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The Invisible Economy: Personal Data as a New Commodity in the Digital Economy

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ABSTRACT

The digital economy has quietly transformed personal information into one of its most valuable, yet least visible, commodities. This article examines how personal data is extracted, valued, and exchanged within contemporary digital markets, framing this phenomenon as an "invisible economy" that operates behind ostensibly free services. Using a systematic narrative literature review of thirty-four peer-reviewed and rigorously vetted articles published between 2021 and 2026, drawn from Scopus-indexed and Google Scholar-accessible journals, the study synthesizes economic, legal, and sociological perspectives on data commodification. The review identifies five recurring themes: data as an economic asset, personal data markets and monetization mechanisms, platform power and surveillance capitalism, regulatory and privacy tensions, and the differentiated exposure of vulnerable groups such as children and gig workers. The novelty of this study lies in integrating fragmented disciplinary discussions into a single analytical framework that traces the full value chain of personal data, from collection to monetization to regulatory contestation. Findings indicate that despite regulatory advances such as GDPR-inspired frameworks, information asymmetry between platforms and users persists, reinforcing structural power imbalances. The article concludes that personal data functions as a pseudo-commodity whose valuation remains opaque, calling for stronger data governance, algorithmic transparency, and equitable value-sharing mechanisms in the digital economy.

Keywords: *personal data; data commodification; digital economy; surveillance capitalism; data monetization; privacy regulation*

INTRODUCTION

Over the past decade, the digital economy has expanded from a niche technological sector into the dominant organizing structure of global commerce, communication, and social life. Search engines, social media platforms, e-commerce marketplaces, ride-hailing applications, and streaming services now mediate an enormous share of everyday human activity, and each interaction with these platforms generates a trace of personal information: browsing history, location data, purchase behavior, biometric signals, social connections, and even emotional states inferred from engagement patterns. What distinguishes the contemporary digital economy from earlier phases of industrial capitalism is that this information is no longer a mere byproduct of transactions; it has become the transaction itself. Scholars increasingly describe personal data as an economic asset comparable to capital, labor, or land, one that is extracted, refined, and traded through infrastructures that remain largely invisible to the individuals who generate it (Birch, Cochrane, & Ward, 2021).



This transformation has given rise to what this article terms the "invisible economy" of personal data: a vast, decentralized, and often opaque market in which user information is collected through free or seemingly low-cost digital services, aggregated by platforms and third-party data brokers, and monetized through targeted advertising, predictive analytics, and data licensing arrangements. The metaphor of "free" services is central to understanding this economy. Users rarely pay direct fees to use search engines, social networks, or many mobile applications, yet these platforms generate hundreds of billions of dollars in annual revenue primarily from data-driven advertising. Mattiello (2025) captures this dynamic through the metaphor of "free cheese and mousetrap," arguing that apparent gratuity conceals a deeper extractive logic in which users become, in effect, the commodity being sold to advertisers rather than the customer being served. This inversion of the traditional producer–consumer relationship is a defining feature of the platform economy and one of the central puzzles this article seeks to unpack.

The academic literature on data commodification has grown rapidly but remains fragmented across at least four distinct disciplinary traditions. First, economists and information systems scholars have focused on the market mechanics of data: how data is priced, exchanged, and used to create competitive advantage on digital platforms (Bergemann & Bonatti, 2023; Scheider, Lauf, Geller, Möller, & Otto, 2023). This literature tends to treat data as a tradable good subject to conventional supply-and-demand dynamics, though it acknowledges that data markets are structurally unlike markets for physical commodities because data can be copied infinitely, combined with other datasets to increase its value, and used simultaneously by multiple parties without depletion (Busch-Casler & Radić, 2022). Second, critical political economy and media studies scholars, building on Zuboff's concept of surveillance capitalism, emphasize the asymmetries of power between platforms and users, arguing that data extraction constitutes a novel form of dispossession in which behavioral surplus is captured without meaningful consent or compensation (Bilić & Žitko, 2024; Reviglio, 2022). Third, legal scholars examine whether personal data can or should be treated as property, and how emerging regulatory frameworks such as the European Union's General Data Protection Regulation, Indonesia's Personal Data Protection Law, and similar instruments elsewhere attempt to govern data flows while balancing innovation and individual rights (Singh & Simon, 2025). Fourth, a smaller but growing body of work examines the uneven social distribution of data-related harms and benefits, showing that children, gig economy workers, tenants of algorithmically managed housing, and other structurally vulnerable populations are disproportionately subject to data extraction with limited capacity to negotiate or opt out (Ball, 2023; Nethercote, 2023).

