ALGORITHMIC COLLUSION IN E-COMMERCE: CONCEPT OF AGREEMENT AND INTENT UNDER SECTION 3 OF THE COMPETITION ACT, 2002 - ISSUES AND CHALLENGES

Shreyaa Patnaik, B.B.A LL.B. (Hons.) Department of Law, CHRIST University, Pune Lavasa, India

ABSTRACT

The rapid proliferation of pricing algorithms and artificial intelligence in India's e-commerce ecosystem has given rise to a phenomenon that existing competition law was not designed to confront: algorithmic collusion. Where competing enterprises deploy sophisticated algorithms that independently converge on supra-competitive price levels without any human communication or explicit understanding, the foundational requirement of an 'agreement' under Section 3 of the Competition Act, 2002 is placed under serious strain. In this paper examines the legal, technological, and institutional dimensions of algorithmic collusion in the Indian context. It critically analyses whether the broad definition of 'agreement' under Section 2(b) of the Act is capacious enough to capture autonomous algorithmic conduct, evaluates the evidentiary and technical challenges faced by the Competition Commission of India (CCI), surveys comparative regulatory developments, and proposes a suite of legislative and regulatory reforms. This study argues that India urgently requires a calibrated regulatory response, one that addresses the harm of algorithmic collusion without stifling the technological innovation that drives digital market efficiency.

Keywords: Algorithmic Collusion, Competition Act 2002, Section 3, Agreement, Intent, E-Commerce, Artificial Intelligence, Competition Commission of India, Antitrust.

I. INTRODUCTION

From the perspective of competition law, this development is deeply ambivalent. On one hand, algorithmic pricing promotes market efficiency, reduces informational friction, and can benefit consumers through dynamic, demand-sensitive pricing. On the other hand, it creates the structural conditions for what scholars Ariel Ezrachi and Maurice Stucke have evocatively described as 'virtual competition' which is a market environment where the genuine rivalry between competitors is hollowed out from within by machines that effectively co-ordinate their conduct without ever communicating.[1]

The Indian competition law framework, codified in the Competition Act, 2002, was conceived in a different era and designed for a different kind of threat. Its central prohibition, Section 3, conditions liability on the existence of an 'agreement' between enterprises which is a concept that, even in its broadest statutory formulation, presupposes some form of mutual engagement between human actors.[2] When identical or near-identical pricing outcomes emerge from the independent operation of algorithms responding to the same digital environment, the question of whether any 'agreement' exists becomes genuinely and profoundly contested.

This paper seeks to examine that question rigorously. Part II sets out the legal framework under Section 3, focusing on the definition of 'agreement' and the role of intent. Part III analyses the nature and typologies of algorithmic collusion. Part IV examines the enforcement challenges facing the CCI. Part V surveys comparative regulatory developments and proposes reforms. Part VI concludes with key findings and suggestions.

II. LEGAL FRAMEWORK: SECTION 3 OF THE COMPETITION ACT, 2002

2.1 The Statutory Prohibition and Its Scope

Section 3(1) of the Competition Act, 2002 is the central provision governing anti-competitive agreements in India. It prohibits any enterprise or association of enterprises from entering into any agreement in respect of production, supply, distribution, storage, acquisition, or control of goods or provision of services, which causes or is likely to cause an appreciable adverse effect

[1]Ariel Ezrachi and Maurice Stucke, Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy (Harvard University Press 2016) 37–89.
[2]Competition Act, 2002, No. 12, Acts of Parliament, 2003 (India), s 3.

on competition (AAEC) within India.[3]

Section 3(3) creates a rebuttable presumption of AAEC for certain categories of horizontal agreements principally those relating to price-fixing, market allocation, bid-rigging, and output limitation.[4] These are treated as presumptively anti-competitive under a near per se rule, placing the burden squarely on the defendant to demonstrate that the impugned agreement does not cause an AAEC. Vertical agreements, governed by Section 3(4), are assessed on a full rule-of-reason basis, requiring a case-by-case analysis of AAEC.[5]

2.2 The Definition of 'Agreement' and the Problem of Intent

The term 'agreement' is broadly defined in Section 2(b) to include 'any arrangement, understanding or action in concert, (i) whether or not such arrangement, understanding or action is formal or informal; or (ii) whether or not such arrangement, understanding or action is intended to be enforceable by legal proceedings.'[6]

This is, on its face, an impressively expansive definition. It extends beyond formal, legally binding contracts to encompass informal understandings and even co-ordinated conduct that was never intended to be legally enforceable. The legislature's intent, plainly, was to ensure that market actors could not evade competition law simply by arranging their conduct through a wink and a nod rather than a signed document.

