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OVERVIEW OF AI AND COMPETITION LAW

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INTRODUCTION

A cognitive process displayed by non-human organisms, such as computer programs that carry out tasks resembling human cognition, is known as artificial intelligence (AI). AI is widely used in both business and consumer settings today because of its many advantages, including the ability to perform tasks as accurately as a human worker but much more quickly. Neural networks, deep learning, machine learning, computer vision, and natural language processing are just a few of the subcategories of AI techniques and software that are primarily utilised in Internet applications and smartphones.

The two main goals of AI and machine learning are to solve problems that people are unable to solve and to handle complicated issues that call for constant manual labour. Large data sources that expand over time can be effectively understood and insights extracted by machines, enabling firms to innovate and engage in revenue-generating activities. AI and machine learning may utilise data insights to forecast future behaviour, allowing companies to monitor important consumer behaviour and respond quickly to capitalise on occurrences the technology detects. Three categories of AI applications exist, each with unique characteristics.

DEFINITION AND KINDS OF AI

The most common kind of artificial intelligence is narrow AI, which is utilised in a variety of contexts, including big data analytics, mobile devices, and the internet. Because of its capacity to focus on certain tasks and complete activities that are not assigned to it, it is also referred to as "weak" AI. Narrow AI is produced using current standards and technologies and is a complicated computer program rather than a collection of intangible components. Businesses expect AI to do one thing well as its usage grows, which will boost their bottom

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line exponentially. Narrow AI is created with the newest technology in a setting where the issue is the focus. This gives AI a specific focus, which makes it a preferred corporate option. Expert systems, spam filtering, and recommendation systems are a few instances of narrow AI. Narrow AI is used by recommendation systems, such Netflix's "Because you watched...", YouTube's "Recommended," and Twitter's "Top Tweets first," to ascertain user preferences and provide tailored experiences.[2] Spam filtering, such as Google's "Spam Filtering" service, uses narrow AI with natural language processing capabilities to keep inboxes clean. The future of artificial intelligence may be paved with expert systems, which are made up of numerous smaller, more focused AI algorithms. Like human intelligence, these systems include a variety of senses as well as cognitive, logical, and creative functions. The future of artificial intelligence is exemplified by IBM Watson, which blends cognitive and natural language processing capabilities.

AI is just a program that can be trained to do jobs; contrary to common assumption, it is not here to replace humans. Establishing a moral, ethical, and legal framework to regulate AI is crucial as it develops. More human-like traits may emerge as the scale moves from typically lower to higher intelligence, making it challenging for developed nations to regulate AI and related technology. As the future of artificial intelligence is carved out, mostly by the kinds of AI that are currently being discussed, it is imperative to have a forward-thinking mindset.

Narrow artificial intelligence (AI) is a very targeted and effective kind of AI that is utilised in many different applications, such as expert systems, spam filtering, and recommendation systems. These technologies can offer users a more efficient and customised experience, opening the door for AI in the future.[3] AI that can think and act like a human, including perceptual tasks like vision and language processing, as well as cognitive tasks like processing, contextual understanding, thinking, and a more generalised way of thinking overall, is known as artificial general intelligence (AGI). The learning component of adaptive general intelligence (AGI) is unsupervised; thus, AGI can be broad and flexible. However, because there aren't many tools available to develop it, AGI is still a way off. Human intelligence is still a mystery, but neural networks offer a reliable method of producing the precursors of AGI. Since a general artificial intelligence (AI) must be conscious and not only an algorithm or machine, defining consciousness is essential.

[2] T. Ramappan, Competition Law in India: Policy, Issues & Developments, 2nd end. (New Delhi: Oxford University Press, 2009).

[3]EinerElhauge and Damien Gradin, Competition Law and Economics (Oxford: Hart Publishing, 2007).

Replicating transfer learning, fostering cooperation and common sense, and determining awareness and mind are some of the difficulties facing broad artificial intelligence. Applying knowledge acquired in one area to another is known as transfer learning, and it is crucial to human functioning. Strong transfer learning skills are necessary for an AGI to prevent retraining. The phrase "artificial super intelligence" (ASI) refers to an AI that significantly surpasses human cognition in every manner. Even though ASI is now only a theory, situations involving it have already been imagined. There is broad agreement among experts in the field that ASI will result from the "Intelligence Explosion," or exponential expansion of AI algorithms. Recursive self-improvement leads to artificial super intelligence, which requires the idea of intelligence explosion. In artificial intelligence, self-improvement takes the form of neural networks learning from human input. The ability of an AI system to learn from itself at quickly rising intelligence levels is known as recursive self-improvement. To achieve genius-level intelligence, for instance, an AGI operating at the level of ordinary human intellect will learn from itself. Artificial intelligence is developing at a rapid rate, becoming more intelligent than itself at every turn. This keeps increasing rapidly until intellect erupts and a superintelligence is created.

LEGAL AND ECONOMIC THEORIES UNDERPINNING COMPETITION LAW

Market Fairness: Legal and Philosophical Foundations

The notion of market fairness is embedded in classical liberal thought, which sees markets as arenas for voluntary exchange governed by rules that prevent coercion, deception, and exclusion. From a legal-theoretical standpoint, the following concepts are central:[4]

Rule of Law and Equality of Opportunity: A fair market is one where all participants operate under the same legal standards. Legal theories emphasising procedural fairness argue that businesses should have equal access to market opportunities without facing arbitrary disadvantages from monopolistic practices or exclusionary behaviour.

Commutative Justice (Aristotelian Ethics): Fairness in transactions implies that exchanges must be mutually beneficial and not skewed by overwhelming power asymmetries. This idea persists in modern notions of regulating unfair trade practices, such as predatory pricing or tying arrangements.

Rights-based Approaches: Jurisprudential approaches grounded in the works of thinkers like Dworkin or Rawls view fairness as encompassing not only procedural rights but also

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[4] D.P. Mittal, Competition Law and Practice, 2nd edn. (New Delhi: Taxmann Allied Services (P) Ltd., 2008).

substantive justice, ensuring that weaker market actors (small businesses or consumers) are not disproportionately burdened or exploited.Thus, legal theories of fairness intersect closely with economic regulation to ensure that competition laws act not only as deterrents but also as equalising mechanisms that preserve the integrity of market structures.[5]

The regulation of markets through competition law is grounded in a confluence of legal and economic theories that aim to preserve market fairness, protect consumer interests, and deter anti-competitive conduct. These theories provide the intellectual framework for assessing practices such as cartels, monopolies, abuse of dominance, and mergers that potentially harm the competitive structure of markets. Over time, the focus of competition law has shifted from purely protecting competitors to ensuring that the process of competition delivers the greatest benefit to consumers and the economy.

Consumer Welfare: The Economic Rationale

At the heart of modern competition law is the consumer welfare standard, a key principle in economic theory. This principle asserts that the ultimate objective of competition regulation is to enhance consumer welfare, typically by encouraging lower prices, better quality, and innovation.

Neoclassical Microeconomics: This school argues that perfectly competitive markets maximise total welfare by achieving efficient allocation of resources. Monopolies or collusive behaviour distort this equilibrium, leading to "deadweight losses" and reduced consumer surplus. Antitrust law, in this view, functions to restore competitive equilibrium.

Chicago School of Economics: Associated with scholars like Robert Bork, this approach strongly advocates for economic efficiency as the sole goal of antitrust law. It views many vertical restraints and large-scale mergers as potentially pro-competitive unless they demonstrably harm consumer welfare.[6]

Post-Chicago School: This school challenges some of the assumptions of the Chicago School, highlighting the real-world strategic behaviours of firms, such as raising rivals' costs, leveraging network effects, or engaging in exclusionary practices that may not immediately result in higher prices but could still harm competition and innovation in the long run.

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[5] Hemant Singh and Radha Naruka, "Competition Commission of India and Consumers' Welfare: An Analysis" (April 17, 2013), available at SSRN: https://ssrn.com/abstract=2252526 or http://dx.doi.org/10.2139/ssrn.2252526.