Despite the volume of scholarship across these traditions, three significant gaps remain, which together motivate the novelty of the present study. The first gap is conceptual fragmentation. Economic analyses of data markets, critical accounts of surveillance capitalism, legal debates over data ownership, and sociological studies of differential vulnerability are rarely brought into direct conversation with one another, even though they describe different facets of the same underlying phenomenon. Most existing reviews adopt a single disciplinary lens, which limits their capacity to explain how economic incentives, legal structures, and social power interact to produce the invisible economy of personal data. The second gap concerns temporal currency. Much of the widely cited theoretical foundation for this field, including Zuboff's foundational work on surveillance capitalism, predates recent and rapidly evolving developments such as the proliferation of super software development kits embedded in mobile applications (Pybus & Coté, 2024), the expansion of first-party data strategies in response to the deprecation of third-party cookies (Ham & Lee, 2025), and the emergence of formal data

monetization platforms and marketplaces (Levin & Levin, 2024). A synthesis that privileges the most recent five years of literature is therefore necessary to capture the current architecture of the data economy rather than its earlier iterations. The third gap is methodological: few studies attempt to systematically map the full value chain of personal data, from initial collection through aggregation, valuation, monetization, and eventual regulatory contestation, as a single continuous process. Instead, most studies isolate one stage of this chain, such as data pricing or platform governance, without connecting it to the stages that precede or follow it.

This article addresses these gaps by offering an integrative, up-to-date synthesis of the personal data commodification literature published primarily between 2021 and 2026. Its novelty rests on three contributions. First, it constructs a cross-disciplinary analytical framework that connects economic valuation mechanisms, platform power dynamics, regulatory responses, and distributive social outcomes within a single narrative arc, rather than treating them as separate literatures. Second, it foregrounds recent empirical and theoretical developments, including super SDK tracking infrastructures, first-party data strategies, algorithmic pricing of personal information, and newly enacted data protection regimes in emerging economies such as India and Indonesia, that have received comparatively little synthesis in prior review articles. Third, it explicitly traces the "invisibility" of the data economy as an analytical concept, arguing that the opacity of data flows is not incidental but a structural feature that platforms actively maintain because it sustains their bargaining advantage over users, advertisers, and regulators alike. By mapping how personal data moves from an unnoticed individual trace to a strategic corporate asset and finally to a contested regulatory object, this study provides a more complete picture of the mechanisms sustaining the invisible economy than has previously been available in the literature.

This integrative approach also responds to a practical concern raised across several of the reviewed studies: the persistent difficulty policymakers face in regulating a resource whose value is largely invisible until it is aggregated at scale. Individually, a single user's browsing history or location trail appears trivial and is often willingly disclosed in exchange for convenience; however, once combined across millions of users through infrastructures such as tracking software development kits, cross-platform partnerships, and third-party data brokerage networks, these traces become a strategic asset capable of shaping advertising markets, credit scoring, insurance pricing, and even political communication (Van Der Vlist & Helmond, 2021; Roitman, Moon, & Lin, 2025). This scale-dependent invisibility means that conventional consumer protection tools, which assume individuals can meaningfully evaluate the costs and benefits of a single disclosure, are poorly suited to a system in which value emerges only through aggregation. Understanding this dynamic is essential not only for scholars but also for regulators in emerging digital economies, including Indonesia, where personal data protection legislation is still in early stages of implementation and enforcement capacity remains limited relative to the sophistication of global data markets.