Indian courts have affirmed this broad reading. The Supreme Court in Excel Crop Care Ltd v. Competition Commission of India[7] held that circumstantial evidence of co-ordination can establish an 'agreement' without direct proof of explicit communication. The CCI in Neeraj Malhotra v. Deutsche Post Bank[8] similarly confirmed that the Act does not require a legally enforceable agreement but a gentlemen's understanding suffices. In Shamsher Kataria v. Honda Siel Cars India Ltd,[9] the CCI demonstrated its willingness to draw inferences of an agreement from patterns of parallel conduct accompanied by circumstantial 'plus factors.'

Yet even this generous reading has a structural limit. An 'arrangement' or 'understanding'

[3]Competition Act, 2002, s 3(1).
[4]Competition Act, 2002, s 3(3).
[5]ibid, s 3(4).
[6]Competition Act, 2002, s 2(b).
[7]Excel Crop Care Ltd v Competition Commission of India (2017) 8 SCC 47.
[8]Neeraj Malhotra v Deutsche Post Bank Home Finance Ltd (2011) CompLR 227 (CCI).
[9]Shamsher Kataria v Honda Siel Cars India Ltd, CCI Case No 03/2011.

necessarily involves at least two parties who have, in some discernible way, engaged with each other's intentions. 'Action in concert' similarly implies a meeting of minds, however informal. When pricing decisions are made entirely by independent algorithms responding autonomously to shared market signals with no human deliberation, communication, or co-ordination then the residual requirement of mutuality becomes extremely difficult to satisfy. The law's architecture assumes human agency; algorithms, strictly speaking, have none.

III. NATURE AND TYPOLOGY OF ALGORITHMIC COLLUSION

3.1 Understanding the Phenomenon

Algorithmic collusion is not a monolithic phenomenon. It encompasses a spectrum of behaviours ranging from the straightforwardly unlawful to the genuinely legally ambiguous. A useful and widely-cited taxonomy is provided by Ezrachi and Stucke, who identify four principal scenarios through which algorithms may facilitate collusive market outcomes.[10]

The first scenario which is the 'Messenger' is the simplest. Here, algorithms are used merely as tools to implement and communicate a pre-existing human cartel agreement. The human intent to collude is clear, the algorithms are passive instruments, and existing law is entirely adequate to address the conduct. The second scenario which is the 'Hub-and-Spoke' is considerably more complex. Here, competing firms independently subscribe to a common algorithmic pricing platform or tool, which effectively functions as a hub through which their pricing is co-ordinated without direct communication between the competing spokes. This scenario has clear analogues in hub-and-spoke conspiracy doctrine, and there is a credible argument that liability can be established under Section 3 of the Competition Act.

The third scenario which is the 'Predictable Agent' arises where firms knowingly deploy algorithms that they understand will predictably produce co-ordinated market outcomes, even without any explicit agreement between them. The firms effectively delegate their decision-making to an agent whose behaviour they know will mirror that of their competitors' agents. This scenario raises serious questions about the attribution of intent and the adequacy of existing legal frameworks.

[10]Ariel Ezrachi and Maurice Stucke, 'Artificial Intelligence and Collusion: When Computers Inhibit Competition' (2017) University of Illinois Law Review 1775, 1781.

The fourth and most legally vexing scenario is 'Autonomous Collusion.' Here, sophisticated self-learning algorithms using reinforcement learning or other machine learning techniques independently converge on co-ordinated pricing strategies through repeated interaction with each other in the digital marketplace. No human designed the collusion; it emerges as an unintended consequence of competitive market dynamics mediated entirely by machine intelligence. Consumers suffer the same harm as they would from a hard-core cartel, but the legal pathway to liability is deeply unclear.

3.2 The Literature on Algorithmic Collusion in India

Indian academic scholarship on algorithmic collusion, while still developing, has begun to identify the key tensions. Gupta and Jha argue that the current legal framework is structurally ill-equipped to address algorithmic collusion because its evidentiary requirements which is developed for human cartels cannot be mechanically transposed to conduct generated by autonomous software.[11] Arpita Gupta's comparative analysis of proof standards in algorithmic cartel cases highlights the inadequacy of the 'plus factors' doctrine when the conduct in question is generated by machines rather than human conspirators.[12]

IV. ENFORCEMENT CHALLENGES FACED BY THE CCI

4.1 The Evidentiary Problem: Proving 'Agreement'

The most fundamental enforcement challenge is evidentiary. Parallel pricing where competitors charge the same or similar prices is not per se unlawful under Indian competition law. It is a common feature of competitive oligopolistic markets where firms independently observe and respond to each other's prices. To establish a violation of Section 3, the CCI must demonstrate something more than mere parallelism: it must show that the parallel conduct was the product of co-ordinated action rather than independent rational response to shared market conditions.

