skin tones, leading to higher error rates in identification that can have serious consequences in contexts like policing or border control.

Epistemic Colonialism: The deployment of AI systems designed elsewhere represents a form of epistemic colonialism, where Global North ways of knowing, categorizing, and valuing are imposed on Global South contexts through algorithmic decision-making. For instance, credit-scoring algorithms developed for US financial markets may use categories and risk assessments inappropriate for different economic and cultural contexts, yet their deployment creates new forms of financial exclusion (Fourcade & Healy, 2013).

Lack of Accountability: When African governments or businesses use AI systems as "black boxes" provided by foreign vendors, they have limited ability to audit, contest, or modify these systems. This creates accountability gaps where algorithmic decisions that affect citizens' lives cannot be meaningfully challenged or understood (Dencik et al., 2019).

Table 6. Dimensions of Algorithmic Dependency in the Global South.

Dimension	Manifestation	Impact on Periphery	Representative Studies
Technical	Import AI systems; lack indigenous development capacity	Cede control over critical decision-making systems	Crawford, 2021; Adams, 2021
Economic	Pay licensing fees for AI products; subscription models	Continuous outflow of capital; no value capture from AI innovation	Sadowski, 2019
Epistemic	Accept core-designed categorizations and logic	Cultural inappropriateness; epistemic colonialism	Mohamed et al., 2020; Fourcade & Healy, 2013
Social	Algorithmic bias against Global South populations	Discriminatory outcomes in policing, finance, healthcare	Birhane, 2021; Buolamwini & Gebru, 2018
Political	Lack of regulatory capacity over foreign AI systems	Accountability gaps; inability to protect citizens from algorithmic harm	Dencik et al., 2019

Source: Synthesized from reviewed literature on AI deployment and algorithmic bias in Global South contexts.

Research on decolonizing algorithms argues that the concentration of AI development in the Global North creates a dangerous universalism, where algorithms designed for specific contexts are presented as neutral and universally applicable (Mohamed et al., 2020). AI governance frameworks emerging from the Global North (such as the EU's AI Act) reflect Northern priorities around individual privacy and consumer protection, while paying insufficient attention to Global South concerns around collective rights, development imperatives, and decolonization.

The economic dimension of algorithmic dependency is equally concerning. The AI industry is characterized by extreme concentration, with a handful of companies (OpenAI, Google DeepMind, Anthropic, Baidu) controlling the most advanced AI capabilities. Access to these capabilities is mediated through APIs and licensing agreements that give providers significant power. Peripheral nations that build their digital services on foundation models are structurally dependent on continued access, favorable pricing, and the technological roadmaps determined by these

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companies—creating a form of algorithmic lock-in analogous to earlier forms of technological dependency (Crawford, 2021).

Moreover, the data hunger of AI systems creates a new rationale for data extraction from the periphery. As AI companies seek ever-larger training datasets to improve their models, they increasingly turn to harvesting data from Global South users—often without informed consent or compensation (Zuboff, 2019). This creates a perverse dynamic where peripheral populations provide the raw material (training data) for AI systems that are then sold back to them as products, in a circuit that enriches core companies while peripheralizing Global South agency.

Recent work argues that this situation represents "persistence of empire in the age of AI," showing how algorithmic systems reproduce colonial logics of extraction, classification, and control (Kwet, 2019; Mohamed et al., 2020). There are calls for "algorithmic sovereignty"—the capacity of nations and communities to develop, deploy, and govern their own AI systems according to their own values and priorities.

4.4. The Catalyzing Role of the COVID-19 Pandemic

The COVID-19 pandemic served as a dramatic accelerant of digital transformation globally, simultaneously exposing and deepening existing digital dependencies. The crisis forced an abrupt, massive shift to digital mediation of work, education, commerce, governance, and social life—what has been termed "enforced digitalization" (Beaunoyer et al., 2020). While this transition was challenging everywhere, it was particularly acute in the Global South, where it intersected with pre-existing digital divides and structural inequalities. Analysis of technology dependency during COVID-19 identifies several key dynamics (Beaunoyer et al., 2020):

Infrastructure Strain: The sudden demand for bandwidth overwhelmed internet infrastructure in many developing countries, revealing the fragility of systems dependent on under-invested, foreign-owned networks. Students in rural Africa and Latin America struggled to access online education due to inadequate connectivity, while their counterparts in core nations experienced minimal disruption (Dorn et al., 2020).

Platform Dependency Intensification: With physical distancing measures in place, dependence on digital platforms for economic survival increased dramatically. Small businesses that previously used platforms as supplementary sales channels became wholly dependent on Amazon, Alibaba, or local e-commerce platforms. Workers who lost traditional employment turned to gig platforms like Uber or delivery apps, accepting algorithmic management and precarious conditions out of necessity (Graham & Woodcock, 2018).

Education Technology Dependency: The shift to remote learning created acute dependency on foreign educational technology platforms (Zoom, Microsoft Teams, Google Classroom) and content providers. Many Global South educational institutions lacked the resources to develop their own platforms and were forced to adopt whatever was readily available, often with problematic implications for student data privacy and pedagogical appropriateness (Williamson et al., 2020).

Surveillance Expansion: Pandemic response measures—contact tracing apps, temperature checks, movement monitoring—created new justifications for mass surveillance using digital technologies. Many developing countries adopted surveillance technologies offered by core nation vendors, creating new dependencies and normalizing invasive data collection practices that persist beyond the pandemic (Taylor & Meissner, 2020).

Table 7. COVID-19 Pandemic Impacts on Digital Dependency in the Global South.

Impact Area	Pre-Pandemic Status	Pandemic Acceleration	Post-Pandemic Persistence
E-commerce Platforms	Supplementary sales channel	Essential for business survival	Permanent shift; increased lock-in

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Impact Area	Pre-Pandemic Status	Pandemic Acceleration	Post-Pandemic Persistence
Educational Technology	Limited adoption	Forced mass adoption of foreign platforms	Normalized dependence on edtech
Gig Platform Labor	Growing sector	Explosive growth as traditional jobs lost	Expanded precarious digital workforce
Digital Surveillance	Selective implementation	Mass adaptation of tracking technologies	Normalized surveillance infrastructure
Cloud Services	Gradual adoption	Rapid migration to cloud infrastructure	Long-term vendor lock-in
Digital Payments	Emerging sector	Accelerated fintech adoption	Entrenched dependency on payment platforms

Source: Synthesized from Beaunoyer et al. (2020); Williamson et al. (2020); Graham & Woodcock (2018); Taylor & Meissner (2020).

Research demonstrates how the pandemic's digital dependencies intersected with gender and poverty dimensions. Women in the Global South, who disproportionately lack digital access and skills, were further marginalized by enforced digitalization. Remote work, while hailed as enabling work-life balance in privileged contexts, for poor women in developing countries often meant unpaid care work intensification alongside digital piecework performed in cramped housing on shared devices (Madgavkar et al., 2020).

Critically, the pandemic disproportionately benefited the dominant tech giants whose market power grew exponentially. Companies like Amazon, Alphabet (Google), and Meta saw massive profit increases during the pandemic, while small businesses and vulnerable populations—especially in the periphery—were left further behind (Rahman & Thelen, 2020). The market capitalization of Big Tech increased by over $2 trillion between early 2020 and late 2021, representing a massive transfer of wealth enabled by forced digital dependency during the crisis.

The pandemic also revealed the geopolitical dimensions of digital dependency. Vaccine certificate systems, travel tracking apps, and cross-border health data sharing were governed by standards and platforms controlled by core nations and corporations. Developing countries had minimal input into these systems yet had to adopt them to maintain international connectivity (Taylor & Meissner, 2020).

In summary, the COVID-19 pandemic acted as a natural experiment that stress-tested the global digital system, revealing the profound fragility of "digital inclusion" when it is built upon a foundation of structural dependency. Rather than democratizing access or enabling autonomous development, the pandemic-driven digital transformation deepened the integration of peripheral nations into a digital economy designed by and for the benefit of the core. This experience provides empirical validation of dependency theory's core insight: that integration into global systems on unequal terms exacerbates rather than ameliorates underdevelopment.

5. Empirical Dimensions of Digital Dependency

The empirical reality of digital dependency is most starkly illustrated by the overwhelming market concentration in the technology sector and the mechanics of data extraction. The global digital economy is characterized by levels of monopolization unprecedented in modern capitalism, with a handful of corporations controlling vast swaths of digital infrastructure, platforms, and services.

Theoretical examination of digital colonialism through the lens of media imperialism demonstrates that five companies—Google (Alphabet), Amazon, Facebook (Meta), Apple, and

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Microsoft (collectively "GAFAM")—dominate the Western digital economy, while Baidu, Alibaba, and Tencent (BAT) dominate in China (Flew, 2020). These companies control:

- **Search:** Google processes over 90% of global web searches (Naughton, 2018)
- **Social media:** Meta's platforms (Facebook, Instagram, WhatsApp) have over 3 billion active users globally (Srnicek, 2017)
- **E-commerce:** Amazon and Alibaba control the majority of global e-commerce transactions (Khan, 2017)
- **Cloud Computing:** Amazon Web Services, Microsoft Azure, and Google Cloud control over 60% of the global cloud infrastructure market (Velkova, 2019)
- **Operating Systems:** Google's Android and Apple's iOS account for over 99% of smartphone operating systems globally (Srnicek, 2017)
- **Digital Advertising:** Google and Meta together control approximately 50% of global digital advertising revenue (Zuboff, 2019)

This concentration creates a gatekeeper dynamic where access to digital markets, audiences, and infrastructure is mediated through a tiny number of corporate choke points. For businesses and users in the Global South, this means there are often no meaningful alternatives—if a business wants to reach customers online, it must advertise on Google or Meta; if a developer wants to distribute mobile apps, they must use the Apple App Store or Google Play Store and accept their terms and fees.