[6] EinerElhauge and Damien Geradin, Competition Law and Economics (Oxford: Hart Publishing, 2007).

Behavioural Economics: A newer lens, behavioural economics recognises that consumers and firms do not always act rationally. This has implications for market power, as dominant firms might exploit cognitive biases or informational asymmetries, necessitating regulatory intervention to truly protect consumer welfare.

In practice, regulatory agencies like the Competition Commission of India (CCI) balance short-term price effects with long-term impacts on innovation, choice, and market access while assessing consumer harm.

Anti-Competitive Conduct: Economic and Legal Frameworks

The regulation of anti-competitive conduct is informed by both **structuralist** and **functionalist** approaches in economics and law.[7]

- **Structure-Conduct-Performance (SCP) Paradigm**: A foundational concept in industrial organisation economics, it posits that market structure (e.g., number of firms, entry barriers) determines firm conduct, which in turn affects market performance. Under this model, concentrated markets are presumed to be less competitive, leading to regulatory interventions against mergers and monopolies.

- **Contestable Market Theory**: In contrast, this theory suggests that even markets with few firms can be competitive if there are no significant barriers to entry or exit. Thus, the focus shifts from market structure to the ease with which competition can be introduced or maintained.

- **Legal Standards for Anti-Competitive Behaviour**: Legally, anti-competitive conduct is evaluated through either:

  o **Per se rules** (automatic illegality, e.g., price-fixing),

  o Or the **rule of reason** (contextual analysis of the effect on competition).

India's Competition Act, 2002 incorporates both, distinguishing between agreements that are presumed to have an appreciable adverse effect on competition (Section 3(3)) and those requiring economic analysis (Section 3(4), Section 4).

- **Economic Concepts in Enforcement**:

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[7]*Ibid*

o **Market Power and Dominance**: Defined by the ability to operate independently of competitive pressures. Abuse of dominance, rather than its mere existence, is penalised under most legal systems.

o **Barriers to Entry**: Legal (e.g., licensing), structural (e.g., capital intensity), and strategic (e.g., brand loyalty) barriers influence the assessment of market power.

o **Price Discrimination, Predation, and Exclusive Dealing**: These behaviours are evaluated based on whether they foreclose market access or harm consumer interests.

Integration of Legal and Economic Theories in Enforcement

Modern competition enforcement reflects an increasing **convergence between legal principles and economic analysis**. Courts and regulators assess:[8]

- **Market definition** (both product and geographic),

- **Counterfactuals**(what would happen absent the conduct),

- **Efficiency defences** (whether anti-competitive effects are outweighed by benefits).

This interdisciplinary approach ensures a nuanced application of law that promotes both **fairness**(in process) and **efficiency** (in outcome).

In India, the CCI and appellate forums like the NCLAT and the Supreme Court have progressively engaged with economic concepts, although there remains a learning curve in balancing doctrinal legal clarity with complex economic modelling.

INTERSECTION OF AI AND COMPETITION LAW PRINCIPLES

Competition Law and Algorithms

Since the Economist warned that price-bots can conspire against customers, concerns about algorithmic competitiveness have been in the public eye. But media and scholarly curiosity have surpassed the situation on the ground. Although price algorithms have been used to fix prices, the harm to consumers appeared to be minimal, and the collusive schemes were very low-tech. Consequently, the literature on AI and competition law was dubbed "the closest our field ever came to science-fiction." Algorithms can genuinely replace human decision-makers and learn to charge supra competitive prices on their own, as demonstrated by more current

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[8] D.P. Mittal, Competition Law and Practice, 2nd edn. (New Delhi: Taxmann Allied Services (P) Ltd., 2008).

economic models, which demonstrate that sellers cannot simply employ pricing algorithms to collude. Pricing algorithms, which have an impact on industries as vital as real estate, have grown even more prevalent and potentially harmful in the interim.

Since it focusses on substantive competition law (and allied fields of law) rather than more institutional issues like enforcement, which need a different discussion, the topic of AI and competition law is ready for a re-examination. The chapter begins by discussing the ultimate purpose of competition law, which is the welfare of consumers, and how algorithms and the growing amount of data available may impact that wellbeing.[9]

The competition's parameters may be impacted by algorithmic competition. It is crucial to realise from away that algorithms require input, or data, to produce output. Price data is the most pertinent kind of information when it comes to competition.[10] At the retail level, pricing transparency has become the standard these days, at least in business-to-consumer (B2C) contexts. Prices are typically accessible online (for example, on the seller's website) and through digital platforms such as price comparison websites (PCWs), which compile prices from several sellers in one location.

In its E-Commerce Sector Inquiry, the European Commission (EC) concluded that price transparency has unclear implications. There is more price competition among merchants because of consumers' ease of price comparison on the internet. However, pricing transparency also makes it possible for businesses to keep an eye on one another's prices, frequently using algorithms. When a supplier and distributor have a vertical relationship, the supplier can more readily identify price variations from the suggested retail price and possibly request adjustments from the retailers. It is now typical for businesses to automatically alter their prices to match those of their rivals in a horizontal relationship. The Making of a Fly, a book that ultimately sold for over $23 million on Amazon, involves both kinds of algorithms—undercutting and rising. The consequences are more detrimental and less ludicrous in many other cases. The more open pricing of petrol has been the subject of numerous investigations. At the expense of customers, the Chilean government even forced petrol station owners to publish their pricing on a public website, boosting their profit

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[9] Vinod Dhall (ed.), Competition Law Today: Concepts, Issues and the Law in Practice (New Delhi: Oxford University Press, 2007).

[10] IoannisLianos and D. Daniel Sokol (eds.), The Global Limits of Competition Law (California: Stanford University Press, 2012).

margins by 9%. Without such radical transparency, a similar outcome can be achieved. Such pricing software is the speciality of businesses like A2i.

Algorithms can lead to unilateral behaviour and competition problems that go beyond coordination on a supercompetitive price point. It is worthwhile to draw attention to two categories of algorithms: those used for non-pricing and personalised pricing. Sellers can accurately price discriminate by using personal information about customers to determine their precise willingness to pay.[11] Price discrimination can enable businesses to service customers they otherwise would not, therefore its effects are not always clear-cut. Algorithms are frequently employed for non-price-related tasks, including ranking. A change to their ranking system can make one company profitable while marginalising another. Digital platforms have emerged to bring order to the unbounded internet. Changes are not difficult if they are made with the interests of the customers in mind. Customers might suffer, though, if changes are made merely to highlight the platform's own goods (self-preferencing).

Since the Economist warned in 2017 that price-bots can conspire against customers, concerns about algorithmic competition have been in the news. A well-reviewed book on the dangers of the algorithm-driven economy, Virtual Competition by Ezrahi and Stucke, garnered press attention. Recent economic models, however, demonstrate that sellers cannot simply collude by using pricing algorithms; rather, algorithms could replace human decision-makers and can set prices that are supercompetitive on their own.

The primary algorithmic competition concerns are covered in detail in Section 3, beginning with both horizontal and vertical restrictive agreements and progressing to exclusionary and exploitative abuses of power. Whether EU competition laws can effectively address these problems is the key question.

The elements of competition, especially price data, can be impacted by algorithmic competition. In business-to-consumer (B2C) contexts, where prices are typically accessible online and compiled on digital platforms such as price comparison websites (PCWs), price transparency has become the standard. To better handle the difficulties presented by algorithmic competition, future studies should concentrate on comprehending the technological facets of AI and competition law.

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[11] Hemant Singh and Radha Naruka, "Competition Commission of India and Consumers' Welfare: An Analysis" (April 17, 2013), available at SSRN: https://ssrn.com/abstract=2252526

It has been discovered that price transparency has conflicting effects on customer welfare and competition. Because it makes it simple for customers to compare costs online, there is more price competition among sellers. Price transparency also makes it possible for businesses to keep an eye on one another's prices, frequently using algorithms. When suppliers and distributors have vertical relationships, suppliers can more readily identify price variations from the retail price they suggested and possibly request adjustments from retailers. It is now typical for businesses to automatically change their prices to match those of their rivals in horizontal connections.