In traditional cartel cases, this burden is typically discharged through documentary evidence of communications between competitors, testimony from leniency applicants, or compelling

[11]Arpit Gupta and Ridhi Jha, 'Algorithmic Pricing and Antitrust: Challenges Under Indian Competition Law' (2022) 14 Indian Journal of Competition Law and Economics 42, 51.
[12]Arpita Gupta, 'Proof of Agreement in Algorithmic Cartels: A Comparative Analysis' (2021) 9 NUJS Law Review 85, 93.

circumstantial 'plus factors' that are consistent with agreement and inconsistent with independent conduct. In cases of autonomous algorithmic collusion, none of these evidentiary tools is readily available. There are no communications to discover, no human conspirators to turn informant, and the 'plus factors' doctrine which was developed to assess human decision-making does not map cleanly onto the deterministic or probabilistic outputs of machine learning systems.

4.2 Technical Complexity and the Limits of Regulatory Capacity

The CCI's 2020 Market Study on E-Commerce in India acknowledged the growing significance of algorithmic pricing on major platforms but stopped short of identifying specific instances of algorithmic collusion or making concrete regulatory prescriptions.[13] The study was candid about the informational limitations facing the regulator. Obtaining and interpreting algorithmic source code requires highly specialised technical expertise. Even where code can be obtained through compulsory process, establishing that an algorithm was designed to co-ordinate as opposed to simply optimise independently demands a level of technical forensic capacity that the CCI, like most competition regulators globally, does not yet fully possess.

The pace of technological change compounds this difficulty. Machine learning systems adapt and evolve continuously. By the time a competition law investigation is completed, often several years after the conduct began, the algorithms under scrutiny may have been entirely redesigned or replaced. This temporal mismatch between the speed of digital markets and the pace of legal proceedings is one of the most practically significant challenges confronting the CCI.

4.3 The Attribution of Intent

Even where parallel conduct can be identified and linked to algorithmic systems, the question of intent presents a significant doctrinal hurdle. Section 3's jurisprudence has evolved in the context of human decision-making, and courts and the CCI have implicitly assumed that the parties to an 'agreement' or 'action in concert' are capable of forming and communicating intentions. In the case of autonomous algorithms, the firms that deployed the systems may have had no intention of achieving collusive outcomes; the convergence may have emerged entirely

[13]Competition Commission of India, 'Market Study on E-Commerce in India' (January 2020) <https://www.cci.gov.in> accessed 1 April 2025.

from the algorithm's own learning process. Whether a firm can be held liable for the unintended competitive consequences of its technology without any human design or intent to collude, is a question that Indian law has not yet answered.

4.4 Institutional Capacity Constraints

The CCI is a relatively young institution, having been operationally active only since 2009. While it has developed considerable expertise in traditional competition enforcement across sectors including pharmaceuticals, automobiles, and broadcasting, its capacity to handle technologically complex cases involving artificial intelligence and machine learning remains limited. The absence of a dedicated digital markets unit comparable to those being established within the European Commission, the UK Competition and Markets Authority (CMA), and the German Bundeskartellamt is a material institutional gap that constrains the CCI's ability to mount effective enforcement actions in this space.

V. REGULATORY RESPONSES AND THE PATH FORWARD

5.1 Algorithmic Detection Tools

A valuable domestic contribution to addressing algorithmic collusion comes from the Goa Institute of Management, whose working paper on algorithmic detection of collusion in Indian digital markets proposes the deployment of machine learning tools to identify suspicious pricing patterns that deviate from competitive market benchmarks.[14] This approach using AI to detect AI-enabled misconduct is conceptually promising and represents a direction that the CCI should actively pursue. If the regulator can develop or commission tools capable of real-time price monitoring and anomaly detection across major e-commerce platforms, the evidentiary gap identified in Part IV above could be meaningfully narrowed.

5.2 The Competition (Amendment) Act, 2023 and Its Gaps

The Competition (Amendment) Act, 2023 introduced several significant modernising reforms to India's competition law framework, including provisions on settlements, commitments, and a revised merger control regime.[15] However, the Amendment is conspicuously silent on

[14]Goa Institute of Management, 'Algorithmic Detection of Collusion in Indian Digital Markets' (Working Paper, 2022).
[15]Competition (Amendment) Act, 2023, No. 18, Acts of Parliament, 2023 (India).

algorithmic collusion and the broader challenges posed by AI-driven market conduct. The definition of 'agreement' in Section 2(b) remains unchanged, and there is no express legislative guidance on the liability of firms for the autonomous anticompetitive conduct of their pricing algorithms. This is a significant and disappointing legislative gap.

