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The Browser as the Epicenter of the Digital Ecosystem: A Platform Economics Perspective on Market Evolution, Revenue Models, and Strategic Trajectories

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Abstract: The web browser, once conceived merely as an interface for information retrieval, has evolved into a multi-sided platform (MSP) that orchestrates economic interactions across digital ecosystems. This study reframes the browser as a strategic access point that mediates value creation among interdependent user groups—end-users, advertisers, content publishers, and developers—thus functioning as both infrastructure and market actor. Drawing on Platform Economics and Digital Ecosystem Theory, this research examines how browsers have become central to digital competition, revenue generation, and regulatory intervention. Employing a hybrid methodology that integrates a systematic literature review with a comparative case study of Google's integrated ecosystem and Huawei's distributed architecture, the study reveals that the browser has transitioned from a software tool to a pivotal control point in the digital economy. Google's Chrome browser exemplifies an integrated market model, embedding advertising and search into a unified ecosystem that captured 69.23% of the global browser market in 2025. Huawei's HarmonyOS, conversely, reflects a distributed model emphasizing cross-device collaboration rather than

browser centrality. The findings contribute to platform and marketing scholarships by demonstrating that browser dominance is not merely technical but structural—rooted in network effects, data-driven feedback loops, and ecosystem orchestration. The article concludes by proposing a theoretical synthesis of digital platform power, situating browsers as gatekeepers that define the future trajectory of innovation, competition, and regulation in the digital marketplace.

Keywords: Web Browser; Platform Economics; Digital Ecosystem, Multi-Sided Platforms; Revenue Models; Network Effects; Technology Strategy; Antitrust Law

1. Introduction

The past decade has seen the digital economy reorganised around platform-mediated ecosystems rather than stand-alone products. Global spending on digital advertising reached an estimated USD 790 billion in 2024, with forward-looking industry analyses projecting a crossing of the USD 1 trillion threshold on a medium-term horizon[1]. In this context, the web browser has shifted from a supposedly neutral "window to the internet" to a strategic access point that governs how users encounter content, how attention is priced and measured, and how value is captured across multi-sided markets. Browser usage concentration crystallises this shift: as of August 2025, Chrome accounted for roughly ~69% of worldwide share, with Safari (~15%) and Edge (~5%) trailing at distance[2]. The coupling of infrastructural concentration and monetisation is visible in Alphabet's financials: Q4-2023 advertising revenue of USD 65.52 billion underscores how browser-anchored journeys feed search and ads at scale [3][4][5].

This paper advances the thesis that the browser should be theorised not as a passive client but as an infrastructural multi-sided platform (MSP). Platform Economics explains how MSPs orchestrate interactions and cross-side externalities among interdependent groups[6][7][8]. Digital Ecosystem Theory enlarges the frame to the architectural level, identifying control points where defaults, interfaces, and rules shape the competitive field for complements [9][10]. Within this dual lens, the browser functions as a front-door infrastructure: it sets the choice architecture (e.g., search defaults), governs access (APIs, privacy controls), and codifies measurement—converting usage into data-driven feedback loops that reinforce adoption, relevance, and monetisation[11][12].

The scholarly and policy salience of this reconceptualisation is twofold. First, it addresses a knowledge gap in marketing and information-systems literatures that traditionally concentrate on downstream applications (social media, e-commerce) while treating the browser as a transparent conduit. We argue instead that the browser creates and structures markets by governing how attention and data flow. Second, it clarifies why remedies and rule-making

increasingly target infrastructure-centric leverage. In the United States, the Department of Justice (DOJ) has intensified actions against Google in both search and ad-tech lines of business, signalling a pivot toward access-point and default-path scrutiny[13]. In Europe, the Digital Markets Act (DMA) operationalises a gatekeeper regime that can impose conduct and, if necessary, structural remedies on platforms occupying control points[14].

Guided by these developments, the research question is:

How has the web browser evolved from a data-retrieval tool into a multi-sided platform that serves as the epicenter of competing digital ecosystems?