Algorithms can have two negative effects: they can undercut competitors, which benefits customers, or they might raise prices, which hurts customers. This is seen in the Making of a Fly narrative, where two book dealers use pricing algorithms to set one book's price 27% higher than the other. But in many other cases, the consequences are more detrimental and less ludicrous. The Chilean government, for instance, forced petrol station owners to publish their pricing on a public website, boosting their profits by 9% at the expense of customers.[12] Without such radical transparency, a similar outcome can be achieved.

Beyond cooperation on a supercompetitive pricing point, algorithms can lead to competition problems. They may also serve as the foundation for unilateral behaviour, of which there are two categories that merit special attention. First, algorithms enable customised pricing, which perfects price discrimination by enabling sellers to determine the precise amount that customers are ready to spend. Although some customers pay more than they otherwise would, pricing discrimination can also enable businesses to service customers they otherwise would not be able to. Second, algorithms are frequently employed for purposes other than price, namely ranking. A change to their ranking system can make one company profitable while marginalising another. Digital platforms have emerged to bring order to the unbounded internet. Changes are not difficult if they are made with the interests of the customers in mind. However, users may pay the price if changes are made merely to promote the platform's own goods (self-preferencing). Through a set of regulations, competition law ensures consumer welfare by protecting competition. Article 101 TFEU and Article 102 TFEU are two clauses that prohibit restrictive agreements and abuse of dominance, respectively. With horizontal agreements more likely to be classified as "by object" and vertical agreements more likely to be classified as "by effect," these limitations address algorithmic competition issues.

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[12] S. Krishnamurthi, Consumer and Law: Redressal of Grievances (Lucknow: Vinod Law Publications, 2001)

Stability and cartel creation may be easier in a digital environment. Because price transparency and monitoring algorithms make it possible to identify cartel agreement violations more quickly, cheating is less of an incentive. Deviation is impossible when a third party sets pricing for several merchants using an algorithm. Cartels are strengthened by algorithmic pricing, and because there is no paper trail, competition regulators may find it more difficult to identify them. Cartels are not less common or resilient because of digitisation, especially pricing transparency and the extensive use of computers to track and determine prices. Algorithmically assisted price coordination can occur in three ways: 1) firms can explicitly agree on prices and use algorithms to help implement that agreement; 2) they can use the same pricing algorithm that a third party provides, which results in price coordination without explicit agreement between them; and 3) they can instruct different pricing algorithms to maximise profits, which leads to a collusive equilibrium or supercompetitive prices.

Competition law has been significantly impacted by the incorporation of artificial intelligence (AI) into contemporary economic activities.[13] The intricacies of machine-led decision-making are challenging established legal tools, which were created for human players and conventional market structures, as markets grow more automated and data-driven. AI can lower transaction costs, provide customised offerings, and improve market efficiency. But it also creates new opportunities for anti-competitive behaviour, namely algorithmic collusion, dominance abuse, and data-driven exclusionary behaviours. To make sure that competition law is still applicable and effective in the digital age, it is essential to comprehend this changing intersection.

The increasing concentration of power in the hands of a small number of technological companies is a fundamental worry resulting from the use of AI in markets. The advancement of AI, especially in fields like machine learning and predictive analytics, is largely dependent on having access to large datasets, sophisticated algorithms, and computational resources. Naturally, big, established players who can afford such resources gain from this reliance. Because businesses with more data can train stronger algorithms, which in turn draw in more users and produce even more data, markets are becoming more and more typified by high barriers to entry and self-reinforcing network effects. Market tipping is the result of this cycle, in which one company or a small number of companies take control of a certain digital ecosystem.

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[13]*Ibid*

In these situations, the true extent of market dominance may be missed by conventional competition law instruments that mainly concentrate on market share or turnover. Dominance is increasingly measured by control over data, algorithmic architecture, and AI infrastructure. Concerns about using market dominance to stifle competition in another are also raised by the vertical integration of AI technologies across services, such as the integration of voice assistants with e-commerce platforms. Because of these advancements, evaluating competitive dynamics in AI-driven industries requires a deeper and more comprehensive understanding of market structure.

Algorithmic collusion is arguably one of the most innovative and difficult areas where AI and competition law meet. Algorithmic collusion can happen through autonomous interactions between self-learning algorithms, in contrast to classical cartels, which entail explicit agreements between enterprises to fix prices or restrict output. For example, two rival companies may use pricing algorithms that, without explicit training, learn to steer clear of price wars and instead use tacit coordination to maintain supra-competitive prices. The lack of a conscious agreement makes it difficult to implement current anti-cartel laws, which are mostly based on demonstrating intent and communication, even when such activity may resemble cartel-like results.

This brings up important liability issues, such as whether businesses should be held accountable for the autonomous actions of their algorithms. Does proving anti-competitive results suffice, or do regulators also need to show control and intentionality? Some legal experts support the implementation of a negligence-based standard, according to which failure to guarantee algorithmic adherence to competition laws may result in legal consequences. Others stress that to avoid unintended consequences without limiting innovation, proactive regulation is necessary. Examples of this include mandated testing, monitoring, and transparency requirements.

Problems Related to Competition Law due to AI

Concerns about abuse of power are further heightened by AI, especially in online marketplaces. AI can be used by dominant companies to discriminatorily determine prices based on user profiling, tailor services, and influence search rankings. Despite their advanced technology, these methods may have exclusionary effects that limit customer choice and strengthen market dominance. One prominent example is self-preferencing, in which a platform's algorithm favours its own goods or services over others. Similarly, without explicit

contractual limits, competitors may not be able to reach the market due to algorithmically imposed exclusivity agreements or loyalty discounts.

Such behaviour necessitates reconsidering the definition of abusive behaviour. Dominance in and of itself is not criminal under current law, but its misuse is. However, by automating judgements in ways that are unclear even to the companies using them, AI might obfuscate or make it more difficult to identify abuse. Because of this, regulators must deal with both the procedural difficulty of accessing and interpreting the underlying algorithmic logic as well as the substantive issue of whether a behaviour is anti-competitive.[14] Thus, from a legal perspective, the idea of "explainable AI" becomes extremely important, especially in situations where courts must decide culpability or competition authorities must defend their intervention.

Another important area where AI and competition law converge is transparency. The foundation of legal systems is accountability, or the capacity to link decisions to specific parties and logical explanations. AI frequently operates as a "black box," generating results without a discernible line of reasoning, especially in its deep learning applications. Due process for accused persons, who could find it difficult to comprehend or refute the allegations' foundation, is similarly complicated by this lack of interpretability. To solve this, there is increasing support for laws requiring algorithmic auditability and transparency, particularly for companies with substantial market power.

Another area where the development of AI presents serious difficulties is merger control. Even while purchasing AI start-ups or data-rich businesses might not satisfy conventional jurisdictional thresholds based on assets or turnover, these deals could significantly affect future market competitiveness. In the tech industry, these so-called "killer acquisitions," in which an established company buys out a new rival with disruptive potential, are especially common. Furthermore, acquisitions that provide a dominant company access to proprietary information or technological know-how can strengthen its position in the market in ways that are hard to undo after the fact. As a result, there is growing demand on competition authorities to improve their merger assessment processes to properly take into consideration non-traditional measures of market strength like talent acquisition, data synergies, and control over AI development pipelines.

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[14] Hemant Singh and Radha Naruka, "Competition Commission of India and Consumers' Welfare: An Analysis" (April 17, 2013), available at SSRN: https://ssrn.com/abstract=2252526

In the end, a delicate balance is required at the nexus between AI and competition law. On the one hand, overzealous regulatory action could discourage investment in new technology, postpone market entry, or discourage innovation. However, the fundamental goals of competition law are compromised when AI is used unchecked in ways that hurt consumers, exclude competitors, or distort competition. As a result, regulators need to take a balanced strategy that incorporates dynamic market evaluations, combines legal principles with technical know-how, and changes with technology.