5.3 Comparative Developments: The EU and US Models

The European Commission's 2019 report on 'Competition Policy for the Digital Era' recommended a shift toward proactive, ex ante regulation of digital markets, including mechanisms designed to address algorithmic pricing concerns.[16] The European Union's Digital Markets Act goes further still, imposing significant obligations on 'gatekeeper' platforms that create a regulatory architecture potentially extendable to collusion concerns.[17]

In the United States, the Stigler Committee on Digital Platforms has recommended the creation of a dedicated digital authority equipped with technical expertise to monitor and regulate algorithmic conduct.[18] Both the Department of Justice and the Federal Trade Commission have issued guidance indicating that algorithmic price coordination can attract antitrust liability even where no explicit agreement is established, provided there is evidence of conscious parallelism combined with facilitating practices.

5.4 Balancing Innovation and Competition

Any regulatory response to algorithmic collusion must be carefully calibrated to avoid chilling the legitimate use of technology in pricing, which delivers real efficiency gains. Not all algorithmic pricing is anticompetitive; much of it intensifies competition by enabling rapid price matching and transparency. The challenge for regulators is to distinguish the anticompetitive from the pro-competitive, and to design interventions precise enough to reach the former without inadvertently suppressing the latter.

5.5 Policy Recommendations

Drawing on the foregoing analysis, this paper proposes five regulatory reforms for the Indian context. First, the CCI should issue detailed guidelines clarifying how the definition of

[16]European Commission, 'Competition Policy for the Digital Era' (Final Report 2019).
[17]Digital Markets Act 2022 (EU Regulation 2022/1925).
[18]Stigler Committee on Digital Platforms, 'Final Report' (Stigler Center, University of Chicago Booth School of Business, 2019) 22.

'agreement' in Section 2(b) applies to hub-and-spoke algorithmic structures, and whether an effects-based liability standard dispensing with the requirement of proven intent is available under the existing statutory text.

Second, the CCI should be empowered and resourced to conduct ex ante algorithmic audits of firms operating in concentrated digital markets. Such audits would enable the regulator to assess the design and likely competitive effects of pricing algorithms before harm materialises, rather than relying exclusively on reactive, ex post enforcement.

Third, Parliament should introduce an 'algorithmic transparency' obligation for dominant e-commerce platforms, requiring periodic disclosure to the CCI of the key parameters governing their pricing algorithms. This need not require the disclosure of commercially sensitive proprietary code in its entirety; targeted disclosure of algorithmic design parameters and pricing objectives would be sufficient to enable regulatory assessment.

Fourth, the CCI should collaborate with academic institutions including the Goa Institute of Management and the national law universities to develop and deploy AI-powered surveillance tools for the real-time detection of suspicious pricing patterns across major platforms. The OECD's work in this space provides a useful international benchmark.[19]

Fifth, and most fundamentally, the Competition Act should be amended to introduce an explicit provision addressing corporate liability for the autonomous anticompetitive conduct of algorithmic systems. A firm should not be able to immunise itself from competition law liability merely by delegating pricing decisions to a machine. Liability should attach where the firm deployed an algorithm that it knew, or ought reasonably to have known, was likely to produce collusive market outcomes irrespective of whether any human decision-maker specifically intended that result.

VI. ALIGNMENT WITH SUSTAINABLE DEVELOPMENT GOALS

The regulation of algorithmic collusion in e-commerce bears a meaningful and direct relationship with several of the United Nations Sustainable Development Goals (SDGs).[20] SDG

[19]Organisation for Economic Co-operation and Development, 'Algorithms and Collusion: Competition Policy in the Digital Age' (OECD 2017).
[20]United Nations Sustainable Development Goals 8 (Decent Work and Economic Growth) and 16 (Peace, Justice and Strong Institutions).

16, which calls for the development of accountable and effective institutions and access to justice for all, is implicated by the need for a CCI that is institutionally equipped to address the most sophisticated contemporary forms of market manipulation. SDG 8, which promotes sustained, inclusive, and sustainable economic growth and decent work for all, is undermined by algorithmic collusion that systematically raises prices for consumers in a country where a significant proportion of the population makes price-sensitive purchasing decisions, this harm is not merely economic but social.

Ensuring that India's e-commerce markets remain genuinely and effectively competitive is not merely a technical legal objective. It is a precondition for the inclusive, innovation-driven digital economy that India's development trajectory demands. Competition law enforcement that keeps pace with technological change is, in this sense, a matter of public interest and sustainable development, not merely regulatory compliance.