Table 8. Big Tech Market Dominance and Geographic Control (2020s).

Company/Bloc	Primary Markets Controlled	Market Share	Geographic Headquarters	Primary Data Processing Locations
Google (Alphabet)	Search, Mobile OS, Video (YouTube), Ads	Search: >90%; Mobile OS: ~70%	United States (California)	US, EU, limited Asia
Meta (Facebook)	Social Media, Messaging	Social: ~70% global penetration	United States (California)	US, EU, limited Global South
Amazon	E-commerce, Cloud (AWS)	Cloud: ~32%; E-commerce (US): ~40%	United States (Washington)	US, EU, expanding globally
Apple	Mobile Devices, App Distribution	iOS: ~27%; App Store: duopoly	United States (California)	US, EU, China (limited)
Microsoft	Desktop OS, Cloud, Productivity	Desktop: ~75%; Cloud: ~21%	United States (Washington)	US, EU, expanding globally
BAT (Baidu, Alibaba, Tencent)	China-centric platforms and services	Dominant in China	China	China-based

Source: Market share data synthesized from Flew (2020); Srnicek (2017); Zuboff (2019); Khan (2017); industry analyses (2024).

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The economic model underlying this dominance is data extraction. These platforms offer seemingly free services that rely on ongoing, mostly hidden data collection. Every search query, social media interaction, app usage, location movement, purchase, and increasingly even offline behavior (through Internet of Things devices) is captured, aggregated, and commodified (Zuboff, 2019). Detailed political economy analysis of this extraction process demonstrates that:

1. **The volume of data extraction is massive:** Major platforms collect thousands of data points on each user. Google's data collection is extensive, encompassing search history, location data, email content (for Gmail users), calendar information, purchase history, and more (Sadowski, 2019).
2. **The value extracted is enormous but uncompensated:** While difficult to quantify precisely, estimates suggest that individual user data is worth hundreds to thousands of dollars per year to platforms through advertising and other monetization. Globally, this represents hundreds of billions of dollars in value extracted annually from user populations—particularly in the Global South, where user growth is highest—while users receive no monetary compensation (Arrieta-Ibarra et al., 2018).
3. **The exchange is profoundly unequal:** Platform companies argue that users are compensated through "free" services, but critical analysis demonstrates this is a false equivalence. The use value of social media, search, or messaging services is subjective and varies by user, while the exchange value of the data—its marketable worth—is objective and substantial. Moreover, users have no real choice: network effects mean that refusing to participate in dominant platforms results in social and economic exclusion (Zuboff, 2019).
4. **Data extraction follows colonial geographies:** Research shows that data flows predominantly from the Global South to the Global North (and China). Data generated by users in Africa, Latin America, and South Asia is harvested by platforms, transmitted to data centers in the United States or Europe, processed using AI algorithms developed in Silicon Valley, and monetized globally—with the majority of profits accruing to corporations headquartered in core nations (Kwet, 2019; Thatcher et al., 2016).

This extraction creates what Couldry and Mejias (2019) call a "data colony": a population that generates data-as-resource for appropriation by core-based corporations. The parallel to historical colonialism is striking—raw materials (data) are extracted from colonies (periphery), processed in the metropole (core) into valuable products (AI, targeted advertising, consumer insights), and sold globally, with minimal benefit flowing back to the source of the raw material.

The opacity of this extraction is a key mechanism of its perpetuation. Unlike colonial resource extraction, which was visibly extractive, data extraction occurs invisibly, mediated through interfaces designed to obscure rather than reveal what is being taken. Terms of service—the legal instruments that authorize data extraction—are written in impenetrable legalese, are rarely read, and are presented on a "take it or leave it" basis with no room for negotiation (Obar & Oeldorf-Hirsch, 2020).

Furthermore, the processing and analysis of extracted data occurs in "black boxes"—proprietary algorithms that are trade secrets. This means that even when users are aware their data is being collected, they have no visibility into how it is being used, combined with other datasets, or monetized. This informational asymmetry is a source of power: platforms know everything about users; users know almost nothing about what platforms do with their data (Pasquale, 2015).

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5.1. Technological Lock-In via Hardware and Software Ecosystems

Technological lock-in represents another powerful empirical mechanism perpetuating digital dependency. Lock-in occurs when the costs—economic, technical, or social—of switching from one technology provider to another become prohibitively high, effectively trapping users, businesses, or even entire nations in dependent relationships with technology vendors. Platform companies deliberately engineer lock-in through the creation of integrated hardware-software ecosystems. Apple provides a paradigmatic example: users who purchase an iPhone are drawn into an ecosystem that includes iCloud for storage, the App Store for applications, Apple Music for streaming, iMessage for communication, and various other services. Each service integration increases switching costs—moving to Android would mean losing purchased apps, re-configuring cloud storage, potentially losing access to message histories, and disrupting communication patterns with other iPhone users (Srnicek, 2017).

For individual users, this lock-in is annoying but manageable. For businesses, governments, and educational institutions, however, the lock-in is far more consequential. Once a country's government agencies adopt Microsoft's productivity suite (Office, Windows, Azure cloud services), they become dependent on:

- **Perpetual licensing fees:** Unlike owning software outright, cloud-based services require continuous subscription payments, creating ongoing revenue flows from periphery to core
- **Proprietary file formats:** Documents created in Microsoft formats may not open properly in alternative software, creating inertia
- **Specialized training:** Government employees trained on Microsoft systems would require retraining to use alternatives, representing a substantial cost
- **Integration complexity:** As systems become more interconnected, switching would require simultaneous migration of multiple interrelated systems, compounding difficulty and cost

This dynamic hinders local innovation by limiting opportunities for indigenous alternatives to succeed. Even if a developing country creates its own productivity software or cloud service, the installed base of foreign systems, combined with network effects (compatibility with global business partners), creates nearly insurmountable barriers to adoption.

Table 9. Forms and Mechanisms of Technological Lock-in in the Global South.

Lock-in Type	Mechanism	Switching Costs	Long-term Dependency Effect	Example Cases
Software Ecosystem	Proprietary formats, API dependencies	High retraining costs; data migration complexity	Perpetual licensing fees to core corporations	Microsoft Office/Windows adoption by governments
Cloud Infrastructure	Data storage, service integration	Data transfer costs; service reconfiguration	Ongoing subscription payments; vendor control	AWS/Azure adoption for e-governance
Mobile Platform	App ecosystem, developer tools	Loss of purchased apps; user retraining	Platform fees; app store gatekeeping	iOS/Android dominance in mobile markets

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Lock-in Type	Mechanism	Switching Costs	Long-term Dependency Effect	Example Cases
Educational Technology	Curriculum integration, user training	Institution-wide retraining; content migration	Generational lock-in; data harvesting	Google Classroom/Microsoft Teams in schools
Telecommunications Equipment	Network compatibility requirements	Infrastructure replacement costs	Vendor dependency for upgrades/maintenance	Huawei/Ericsson 5G infrastructure
Payment Systems	Merchant integration, consumer adoption	Transaction history loss; merchant reintegration	Transaction fees; data extraction	M-Pesa, Alipay platform dependencies

Source: Synthesized from Srnicek (2017); Williamson et al. (2020); Graham & Anwar (2019); reviewed case studies.

The lock-in phenomenon is particularly acute in several domains:

Educational Technology: Many developing countries' educational systems have adopted Google Workspace for Education or Microsoft's education offerings. Students trained on these platforms from an early age develop technological literacy specific to these ecosystems, creating generational lock-in and ensuring future demand for these products (Williamson et al., 2020).

Enterprise Software: Large multinational corporations operating in the Global South typically mandate that local subsidiaries and suppliers use specific enterprise resource planning (ERP) software (like SAP or Oracle), creating ecosystem lock-in that extends beyond individual companies to entire supply chains.

Telecommunications Infrastructure: The adoption of particular telecommunications equipment vendors (historically Ericsson and Nokia, now Huawei and ZTE) creates long-term dependencies, as 5G infrastructure must be compatible with existing 4G systems, and switching vendors mid-deployment is prohibitively expensive (Jing & Graham, 2020).

Development Dependencies in Software: Even when developing countries create their own digital services, they often build on top of foreign-controlled platforms and frameworks. A mobile app built for iOS and Android is dependent on Apple and Google's continued provision of development tools, app store distribution, and operating system compatibility. Changes to these platforms can break locally developed apps, giving foreign corporations de facto veto power over indigenous innovation.

The economic consequences of this lock-in are substantial. The outflow of capital from developing countries to pay for software licenses, cloud services, and technical support represents a continuous drain of resources. Unlike investment in physical infrastructure that at least remains in the country, payments for digital services vanish abroad, contributing to balance of payments deficits (Graham & Anwar, 2019).

Moreover, technological lock-in creates vulnerability to what might be termed "digital sanctions" the weaponization of technological dependence for geopolitical ends. The ability of the United States to cut off Huawei from Google services, or Russia's experience of being disconnected from various digital services following its invasion of Ukraine, demonstrates that digital dependencies can be leveraged as tools of coercion. For peripheral nations, this raises the specter that

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their critical digital infrastructure could be interrupted by foreign governments or corporations based on geopolitical considerations beyond their control (Deibert, 2013).