Our contribution is threefold. Theoretically, we synthesise Platform Economics with Digital Ecosystem Theory to formalise the browser as infrastructural multi-sidedness—a configuration where code, defaults, and interfaces enact market governance[15]. Empirically, we present a comparative analysis of Google's browser-centric integration and Huawei's OS-centric distribution, showing how alternative control points (browser versus operating system) yield distinct value logics—behavioural data monetisation versus cross-device service continuity[16]. Practically, we delineate implications for marketers and policymakers: strategy must now optimise to browser-layer rules (consent, identity, measurement) while policy must calibrate remedies to preserve consumer surplus from data-driven quality improvements even as it deters foreclosure[14] [17].

In sum, we reframe the browser as a digital institution—an architectural locus where competition, innovation, and regulation converge.

2. Literature Review and Theoretical Framework

The web browser's metamorphosis from a single-function software application into a pivotal infrastructure of digital capitalism can only be understood through the dual lenses of platform economics and digital ecosystem theory. These frameworks jointly explain how control over an access point—such as a browser—enables firms to orchestrate interactions across markets, generate data-driven network effects, and capture disproportionate economic rents. This section reviews the major theoretical currents

2.1. From Rendering Client to Market Orchestrator

Early accounts of browsers documented technical advances and "browser wars," but typically portrayed the browser as an interface rather than an economic actor. Contemporary platform scholarship, by contrast, foregrounds ecosystem competition and the primacy of control points[18] [19]. Two strands are especially pertinent. First, the MSP literature models how platforms balance cross-side externalities and convert participation into value[7]. Second, ecosystem research shows that standards, APIs, and default pathways are architectural instruments that allocate bargaining power among complements[9] [10]. When mapped onto the

browser, these strands imply that software choices at the client layer—permissions, identity, privacy surfaces—reallocate surplus among advertisers, publishers, and ad-tech intermediaries[15].

2.2. Data-Driven Network Effects and "Tuned" Advertising

Recent work emphasises data externalities: usage begets data; data improves relevance and ranking; improved relevance attracts further usage, tightening feedback loops[7][12]. In the ads domain,[20] characterise the rise of "tuned" advertising, wherein platforms constantly adjust creative, targeting, and delivery in response to behavioural signals. Because most search and content discovery is browser-initiated, these loops increasingly operate at—or through—the browser layer. The result is a migration of measurement power toward the access point, especially as third-party tracking is constrained and platform-provided identity/attribution substitutes emerge[5].

2.3. Ecosystem Control and Regulatory Turn

Ecosystem studies show how firms leverage control points to steer users toward native complements and raise switching costs[10][18]. Regulators have begun to respond with infrastructure-centric approaches. The DMA codifies a gatekeeper status for platforms meeting scale and integration thresholds, enabling obligations around interoperability, self-preferencing, and choice architecture[17]. In the U.S., the DOJ's search and ad-tech actions similarly frame defaults, bundling, and cross-market leverage as potential mechanisms of exclusion[13][22]. Collectively, these moves align with an institutional view of the browser as a rule-setting device rather than a mere client[15].

2.4. Gap and Contribution

Despite this momentum, marketing and IS literature still under-specify the browser's infrastructural role. Downstream channels (social, commerce) remain the dominant analytical focus, while the front-door governance of attention, identity, and measurement at the client layer is under-theorised. This paper addresses the gap by:(1) formalising the browser as infrastructural MSP within an ecosystem architecture; (2) providing market-level evidence that usage concentration and ad-revenue coupling track infrastructural control[3][4][5] and
(3) contrasting browser-centric and OS-centric ecosystem strategies to surface mechanism-level differences in value capture[16].

3. Theoretical Framework

3.1. Multi-Sided Platform Economics

Platform Economics models digital businesses as multi-sided platforms

(MSPs) that create value by facilitating interactions among distinct but interdependent user groups, with participation on one side raising willingness to participate on the other—cross-side network effects[6][7]. Unlike linear production chains, MSPs balance price structures and subsidies to catalyse both adoption and interaction intensity[6]. In the browser context, users, publishers, advertisers, and developers constitute the core sides. The browser reduces search and transaction costs (navigation, rendering, identity, consent), standardises interfaces (standards/APIs), and internalises data externalities: usage generates behavioural data; data improves relevance, ranking, and security; improvement raises usage—a self-reinforcing feedback loop[7]. As a result, monetisation is governed less by per-use pricing and more by two-part revenue logics—attention intermediation (ads), distribution privileges (default search), and complement access (extension stores)[5].