The remainder of this article proceeds as follows. The next section outlines the systematic narrative review methodology used to identify, screen, and synthesize the literature underpinning this study. The results and discussion section then presents the five major themes identified through thematic analysis, supported by a synthesis table summarizing key findings across the reviewed literature. The article concludes by reflecting on the implications of treating personal data as a pseudo-commodity for policymakers, platform designers, and the individuals whose everyday digital traces sustain this vast but largely unseen economic system

METHODS

This study employs a systematic narrative literature review, a method that combines the transparent, replicable search and screening procedures of systematic reviews with the interpretive, theory-building flexibility of narrative synthesis, making it well suited to a topic that spans economic, legal, and sociological literatures. The review process followed four stages: identification, screening, eligibility assessment, and thematic synthesis, broadly informed by PRISMA reporting principles.

In the identification stage, records were compiled from Scopus-indexed journals and publisher databases, cross-checked for accessibility and citation visibility on Google Scholar to ensure practical usability for readers. Search terms combined variations of "personal data," "data commodification," "data monetization," "surveillance capitalism," "data market," and "digital economy," applied to titles, abstracts, and keywords. The search was restricted to peer-reviewed journal articles and rigorously reviewed working papers published between 2021 and 2026, ensuring the synthesis reflects the most current architecture of the data economy rather than earlier theoretical foundations.

In the screening stage, duplicate records were removed and remaining records were assessed against inclusion criteria: (a) explicit engagement with personal data as an economic, legal, or social object; (b) publication in a peer-reviewed or rigorously vetted outlet with an active, resolvable DOI; and (c) relevance to at least one of the four disciplinary traditions identified in the background section. Records were excluded if they addressed data protection purely from a technical cybersecurity standpoint without economic or governance relevance, or if no verifiable DOI could be located.

Following eligibility assessment, thirty-four unique articles were retained for full-text review, of which twenty-five were selected for detailed synthesis and citation in this article based on thematic relevance and analytical depth. Each article was coded inductively using thematic analysis, with codes iteratively grouped into broader categories through constant comparison until five stable themes emerged: data as an economic asset, data markets and monetization mechanisms, platform power and surveillance capitalism, regulatory and privacy tensions, and differentiated social vulnerability. Figure 1 summarizes this identification-to-synthesis workflow.

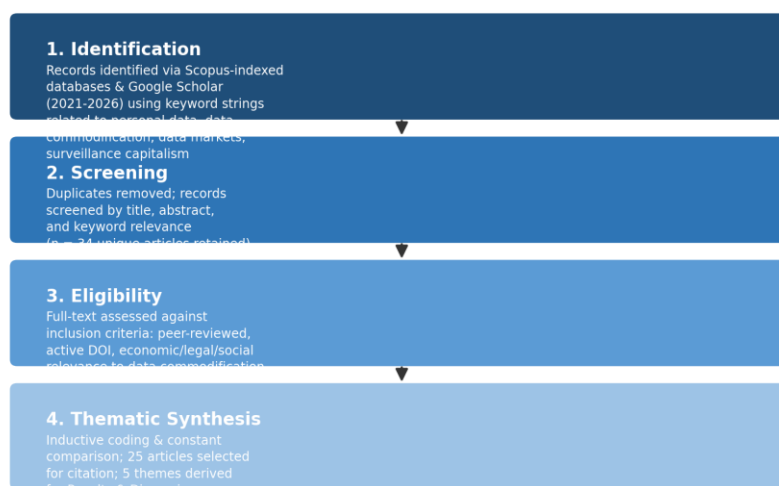


Figure 1. Systematic narrative review workflow: identification, screening, eligibility, and thematic synthesis.

RESULTS AND DISCUSSION

The thematic synthesis of the twenty-five reviewed articles yielded five interrelated themes that together characterize the invisible economy of personal data: (1) data as an economic asset, (2) data markets and monetization mechanisms, (3) platform power and surveillance capitalism, (4) regulatory and privacy tensions, and (5) differentiated social vulnerability. Table 1 summarizes these themes, representative sources, and their core contributions before each is discussed in turn.