A lot of the conventional presumptions that support competition law are called into question by AI.[15] It creates new types of market power based on data and algorithmic control, blurs the boundaries between human and machine decision-making, and complicates ideas of intent and accountability. In addition to regulatory innovation, addressing these issues calls for interdisciplinary cooperation between legislators, economists, technologists, and attorneys. The ability of competition law to evolve while maintaining its core principles of justice, transparency, and consumer welfare will be crucial as AI continues to transform markets.

A cognitive process involving non-human entities, such as computer programs that carry out tasks that mimic human cognition, is known as artificial intelligence (AI). AI and machine learning seek to address complicated problems that necessitate continuous manual labour and challenges that humans are unable to solve. Businesses can keep an eye on customer behaviour and react promptly by using data insights to predict future behaviour. Artificial general intelligence (AGI), limited AI, and artificial super intelligence (ASI) are the three categories of AI. While AGI is capable of thinking and acting like a human, including perceptual and cognitive tasks, narrow AI is utilised in big data analytics, mobile devices, and the internet. Establishing a moral, ethical, and legal framework to govern AI is essential as it advances. Market fairness is a key idea in the legal and economic theories that support competition law. Legal theories place a strong emphasis on commutative justice, which ensures reciprocal benefits, and procedural fairness, which guarantees equitable access to market possibilities.

Fairness, consumer welfare, and anti-competitive behaviour are the main focusses of competition law, which prohibits unfair economic practices. It is based on economic and legal theories that seek to prevent anti-competitive behaviour, safeguard consumer interests, and maintain market fairness. With neoclassical microeconomics, the Chicago School of

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[15] S. Krishnamurthi, Consumer and Law: Redressal of Grievances (Lucknow: Vinod Law Publications, 2001)

Economics, the Post-Chicago School, and behavioural economics offering the intellectual framework for evaluating behaviours like as cartels, monopolies, abuse of dominance, and mergers, the consumer welfare criterion is at the heart of contemporary competition law. Both structuralist and functionalist techniques are used to control anti-competitive behaviour, and the rule of reason or per se norms are used to assess legal requirements for such behaviour. A sophisticated application of the law that fosters efficiency and fairness is ensured by the combination of legal and economic theories in enforcement.

Concerns regarding algorithmic competitiveness have drawn attention to the relationship between AI and competition law. Even though price algorithms have been employed to set prices, collusive schemes were low-tech and the harm to customers seemed to be minor. Current economic models show that sellers cannot simply collude by using pricing algorithms. In the meantime, pricing algorithms have become increasingly common and potentially dangerous, affecting sectors such as real estate. The welfare of customers is the goal of competition law, and algorithms and the expanding amount of data available may have an impact on that welfare. In business-to-consumer (B2C) settings, price transparency has become the norm, facilitating online pricing comparisons for consumers and price monitoring between companies. To properly address the challenges posed by algorithmic competition, future research should concentrate on comprehending the technological aspects of AI and competition law.

Algorithms can impact competition in both positive and harmful ways. They allow for personalised pricing and ranking and can undercut rivals, help clients, or increase prices. By safeguarding competition through laws like Article 101 TFEU and Article 102 TFEU, competition law guarantees the welfare of consumers.[16] Artificial intelligence (AI) integration into business operations has had a big impact on competition law, posing problems for long-standing legal frameworks and market mechanisms. Although AI can increase market efficiency, reduce transaction costs, and offer personalised products, it also opens the door for anti-competitive practices such algorithmic collusion and abuse of dominance. Concerns regarding market dominance are brought up by the growing concentration of power in a small number of technology companies, which traditional competition law tools might ignore.In domains like algorithmic collusion, power abuse, transparency, and merger control, AI and competition law converge. Self-learning algorithms

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[16]Vinod Dhall (ed.), Competition Law Today: Concepts, Issues and the Law in Practice (New Delhi: Oxford University Press, 2007).

can communicate autonomously to engage in algorithmic collusion, which makes anti-cartel legislation challenging to enforce. Exclusionary effects can also result from AI's ability to customise services, discriminate in pricing, and affect search engine rankings. To do this, we must reevaluate what constitutes abusive behaviour and the concept of "explainable AI." Since AI frequently functions as a "black box" and is not interpretable, transparency is another area where it converges. Another issue is merger control, since AI has a big impact on market competitiveness. AI and competition law must be carefully balanced, integrating legal precepts with technological advancements and interdisciplinary collaboration.

LEGAL CHALLENGES POSED BY AI TO COMPETITION LAW

The goal of competition law in the present day is not only to defend rights and create an environment in which a product can be freely sold, but also to improve the purchasing power of the buyer. It refers to both improving market efficiency and controlling market conduct. The Competition Act of 2002 was created with the same goal, but artificial intelligence (AI) expanded its reach by developing a more advanced technological system. The question remains unaddressed. As a result, while modern technology made life somewhat easier for men, it also opened the door for widespread access to the criminal underworld. It has been demonstrated in the modern world that technology can be used to penalise people for crimes they commit. Its own market participants pose the biggest threat to the competitive market. A market with a monopoly, for example, may have many opportunities for the monopolist to enter into agreements pertaining to the supply, service, and purchasing power of any good; this will, in turn, impact the market's freedom in the aforementioned areas. According to India's constitution, an effective environment should be established so that everyone can exercise their fundamental right to freedom of commerce and profession. Because of this, the market's main threat comes from its participants alone.[17] To eliminate these monopolistic situations, the law should not only safeguard citizens' rights but also boost market purchasing power to create a more effective market economy system nationwide.

In general, there are two distinct situations that lead to market competition. The first occurs when a business attracts customers by lowering the price below the initial specification, which leads to the closure of a specific business that is unable to sell a product below the original price. The second scenario concerns when a business attracts customers by offering

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[17] Competition and Markets Authority, AI Foundation Models: Initial Report (2023a), available at https://www.gov.uk/government/publications/ai-foundation-models-initial-report

its services and by utilising promotional tools.[18] The second scenario was thought to be the most successful approach from the standpoint of global competition since it benefits the buyer the most while also helping the business maintain a superior strategy.

It also makes sense to completely avoid anti-competitive practices in the market and, in turn, to have a significant amount of state aid control. The competition law of 2002 aims to regulate business-to-business agreements to determine whether they violate the principles and foundations of the market.

The main goal or pillars of the Competition Act of 2002 are the prohibition of anti-competitive agreements, the prohibition of the abuse of a dominating position, and the regulation of company combines with the assistance of state aid oversight. Since AI has the potential to foster new market collusion, which in turn opens a whole new avenue for committing an anti-competitive agreement, the Competition Act of 2002 is facing challenges due to the recent surge in the use of AI-related technology.

This is where the issue comes up. Generally, the Competition Act of 2002 outlines the process for manually punishing the individual who engaged in anti-competitive behaviour. It also mandates that the agreement be evaluated to determine whether it violates any type of Competition Law. In contrast, how can an agreement be evaluated in the context of artificial intelligence. This could make it easier for numerous businesses to disregard the terms outlined therein and put into question the conventional definition that has been in place since day one.

DEVELOPMENT OF COMPETITION LAW POLICY IN INDIA

The evolution of competition law in India has played a crucial role in shaping the regulatory landscape of various industries, including the pharmaceutical sector. The need for an effective competition law framework arose due to the inadequacies of the Monopolies and Restrictive Trade Practices (MRTP) Act, 1969, which primarily focused on curbing monopolies rather than fostering a competitive market environment. As the Indian economy liberalized in the 1990s, the limitations of the MRTP Act became evident, necessitating a modern legal framework capable of addressing contemporary market challenges. This led to the enactment of the Competition Act, 2002, which marked a paradigm shift in India's

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[18] K. Sai Sree Sanjay, "A Critical Analysis on Challenges Posed to the Competition Law in India: Artificial Intelligence Perspective", (2022) 4(1) International Journal of Legal Science and Innovation 536–543, DOI: https://doij.org/10.10000/IJLSI.111341.

approach to market regulation. The Act aimed to promote and sustain competition, protect consumer interests, and prevent anti-competitive practices. The establishment of the Competition Commission of India (CCI) as the enforcement authority under this Act brought a more proactive and structured approach to competition regulation in India. The pharmaceutical industry, being a critical sector that impacts public health and economic growth, has been significantly influenced by this legal transition.

