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CLOUD AS INFRASTRUCTURE: THEORISING LINKS BETWEEN 'BIG TECH' AND 'SMALL TECH'

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Introduction

This paper focuses on the political economy of cloud computing and the new industry dynamics it activates. It helps uncover the industrial and infrastructural underpinnings of the internet. The analysis and arguments I develop emerge from a multi-year field-based study of the global corporate computing industry or more colloquially, the 'IT industry.' Specifically, an offshore industry in India that has historically maintained the computing systems of the world's largest firms (Narayan, 2023a, 2023b; Peck, 2017; Upadhya, 2016). I study how traditional relations between lead firms in the US and UK and offshore IT suppliers were interrupted by cloud firms and cloud computing models.

Cross-disciplinary scholarship on platform-mediated transformations is growing rapidly (Cole, 2023; Nieborg and Poell, 2018). Cloud providers create and own massive computing assets, that now represent new internet infrastructures (Greene, 2022). Large-scale data centres that aggregate hardware resources are an important element shaping the expansion of platform economies. However, the impact of this configuration of hardware on the dynamics of software development is still unclear. There is growing scholarship on data centres. But the precise impact of the aggregation of a highly scalable hardware system on industry dynamics calls to be delineated. For one thing, cloud computing lowers the upfront cost of using and owning computing systems (Kushida et al., 2015; Mosco, 2014). This reduces barriers to entry and also promotes the expansion of platform economies. A number of industries are being platformised (Davis, 2016; Lotz, 2021; Srnicek, 2017). The wide-ranging impact of platforms is explained at least in part by cloud infrastructure: the scalable provisioning of computing resources via the internet.

Given the impact of cloud computing and its features that resemble other public utilities (Kennedy, 2018), this work seeks to refine the understanding of cloud architecture and its organisational character. I look under the hood, so to speak, analysing the dominant players and their new constellation of partners and users.

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Until Amazon, Google, and Microsoft upended the market for hardware and software, a more traditional industry model prevailed. Lead firms had a more conventional procurement supply chain for hardware, software, and services. Cloud computing transformed both computing infrastructure and organisational relations, rendering these more flexible and scalable (Narayan, 2022). The first part of the project focuses on the transformation of traditional suppliers in the face of a new market threat, examining how IT firms coped with the turbulence in their market. However, I present here the second part of the study. I focus on the anatomy of the infrastructure itself, and how it activates a new set of relations between start-ups, developers, entrepreneurs, and investors.

Increasingly scholars argue that platforms, including cloud platforms, foster 'ecosystems' rather than supply chains (Kapoor, 2018; Kapoor et al., 2021). I outline what this means, by drawing out the attributes of cloud infrastructure. I identify virtualized hardware, modularity, resource sharing, and externalisation as defining aspect of the increasingly dominant cloud regime. Here, I show how these coalesce to form a new industry dynamic, with hardware centralisation on the one hand and decentralisation of cloud users and complement developers on the other. Data centres aggregate and centralize computing capacity and in turn enable the growth of globally distributed and organizationally decentralized corporate ecosystems. Scholarship in this area is beginning to examine the relations between dominant technology corporations and their networks of users and third-party companies (Blanke and Pybus, 2020; Helmond et al., 2019). Thus, I contribute to literature on platform ecosystems by examining changing organizational and market dynamics introduced by cloud computing within the corporate computing sector. This industry can be considered a meta-industry given that firms and organisations across sectors use and deploy cloud resources.

Theoretically, I consider the broader implications for industry dynamics when the cost of digital innovation falls thanks to cloud-based modularity and virtualisation. I borrow ideas from Marxist industrial analysis (e.g., Harvey, 1982), to discuss how cloud platforms enable the "liquification of fixed capital" and thereby accelerate the creation and capture of new markets. The conceptual goal is to account for new mechanisms and strategies of accumulation that platforms afford.

The research project is based on 110 interviews with managers (executive, senior, and middle) in traditional IT firms with large offices in Bangalore, India, as well as industry experts, and software engineers. Here I draw from a subset of the sample that focuses on the new start-ups that have exploded in India as users of cloud technology. Drawing on qualitative interviews with managers and investors of software start-ups in India, I explicate the falling barriers to entry and an emergent transnational competitive terrain, with special emphasis on transnational labour and speculative financial relations. This analysis, by exploring the intersection of platform studies and internet studies, contributes to STS, economic sociology, and political economy. It also directly contributes to the study of industrial analysis and processes, the overarching theme of AoIR 2024.

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