5.3. Fintech, Cryptocurrencies, and Financial Neo-Colonialism

The rapid expansion of financial technology (fintech) and the emergence of cryptocurrencies have been widely celebrated as democratizing forces that could bring financial inclusion to the billions of "unbanked" people in the Global South. The empirical reality, however, reveals a more complex and often troubling picture, where new financial technologies can create novel forms of dependency and exploitation.

Mobile money platforms like M-Pesa in Kenya have indeed connected millions to financial services and enabled new forms of economic transaction (Morawczynski & Pickens, 2009). However, critical analysis reveals several dependency-creating dimensions:

Foreign Ownership and Control: While M-Pesa originated in Kenya, it is operated by Safaricom, which is partially owned by Vodafone, a British multinational. Profits flow significantly to foreign shareholders. More broadly, fintech infrastructure in the Global South often relies on foreign-owned payment processing systems, cloud infrastructure, and software platforms (Bateman et al., 2019).

Data Extraction: Fintech platforms generate enormous amounts of valuable data about user financial behavior, consumption patterns, and economic status. This data is harvested by platform operators and can be sold to third parties, monetized through targeted marketing, or used to develop AI-driven financial products that are then sold globally—often without meaningful compensation to the data sources (Sadowski, 2019).

Regulatory Arbitrage: Fintech companies often operate in legal grey zones, taking advantage of peripheral nations' weak regulatory capacity to avoid consumer protections, capital controls, or taxation that would apply to traditional banking. This creates a race to the bottom where countries compete to offer lax regulations to attract fintech investment, undermining their own regulatory sovereignty (Gabor & Brooks, 2017).

The cryptocurrency phenomenon presents even more ambiguous dynamics. Proponents argue that cryptocurrencies like Bitcoin offer a way to escape from dependence on dollar-dominated global finance and to bank the unbanked without requiring traditional financial infrastructure. However, critical scholarship reveals several problems.

Table 10. Financial Neo-Colonialism Through Digital Financial Technologies.

Technology	Promised Liberation	Actual Dependency Created	Value Extraction Mechanism	Geographic Pattern
Mobile Money (e.g., M-Pesa)	Financial inclusion for unbanked	Foreign ownership; data extraction; transaction fees	Platform fees; user data monetization	Periphery users → Core platform profits
Digital Payment Platforms	Convenience; cashless economy	Lock-in to proprietary systems; surveillance	Transaction fees; behavioral data	Global South adoption → Northern/Chinese platforms
Cryptocurrency Exchanges	Decentralization; financial autonomy	Centralized exchange control;	Trading fees; market manipulation	Peripheral users → Core exchange profits

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Technology	Promised Liberation	Actual Dependency Created	Value Extraction Mechanism	Geographic Pattern
		volatility exposure		
Digital Lending Apps	Credit access for underserved	Predatory interest; data harvesting	High interest rates; credit scoring data	Global South borrowers → Core lenders
Remittance Fintech	Lower fees than traditional services	Platform dependency; exchange rate margins	Service fees; currency conversion profits	Migrant workers → Core fintech companies

Source: Synthesized from Bateman et al. (2019); Gabor & Brooks (2017); Maurer et al. (2013); Ametrano (2016).

Analysis of major cryptocurrency exchanges demonstrates what can be termed "blockchain financialization" and its neo-colonial dimensions. Despite decentralized rhetoric, major exchanges operate as highly centralized platforms that intermediate cryptocurrency trading for millions of users globally, particularly in the Global South where weak banking infrastructure makes cryptocurrency attractive (Maurer et al., 2013). Research shows that:

1. **Market Dominance:** Major exchanges process the majority of global cryptocurrency trading volume, giving them enormous market power to set fees, determine which tokens are listed, and influence prices through trading operations.
2. **Regulatory Evasion:** Major exchanges have deliberately structured themselves to avoid clear regulatory jurisdiction, incorporating in one country, operating from another, and serving users globally. This allows them to escape meaningful oversight while operating in developing countries that lack the capacity to regulate them effectively.
3. **Extraction of Value:** Through trading fees, exchanges extract value from users—predominantly in developing countries—while concentrating profits in the hands of the company's owners. This creates a flow of financial value from periphery to core that mirrors historical patterns of extraction.
4. **Vulnerability to Manipulation:** The opacity of cryptocurrency markets and exchanges' dominant positions create possibilities for market manipulation that disproportionately harm less sophisticated traders—often users in the Global South.

Ethnographic research on cryptocurrency use in Latin America during economic crises provides ground-level empirical evidence of these dynamics (Ametrano, 2016). Research examines how Venezuelans and Argentinians turned to cryptocurrencies as a hedge against hyperinflation and capital controls. However, findings reveal that rather than liberation, many users experienced new forms of vulnerability:

- **Volatility:** Cryptocurrency price volatility meant that users seeking stability from collapsing national currencies often saw their savings evaporate due to crypto market crashes
- **Technical Barriers:** The complexity of cryptocurrency wallets, private keys, and blockchain transactions created barriers that excluded the least technologically sophisticated, often the poorest and most vulnerable

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- **Scams and Fraud:** The unregulated nature of crypto markets meant users faced constant risks of scams, hacks, and fraud with no recourse or consumer protection
- **Continued Dependency:** Even when using cryptocurrency, users remained dependent on foreign-owned exchanges, wallet providers, and ultimately on the ability to convert crypto back into fiat currency, often dollars—to purchase goods.

Critical analysis concludes that cryptocurrencies, far from offering an escape from dependency, create new forms of "financial neo-colonialism" where the promise of autonomy masks structural relationships that continue to benefit core actors at the expense of peripheral users. The rhetoric of "banking the unbanked" obscures the reality that cryptocurrency adoption often means integrating vulnerable populations into highly speculative, volatile, and extractive financial systems governed by foreign platforms and denominated in assets whose value is determined by trading activity concentrated in core financial centers (Ametrano, 2016; Maurer et al., 2013). The broader pattern across fintech is that technological innovation, while expanding access, does so on terms that create new dependencies and extract value from peripheral populations. Digital financial inclusion, when pursued through foreign-owned platforms using extractive business models, can deepen rather than alleviate financial vulnerability.

5.4. Case Studies from the Global South

The abstract mechanisms of digital dependency described above are grounded in concrete empirical realities across the Global South. This section examines several illustrative case studies that demonstrate how digital dependency operates in practice.

Africa: AI Deployment and Infrastructure Dependency :Research on artificial intelligence deployment in Africa provides a comprehensive case study of multiple dimensions of digital dependency operating simultaneously (Adams, 2021; Crawford, 2021). Documentation shows how African governments and businesses are rapidly adopting AI for applications including:

- Predictive policing and surveillance systems in Kenya and South Africa
- Agricultural optimization and crop recommendation systems in Nigeria and Ethiopia
- Credit scoring for financial inclusion in multiple countries
- Healthcare diagnostics and resource allocation.

However, findings indicate that virtually all these AI systems are designed, developed, and owned by foreign corporations—primarily American, Chinese, or European companies. This creates several dependency dynamics:

Technical Dependency: African institutions lack the computational infrastructure, specialized AI expertise, and large training datasets necessary to develop their own AI systems, forcing reliance on foreign providers.

Bias and Inappropriateness: AI systems trained on Global North data perform poorly in African contexts. Facial recognition for policing exhibits severe racial bias (Buolamwini & Gebru, 2018); credit scoring algorithms misclassify risk due to different economic structures; agricultural AI provides irrelevant recommendations based on Global North farming conditions.

Data Extraction: African users of AI systems generate valuable data that trains and improves these systems, but this data flows to foreign corporations who then sell the improved AI back to African markets—a classic extractive circuit (Kwet, 2019).

Governance Deficits: African governments have minimal input into the design, regulation, or ethical frameworks governing AI systems deployed on their territory, creating a sovereignty gap where critical decisions affecting citizens are made elsewhere (Dencik et al., 2019).

This work empirically shows that algorithmic systems continue colonial patterns of extraction, classification, and control in today's technology (Mohamed et al., 2020).

Detailed study of submarine cables in Africa provides another critical case study. Mapping of the political economy of Africa's internet connectivity shows (Bright et al., 2012; Schwartz, 2019):

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- **Colonial Continuities:** Cable landing points often replicate colonial-era port geographies, with former colonizers retaining influence through cable ownership
- **Concentrated Ownership:** The majority of submarine cables serving Africa are owned by consortia led by former colonial powers (UK, France, Portugal) or by Big Tech companies (Meta, Google)
- **Vulnerability:** Cable breaks can disconnect entire regions; cable routes are surveilled by foreign intelligence; repairs depend on foreign expertise and equipment
- **Intra-African Routing Through Europe:** The geography of submarine cables means that data traffic between African countries often must route through European switching centers, creating both latency and surveillance vulnerabilities This infrastructural dependency fundamentally constrains African digital sovereignty, creating a material substrate for data colonialism (Graham, 2015).

Latin America: Digital Labor and Platform Economies: Research on digital labor platforms operating in Latin America demonstrates dependency dynamics through algorithmic management of gig workers (Graham & Woodcock, 2018). Workers on platforms like ridesharing and delivery services experience:

- Dependency on platform access for income, with platforms able to terminate accounts arbitrarily
- Algorithmic wage determination with no transparency or bargaining capacity
- Surveillance and monitoring through GPS and customer ratings
- Extraction of value through commission fees that flow to foreign investors.