No specific type of law exists to control the market and prevent anti-competitive agreement as well as for abusing a position of power. Additionally, considering that India has historically regulated the market for competition, Kautilya and Arth sastra specifically addressed economic policy and state crafts during that time. The Industrial (Department & Regulation) Act, IRDA, 1951, which gives the government the authority to control practically every facet of the private sector's operations, is where market regulation is applied. The idea of free competition was buried, and the market suffered somewhat because of inadequate legislation and excessive tariffs.

 Under the name of the Monopolies Restrictive Trade Practice Act, 1969, India initially introduced a competition law policy in 1969. Later, it was made as part of the country's internal economic life. It simply largely eliminated monopolistic and unfair trading practices. As a result, a committee was formed in 1977 to limit deceptive and fraudulent advertising to incorporate it into the MRTP Act. In 1991, the MRTP Act was amended to eliminate the licensing requirements established by the Act. It should be highlighted, nonetheless, that MRTP does not precisely define unfair commercial practices and anti-competitive conduct.

As a result, India made the audacious choice to liberalise the market environment in 1991. The Indian competition market will be fully liberalised as a result. The lack of appropriate legislation at this time caused the nation to deepen its economic catastrophe. When India joined the World Trade Organisation, it began to embrace the challenges of liberalisation, and as a result, the market structure underwent a radical shift.

A committee was formed in 1999 to determine if a sufficient legislative framework was needed or whether the MRTP Act needed to be amended. The committee recommended that the MRTP Act be repealed, that product reservations be removed, that government shares and assets be reallocated, and that all industries be included in the proposed legislation. Considering this, the Competition Act was enacted in 2002 with the goals of preventing anti-

competitive behaviour, outlawing the abuse of a dominant position, regulating mergers and acquisitions, and establishing a mechanism for controlling state aid. This is one of the best competition law regimes in the world. Consequently, a body known as the Competition body of India was created by the Competition Act of 2002.

Repeal of the MRTP Act, 1969

The MRTP Act, 1969, was India's first attempt at regulating market competition. However, its primary objective was to prevent economic concentration in the hands of a few business entities rather than fostering a competitive marketplace. The Act did not adequately address modern anti-competitive practices such as cartels, abuse of dominance, and anti-competitive mergers. Moreover, the MRTP Commission, which was responsible for enforcing the Act, had limited investigative powers and could only issue cease-and-desist orders without imposing penalties. These shortcomings became particularly problematic in the pharmaceutical industry, where companies engaged in price-fixing, restrictive agreements, and market exclusion strategies that limited access to affordable medicines. As India transitioned into a globalized economy, the need for a more comprehensive competition law became apparent.

Enactment of the Competition Act, 2002

The Competition Act, 2002, replaced the MRTP Act and introduced a more dynamic and structured regulatory framework. Unlike its predecessor, the Competition Act focused on promoting market competition rather than merely preventing monopolies. It provided the CCI with substantial powers to investigate, penalize, and prevent anti-competitive behaviour. The Act covers three main areas: anti-competitive agreements, abuse of dominant position, and regulation of combinations (mergers and acquisitions). These provisions have had a significant impact on the pharmaceutical industry, where market players often engage in practices that limit competition and inflate drug prices. The CCI has been instrumental in ensuring that pharmaceutical companies do not misuse their market position to the detriment of consumers and competitors.

The regulation of mergers and acquisitions (M&A) under the Competition Act, 2002, has also had a profound impact on the pharmaceutical industry. M&A activity in this sector is often driven by the need for research and development (R&D), expansion of product portfolios, and access to new markets. While such consolidations can enhance efficiency and innovation, they can also lead to reduced competition if they result in excessive market concentration. The CCI reviews all significant mergers and acquisitions to assess their impact on competition.

Features of the Competition Commission of India

The CCI is characterised by several distinctive features that enable it to function effectively in regulating competition across the country: [19]

1. Statutory Body

The CCI is a statutory body created under the Competition Act, 2002. This legal foundation provides it with enforceable authority to carry out its duties and make binding decisions.

2. Quasi-Judicial Nature

CCI possesses quasi-judicial powers, meaning it can investigate, adjudicate, and pass orders, much like a civil court. It can summon individuals, demand documents, examine witnesses under oath, and impose penalties.

3. Wide Jurisdiction

The Commission's jurisdiction is comprehensive, covering all sectors of the economy. Whether it involves goods or services, private or public enterprises, small firms or multinational corporations—CCI can regulate them all.

4. Proactive and Reactive Role

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[19] Dando B. Cellini, "Economic Growth and Consumer Welfare – The Role of Competition Law", in Competition Law Today: Concepts, Issues and the Law in Practice, ed. Vinod Dhall (New Delhi: Oxford University Press, 2007).

CCI can act both proactively (Suo motu) and reactively (based on complaints or government references). This ensures that it not only responds to specific issues but also keeps a broader watch on emerging trends that may harm competition.

5. Autonomy and Independence

Although appointed by the Central Government, the Commission operates independently in its decision-making. Its autonomy is essential for fair and impartial regulation.

6. Integration with Global Norms

The CCI aligns itself with international best practices and cooperates with global competition authorities. This alignment helps in regulating cross-border mergers and tackling anti-competitive behaviour by multinational entities.

7. Emphasis on Advocacy

Apart from enforcement, the CCI plays an advocacy role. It conducts awareness programmes, publishes research papers, and advises governments and stakeholders on competition-related matters.

Artificial intelligence was presenting a few obstacles to the Competition Act of 2002, such as the emergence of new forms of tacit collusion, which in turn made it challenging for the Act to regulate and restrict to the same to a significant degree. Consequently, it was discovered that the primary issue with the Act and AI was how businesses would decide what constituted a reasonable standard of care and how they would deal with the difficulties posed by AI algorithms.

It was then discovered that it was also known that the competitors' acknowledgement of the anti-competitive tactics must be considered. As a result, the courts have frequently ruled that the Competition Commission of India has a responsibility to uphold and defend the arguments and core tenets of the Competition Act of 2002. Consequently, it ought to

guarantee the presence of free market entry and shall ensure that the Competition Act of 2002's interests are being upheld by creating a suitable legislative intention.[20]

It should be mentioned that artificial intelligence has the capacity to significantly impact the market and introduce new forms of collusion and anticompetitive practices using emerging technologies. However, in exchange, it also introduces new types of collusions that are not covered by the 2002 Competition Act. Therefore, it is imperative that the Indian legislature and policymakers amend the Competition Act of 2002 to include the artificial intelligence perspective. Failure to do so would result in an unfavourable impact on the competitive market as AI would eliminate the free market and drive out current competitors.

ALGORITHMIC COLLUSION

When algorithms that are meant to operate independently coordinate to generate an unfair or damaging outcome, this is known as algorithm collusion. This can happen when algorithms are built to make choices that are impacted by one another's actions, leading to results that deviate from the original intent. When two algorithms that were intended to compete with one another end up cooperating to manipulate the market, this is an example of algorithm collusion. Price fixing, less competition, and other negative effects may result from this. One Another instance is when algorithms intended to produce impartial and equitable results instead work together to support preexisting prejudices or discrimination. This can happen when algorithms are taught biassed data, which causes them to make biassed conclusions. Because it can compromise algorithmic decision-making's accountability and transparency and have detrimental effects on both individuals and society, algorithm collusion is a serious issue. Therefore, it is crucial to make sure algorithms are created and closely watched to avoid collusion and to make sure they are generating just and moral results. India's experience with algorithmic collusion is examined in this article. Additionally, it looks at how well-suited the Competition Act of 2002 (henceforth referred to as "the Act") is to investigate algorithmic collusion and the stances taken by western nations in this regard.