Two implications follow. First, browser owners can use choice architecture—defaults, prompts, UI flows—to tilt participation across sides, shifting surplus from complements to the platform. Second, as privacy policies constrain third-party tracking, platform-provided identity and measurement (e.g., sandboxed attribution, first-party cohorts) migrate value capture toward the access point[5]. Consequently, the browser is not merely a client but a market-making MSP.

3.2. Digital Ecosystem Theory and Architectural Control

Digital Ecosystem Theory extends analysis from price/participation to architecture and governance. Ecosystems are networks of firms and complements coordinated by keystone actors who define standards, interfaces, and rules, thereby shaping innovation direction and value capture[19]. Control points—technological junctures where switching costs, complementarities, and data flows concentrate—are decisive in ecosystem competition[9][10]. The browser as the first point of digital contact qualifies as such a control point because it configures 1. discovery (search defaults and UI affordances), 2. permissioning (consent and tracking surfaces), and 3. measurement (telemetry, attribution scaffolds). Gatekeeper regimes such as the EU Digital Markets Act (DMA) explicitly target these access-layer levers with obligations around interoperability, anti-self-preferencing, and fair choice architecture[17].

3.3. Infrastructural Multi-Sidedness: A Conceptual Integration

We synthesize the two literatures into the construct of infrastructural multi-sidedness: a platform condition in which market orchestration is effected primarily through architecture and defaults at the access layer. Three mechanisms operationalise the construct:

1. Access-point control (APIs, rendering engines, extension policies) shapes complement viability and user flows;

2. Choice architecture (defaults, consent UX) steers search and content discovery;

3. Algorithmic governance (ranking, filtering, attribution) codifies rules of visibility and revenue allocation[7][15].

From this model we articulate analytic propositions used to guide case analysis:

P1 (Feedback): Browser-layer data feedback loops intensify cross-side network effects, raising entry barriers.

P2 (Leverage): Control over defaults and identity/measurement enables cross-market leverage into ads, search, and cloud.

P3 (Remedy sensitivity): Remedies that reconfigure access-point governance (e.g., DMA-style obligations) measurably alter surplus allocation without necessarily degrading consumer surplus[7][15].

3.4. Scope Conditions and Boundary Assumptions

The theorisation applies to general-purpose browsers and browser-centric OSs under conditions of 1. significant complement bases (publishers, extensions), 2.advertising or transaction intermediation, and 3.at-scale telemetry for algorithmic governance. It may not fully characterise embedded webviews inside super-apps or special-purpose secure browsers with constrained complement sets. We therefore treat super-app webviews and decentralised/Web3.0 browsers as boundary cases for future comparative work.

4. Methodology

4.1. Research Design

This article adopt a qualitative multi-method design combining a Systematic Literature Review (SLR) with a Comparative Case Study (CCS), using abductive reasoning to iteratively align emergent evidence and theory[23]. This design is appropriate for processual, architecture-intensive phenomena where causal mechanisms are distributed across technical and organisational layers[24][25].

4.2. Systematic Literature Review (PRISMA-guided)

Following PRISMA 2020[26], we scoped 2019–2025 to ensure recency in a fast-moving domain. Databases: Web of Science, Scopus, JSTOR, and SSRN (for working papers with institutional provenance). Boolean queries combined keywords across three concept clusters:

- Browser/Access layer: “browser” OR “rendering engine” OR “web client”;
- Platform/Ecosystem: “multi-sided platform” OR “platform economics” OR “digital ecosystem” OR “gatekeeper” OR “control point”;

- Monetisation/Governance: “revenue model” OR “advertising” OR “measurement” OR “defaults” OR “DMA”.

Inclusion criteria: peer-reviewed journals/conference papers; institutional reports (EU/DOJ; IAB/PwC) and corporate filings (Alphabet) as primary sources; English language; clear methods or conceptual contribution. Exclusion criteria: blogs, trade press without primary sourcing, pre-2019 items unless canonical[6][8]. We screened titles/abstracts (n≈420), full-text reviewed (n≈128), and retained a final corpus (n=58) spanning platform economics, ecosystem governance, algorithmic regulation, and market measurement. Data were extracted into evidence tables (constructs, mechanisms, measures, context), and cross-checked against market data[3] and industry revenue series[5].