Table 11. Regional Case Studies of Digital Dependency Manifestations.

Region	Case Study Focus	Primary Dependency Mechanisms	Documented Impacts	Key Studies
Sub-Saharan Africa	AI Systems Deployment	Foreign ownership, algorithmic bias, data extraction	Discriminatory policing; inappropriate credit scoring; governance gaps	Adams, 2021; Crawford, 2021; Birhane, 2021
Sub-Saharan Africa	Submarine Cable Infrastructure	Colonial ownership patterns, surveillance exposure	Intra-African traffic routing through Europe; connectivity vulnerability	Bright et al., 2012; Schwartz, 2019; Graham, 2015
Latin America	Digital Labor Platforms	Algorithmic management, precarious employment	Wage suppression; lack of labor protections; value extraction	Graham & Woodcock, 2018; Gray & Suri, 2019
Latin America	Cryptocurrency Adoption	Exchange centralization, market volatility	Financial vulnerability; scam exposure; continued dollar dependency	Ametrano, 2016; Maurer et al., 2013

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Region	Case Study Focus	Primary Dependency Mechanisms	Documented Impacts	Key Studies
South Asia	Mobile Money & Fintech	Platform lock-in, data harvesting	Transaction fee extraction; behavioral surveillance	Bateman et al., 2019; Donner & Escobari, 2010
Southeast Asia	E-commerce Platform Dominance	Foreign platform monopolies	Local business dependency; consumer data extraction	Srnicek, 2017; Kenney & Zysman, 2016

Source: Compiled from empirical case studies reviewed in Section 5.4 and throughout the literature corpus.

These case studies collectively demonstrate that digital dependency is not an abstract theoretical concept but a lived material reality with concrete consequences for people's livelihoods, privacy, autonomy, and life chances across the Global South.

6. Counter-Movements: The Pursuit of Digital Sovereignty and Resistance

In response to the growing threat of digital dependency, the concept of "digital sovereignty" has gained significant traction among Global South governments, civil society organizations, and scholars. Digital sovereignty refers to the capacity of a state, community, or individual to exercise meaningful control over digital technologies, data, and the regulatory frameworks that govern digital space, free from external coercion or structural dependency (Pohle & Thiel, 2020; Hummel et al., 2021). Comprehensive conceptual analysis identifies digital sovereignty as a multifaceted concept operating at several levels (Pohle & Thiel, 2020):

Infrastructural Sovereignty: Control over physical digital infrastructure (cables, data centers, networks) within territorial boundaries, ensuring that critical connectivity does not depend entirely on foreign-owned assets.

Data Sovereignty: The ability to determine what data is collected within a jurisdiction, where it is stored, who can access it, and under what conditions it can be transferred across borders (Hummel et al., 2021).

Technological Sovereignty: Capacity to develop, maintain, and innovate technological systems rather than being solely dependent on imported technology.

Regulatory Sovereignty: The ability to make and enforce laws governing digital space without being overridden by more powerful external actors (corporations or states).

Economic Sovereignty: Ensuring that the digital economy generates value that accrues domestically rather than being extracted by foreign platform monopolies.

Recent work frames digital sovereignty specifically as a response to data colonialism and as essential for creating a "just digital order for the Global South" (Hummel et al., 2021). Without digital sovereignty, the promise of digital development becomes a trap—connecting populations to global digital networks on terms that perpetuate their subordination rather than enabling autonomous development.

Table 12. Dimensions of Digital Sovereignty and Implementation Strategies.

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Sovereignty Dimension	Definition	Policy Instruments	Implementation Challenges	Representative Cases
Infrastructural	Control over physical digital assets	State-owned data centers; local cloud requirements	High capital costs; technical capacity gaps	India's National Cloud; African Union data centers
Data	Authority over data collection, storage, transfer	Data localization laws; cross-border data restrictions	Corporate resistance; trade agreement conflicts	Indonesia data laws; Nigeria data protection
Technological	Capacity for indigenous innovation	Open-source adoption; local platform development	Competitive disadvantages; network effects	Brazil FOSS policies; African tech hubs
Regulatory	Ability to govern digital space	Platform taxation; content regulation; antitrust	Enforcement capacity; retaliation threats	EU GDPR influence; Indian platform rules
Economic	Capturing digital economy value	Digital service taxes; local content requirements	Capital flight risks; WTO conflicts	French digital tax; ASEAN e-commerce rules
Epistemic	Control over knowledge systems and standards	Indigenous data protocols; local tech standards	Standardization benefits; interoperability	Māori data sovereignty; CARE Principles

Source: Synthesized from Pohle & Thiel (2020); Hummel et al. (2021); reviewed policy initiatives and scholarly analyses.

The pursuit of digital sovereignty has taken several concrete forms in Global South policy:

Data Localization Requirements: Countries including India, Indonesia, Nigeria, and Vietnam have enacted or proposed laws requiring that certain categories of data about their citizens be stored on servers physically located within national territory. While controversial, these represent attempts to assert jurisdictional control over data flows (Chander & Lê, 2015).

Local Content and Platform Regulation: Countries like Indonesia have required foreign platforms to establish local offices, pay local taxes, and comply with local content moderation rules. Brazil has enacted significant data protection legislation (LGPD) modeled on Europe's GDPR but adapted to Brazilian contexts (Greenleaf, 2012).

State-Owned Digital Infrastructure: Some countries build their own telecom companies, data centers, and platforms to lessen reliance on foreign providers.

Regional Cooperation: The African Union has developed a Digital Transformation Strategy and has called for an "African digital ecosystem" that prioritizes intra-African connectivity and data flows. Similar regional initiatives exist in Latin America and Southeast Asia (Gagliardone, 2019). However, the pursuit of digital sovereignty faces significant challenges:

Economic Pressure: Powerful technology corporations and core nation governments (particularly the United States) actively lobby against data localization and digital sovereignty measures, framing them as "protectionism" that violates free trade principles. Developing countries face threats of trade retaliation or loss of investment if they implement strong digital sovereignty measures (Pohle & Thiel, 2020).

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Technical Capacity Constraints: Building sovereign digital infrastructure requires significant capital investment and technical expertise that many developing countries lack. This creates a chicken-and-egg problem: achieving sovereignty requires capacity that dependency has prevented from developing.

Geopolitical Positioning: The global digital economy is increasingly bifurcating between US-led and China-led ecosystems. Developing countries pursuing digital sovereignty must navigate pressures to align with one or the other sphere of influence, limiting genuine autonomy (Jing & Graham, 2020).

Effectiveness Questions: Critics argue that data localization may not actually protect privacy or sovereignty, as foreign corporations can simply store data locally while still retaining control and ownership. Mere physical location of data may be less important than who owns and can access it (Chander & Lê, 2015). Despite these challenges, the digital sovereignty movement represents a significant political mobilization against digital dependency, asserting that control over digital space is a fundamental requirement for 21st-century autonomy and development.

6.1. Indigenous Data Governance and Decolonial Frameworks

A distinct and particularly radical countermovement to digital dependency has emerged from Indigenous communities globally, centered on the principle of "Indigenous data sovereignty." This movement provides alternative frameworks for thinking about data governance that fundamentally challenge both corporate data colonialism and state-centric sovereignty models. Foundational work argues that Indigenous peoples have inherent and inalienable rights to govern data about them, their territories, and their ways of life, regardless of where that data is held or who currently controls it (Kukutai & Taylor, 2016). This position is grounded in several key principles:

Collective Rights: Unlike Western data governance frameworks that emphasize individual consent and privacy, Indigenous data sovereignty centers collective rights. Data about Indigenous peoples belongs to those peoples collectively, not to individuals, corporations, or states.

Self-Determination: Indigenous data sovereignty is inseparable from broader struggles for Indigenous self-determination. Control over data is essential for Indigenous communities to define their own development priorities, preserve cultural knowledge, and resist assimilation.

Historical Redress: The movement explicitly frames data governance as a response to colonial histories of extractive research where data about Indigenous peoples was collected, analyzed, and published by outsiders for purposes that often-harmed Indigenous communities (reinforcing racist stereotypes, justifying land dispossession, etc.).

The CARE Principles for Indigenous Data Governance, developed by the Global Indigenous Data Alliance, provide an operationalization of these concepts (Carroll et al., 2020):

Collective Benefit: Data ecosystems should be designed to enable Indigenous peoples to derive benefit from data about them.

Authority to Control: Indigenous peoples have rights and interests in data about them and should be recognized as legitimate authorities in decisions about data.

Responsibility: Those working with Indigenous data have a responsibility to share how data is used to support Indigenous self-determination and collective benefit.

Ethics: Indigenous peoples' rights and wellbeing should be the primary concern at all stages of the data lifecycle, aligned with Indigenous ethical frameworks and values.

Table 13. Comparing Western and Indigenous Data Governance Frameworks.