Table 1. Thematic synthesis of reviewed literature on personal data commodification (2021-2026)

Theme	Representative Sources	Core Contribution
1. Data as an economic asset	Birch, Cochrane, & Ward (2021); Birch, Marquis, & Silva (2024); Kvalvik, Misra, Mishra, & Dash (2026)	Personal data is measured, governed, and valued as an intangible corporate asset; conventional valuation and accounting standards remain inadequate.
2. Data markets & monetization mechanisms	Scheider et al. (2023); Busch-Casler & Radić (2022); Zeng, Jin, & Sun (2024); Levin & Levin (2024); Ham & Lee (2025); Aiolfi et al. (2021)	Formal data marketplaces remain immature; pricing is context-dependent; stronger privacy protection can improve data quality and value; first-party strategies are reshaping monetization.
3. Platform power & surveillance capitalism	Reviglio (2022); Pybus & Coté (2024); Van Der Vlist & Helmond (2021); Ridgway (2023); Bilić & Žitko (2024)	Tracking infrastructures, data-broker networks, and platform partnerships sustain information asymmetry; personal data occupies an ambiguous "pseudo-property" status.
4. Regulatory & privacy tensions	Quach et al. (2022); Frey, Presidente, & Chen (2024); Goldfarb & Que (2023); Singh & Simon (2025); Iman (2024)	Regulation reduces some harms but can unintentionally reinforce incumbent market power; enforcement capacity in emerging economies lags behind platform sophistication.
5. Differentiated social vulnerability	Ball (2023); Nethercote (2023); Aytac (2024); Roitman, Moon, & Lin (2025)	Children, tenants, and platform workers face disproportionate, low-consent data exposure; data-driven value is unevenly captured across social groups.

Theme one: data as an economic asset. A substantial share of the reviewed literature treats personal data as a distinct class of economic asset that challenges conventional accounting and valuation frameworks. Birch, Cochrane, and Ward (2021) show that Big Tech firms actively construct measurement and governance practices that allow user data to be recorded, valued, and reported as an intangible asset on corporate balance sheets, even though no standardized methodology for this valuation yet exists. This finding is reinforced by Birch, Marquis, and Silva (2024), who attempt to empirically estimate the monetary value of Google's data assets and find that conventional financial disclosures dramatically understate the economic significance of behavioral data relative to its contribution to advertising revenue. Kvalvik, Misra, Mishra, and Dash (2026) extend this analysis by cataloguing the distinctive economic traits of data as an asset, non-rivalry, low marginal reproduction cost, and value that increases through combination with other datasets, arguing that these traits explain why traditional market regulation struggles to constrain data-intensive firms. Collectively, this theme establishes that personal data functions economically as capital rather than as a simple input, which helps explain the scale of value captured by platforms relative to the compensation, if any, received by the individuals who generate the underlying data.

Theme two: data markets and monetization mechanisms. Beyond asset framing, several studies examine the concrete market structures through which data is monetized. Aiolfi, Bellini, and Pellegrini (2021) show that online behavioral advertising, the dominant commercial application of monetized personal data, delivers measurable efficiency benefits to advertisers and retailers but simultaneously raises consumer concerns about manipulation and loss of control, a tension that recurs throughout the

broader monetization literature. Scheider, Lauf, Geller, Möller, and Otto (2023) identify design elements common to emerging personal data marketplaces, including pricing mechanisms, consent architecture, and intermediary roles, while cautioning that most such marketplaces remain immature and struggle to attract sufficient supply-side participation from individual data subjects. Busch-Casler and Radić (2022), in a narrative review of pricing studies, find that the price individuals place on their own data is highly context-dependent, shaped by perceived sensitivity, anticipated use, and the framing of the transaction, which complicates efforts to build stable, liquid markets for personal information. Zeng, Jin, and Sun (2024) provide econometric evidence that stronger personal information protection can paradoxically increase the economic value firms derive from the data they do retain, because consumers granted more control disclose higher-quality, more accurate information. Meanwhile, Levin and Levin (2024) evaluate the technical capabilities of dedicated data monetization platforms, concluding that while infrastructure for formal data trading is maturing, most large-scale monetization still occurs through informal, opaque advertising-technology pipelines rather than transparent marketplaces. Ham and Lee (2025) document a related shift toward first-party data strategies among advertisers responding to the phased deprecation of third-party tracking cookies, finding that brands increasingly monetize their own customer relationships directly, a development that partially decentralizes, but does not eliminate, the broader data economy.