4.3. Comparative Case Study and Case Selection

We employ theoretical sampling to contrast two most-different ecosystem strategies that nonetheless compete over access-layer control[24] Ragin logic via pattern matching:

- Google (Chrome ecosystem)—an integrated, browser-centric model leveraging search/ads coupling and OS/hardware extensions[4][3].
- Huawei (HarmonyOS ecosystem)—a distributed, OS-centric model emphasising cross-device orchestration and data sovereignty via microkernel and ArkUI/ArkWeb[27][16].

Unit of analysis: access-layer governance within each ecosystem (defaults, standards, APIs, measurement) and its coupling to monetisation and regulatory exposure. Data sources: corporate filings and developer documentation, market shares[3], revenue series[5], ecosystem/strategy scholarship[10][18] and regulatory texts[13][17][22].

4.4. Coding and Analytical Procedures

Used the Gioia methodology to preserve informant/authorial terms (first-order codes), develop second-order themes, and derive aggregate dimensions[21]. First-order codes captured constructs such as “choice architecture,” “identity/measurement,” “extension governance,” and “data externalities.” Second-order themes grouped these under access-point control, algorithmic governance, and ecosystem leverage. We then conducted pattern matching against our theoretical propositions (Yin-style logic) to assess the fit of mechanisms across cases. A cross-case matrix compared Google and Huawei on architecture, value logic, governance model, and regulatory exposure.

4.5. Validity, Reliability, and Auditability

Construct validity was enhanced by triangulation across sources (market data, filings, regulatory texts) and by tracing each quantitative claim to a primary

report[3][4][5]. Internal validity relied on rival-explanation testing (e.g., performance vs. default effects) and negative-case analysis during coding. Reliability was supported by an audit trail (search strings, screening logs, codebook evolution) and document versioning. External validity is analytical, not statistical: we generalise to theory on infrastructural MSPs under ecosystem competition[25].

4.6. Ethics and Limitations

The study of this article uses publicly available documents and aggregate market data; no human subjects were involved. Limitations include reliance on secondary data (restricted access to proprietary metrics), measurement heterogeneity across trackers, and potential survivorship bias in case narratives. These risks are mitigated by cross-validation and by focusing conclusions on mechanisms rather than point estimates.

5. Analysis & Findings

5.1. Market Evolution and Concentration at the Access Layer

The browser market today exhibits a degree of concentration consistent with winner-takes-most dynamics in multi-sided settings. As of August 2025, Google Chrome accounts for approximately 69.23% of global usage across platforms, with Safari at 14.98% and Edge at 5.03%[3]. From a platform-economics standpoint, this pattern reflects cross-side network effects: user adoption raises developer and advertiser participation, which in turn raises user utility—amplified by data externalities whereby telemetry improves rendering quality, security, ranking, and personalisation[7][6].

Monetisation evidence comports with the infrastructural thesis. Alphabet's Q4 2023 advertising revenue totalled USD 65.52 billion, illustrating how browser-anchored journeys feed search and ads at scale, even if revenues are not linearly attributable to Chrome alone[4][5]. In other words, the browser is the access device through which attention is metered, consent is captured, and identity/measurement regimes are instantiated—functions central to value capture in a post-third-party-cookie environment[5][15].

5.2. Case Study I — Google: Integrated, Browser-Centric Orchestration

Google's strategy exemplifies platform envelopment (Cennamo, 2021) anchored at the access layer: Chrome integrates discovery (default search pathways), delivery (rendering/standards), and measurement (browser-level identity and attribution surfaces). The strategy scales across complements—Search, Ads, YouTube, Cloud—and downstream devices

(ChromeOS/Chromebook), tightening feedback loops between usage, data, and monetisation[4][8].

At the governance level, choice architecture—for example, default search options and consent UX—operates as a lever shaping user flows and advertiser reach. From the perspective of algorithmic governance, browser code and interfaces effectively enact rules of visibility, matching, and measurement[15]. This coupling of market access and monetisation has drawn intensifying scrutiny: U.S. enforcement has pursued remedies in both search and ad-tech domains, signalling a shift toward infrastructure-centric assessments of competitive harm[13][22]. In the EU, the Digital Markets Act (DMA) codifies gatekeeper obligations that bear directly on access-layer defaults, interoperability, and self-preferencing[17][19]. Together, these moves recognise that browser-level control points condition downstream competition and surplus allocation.