VII. CONCLUSION AND SUGGESTIONS

7.1 Summary of Key Findings

This paper has established three central findings. First, the existing definition of 'agreement' under Section 2(b) of the Competition Act, 2002, while broad, was designed for human actors and is not readily applicable to cases of fully autonomous algorithmic collusion where no human communication or deliberate co-ordination has occurred. Second, the CCI faces significant evidentiary, technical, and institutional challenges in detecting, investigating, and prosecuting algorithmic collusion cases, and its current toolkit, both legal and technical is inadequate to the challenge. Third, the Competition (Amendment) Act, 2023 has not addressed these deficiencies, leaving a substantial and growing regulatory gap.

7.2 Answers to Research Questions

Does algorithmic collusion fall within the ambit of Section 3 of the Competition Act, 2002? The answer is: partially and conditionally. Hub-and-spoke algorithmic structures and 'Predictable Agent' scenarios can plausibly be addressed within the existing framework if courts and the CCI adopt an effects-based approach and draw appropriate inferences from circumstantial evidence. Fully autonomous algorithmic collusion, however, stretches the current framework beyond its natural limits and almost certainly requires legislative

intervention to address definitively.

Can intent be established in cases of autonomous algorithmic conduct? Probably not under the current framework as traditionally applied. A legislative shift toward objective, effects-based liability with intent relevant to penalty quantum but not to the basic finding of infringement is both legally coherent and practically necessary.

7.3 Contributions of This Study

This paper makes both practical and academic contributions. Practically, it maps the specific legal gaps in India's competition framework as applied to algorithmic collusion and proposes concrete legislative and regulatory reforms. Academically, it situates India's challenges within the broader global scholarly debate on the adequacy of existing antitrust frameworks for the algorithmic age, and offers an India-specific analytical framework that can inform future research and regulatory action.

7.4 Suggestions for Future Research and Policy

Future research should focus on three areas. First, empirical study of pricing patterns on Indian e-commerce platforms using publicly available price data to identify and document instances of suspicious parallel pricing that may indicate algorithmic collusion. Second, doctrinal analysis of whether the Indian courts are likely to adopt an effects-based liability standard under the existing statutory text, without legislative amendment. Third, comparative institutional analysis of how different regulatory architectures the US sector-specific model, the EU ex ante platform regulation model, and emerging models in China and Australia perform in practice, with a view to identifying the most appropriate institutional design for India.

In the final analysis, algorithmic collusion tests the resilience and adaptability of India's competition law framework. The stakes are high: a failure to regulate effectively will allow AI-powered price co-ordination to become entrenched in India's digital markets, to the permanent detriment of consumers and competitive market dynamics. The time for a considered, well-crafted legislative and regulatory response is now.

REFERENCES

[1] Competition Act, 2002, No. 12, Acts of Parliament, 2003 (India).

[2] Competition (Amendment) Act, 2023, No. 18, Acts of Parliament, 2023 (India).

[3] Digital Markets Act 2022 (EU Regulation 2022/1925).

[4] Excel Crop Care Ltd v Competition Commission of India (2017) 8 SCC 47.

[5] Neeraj Malhotra v Deutsche Post Bank Home Finance Ltd (2011) CompLR 227 (CCI).

[6] Shamsher Kataria v Honda Siel Cars India Ltd, CCI Case No 03/2011.

[7] Ezrachi A and Stucke M, Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy (Harvard University Press 2016).

[8] Ezrachi A and Stucke M, 'Artificial Intelligence and Collusion: When Computers Inhibit Competition' (2017) University of Illinois Law Review 1775.

[9] Gupta A and Jha R, 'Algorithmic Pricing and Antitrust: Challenges Under Indian Competition Law' (2022) 14 Indian Journal of Competition Law and Economics 42.

[10] Gupta A, 'Proof of Agreement in Algorithmic Cartels: A Comparative Analysis' (2021) 9 NUJS Law Review 85.

[11] Competition Commission of India, 'Market Study on E-Commerce in India' (January 2020)

[12] European Commission, 'Competition Policy for the Digital Era' (Final Report 2019).

[13] Goa Institute of Management, 'Algorithmic Detection of Collusion in Indian Digital Markets' (Working Paper, 2022).

[14] Organisation for Economic Co-operation and Development, 'Algorithms and Collusion: Competition Policy in the Digital Age' (OECD 2017).

[15] Stigler Committee on Digital Platforms, 'Final Report' (Stigler Center, University of Chicago Booth School of Business, 2019).