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[20] Moritz Hennemann, "Regulating the Artificial Intelligence", in New Technology, Big Data and the Law, 361–388 (Springer, 2020).

Collusion refers to a situation in which two or more entities work together in a coordinated and secretive way to achieve a common goal. In the context of algorithms, collusion typically refers to the use of multiple algorithms in a coordinated way to manipulate the outcome of a decision-making process, often for some illicit or unethical purpose. Algorithmic collusion can occur in several ways, depending on the specific context in which the algorithms are being used. According to Ariel Ezrahi and Maurice E. Stucke, algorithms can be used for collusion in four ways:[21]

Messenger scenario: In the messenger scenario, the market participants employ computers or a single algorithm as a means of collusion. Such an instance occurred in *United States v. David Tompkins[22]*, when the conspirators opted to sell their posters using a single pricing algorithm to help make sure price parity. This agreement was found to be illegal. Similar findings were made in 1994 regarding the sharing of a computerised online booking system by six airlines, which allowed for collusive price setting and was thus declared anti-competitive. So, the messenger scenario is the situation in which the conspirators opt to utilise the algorithm to perform collusion.

Hub-and-spoke conspiracy: This type of conspiracy refers to an agreement formed by vertical or horizontal players (spokes) via the use of a platform (hub), which is like an indirect agreement. A single price algorithm is utilised in this instance, as in the messenger scenario, but it is the algorithm developer who forces the players to collude. As a result, the agreement is focused on how the hub will be used.

Predictable agent: In this type, there is no agreement between rivals. Each company unilaterally implements its own pricing algorithm, and as predictable agents, they keep an eye on and adjust to each other's prices. Hence, even though competitors do not adopt the same algorithm, tacit collusion is still affected by programming algorithms to adjust to each other's price.

Autonomous machine: It involves self-learning learning algorithms that cooperate despite not being designed to do so in response to market data or price changes. According to the

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[21] Ariel Ezrachi and Maurice E. Stucke, "Algorithmic Collusion: Problems and Countermeasures", Organisation for Economic Cooperation and Development (31 May 2017), available at https://www.scconline.com/blog/post/2023/05/18/changing-dynamics-of-algorithmic-collusion-an-analytical-study/.
[22] No. CR 15-00201 WHO (2015, US NDC)

Organisation for Economic Cooperation and Development (OECD) Report, it is unclear how machine learning algorithms could arrive at a collusive result; but, once it has been established that market conditions are conducive to collusion, it is possible that algorithms learning more quickly than humans could achieve a cooperative equilibrium.

Algorithm collusion in India

In India, there is growing concern over algorithmic collusion, especially in relation to online markets and online advertising. Because it might result in less competition, higher prices, and fewer options for consumers, algorithmic collusion can have a big effect on consumer welfare and competitiveness in India. The Competition Commission of India (CCI) oversees upholding the Act in India, which attempts to safeguard consumers against anti-competitive behaviour and encourage competition. Companies that engage in anti-competitive activity, such as algorithmic collusion, may be investigated by the CCI and subject to sanctions. However, because algorithmic collusion can happen in intricately linked systems and is challenging to comprehend and establish, it can be challenging to identify and punish in India.[23] It can be difficult for the CCI and competition authorities to stay on top of emerging kinds of algorithmic collusion because of the speed at which technology is changing in digital markets. Notwithstanding these obstacles, the CCI and other Indian competition authorities must act to combat algorithmic collusion and advance transparent and equitable competition in online marketplaces. This can involve enhancing their knowledge of algorithms and their possible drawbacks, enhancing digital market transparency, and taking legal action against businesses that act in an anti-competitive manner. By doing this, India's competition authorities and CCI may contribute to ensuring that consumers are safeguarded and that the advantages of digital markets are distributed equitably among all players. Several industries, including social media, ride-hailing, and e-commerce, are susceptible to algorithmic collusion. The purported price-fixing and market-controlling collusion between ride-hailing services like Ola and Uber is one instance of algorithmic collusion in India.[24] Both companies were the subject of an inquiry by the CCI in 2018.However, the National Company Law Appellate Tribunal (NCLAT) maintained the same remarks after the CCI later

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[23] OECD (2017), Algorithms and Collusion: Competition Policy in the Digital Age, available at https://www.scconline.com/blog/post/2023/05/18/changing-dynamics-of-algorithmic-collusion-an-analytical-study/

[24] Samir Agrawal v. Competition Commission of India, 2020 SCC OnLine NCLAT 811

rejected claims of price fixing against both corporations.[25] In a similar vein, the CCI launched an investigation into price cartels in the airline sector in 2014.[26] Due to the tremendous increase of air travel and technological advancement over the years, the airlines have used third-party software to help them decide, implement, and dynamically alter the rates supplied to consumers in real time.[27] Each of these programs is based on an ever-changing set of algorithms that decide airfares by considering many factors such as rival pricing, actual bookings, seasons, and more. The sector is competitive because many established firms are losing market share to new or recent players over a period of 4 to 5 years due to significant fluctuations in the market shares of competing airlines. It's interesting to note that CCI acknowledged the existence of software that was like or identical to that used by the airlines, but more importantly, it applied the very fundamental principle of the evidentiary standard required to prove a cartel's conduct using either direct or circumstantial evidence. Moreover, the CCI was unable to find any hard evidence that other airlines had determined their fares using the same software. Regarding the pricing determination process, the CCI pointed out that algorithms were not used with the goal of enacting a price cartel, but rather just to assist in actual price determination in a sector that demands dynamic pricing. According to the CCI, the fact that a "human" component was involved in determining the final prices suggested that algorithms were not used with the intention of implementing a price cartel, but rather merely to enable true price determination in a market that demands dynamic pricing.

Collusion between businesses is prohibited by Section 3(3) of the Act.[28] It declares that any agreement among businesses, decisions made by business groups, or coordinated actions by businesses that have the impact of limiting, blocking, or distorting competition in India will be deemed anti-competitive. Section 414 of the Act forbids the misuse of a dominant position in addition to Section 3. It is illegal for a business with a dominant market position to misuse that position by participating in anti-competitive activities like algorithmic collusion. To stop algorithmic collusion and other anti-competitive activity, CCI has adopted a multifaceted strategy. Market research in several industries, including e-commerce, is one of the measures used to find anti-competitive behaviour, such as algorithmic collusion. These studies enable CCI take the necessary steps to stop and correct anti-competitive

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[25]*Ibid*

[26] AZB & Partners, "Pricing Algorithms: CCI's First Major Encounter with Assessing New-Age Collusions" (15 March 2021), available at https://www.scconline.com/blog/post/2023/05/18/changing-dynamics-of-algorithmic-collusion-an-analytical-study/.

[27] Alleged Cartelisation in the Airlines Industry, In re, 2021 SCC OnLine CCI 3.

[28] Competition Act, 2002, S. 3(3)

behaviour by offering insights into how the market operates. To exchange knowledge and best practices for dealing with anti-competitive activity, CCI has also collaborated with international organisations, such as competition authorities from other nations. 15. The CCI has the authority to enforce sanctions and take other actions to restore competition in the impacted market if it discovers that a corporation has participated in algorithmic collusion. A fine of up to 10% of the business's average turnover over the previous three fiscal years is one of the possible penalties.

The CCI will have several difficulties in addressing algorithmic collusion, notwithstanding its numerous efforts. Among the main obstacles are:

Detection difficulty: It might be challenging to identify and comprehend the root reasons of algorithmic collusion in intricately linked systems. Because of this, it may be difficult for competition authorities to spot cases of algorithmic collusion and take the necessary measures.

Lack of transparency: Since many of the algorithms employed in digital markets work in the background, it can be challenging to comprehend how they make choices and spot instances of algorithmic collusion. Proving anti-competitive purpose can be challenging because, although the Act calls for proof of anti-competitive intent, algorithmic collusion might take place without any overt aim to undermine competition.