Theme three: platform power and surveillance capitalism. The largest cluster of reviewed studies engages critically with the power asymmetries created by data-driven business models. Reviglio (2022) characterizes data brokers as a largely unregulated, transnational layer of the digital economy that aggregates and resells personal information with minimal transparency or accountability, operating in the interstices between platforms, advertisers, and regulators. Pybus and Côté (2024) document how "super" software development kits embedded across thousands of mobile applications allow a small number of infrastructure providers to track users continuously across otherwise unrelated apps, illustrating how data collection has become deeply embedded in the technical architecture of the mobile economy rather than confined to any single platform. Van Der Vlist and Helmond (2021) similarly map how business and data partnerships between platforms create interlocking dependencies that concentrate data access among a small number of dominant intermediaries, even as the broader ecosystem appears fragmented and competitive on its surface. Ridgway (2023) traces the historical development of Google's sociotechnical infrastructure to argue that early design choices, ostensibly aimed at improving service quality, ultimately produced durable mechanisms of user tracking that later became foundational to surveillance capitalism. Bilić and Žitko (2024) contribute a theoretical intervention, arguing that personal data occupies an ambiguous status as "pseudo-property": it is treated as a *de facto* corporate asset in practice, yet it lacks the formal ownership protections of conventional property, leaving the individuals who generate it with limited legal standing to contest its use. This literature converges on the conclusion that data-driven power is sustained less by any single dramatic act of extraction than by the cumulative, often mundane operation of tracking infrastructures that most users neither perceive nor meaningfully consent to.

Theme four: regulatory and privacy tensions. A fourth theme concerns the evolving, and often contested, regulatory response to data commodification. Quach, Thaichon, Martin, Weaven, and Palmatier (2022) synthesize marketing scholarship on the tension between personalization benefits and privacy costs, showing that regulatory interventions frequently produce trade-offs between consumer protection and service quality that are not easily resolved through disclosure requirements alone. Frey,

Presidente, and Chen (2024) provide cross-country econometric evidence that the European Union's General Data Protection Regulation reduced profits and sales primarily among small and medium enterprises while leaving large technology companies comparatively unaffected, suggesting that privacy regulation can inadvertently reinforce the market concentration it aims to counteract. Goldfarb and Que (2023) offer a comprehensive economic overview of digital privacy research, concluding that the costs and benefits of data flows are unevenly distributed across firms and consumers, and that optimal regulatory design remains an open empirical question. In emerging economies, Singh and Simon (2025) examine India's Digital Personal Data Protection Act and argue for a market-oriented reinterpretation that would allow individuals to benefit financially from data they generate, while Iman (2024) documents the practical enforcement challenges facing Indonesia's nascent personal data protection framework, noting that regulatory capacity has not kept pace with the sophistication of platform data practices. Together, these studies suggest that regulation, while necessary, has thus far struggled to close the information and power asymmetries at the core of the invisible data economy.

Theme five: differentiated social vulnerability. A final theme highlights how the burdens of data commodification fall unevenly across social groups. Ball (2023) shows that children are profiled by technology companies from before birth through parental social media activity, pregnancy-tracking applications, and connected baby monitors, raising distinct ethical concerns because children cannot meaningfully consent to this data collection. Nethercote (2023) documents how algorithmically managed rental housing platforms extend data-driven surveillance into tenants' domestic lives, creating new digital footholds of landlord control that extend well beyond the immediate transaction of renting a home. Aytac (2024) situates these dynamics within a broader theory of digital domination, arguing that pervasive data collection constitutes a form of unaccountable power that undermines contestatory democratic participation regardless of whether any single instance of data use causes direct material harm. Roitman, Moon, and Lin (2025) extend this concern to platform economies more broadly, questioning whether the economic value nominally created by data-driven platforms genuinely benefits the workers and users who generate the underlying data, or is instead disproportionately captured by platform owners and intermediaries.