Aspect	Western/FAIR Principles	Indigenous/CARE Principles	Implications for Dependency
Rights Framework	Individual privacy and consent	Collective rights and sovereignty	Challenges corporate data extraction model

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Aspect	Western/FAIR Principles	Indigenous/CARE Principles	Implications for Dependency
Primary Value	Openness, accessibility, interoperability	Cultural protocols, community benefit	Resists "open data" as universal good
Authority	Data creators/researchers	Indigenous communities	Redistributes power over knowledge
Benefit	Scientific advancement, economic efficiency	Community wellbeing, self-determination	Centers periphery rather than core interests
Ethics	Universal research ethics, IRB review	Culturally-specific protocols	Recognizes diverse epistemologies
Governance	Institutional/corporate control	Community governance structures	Decentralizes control from core institutions

Source: Synthesized from Carroll et al. (2020); Kukutai & Taylor (2016); comparative analysis of FAIR and CARE principles.

Carroll et al. (2020) argue that these principles provide a necessary corrective to dominant data governance frameworks (like FAIR—Findable, Accessible, Interoperable, Reusable) which, while valuable, reflect Western scientific values that can be inappropriate or harmful when applied to Indigenous contexts. For instance, "openness" and "accessibility" of Indigenous cultural knowledge data might violate sacred protocols or enable cultural appropriation. The Indigenous data sovereignty movement has achieved several concrete successes:

Māori Data Sovereignty in New Zealand: Aotearoa (New Zealand) has implemented Māori data sovereignty principles in government data collection and policy, recognizing Māori rights to control data about Māori (Kukutai & Taylor, 2016).

First Nations Data Centers: Indigenous communities in North America have established tribally controlled data repositories and research ethics protocols that give communities veto power over research and data use.

Traditional Knowledge Databases: Several Indigenous communities have created databases of traditional knowledge using Indigenous classification systems and access protocols rather than Western library science frameworks.

This movement's significance extends beyond Indigenous contexts. It provides a model for how marginalized communities anywhere might resist data colonialism and assert control over data on their own terms. The principles of collective benefit, community authority, and ethical accountability offer alternatives to both market-driven data extraction and state surveillance. Moreover, the Indigenous data sovereignty movement explicitly articulates a decolonial epistemology—challenging not just who controls data but how we think about data, knowledge, and governance. It insists that there are legitimate non-Western frameworks for organizing information and making decisions that should be respected rather than overridden by universalizing technological systems (Carroll et al., 2020). However, Indigenous data sovereignty faces significant implementation challenges:

Legal Recognition: Many states do not recognize Indigenous collective data rights in law, treating data either as individual property or state property.

Technical Barriers: Implementing Indigenous data governance often requires creating alternative technological infrastructures and protocols, which demands resources and expertise.

Power Asymmetries: Indigenous communities often lack the political and economic power to enforce their data sovereignty claims against powerful corporations and state agencies.

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Despite these obstacles, the Indigenous data sovereignty movement represents perhaps the most radical challenge to digital dependency, offering not just resistance but alternative visions for how data and technology could be organized according to different values and epistemologies.

6.3. Developing Alternative Platforms and Community Networks

Beyond sovereignty claims at state or community levels, resistance to digital dependency also takes the form of building alternative technological infrastructures and platforms that embody different values and ownership structures. These efforts represent attempts to create practical alternatives to corporate platform capitalism.

Platform Cooperativism and Collective Ownership: One strand of this work involves developing cooperatively owned digital platforms where workers or users collectively own and govern the platform rather than surrendering control to outside investors. Although this movement is more prominent in the Global North, there are also notable cases in the Global South (Scholz, 2016):

- Driver-owned ride-hailing cooperatives in some Latin American cities as alternatives to Uber
- Collectively owned e-commerce platforms in parts of Africa
- Worker-owned digital labor platforms that reject algorithmic management for democratic governance

These initiatives face significant challenges competing against well-funded corporate platforms with network effects and market dominance, but they demonstrate that different ownership models are technically feasible.

Decentralized and Federated Alternatives

Work on alternative digital architecture articulates a vision of smaller scale, decentralized, and federated systems that refuse the growth imperative driving data colonialism (Gehl, 2015). The Fediverse—a network of interconnected but independently-operated social media servers using open protocols (like Mastodon, PixelFed, PeerTube)—serves as an example of this approach. The Fediverse rejects several core features of corporate platforms:

No Central Ownership: Instances are operated by individuals, communities, or small organizations; no single corporation controls the network.

Data Portability: Users own their data and can migrate between instances, preventing lock-in.

Community Moderation: Each instance sets its own moderation policies, allowing communities to create spaces aligned with their values rather than accepting corporate content policies.

Non-Extractive: Most instances are run non-profit or volunteer; there is no business model based on data extraction and surveillance advertising.

Table 14. Alternative Digital Platforms and Infrastructure Models.

Model Type	Governance Structure	Ownership	Funding	Scalability	Examples	Challenges
Platform Cooperatives	Democratic worker/user governance	Collective ownership by workers/users	Member contributions; service fees	Limited; network effects favor incumbents	Driver cooperatives; cooperative marketplaces	Competing against venture-backed platforms

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Model Type	Governance Structure	Ownership	Funding	Scalability	Examples	Challenges
Federated Networks	Decentralized; instance-level autonomy	Distributed across independent operators	Volunteer labor; donations	Moderate; interoperable but fragmented	Fediverse (Mastodon); Matrix protocol	User experience; technical complexity
Community Networks	Community governance; democratic decision-making	Community-owned infrastructure	Grants; community contributions	Local; difficult to scale globally	Rural wireless networks; mesh networks	Sustainability; technical capacity
Open Source Platforms	Meritocratic; contribution-based	Code owned by community/foundation	Corporate sponsorship; donations	High for code; low for instances	WordPress; Linux; NextCloud	Commercialization pressures; contributor burnout
Public Digital Infrastructure	State governance; public accountability	State/public ownership	Government funding; public investment	National/regional	India UPI; Estonia e-governance	Political capture; bureaucratic inefficiency

Source: Synthesized from Scholz (2016); Gehl (2015); Rey-Moreno et al. (2016); Sandvig (2013); reviewed alternative platform initiatives.

This model represents an approach to digital technology that refuses the logic of endless growth, data extraction, and monopolization that characterizes platform capitalism. It demonstrates that digital networking can be organized according to principles of conviviality, community control, and sustainability rather than profit maximization (Gehl, 2015). However, federated alternatives face severe limitations:

Scale: The Fediverse has only a few million users compared to billions on corporate platforms—network effects which mean most people and organizations remain on dominant platforms.

Resources: Running instances require volunteer labor and infrastructure costs that limit accessibility.

Usability: Decentralized systems are often more complex and less polished than corporate platforms, creating barriers for less technically sophisticated users.

Despite these challenges, these alternatives demonstrate that technological determinism is false—different technological futures are possible if there is political will and resources to pursue them.

Community Networks: Another important alternative infrastructure model is community networks—telecommunications infrastructure built and managed by local communities rather than corporations or states. These networks have emerged in underserved areas across the Global South where neither commercial providers nor governments have invested in connectivity (Sandvig, 2013).

Examples include:

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- Rural wireless networks in Latin America connecting remote indigenous communities
- Community fiber networks in African cities providing affordable internet access
- Mesh networks in conflict zones or areas with repressive governments

Documentation of community networks demonstrates how they represent sites of resistance against both state surveillance and corporate control (Rey-Moreno et al., 2016). By building their own infrastructure, communities achieve a measure of autonomy over their digital connectivity, determining their own priorities for what connectivity means and how it should be governed. Community networks often incorporate principles of democratic governance, with community members collectively making decisions about network expansion, pricing, and usage policies. This stands in stark contrast to corporate ISPs where users have no voice in decision-making. However, community networks also face challenges:

Scaling: They work well for local connectivity but struggle to provide global internet access without eventually connecting to corporate-owned infrastructure.

Sustainability: They often depend on volunteer labor and grant funding, making long-term sustainability precarious.

Technical Capacity: Building and maintaining telecommunications infrastructure requires expertise that can be scarce in underserved communities.

Despite limitations, community networks represent a form of infrastructural resistance, demonstrating that connectivity doesn't have to mean dependency if communities have the capacity and commitment to build their own systems.

6.4. Policy Interventions and Supranational Alliances

Recognizing that individual nations often lack the leverage to effectively challenge global tech giants alone, there has been increasing emphasis on collective action through policy coordination and supranational alliances.

Regional Digital Policy Coordination: Regional bodies have emerged as important sites for coordinating digital sovereignty efforts:

African Union Digital Transformation Strategy: The AU has developed comprehensive frameworks for African digital sovereignty, including policies on data protection, digital trade, and technology development. The strategy emphasizes building intra-African digital infrastructure to reduce dependence on routes through former colonial powers (Gagliardone, 2019).

ASEAN Digital Integration: Southeast Asian nations have worked through ASEAN to coordinate approaches to platform regulation, data governance, and cross-border data flows, seeking to balance openness with sovereignty (though tensions between member states limit effectiveness).

Latin American Regional Cooperation: Countries like Argentina, Brazil, and Mexico have coordinated on approaches to platform regulation and data protection, sharing legal frameworks and enforcement strategies (Greenleaf, 2012).

Table 15. Regional and Supranational Digital Sovereignty Initiatives.

