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DIGITAL INEQUALITY AS A STRUCTURALLY REPRODUCED OUTCOME OF DIGITAL STRATIFICATION: MECHANISMS, OPPORTUNITY TRAPS, AND POLICY IMPLICATIONS

Digital transformation constitutes a defining structural process of contemporary socio-economic development. Its impact, however, cannot be interpreted as inherently equalizing or neutral with respect to social outcomes. Digital technologies are embedded in pre-existing institutional arrangements, regimes of ownership, and distributions of power, which shape how technological change is translated into differentiated life chances. As a result, digital inequality emerges not as a temporary imbalance associated with uneven diffusion, but as a structurally reproduced outcome of digital stratification [1–3].

Digital inequality should be analytically distinguished from descriptive notions of digital gaps. While gaps capture observable differences in access, skills, or outcomes, they do not explain the persistence and transformation of inequality under conditions of expanding digital inclusion. A stratification perspective shifts the focus from empirical disparities to the hierarchical organization of positions within the digital economy. Digital stratification refers to the structured ordering of social groups with respect to access to digital resources, the capacity to use them productively, and the ability to appropriate the benefits generated by digitalization. Digital inequality is therefore understood as an empirical manifestation of this underlying structural order [4].

The analytical separation between inequality and stratification is crucial. Inequality denotes differences in outcomes or resources, whereas stratification denotes the institutionalized hierarchy that systematically allocates advantages and disadvantages across groups. In the digital context, this hierarchy is organized around control over infrastructures, platforms, data, and algorithmic

systems. These elements function as strategic assets, with their ownership and governance determining the distribution of opportunities and risks. Digital technologies thus do not dissolve existing hierarchies but reconfigure the mechanisms through which they are reproduced.

Digital inequality is sustained through a set of interconnected mechanisms operating across multiple levels of the socio-economic system. At the infrastructural level, access is institutionally structured not only by availability but also by quality, reliability, and affordability. Access, therefore, becomes a positional attribute embedded in broader configurations of opportunity. Unequal infrastructural conditions affect the capacity to accumulate skills, access digital services, and engage in productive digital activity, thereby initiating cumulative disadvantage.

At the level of practices and competencies, socially conditioned differentiation plays a central role. Digital skills are not acquired in a vacuum but are shaped by educational systems, occupational environments, cultural expectations, and institutional support structures [5]. Even where formal access is equalized, groups differ significantly in their ability to convert digital tools into meaningful opportunities. This differential conversion explains why policies focused exclusively on access expansion often fail to reduce inequality, instead displacing it into other dimensions.

A critical mechanism of reproduction lies in the concentration of digital assets and monetization channels. Economic benefits of digital transformation are disproportionately captured by actors who control platforms, data flows, standards, and interfaces. Such concentration reflects existing asymmetries in capital, knowledge, and political influence, and reinforces them over time. The accumulation of digital assets enables dominant actors not only to secure economic advantages but also to shape the institutional rules governing access and participation, thereby transforming privilege into a structural condition.

Algorithmic management and labor segmentation constitute another mechanism through which digital inequality is reproduced. Platform-mediated and digitally managed forms of work institutionalize unequal distributions of risk, security, and autonomy. The upper segments of the digital labor market are characterized by stability, skill development, and upward mobility, while the lower segments face precarity, income volatility, and limited opportunities for advancement. These labor market dynamics have spillover effects on financial security, access to education, and long-term capability formation, intensifying cumulative disadvantage.

The spatial dimension of digital inequality reflects a hierarchical integration of regions and countries into the global digital economy. Control

over innovation, investment, and digital governance is concentrated in a limited number of centers, while peripheral regions are incorporated primarily as markets or labor reservoirs. Spatial asymmetries amplify other mechanisms of stratification and constrain national and regional development trajectories, making digital inequality a key component of global structural inequality.

Digital inequality also exhibits a pronounced intergenerational dimension. Unequal access to high-quality education, digital resources, and stable income conditions shapes the starting positions of subsequent generations. Digital advantages and disadvantages are thus transmitted over time, transforming short-term disparities into long-term trajectories. This intergenerational reproduction underscores the structural nature of digital inequality and its resistance to isolated or short-term interventions.

The cumulative interaction of these mechanisms gives rise to opportunity traps, which represent stable configurations of advantage and disadvantage. A cumulative disadvantage trap emerges when institutional access constraints, skill differentiation, and labor market segmentation reinforce one another, narrowing life chances across multiple domains. Even under conditions of formal inclusion, such traps may persist by shifting inequality from visible barriers to less observable but more durable mechanisms.

Conversely, zones of cumulative advantage arise where favorable institutional conditions, productive digital practices, and secure employment mutually reinforce the expansion of capability. Access to these zones is itself stratified, reflecting the underlying hierarchy of digital positions. A distinct configuration is the privilege generation trap, in which concentrated control over digital assets enables dominant actors to define the rules governing access, competition, and value creation. In this case, the advantages of some groups become a structural precondition for the constraints faced by others.

Effective policies to counter the entrenchment of digital inequality must therefore move beyond technocratic solutions. Measures focused solely on expanding access or providing basic training are insufficient to alter the structural conditions of reproduction. Policy interventions must address the institutional frameworks that govern ownership, control, and distribution of digital resources. This requires a multidimensional approach that recognizes the cumulative and interconnected nature of inequality mechanisms.

Breaking the cumulative disadvantage trap requires coordinated interventions across infrastructure, education, labor markets, and social protection. Expanding access to zones of cumulative advantage requires democratizing high-quality education, ensuring secure forms of digital employment, and supporting collective capability formation. Counteracting

privilege generation involves regulating digital markets, enhancing transparency of algorithmic systems, and promoting alternative models of digital organization based on distributed control.

Digital inequality should be conceptualized as a structurally reproduced outcome of digital stratification rather than as a collection of isolated gaps. It reflects the institutionalized hierarchy of positions within the digital economy and the mechanisms through which advantages and disadvantages accumulate over time and across domains. Addressing digital inequality, therefore, requires structural transformation of the institutional conditions that shape digital development, rather than incremental or purely technical adjustments.

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