5.3. Case Study II — Huawei: Distributed, OS-Centric Ecosystem Sovereignty

Huawei's HarmonyOS represents a distinct architectural logic: a distributed, microkernel-based operating system that orchestrates resources across smartphones, PCs, wearables, vehicles, and IoT devices via ArkUI and ArkWeb. In this model, the "browser" is less a stand-alone consumer choice and more an embedded rendering capability within a cross-device UX fabric[27]. The value proposition emphasises service continuity, device cooperation, and data sovereignty rather than browser-led ads monetisation. Analyst coverage of Huawei's HarmonyOS PCs underscores the potential and hurdles of extending this OS-centric orchestration to PC-class computing, reinforcing the strategic bet on system-layer control rather than browser-layer defaults[16]. From an ecosystem perspective, HarmonyOS shifts the control point downwards into the OS, using distributed orchestration (soft bus, shared capabilities) to internalise complementarities across devices—an alternative route to ecosystem lock-in consistent with Digital Ecosystem Theory[9][10].

5.4. Comparative Synthesis

To clarify how governance choices at different layers shape ecosystem outcomes, it would be show in Table 1.

Table 1. contrasts Google's browser-centric model with Huawei's OS-centric design

Dimension	Google (Chrome Ecosystem)	Huawei (HarmonyOS Ecosystem)
Governance Model	Centralised, browser-centric integration controlling access pathways[13][17]	Distributed governance emphasising device-level autonomy and data localisation[27][28]
Core Strategy	Data-driven integration across Ads, Search, Cloud, YouTube; access-layer defaults and identity/measurement[4]	Microkernel architecture with cross-device resource pooling (ArkUI/ArkWeb) for IoT coordination [27][28]
Value Logic	Behavioural-data monetisation under a platform learning loop[5][12]	Service continuity and sovereignty-preserving orchestration across devices[10]
Architecture	Application-layer control with OS/hardware extensions [11][7]	System-layer orchestration through distributed software[28]
Regulatory Exposure	High—U.S./EU focus on defaults, bundling, and cross-market leverage[13]	Medium—domestic compliance priorities; geopolitical drivers of localisation[28]

6. Discussion

6.1. Summary of Core Findings

The findings support a reclassification of the browser from client application to infrastructural MSP. Concentration at the access layer (Chrome ~69%) coexists with substantial ad-revenue series (USD 65.52B in Q4-2023), indicating that attention intermediation and monetisation are structurally coupled to browser governance[3][4][5]. The dual case study shows two viable trajectories: Google's integrated browser-centric orchestration, and Huawei's distributed OS-centric sovereignty. Both generate ecosystem lock-in, but via different control points—choice architecture and measurement (Google) versus cross-device resource orchestration (Huawei)[16][18][27].

6.2. Theoretical Synthesis

Integrating Platform Economics with Digital Ecosystem Theory yields the construct of infrastructural multi-sidedness. Economically, the browser balances sides and internalises data externalities, turning interaction data into learning and value capture[6][7]. Architecturally, it enacts algorithmic governance over discovery, permissioning, and measurement—rules of the game expressed in code,

defaults, and interfaces[15]. This synthesis explains why browser-level leverage shapes outcomes far downstream and why remedies increasingly target the access layer[7].

6.3. Implications for Marketing and Strategy

For marketers, strategic advantage now depends on optimising to browser-layer rules—consent UX, identity frameworks, and attribution scaffolds—rather than treating the browser as a transparent conduit[5]. For complementors (publishers, extensions, PWAs), product strategy should pursue cross-side enhancement, i.e., features that simultaneously raise user utility and improve advertiser/publisher outcomes, thereby riding the platform's positive feedback loops[8]. Firms competing with native services should anticipate choice-architecture frictions at the access point and design for resilience (multi-home, deep-linking, and interoperability).