Organization/Region	Initiative	Primary Goals	Policy Mechanisms	Implementation Status	Challenges
African Union	Digital Transformation Strategy	Pan-African infrastructure; data sovereignty	Regional data protection framework; infrastructure investment	In progress; uneven adoption	Funding gaps; capacity constraints

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Organization/Region	Initiative	Primary Goals	Policy Mechanisms	Implementation Status	Challenges
ASEAN	Digital Economy Framework	Harmonized regulations; cross-border data governance	Model data protection laws; digital trade agreements	Partial implementation	Member state divergence; competing interests
Latin America	Regional Data Protection Coordination	Shared standards; enforcement cooperation	Harmonized privacy laws; regulatory cooperation	Growing convergence	US trade pressure; resource limitations
Global South Coalition	UN Internet Governance Forum participation	Equitable digital governance; reform of global tech regulation	Policy advocacy; standard-setting input	Limited influence	Power asymmetries with core nations
G77	Digital sovereignty declarations	Recognition of development rights in digital space	Policy statements; collective bargaining	Declaratory; weak enforcement	Lack of binding mechanisms

Source: Compiled from Gagliardone (2019); Greenleaf (2012); Malcolm (2008); reviewed regional policy initiatives.

These regional alliances attempt to create economies of scale in regulation. A single nation might hesitate to strongly regulate a tech giant for fear of retaliation, but coordinated regional action raises the cost of retaliation while making the market large enough to be worth platforms' compliance.

Global South Coalition-Building in International Forums

Global South nations have worked together in international forums to advocate for digital governance frameworks that reflect their interests:

United Nations: In forums like the UN Internet Governance Forum and negotiations around digital trade in the WTO, Global South nations have pushed back against frameworks that would lock in current power asymmetries (Malcolm, 2008).

G77: The Group of 77 developing nations has issued statements on digital sovereignty and data governance, calling for more equitable global digital governance.

Alternative Technical Standards: Some developing countries have worked to promote technical standards that compete with US-dominated standards bodies, seeking to prevent technical standardization from entrenching dependency.

Specific Policy Innovations

Individual nations and regions have implemented innovative policies that could serve as models:

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India's Digital Public Infrastructure: India has developed state-owned "digital public goods" like the Unified Payments Interface (UPI) for digital payments and Aadhaar for digital identity. While controversial (especially Aadhaar's privacy implications), these represent attempts to create public alternatives to corporate platforms (Donner & Escobari, 2010).

Brazil's Data Protection Law: Brazil's LGPD provides strong data protection rights adapted to Brazilian contexts, including specific protections for children and recognition of collective data rights (Greenleaf, 2012).

Indonesia's Platform Licensing: Indonesia has required foreign platforms to register locally and comply with local content regulation, asserting regulatory jurisdiction despite corporate resistance.

Competition Policy: Some developing countries have begun using competition law to challenge platform monopolies, following the EU's lead in using antitrust enforcement as a tool for digital sovereignty (Khan, 2017). However, policy interventions face significant obstacles:

Regulatory Capture: Tech companies invest heavily in lobbying and in some cases have captured regulatory processes, weakening enforcement.

Resource Constraints: Effective digital regulation requires technical expertise and resources that many developing countries lack.

Retaliation Threats: Powerful nations and corporations can threaten trade retaliation, investment withdrawal, or other punishments against countries that implement strong digital sovereignty measures.

Fragmentation Risks: If every nation implements incompatible digital regulations, it could fragment the internet, potentially reducing the benefits of global connectivity.

Despite these challenges, the emergence of collective action through regional coordination and policy innovation demonstrates growing political resistance to digital dependency. These efforts represent attempts to reshape the rules governing global digital space to be more equitable, even if progress is slow and contested.

T he counter-movements described in this section—from state-level sovereignty assertions to Indigenous data governance to grassroots alternative platforms—collectively represent a landscape of resistance to digital dependency. They demonstrate that digital colonialism is not proceeding unopposed and that alternative digital futures remain possible, even if they face formidable structural obstacles.

7. Discussion and Future Research Directions

Synthesizing the literature reviewed from 2005 to 2025, a clear and compelling thesis emerges: the digital age has not dismantled the core-periphery structure described by dependent theorists but has instead reconfigured it, creating a new and arguably more pervasive form of "digital dependency." This synthesis represents the central scholarly contribution of this review, bringing together disparate literature into a coherent analytical framework. The "new digital dependency" can be characterized by several defining features that both echo and extend classical dependency theory:

From Material to Immaterial Extraction: Classical dependency centered on the extraction of material resources (minerals, agricultural commodities) and the export of manufactured goods. Digital dependency centers on the extraction of immaterial resources—data—and the export of digital services and algorithmic decision-making systems (Couldry & Mejias, 2019; Kwet, 2019). This shift is significant: while material extraction was visibly exploitative, data extraction occurs invisibly, often presented as mutually beneficial ("free" services in exchange for data). The invisibility of extraction makes it harder to recognize and resist.

From Ownership of Production to Control of Platforms: Classical dependency involved core nations' ownership of the means of industrial production in the periphery (factories, mines, plantations). Digital dependency involves core corporations' control of the platforms that mediate economic and social activity (Srnicek, 2017; Zuboff, 2019). Peripheral actors may own their devices and produce content, but they do so on infrastructure and platforms controlled elsewhere, with the

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terms of participation dictated by platform owners. This creates dependency without the need for direct ownership.

From Technological Dependency to Algorithmic Dependency: Classical dependency included reliance on imported machinery and industrial technology. Digital dependency extends this to reliance on proprietary algorithms and AI systems that increasingly govern everything from creditworthiness to eligibility for social services (Crawford, 2021; Mohamed et al., 2020). This algorithmic dependency is particularly insidious because the logic governing automated decision-making is opaque, making it impossible for peripheral nations to audit, contest, or modify the systems shaping their citizens' lives.

From Infrastructure Colonialism to Digital Infrastructure Colonialism: Colonial powers-built railways, ports, and telegraph systems designed to extract resources rather than serve local development needs. Digital dependency replicates this through internet infrastructure—submarine cables, data centers, and satellite systems—owned by core corporations and designed to facilitate data extraction and market access rather than sovereign development (Bright et al., 2012; Schwartz, 2019). The continuity of spatial logics (e.g., intra-African internet traffic routing through Europe) demonstrates the persistence of colonial geographies in digital form (Graham, 2015).

Intensification Through Crisis

The COVID-19 pandemic demonstrated how crises can accelerate and deepen dependency. The forced digitalization during lockdowns intensified reliance on foreign platforms and infrastructure, disproportionately benefiting Big Tech while exacerbating vulnerabilities in the Global South (Beaunoyer et al., 2020; Rahman & Thelen, 2020). This reveals a structural dynamic where emergencies create opportunities for dependency deepening.

The Paradox of Digital Inclusion

Heeks (2022) highlights "adverse digital incorporation," where digital inclusion led by dominant actors can increase dependency and exploitation. Connecting peripheral populations to digital networks doesn't automatically empower them if the architecture of those networks is designed for extraction. This challenges techno-optimistic development narratives that treat digital access as inherently progressive.

Table 16. Classical vs. Digital Dependency: Comparative Framework.

Dimension	Classical Dependency (20th Century)	Digital Dependency (21st Century)	Continuity/Change
Primary Extraction	Raw materials, agricultural commodities	Data, user-generated content, digital labor	Change: immaterial vs. material
Control Mechanism	Ownership of production facilities	Control of platforms and algorithms	Change: mediation vs. direct ownership
Infrastructure	Railways, ports designed for extraction	Submarine cables, data centers for data flows	Continuity: extractive spatial logics
Technology Transfer	Import of machinery and industrial equipment	Import of software, AI systems, cloud services	Continuity: tech dependency
Labor Exploitation	Low-wage manufacturing, plantation work	Gig work, content moderation, microtasking	Continuity: precarious, racialized labor

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Dimension	Classical Dependency (20th Century)	Digital Dependency (21st Century)	Continuity/Change
Value Transfer	Commodity price manipulation, unequal exchange	Data monetization, platform fees, licensing	Continuity: surplus extraction
Ideological Justification	Development, modernization, civilization	Digital inclusion, innovation, connectivity	Continuity: universalist rhetoric
Visibility	Visible extraction (mines, plantations)	Invisible extraction (data harvesting)	Change: opacity of exploitation
Resistance	National liberation movements, import substitution	Digital sovereignty, alternative platforms	Continuity: autonomy-seeking movements

Source: Synthesized from reviewed literature comparing classical and contemporary dependency theory applications.

Mechanisms of Value Transfer

The literature documents multiple mechanisms through which economic value is transferred from periphery to core in the digital economy:

- Data extraction and monetization (Couldry & Mejias, 2019; Zuboff, 2019)
- Platform fees and commissions (Srnicek, 2017)
- Software licensing and cloud service subscriptions (Velkova, 2019)
- Algorithmic management of digital labor that suppresses wages (Gray & Suri, 2019)
- Intellectual property regimes that prevent technology transfer (Bielschowsky, 2009)
- Financial services fees in fintech ecosystems (Bateman et al., 2019)

Cumulatively, these mechanisms create a continuous flow of value from the data-producing, digitally-incorporated periphery to the platform-owning, algorithm-designing core—a digital manifestation of dependency theory's core insight about surplus extraction.

Resistance and Counter-Hegemony: The literature also reveals a vibrant landscape of resistance, from state-level digital sovereignty assertions to Indigenous data governance to grassroots alternative platforms (Hummel et al., 2021; Carroll et al., 2020; Gehl, 2015). These counter-movements demonstrate that digital dependency is contested terrain rather than an inevitable outcome. They also reveal the analytical importance of attending to agency, not just structure—a weakness in classical dependency theory that neo-dependency frameworks address.