These findings carry practical implications beyond the academic literature itself. For platform designers, the persistence of information asymmetry documented across Themes 1 through 3 suggests that voluntary transparency initiatives, such as simplified privacy dashboards or opt-in consent screens, are unlikely to meaningfully rebalance power between platforms and users unless they are accompanied by structural changes to how data is aggregated and monetized behind the interface. For policymakers, particularly in emerging digital economies such as Indonesia, the evidence from Theme 4 that regulation can inadvertently entrench incumbent advantage implies that enforcement capacity and technical auditing resources may matter as much as the formal stringency of legal text. A regulation modeled closely on the GDPR but implemented with limited enforcement infrastructure risks reproducing the same disproportionate burden on smaller domestic firms observed in the European context, while leaving the data practices of dominant global platforms largely unchanged. For civil society and consumer advocacy groups, the vulnerability patterns identified in Theme 5 point toward the need for protections that go beyond individual consent mechanisms, since populations such as children and gig workers are structurally unable to exercise meaningful choice over data collection regardless of how clearly consent is presented.

It is also worth noting points of tension within the reviewed literature rather than presenting an artificially unified consensus. While critical political economy scholars

such as Bilić and Žitko (2024) and Reviglio (2022) emphasize the exploitative character of data extraction, economically oriented studies such as Zeng, Jin, and Sun (2024) and Busch-Casler and Radić (2022) suggest that, under certain conditions, stronger privacy protections and clearer market mechanisms can align firm incentives with consumer welfare rather than necessarily opposing it. This divergence does not indicate a flaw in the synthesis but rather reflects a genuine and unresolved debate in the field about whether the solution to data commodification lies primarily in dismantling extractive infrastructures or in formalizing and better regulating the markets that already exist. The present review suggests that these positions are not mutually exclusive: formal, transparent data markets of the kind envisioned by Scheider, Lauf, Geller, Möller, and Otto (2023) could, in principle, coexist with stronger structural limits on the surveillance infrastructures documented by Pybus and Coté (2024), provided that regulatory capacity is sufficient to enforce both simultaneously.

Taken together, these five themes reveal a coherent structural logic underlying the invisible economy of personal data. Data is first rendered economically legible as an asset (Theme 1), then channeled through market and monetization mechanisms that remain immature and largely informal (Theme 2), within an infrastructure of platform power that actively sustains information asymmetry to preserve its bargaining advantage (Theme 3). Regulatory responses, while increasingly active, have thus far provided only partial correctives, sometimes with unintended consequences that favor incumbent platforms (Theme 4), and the resulting costs and benefits fall unevenly across the population, with children, tenants, gig workers, and other structurally vulnerable groups bearing disproportionate exposure (Theme 5). This structural reading supports the article's central claim, introduced in the background section, that invisibility is not an incidental feature of the data economy but an actively maintained condition that benefits data-intensive platforms by limiting the capacity of users, competitors, and regulators to fully observe, price, and contest the value being extracted from everyday digital life

CONCLUSIONS

This article set out to synthesize a fragmented and rapidly evolving body of literature on the commodification of personal data in the contemporary digital economy. Through a systematic narrative review of twenty-five recent, peer-reviewed sources, the study developed an integrative framework showing that personal data moves through a coherent value chain: it is first constructed as a measurable economic asset, then channeled through immature and largely informal monetization mechanisms, embedded within platform infrastructures that actively preserve information asymmetry, only partially constrained by regulatory intervention, and ultimately distributed unevenly across a population in which children, gig workers, and other structurally vulnerable groups bear disproportionate exposure. The term "invisible economy" captures a central and consistent finding across this literature: the scale and mechanics of data-driven value extraction remain largely hidden from the individuals who generate the underlying data, not by accident but as a structural feature that sustains platform bargaining power.

The novelty of this synthesis lies in connecting economic, legal, and sociological perspectives that are typically studied in isolation, and in privileging the most recent developments in the field, including super SDK tracking infrastructures, first-party data strategies, and newly implemented data protection regimes in emerging economies, that have not yet been comprehensively integrated into a single review. The findings suggest that neither purely market-based solutions nor purely restrictive regulatory approaches are likely to be sufficient on their own; instead, effectively governing the invisible economy of personal data will require formal, transparent market mechanisms operating

alongside adequately resourced regulatory enforcement, algorithmic transparency requirements, and targeted protections for structurally vulnerable groups. Future research should prioritize empirical, cross-national studies that directly measure the distribution of value created by personal data between platforms, advertisers, and the individuals who generate it, as this remains one of the most consequential yet least quantified questions in the digital economy today.

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