Because of this, it may be challenging for competition authorities to prosecute businesses for algorithmic collusion. Technology development: Because of the speed at which technology is developing in digital marketplaces, new types of algorithmic collusion may appear at any time. Because of this, it may be difficult for the Act and its implementation to stay up to date and promptly and successfully combat algorithmic collusion. Notwithstanding these obstacles, the Act has the potential to significantly reduce algorithmic collusion in India. Competition regulators can take action to enhance openness in digital markets and to better understand algorithms and their potential for harm.The Act can also be used to punish and remedy businesses that engage in anti-competitive activity, as well as to handle identified cases of algorithmic collusion.

DOMINANCE BY DIGITAL PLATFORMS

The dominance held by digital platforms constitutes one of the most significant challenges in modern competition law. Unlike traditional markets, where dominance is often measured primarily on tangible assets or output, digital dominance is typified by intangible assets such as data control, user attention, network effects, and algorithmic reach. Platforms such as Google, Amazon, Facebook (Meta), and Apple operate multisided markets where they function concurrently as marketplace, gatekeeper, rival, and regulator – thereby concentrating massive economic and informational power within a single company. A fundamental element of digital platform dominance is the network effect, wherein the value of the service increases with each additional user.[29] For example, a social media network becomes more important as more users join, resulting to a self-reinforcing loop that makes market entry for new competitors prohibitively difficult. This produces a scenario of market tipping, when the entire sector is taken by a few major companies, not necessarily because of superior efficiency but due to the structural advantages of early user accumulation and data hoarding. Another significant feature is the control over huge data. Dominant platforms collect and process huge amounts of personal, behavioural, and transactional data, enabling them to optimise user interaction, forecast preferences, and target advertising more efficiently than smaller rivals. This data asymmetry enables these platforms to entrench their position and prevent competition. For instance, a dominating e-commerce platform may leverage third-party seller data to detect profitable trends and then introduce competitive products, privileging its offerings through algorithmic self-preferencing. Such action raises substantial concerns regarding abuse of power under competition law, particularly under provisions analogous to Section 4 of the Indian Competition Act, 2002.

Digital platforms also demonstrate ecosystem domination, as customers become trapped into a suite of interconnected services — such as email, cloud storage, maps, and payment systems run by the same supplier. The integration of these services limits customer mobility and hampers the ability of competitors to offer independent alternatives. This raises problems regarding interoperability, data portability, and the extent to which platforms should be forced to open some components of their infrastructure to guarantee competitive fairness. From a legal standpoint, assessing dominance in digital marketplaces demands a move from traditional indicators such as market share and pricing tactics to a multi-dimensional approach. This covers aspects like user engagement measurements, control over digital

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[29] Dando B. Cellini, "Economic Growth and Consumer Welfare – The Role of Competition Law", in Competition Law Today: Concepts, Issues and the Law in Practice, ed. Vinod Dhall (New Delhi: Oxford University Press, 2007).

infrastructure, algorithmic impact, and data monetisation methods. Competition authorities across the world including the Competition Commission of India (CCI), the European Commission, and the US Federal Trade Commission — have increasingly acknowledged that digital dominance cannot be meaningfully regulated without recognising the unique dynamics of the online economy. However, enforcement faces substantial challenges. Algorithms and artificial intelligence enable opaque decision-making, hampering enquiries into preferential treatment or discriminating actions.[30]   Moreover, since many leading digital platforms offer "free" services to users, establishing harm to consumer welfare in traditional pricing terms becomes problematic. Therefore, competition law must increasingly account for non-price dimensions of consumer suffering – such as loss of privacy, restricted choice, and innovation suppression.

In India, the CCI has begun examinations into platform activity involving alleged abuse of power by firms like Google in the Android ecosystem, Amazon and Flipkart in e-commerce activities, and food delivery aggregators such as Zomato and Swiggy. These examples show a rising realisation of platform power and the necessity for context-sensitive regulation. In addition, reports such as the Parliamentary Standing Committee Report on Anti-Competitive Practices by Big Tech Companies (2022) have underscored the urgency of developing a Digital Competition Law tailored to the Indian context, possibly with ex-ante obligations for gatekeepers like the EU's Digital Markets Act. Overall, dominance by digital platforms needs a paradigm shift in competition law enforcement. It advocates for new regulatory frameworks that are nimble, technologically aware, and capable of tackling both structural and behavioural aspects of digital monopolies. As the digital economy continues to increase in scale and complexity, guaranteeing competitive neutrality and consumer protection will depend on how well legal institutions respond to the evolving nature of dominance.

THE GENERATIVE AI CHALLENGES FOR COMPETITION AUTHORITIES

Since ChatGPT's November 2022 launch, generative artificial intelligence (GenAI) has had a major impact on business and regulatory developments. Nonetheless, three key elements must be available to developers: data, machine learning models, and computational resources. Because there are just a few IT companies that offer access to computing resources, several model creators have partnered with major cloud computing providers. These partnerships

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[30]*Ibid*

could encourage competition, but they could also lead to bad habits like tying. Machine learning models use input data, including text, photos, videos, or music, to produce output. There is no solid evidence to back up the accusations that a small number of powerful web platforms control most models. Rather, hundreds of open-sources and closed-source models compete based on a variety of factors, such as model size, language constraints, and task requirements. Another crucial element, data, raises questions about whether models offered by big web platforms with access to enormous proprietary datasets could have a competitive edge. But there isn't any solid proof to back up this worry.[31]

Because of new industries and technology as well as unstable regulations, competition authorities around the world are keeping a careful eye on advances in GenAI. Answer engines and advertising are two examples of how new goods and services are influencing both new and old markets. The competition in GenAI is being impacted by regulatory uncertainty.

Competition authorities should concentrate on comprehending market and regulatory advances at this developmental stage by collaborating with pertinent and capable authorities. Based on the knowledge gathered from market research, they should only use their official enforcement authority and possibly upgrade their competition tools when required and warranted. One crucial piece of infrastructure for implementing models is the cloud computing industry. To run and deploy their models at scale without having to invest in the infrastructure, model creators use cloud computing services. The model developer is viewed as a business driver by cloud providers. In a variety of ways, certain cloud providers have partnered with model creators.

There are numerous national, regional, and international competitors in the cloud market. Given their size and financial resources, competition authorities around the world are worried about a tendency towards concentration in the hands of a few numbers of global hyperscale's, such as Google, Microsoft, and Amazon. The collaboration may accelerate the trend towards concertation as demand for GenAI rises. Competition officials are also worried about possible competition problems brought on by switching barriers including interoperability, software licensing policies, and data transfer costs. Both closed-source and open-source machine learning models are generated from input data, including text, images, videos, and

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[31] D.P. Mittal, Competition Law and Practice, 2nd edn. (New Delhi: Taxmann Allied Services (P) Ltd., 2008).

music. While open-source models are freely accessible for both commercial and scientific purposes, closed-source model developers grant licenses to third parties for usage in commercial applications. Competition among model creators is based on several criteria, such as model size, language requirements, and work requirements.

Machine learning models

Text-to-text, text-to-image, text-to-video, and text-to-music models are among the non-exclusive categories of models that differ based on the intended generated output. Developers have developed multilingual models (like OpenAI GPT) by training them on input data that contains multiple languages, as the language of the training dataset is a crucial quality parameter of the output.[32] For a particular language, others created monolingual models, which occasionally outperform multilingual ones. Models vary in size; large language models (LLMs) are larger models with a high number of parameters. Even if the dataset comprises data from a general domain, large models can still accomplish a variety of tasks. However, they need more data and processing capacity, which raises the model's cost. Small language models (SLMs), which function similarly to LLMs, are smaller models with fewer parameters that researchers and developers are suggesting to lower costs and environmental impacts. The amount, variety, velocity, and quality of the dataset all influence the quality of the output that is produced, making data an essential input for model developers. Both private datasets from their own first-party or third-party services and publicly accessible data from the internet or open-source repositories are used by developers to train their models.