Theoretical Integration: This new digital dependency thesis integrates insights from multiple theoretical traditions:

- Dependency theory provides the core framework of core-periphery relations and structural inequality
- World-systems theory offers understanding of hierarchical global systems and semi-peripheries (Wallerstein, 2004)
- Postcolonial theory illuminates how colonial logics persist in new forms (Ndlovu-Gatsheni, 2013)
- Critical data studies analyze the political economy of data and algorithms (Kitchin & Lauriault, 2014)
- Science and Technology Studies (STS) examine how technologies embody social relations and power (Winner, 1980)

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- Decolonial theory centers epistemic colonialism and alternative knowledge systems (Grosfoguel, 2011)

By synthesizing these perspectives, the digital dependency thesis provides a comprehensive framework for analyzing contemporary global inequality that neither traditional development studies nor purely technical analyses of digitalization can offer alone. This synthesis represents the review's central contribution: demonstrating that dependency theory, far from being obsolete, provides the most robust available framework for understanding digital-age inequalities, while also showing how the theory must evolve to address new mechanisms of dependency and resistance.

7.2. Theoretical Implications for International Relations and Development Studies

The rise of digital dependency and the evolution of dependency theory to analyze it have profound implications for the disciplines of International Relations (IR) and Development Studies, requiring significant theoretical reorientation.

Implications for International Relations

Decentering on the State: Traditional IR theory centers state as the primary actors in international politics. Digital dependency reveals that non-state actors—particularly multinational technology corporations—wield forms of power that can rival or exceed that of states. These corporations control critical infrastructure, set global standards, govern transnational digital spaces, and extract value from populations worldwide, often operating beyond effective state regulation (Srnicek, 2017; Zuboff, 2019). This necessitates theoretical frameworks that can analyze corporate power as geopolitical power, not merely economic power.

New Dimensions of Sovereignty: Digital dependency challenges Westphalian conceptions of sovereignty as territorial control. When a nation's critical infrastructure is foreign owned, its citizens' data flows abroad, and algorithms designed elsewhere govern domestic decision-making, what does sovereignty mean? The literature demonstrates that 21st-century sovereignty must encompass digital, data, and algorithmic dimensions—domains where traditional sovereignty concepts are inadequate (Pohle & Thiel, 2020; Hummel et al., 2021). IR theory must develop frameworks for analyzing sovereignty as layered and contested rather than binary (sovereign/not sovereign).

Technology as Geopolitical Instrument: Digital dependency reveals technology as a tool of geopolitical competition and domination. The US-China tech rivalry, the weaponization of platform access (digital sanctions), and infrastructure diplomacy (e.g., China's Digital Silk Road) demonstrate that technology policy is foreign policy. IR must integrate political economy of technology more centrally, moving beyond viewing technology as merely a tool that states use toward understanding it as constitutive of interstate power relations (Jing & Graham, 2020).

Hierarchies and Inequality: Much IR theory, particularly liberal institutionalism and constructivism, downplays hierarchy and structural inequality in the international system. Digital dependency provides stark evidence that the international system is fundamentally hierarchical, with core nations exercising structural power over peripheral nations through control of digital infrastructure and platforms. This validates critical IR approaches (world-systems theory, postcolonial IR) while challenging mainstream frameworks (Wallerstein, 2004; Santos, 2020).

Resistance and Counter-Hegemony: The literature on digital sovereignty movements, Indigenous data governance, and alternative platforms demonstrates that peripheral actors are not passive in the face of digital dependency. IR theory needs frameworks—such as those from postcolonial and decolonial IR—that can analyze resistance, counter-hegemonic movements, and alternative orders, not just dominant power structures (Ndlovu-Gatsheni, 2013).

Implications for Development Studies

Critique of Techno-Optimism: Development Studies has exhibited significant techno-optimism, treating digital technologies as drivers of development. The digital dependency literature provides a necessary corrective, demonstrating that technology transfer and digital inclusion can

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entrench underdevelopment when they occur on unequal terms (Heeks, 2022; Graham & Anwar, 2019). This revitalizes dependency theory's core insight—that integration into global systems on unequal terms perpetuates rather than resolves underdevelopment—for the digital age.

Beyond the Digital Divide: The "digital divide" framework, which dominated development discourse for two decades, focuses on access inequality. The literature reviewed here demonstrates this is inadequate: what matters is not just access but ownership, control, and the terms of incorporation into digital systems (Heeks, 2022). Development Studies must shift from counting connections to analyzing power relations embedded in digital technologies.

Data as Development Resource: The literature reveals data as a crucial development resource in the 21st century. Development Studies must grapple with questions of data ownership, data sovereignty, and how to ensure that the value generated from data benefits the populations from whom it is collected rather than flowing to foreign corporations (Couldry & Mejias, 2019; Kukutai & Taylor, 2016).

Decolonizing Development: The Indigenous data sovereignty movement and decolonial critiques of digital colonialism challenge Development Studies to decolonize its epistemologies and methodologies. This means centering Global South and Indigenous knowledge systems, questioning who defines development and progress, and being reflexive about how development research itself can reproduce colonial relations (Carroll et al., 2020; Grosfoguel, 2011).

Institutional Capacity and Regulatory Sovereignty: The literature demonstrates that meaningful development in the digital age requires institutional capacity for technology regulation, antitrust enforcement, and digital policymaking. Development Studies must move beyond technical capacity building (teaching people to code) toward building sovereign capacity for governing technology (Hummel et al., 2021).

Intersectional Analysis: Research revealing how digital dependency intersects with gender and poverty (Madgavkar et al., 2020) demonstrates the need for intersectional approaches that analyze how digital inequalities compound other forms of marginalization.

Alternative Development Paradigms: The literature on platform cooperatives, community networks, and alternative digital architectures (Scholz, 2016; Gehl, 2015) points toward alternative development paradigms that reject the growth imperative and extractivism embedded in dominant models. Development Studies should engage more seriously with these alternatives rather than treating them as marginal.

In summary, digital dependency challenges both IR and Development Studies to fundamentally reconsider their core concepts, assumptions, and priorities. It validates critical theoretical traditions (dependency theory, world-systems theory, postcolonial studies) while demonstrating that mainstream approaches that ignore power, hierarchy, and structural inequality are inadequate for understanding contemporary global dynamics.

7.3. Gaps in the Literature and Avenues for Future Inquiry

Despite the richness of the emerging literature on digital dependency, several significant gaps remain, pointing toward important avenues for future research.

Quantitative Analysis of Digital Dependency

Gap: While the conceptual and qualitative evidence for digital dependency is strong, there is a relative paucity of quantitative research measuring its economic impact. We lack comprehensive data on:

- The monetary value of data extracted from the Global South annually
- Net financial outflows due to software licensing, cloud services, and platform fees
- Long-term economic effects of technological lock-in
- Comparative economic performance of countries with different levels of digital sovereignty

Future Research: Economists should develop methodologies to quantify data value transfer, technology rents, and the macroeconomic impacts of digital dependency. This could include:

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- Input-output analyses of digital value chains showing where value is created vs. captured
- Econometric studies comparing growth trajectories of countries with different degrees of digital sovereignty
- Valuation methodologies for user-generated data and unpaid digital labor (building on Arrieta-Ibarra et al., 2018)
- Balance of payments analyses incorporating digital services trade

Comparative Studies of Resistance Strategies

Gap: Much of the literature on digital sovereignty and resistance consists of case studies of initiatives or conceptual frameworks. There is insufficient comparative analysis of which resistance strategies are most effective under which conditions.

Future Research: Systematic comparative research could examine:

- Which data localization and digital sovereignty policies have successfully constrained platform power vs. which have been ineffective or counterproductive?
- Under what political-economic conditions can alternative platforms and community networks achieve sustainability and scale?
- How do different legal and institutional frameworks enable or constrain digital sovereignty?
- What are the trade-offs between digital sovereignty measures and other development goals (e.g., innovation, investment attraction)?
- Comparative analysis of Indigenous data governance implementations across different contexts.

The "Digital Semi-Periphery"

Gap: The literature often maintains a core-periphery binary or focuses on the most marginalized regions. More nuanced research is needed on "digital semi-peripheral" nations like India, Brazil, Indonesia, and South Africa that simultaneously exhibit characteristics of dependency while also developing significant domestic tech sectors and, in some cases, exporting their own digital platforms and services.

Future Research: Studies should examine:

- How do semi-peripheral nations navigate dependencies while building their own digital economies?
- Do domestic tech sectors in semi-peripheral nations challenge or reproduce dependency relations?
- How do South-South digital dependencies differ from North-South dependencies?
- Can semi-peripheral nations develop "strategic coupling" with global digital platforms that create more equitable relationships?
- What can fully peripheral nations learn from semi-peripheral tech development strategies?

Environmental and Ecological Dimensions

Gap: The environmental costs of digital dependency—from the energy consumption of data centers predominantly located in core nations but serving global populations, to the e-waste generated by planned obsolescence in proprietary hardware, to the resource extraction required for device manufacturing—are significantly underexplored in the dependency literature.

Future Research: An ecological political economic approach could examine:

- Carbon footprints of global data flows and where environmental costs are externalized

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- E-waste flows and how peripheral nations become dumping grounds for core nations' technological obsolescence
- Resource dependencies created by rare earth minerals required for digital devices
- Ecological costs of cryptocurrency mining are concentrated in areas with cheap electricity (often developing countries)
- Intersections between digital dependency and climate vulnerability (building on Hickel, 2020).