6.4. Policy and Regulatory Implications

The regulatory turn toward infrastructure-centric analysis is warranted but must be calibrated. The DMA's gatekeeper regime targets self-preferencing, interoperability, and choice screens—key levers at the browser layer[17]. In the U.S., the DOJ's remedies efforts in search and ad-tech indicate a willingness to restructure access-layer incentives[13][22]. Optimal policy design should preserve consumer surplus from data-driven quality while deterring foreclosure. Remedies that combine interoperability, audited data-access, and fair choice architecture align best with this dual objective[22].

6.5. Limitations

Our qualitative, secondary-source design prioritises explanatory mechanisms over causal magnitudes. Market-share trackers differ in methodology, and revenue linkages from browser usage to ads are inferred from segment disclosures rather than isolated experiments[3][4]. We focus on Google and Huawei; privacy-first browsers and super-app webviews merit separate treatment.

6.6. Future Research

Three routes appear promising: (1) quasi-experimental analysis of default/search-path changes on user behaviour and advertiser outcomes; (2) ecosystem input–output models to quantify surplus reallocation under DMA-style remedies; (3) comparative institutional studies of super-app or decentralised/Web3.0.0 browsers to test whether infrastructural multi-sidedness generalises beyond the open-web client paradigm.

6.7. The Browser as a Digital Institution

Conceptually, the browser is a digital institution that governs not by statute but by code. Its standards, defaults, and interfaces structure what can be seen, tracked, and transacted, thereby determining how surplus is created and shared. Recognizing this institutional role clarifies why browser-level remedies—rather than purely downstream measures—are pivotal to aligning innovation incentives with competitive fairness.

6.8. Conclusion

This ariticle has reconceptualised the web browser as an infrastructural multi-sided platform at the epicentre of contemporary digital ecosystems. Rather than a neutral client, the browser functions as a rule-setting access point whose standards, defaults, and interfaces orchestrate interactions among users, publishers, advertisers, and developers. Synthesising Platform Economics with Digital Ecosystem Theory, we theorised infrastructural multi-sidedness—a configuration in which cross-side externalities are intensified by data feedback loops while architectural control at the access layer (choice architecture, identity/measurement, and API governance) structures downstream competition and value capture.

Empirically, market concentration at the access layer (Chrome ≈ 69% worldwide in August 2025) coexists with the scale of advertising revenues reported by Alphabet, illustrating the tight coupling of browser-anchored journeys with monetisation engines[3][4]. The comparative cases surfaced two viable ecosystem logics: Google's integrated, browser-centric orchestration that leverages defaults and measurement to channel demand across Search/Ads/Cloud/YouTube; and Huawei's distributed, OS-centric orchestration that emphasises cross-device service continuity and data sovereignty via HarmonyOS and ArkWeb. Both paths generate lock-in, but through different control points—a finding that clarifies why remedies and rules increasingly target access-layer governance.

Theoretical implications follow directly. First, treating the browser as a digital institution (governing by code rather than statute) sharpens the analysis of how market power is formed and exercised in platformised economies. Second, the construct of infrastructural multi-sidedness links economic participation models (pricing, cross-side externalities) with architectural instruments (defaults, interoperability, attribution), providing a template for mechanism-aware research and policy evaluation. Third, the model offers a unifying vocabulary for studying adjacent access points—app stores, identity providers, embedded webviews—under a common lens of control-point governance.

Managerially, marketers and complementors should optimise to browser-layer rules—consent UX, first-party identity frameworks, and privacy-preserving

attribution—rather than assuming a transparent conduit. Strategists should anticipate choice-architecture frictions and design for multi-homing, deep linking, and interoperability. For policymakers, infrastructure-centric remedies that combine interoperability mandates, audited data access, and fair choice screens are most likely to preserve data-driven consumer surplus while deterring foreclosure and self-preferencing.

Limitations include reliance on secondary sources and a focus on two emblematic ecosystems. Future work should add quasi-experimental evidence on default and consent changes, ecosystem input–output modelling of surplus reallocation under DMA-style obligations, and comparative studies of super-app webviews and decentralised/Web3.0.0 browsers to test the generality of infrastructural multi-sidedness beyond the open-web client paradigm.

In sum, recognising the browser as the epicentre of digital ecosystems clarifies why innovation, competition, and regulation converge at the access layer—and why the future of digital markets will be determined as much by architecture and defaults as by algorithms and content.

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