Intersectional and Subaltern Perspectives

Gap: While there is some research on gender and digital dependency (Madgavkar et al., 2020) and growing work on Indigenous data sovereignty (Carroll et al., 2020), there remains insufficient research on how digital dependency intersects with other axes of marginalization: race, caste, disability, sexuality, ethnicity, religion.

Future Research: Intersectional analyses could be examined:

- How do race and ethnicity shape experiences of algorithmic bias and digital dependency?
- How does digital dependency affect disabled people in the Global South?
- How do digital dependencies operate within countries along lines of caste, tribe, or ethnicity?
- What are the specific impacts of digital dependency on women's labor in the Global South?
- How do LGBTQ+ communities in the Global South experience digital platforms and surveillance?

Sectoral Deep Dives

Gap: While literature covers digital dependency broadly, there is room for more sector-specific analysis in areas like:

- Agriculture (precision agriculture technologies creating new dependencies)
- Healthcare (health data extraction and telemedicine dependencies)
- Education (edtech platforms and curriculum dependencies)
- Creative industries (platform dependencies for cultural producers)
- Public administration (e-governance systems creating vendor lock-in)

Future Research: Detailed sectoral studies could reveal specific mechanisms of dependency and sector-appropriate resistance strategies.

Temporal Dynamics and Future Trajectories

Gap: Most research is synchronic, analyzing current conditions. There is less work on:

- Historical trajectories: How did current digital dependencies emerge over time?
- Future projections: What will digital dependency look like with emerging technologies (quantum computing, brain-computer interfaces, etc.)?

Future Research: Historical research could trace the evolution of digital dependency to understand path dependencies and critical junctures. Futures studies could use scenario planning to envision alternative technological futures and pathways toward or away from digital sovereignty.

Language and Epistemological Diversity

Gap: This review, limited to English-language sources, inevitably reflects Anglophone and Northern epistemologies. Critical perspectives from non-Anglophone Global South scholarship are underrepresented.

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Future Research: Multilingual literature reviews incorporating scholarship in Spanish, Portuguese, French, Arabic, Swahili, Hindi, Mandarin, and other languages would provide richer, more diverse perspectives on digital dependency. This could reveal alternative conceptualizations and resistance strategies not visible in Anglophone literature.

Corporate and Elite Perspectives

Gap: The literature reviewed is predominantly critical, centering peripheral perspectives. There is less engagement with how corporate and core nation actors understand and justify current arrangements.

Future Research: While maintaining critical stance, research could include:

- Ethnographies of tech corporations to understand how they conceptualize their role in development
- Analysis of corporate social responsibility and "tech for good" initiatives through dependency lens
- How do core nation policymakers understand digital dependency issues?
- What are points of potential alliance or irreconcilable conflict between critical scholars and corporate actors?

Legal and Governance Mechanisms

Gap: While there is some work on digital sovereignty policies, there is less detailed analysis of the legal mechanisms of digital dependency—how contracts, intellectual property law, terms of service, and trade agreements create and enforce dependencies.

Future Research: Legal scholars could examine:

- How do platform terms of service function as de facto global governance instruments?
- How do intellectual property regimes in digital technologies differ from earlier eras?
- What legal innovations could enable greater digital sovereignty?
- How do trade agreements (like USMCA, RCEP) constrain or enable digital sovereignty?

Table 17. Priority Research Gaps and Proposed Methodological Approaches.

Research Gap	Why Important	Proposed Methods	Expected Contribution
Quantitative value transfer analysis	Empirically ground dependency claims	Econometric modeling; input-output analysis	Measure economic magnitude of extraction
Comparative resistance strategies	Identify effective sovereignty approaches	Comparative case studies; policy analysis	Practical guidance for policymakers
Digital semi-periphery dynamics	Understand complex positionality	Mixed methods; comparative political economy	Nuanced understanding of hierarchy
Environmental dimensions	Complete political economy picture	Life cycle assessment; ecological footprint analysis	Integrate ecological costs

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Research Gap	Why Important	Proposed Methods	Expected Contribution
Intersectional perspectives	Center marginalized experiences	Ethnography; participatory action research	Decolonize knowledge production
Sectoral deep dives	Context-specific mechanisms	Industry case studies; sector analysis	Tailored resistance strategies
Historical trajectories	Understand path dependencies	Historical institutionalism; process tracing	Identify critical junctures for change
Multilingual scholarship	Overcome Anglophone bias	Multilingual systematic review	Epistemological diversity

Source: Author's synthesis of identified gaps and recommended future research directions.

These gaps collectively point toward a rich agenda for future scholarships. Addressing them would deepen our understanding of digital dependency, improve the empirical grounding of theoretical claims, and provide more actionable insights for policy and resistance movements.

8. Conclusion

This comprehensive literature review has traced the trajectory and demonstrated the revitalization of dependency theory from 2005 to 2025 through its application to understanding inequalities in the digital age. The central finding is both striking and deeply concerning: the global digital transformation, far from creating the level playing field imagined by techno-optimists, has forged new and intricate chains of dependency that bind peripheral nations to the core with mechanisms as effective, and perhaps more insidious, than those of earlier eras.

The review has demonstrated how control of digital infrastructure—submarine cables, satellites, and data centers—creates foundational dependencies analogous to colonial-era control of ports and railways (Bright et al., 2012; Schwartz, 2019). It has shown how platform capitalism and data colonialism establish extractive relationships where data flows from the periphery as raw material for core-based AI industries, creating a hidden but massive transfer of economic value (Couldry & Mejias, 2019; Kwet, 2019; Zuboff, 2019).

It has revealed how algorithmic dependency imposes core-designed decision-making systems on peripheral contexts, often with discriminatory and inappropriate outcomes (Birhane, 2021; Crawford, 2021; Mohamed et al., 2020). The COVID-19 pandemic served as a dramatic catalyst for these processes, accelerating digital transformation while deepening vulnerabilities and dependencies, disproportionately benefiting Big Tech corporations while exacerbating inequalities (Beaunoyer et al., 2020; Rahman & Thelen, 2020). Empirical analysis across the Global South—from Africa's submarine cable dependencies to Latin America's fintech adoption, from AI deployment across developing nations to platform labor—provides concrete evidence that digital dependency is not an abstract theoretical concept but a lived material reality with profound consequences for sovereignty, development, and human wellbeing.

Yet the review has also documented a vibrant and growing landscape of resistance. From state-led pursuits of digital sovereignty through data localization and platform regulation (Hummel et al., 2021; Pohle & Thiel, 2020) to the radical decolonial vision of Indigenous data governance (Carroll et al., 2020; Kukutai & Taylor, 2016), from grassroots development of alternative community networks (Rey-Moreno et al., 2016) to alternative platform architectures (Gehl, 2015; Scholz, 2016), actors across the Global South are actively working to decolonize the digital sphere and reclaim technological futures. These counter-movements demonstrate that digital dependency is contested terrain, not a

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foregone conclusion, and that alternative arrangements embodying values of equity, community control, and sustainability remain possible.

The theoretical contribution of this review lies in synthesizing disparate literatures—from development studies and international political economy to critical data studies and indigenous studies—into a coherent framework: the "new digital dependency thesis." This framework reveals how digital inclusion can paradoxically entrench exploitation when it occurs on terms set by the digital core, validating dependency theory's enduring insight that integration into global systems on unequal terms perpetuates underdevelopment. It also demonstrates how dependency theory, far from being a relic of 20th-century debates, provides the most robust available lens for interrogating the political economy of 21st-century technologies.

For policymakers, civil society organizations, and development practitioners, the implications are clear: digital development strategies that focus merely on expanding access—closing the "digital divide"—are inadequate and potentially counterproductive if they deepen structural dependencies. Genuine digital development requires building sovereign capacity: the ability to develop, own, and govern digital technologies according to local priorities and values rather than consuming technologies designed elsewhere for purposes not aligned with autonomous development.

For scholars, this review demonstrates that dependency theory, continuously updated through neo-dependency frameworks that integrate postcolonial, decolonial, and critical technology studies perspectives, remains indispensable for understanding global inequality. It also identifies numerous gaps—in quantitative analysis, comparative resistance studies, environmental dimensions, and intersectional approaches—that represent crucial directions for future inquiry.

The stakes could not be higher. As artificial intelligence, Internet of Things, blockchain, and other emerging technologies become ever more embedded in economic, political, and social life, the power to shape these technologies will increasingly determine who can govern themselves, who can develop autonomously, and who must accept subordinate positions in global hierarchies. The literature reviewed here demonstrates that these are not technical questions but fundamentally political ones about power, justice, and the structure of the global order.

Ultimately, this review affirms that true development in the 21st century cannot be achieved through passive consumption of technologies designed elsewhere but requires the sovereign capacity to shape and control the technological forces that define our age. Dependency theory, in its evolved contemporary form, provides the critical analytical toolkit necessary for this task—revealing how digital inclusion can mask deepening exploitation and pointing toward alternative technological futures grounded in equity, sovereignty, and decolonization. As the world moves further into an increasingly digital future, these insights will be ever more crucial for navigating the complex path toward a more just and equitable global order.

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Author Bio

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87. Beyond academia, Dr. Almakaty is a sought-after consultant on communication strategy, corporate communications, and international relations, advising government agencies, corporate entities, and non-profit organizations. His expertise includes the development of higher education policies, focusing on the intersection of media literacy, digital transformation, and educational reform.
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