Large web platforms like Alphabet and Meta benefit from data, which is a significant component of market power in traditional data-driven marketplaces. Additionally, users gain from data because of data-driven network effects, which occur when users' utility improves because of better data learning. It is suggested that the more model users there are, the higher the model quality is, as some models, like GPT, learn from user dialogue data. However, since there is no proof that data is a source of market power or that models created by major internet platforms profit from data advantages, the veracity of these claims in model marketplaces merits careful examination. Models make it possible to create programs for specific purposes, such text generation. Some apps allow both third-party and first-party add-ins to enhance the app, and developers can either create their own AI-powered apps or enable

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[32] Competition and Markets Authority, AI Foundation Models: Initial Report (2023a), available at https://www.gov.uk/government/publications/ai-foundation-models-initial-report

third-party ones. Numerous upstream and downstream competitive concerns are brought up by these applications. The cloud provider that hosts the model is used by model and application developers at the upstream level. This provider may be able and motivated to enforce technical and commercial requirements to recoup the investment cost. This can strengthen the position of the cloud provider hosting the model and have a detrimental effect on competition in the cloud industry. Some model and application developers may integrate their own AI-powered applications with other businesses to offer additional services in several marketplaces at the downstream level. Because the company has a motive to promote its own services above those of third parties, this vertical integration raises possible competition difficulties about tying, bundling, and self-preferring. Reluctance to deal is another problem associated with vertical integration.

GenAI brings up several regulatory issues that affect the functioning of competition, such as data security, competition, AI governance, and intellectual property rights. To use data, one must obtain the owner's permission under intellectual property rights; the owner may choose to charge for the license. There have been lawsuits in several nations due to worries that certain model developers utilise databases without permission. Opt-out systems, which enable publishers to proactively prevent model developers from gathering their information to train their models, are proposed by some model developers as a solution to this problem. The gathering and use of both personal and non-personal data in training datasets raises data protection issues. Authorities in charge of data protection around the world are paying more attention to how models use personal information and the consequences for legal obligations. Fines and prohibitions may follow noncompliance.

CONCLUSIONS AND SUGGESTIONS

CONCLUSION

In business and consumer contexts, artificial intelligence (AI) refers to a cognitive process that is similar to human cognition. Its primary objectives are to manage complicated problems that necessitate continuous manual labour and to solve problems that humans are unable to solve. By using data insights to predict future behaviour, AI and machine learning enable businesses to keep an eye on customer behaviour and react promptly. Artificial general intelligence (AGI), limited AI, and artificial super intelligence (ASI) are the three categories of AI. While AGI is capable of thinking and acting like a human, including perceptual and cognitive tasks, narrow AI is utilised in big data analytics, mobile devices, and

the internet. As AI advances, it is imperative to provide a moral, ethical, and legal framework.

After the "Intelligence Explosion," artificial intelligence (AI) is predicted to emerge, with recursive self-improvement leading to artificial superintelligence. The "Intelligence Explosion" and the creation of neural networks that can learn from human input are to blame for the quick development of AI. The legal and economic ideas that underpin competition law seek to uphold market equity, safeguard consumer interests, and discourage anti-competitive behaviour. The core of contemporary competition law is the consumer welfare standard, with behavioural economics, the Chicago School of Economics, the post-Chicago School, and neoclassical microeconomics offering the theoretical foundation for evaluating actions that might jeopardise the competitive structure of markets.

In order to guarantee efficiency and justice, Indian competition law integrates legal and economic theory. Both the per se rules and the rule of reason are used in the Competition Act of 2002 to assess anti-competitive behaviour. Market power, dominance, entry hurdles, and price discrimination are examples of economic ideas used in enforcement. To comprehend how algorithms affect competition, it is essential to integrate AI with the principles of competition law. In business-to-consumer (B2C) settings, pricing transparency has become the norm, enabling companies to keep an eye on one another's prices and maybe adjust their own to match those of competitors. Nevertheless, it is still unknown how algorithmic competition affects competition parameters, and a more thorough understanding requires the integration of AI and competition law principles.

Beyond coordinating on a supercompetitive pricing point, algorithms can result in unilateral behaviour and competition issues. By figuring out what customers are ready to pay, they can allow for personalised pricing, which perfects price discrimination. For non-price-related tasks like ranking, algorithms are frequently used, which might benefit one business while hurting another. Customers' interests can guide improvements, but digital platforms have emerged to bring order to the unrestricted internet. Two adverse consequences of algorithmic competition are price increases and undercutting rivals. By safeguarding competition, competition law protects consumers, and digital environments facilitate the detection of cartel agreement violations. Three methods exist for algorithmically assisted price coordination: 1) firms can use algorithms to help implement explicit price agreements; 2) they can use the same pricing algorithm provided by a third party; and 3) they can instruct various pricing algorithms to maximise profits, resulting in supercompetitive prices or a collusive equilibrium.

Because AI may reduce transaction costs, offer customised products, and increase market efficiency, it has had a substantial impact on competition law. But it also opens the door for anti-competitive practices like data-driven exclusionary practices, algorithmic collusion, and abuses of dominance. Because traditional competition law tools might not fully capture the amount of market domination, the growing concentration of power in a limited number of technology corporations is concerning. Because it can occur spontaneously between self-learning algorithms, algorithmic collusion is a challenging area where AI and competition law meet, making anti-cartel legislation challenging to enforce. AI can potentially have exclusionary consequences by influencing search ranks, discriminating in pricing, and customising services. Since AI frequently functions as a "black box" and is not interpretable, transparency is another area where AI and competition law intersect.

The development of AI poses difficulties for merger control since it has a big influence on market competitiveness. "Killer acquisitions" are frequent in the tech sector, and purchases that provide dominant firms access to confidential data or technological know-how can bolster their position. Since aggressive regulatory action might deter investment in new technologies and delay market entry, a careful balance between AI and competition law is necessary. AI blurs the lines between human and machine decision-making by generating new forms of market power based on data and algorithmic control. To solve these problems, interdisciplinary collaboration among lawmakers, economists, technologists, and lawyers as well as regulatory innovation are essential. Fairness, consumer welfare, and anti-competitive behaviour are the main concerns of competition law, which is founded on legal and economic ideas. Long-standing legal frameworks and market processes, such as algorithmic collusion, power abuse, transparency, and merger control, have encountered issues as a result of AI integration into commercial operations.

As artificial intelligence (AI) has grown, the Competition Act of 2002's goals of enhancing market efficiency and safeguarding consumer rights have broadened. The primary objectives of the Act may be challenged by AI's potential to result in monopolies and anti-competitive agreements. Prohibiting anti-competitive agreements, preventing dominating positions, and regulating businesses with state aid oversight are the three primary foundations of the Act. But using AI to assess agreements calls into question the conventional understanding of competition law and the possibility that companies will ignore it.

The pharmaceutical industry is one of the many industries that have been greatly impacted by India's evolving competition law. Instead of encouraging a competitive market environment, the MRTP Act of 1969 concentrated on reducing monopolies. The Competition Act of 2002

was passed as a result of the Act's limits becoming apparent as the Indian economy liberalised in the 1990s. The objectives of this Act were to safeguard consumer interests, encourage and maintain competition, and stop anti-competitive behaviour. This Act created a more proactive and organised approach to competition regulation by designating the Competition Commission of India (CCI) as the enforcement body.

The MRTP Act was superseded by the Competition Act of 2002, which established a more flexible regulatory structure. It aimed to encourage market competition and gave the Competition Commission of India (CCI) the authority to look into, punish, and stop anti-competitive practices. The Act addresses merger and acquisition regulation, misuse of a dominant position, and anti-competitive agreements. To prevent pharmaceutical corporations from abusing their market position to the detriment of customers and rivals, the CCI has played a crucial role. Every area of the economy is under the CCI's extensive control. It has the capacity to act both proactively and reactively, and independence and autonomy are necessary for just regulation. In its advocacy role, the CCI also publishes research papers, runs awareness campaigns, and counsels stakeholders and governments on issues pertaining to competition.

When several organisations band together to accomplish a shared objective, frequently for illegal or immoral reasons, this is known as collusion. There are four ways that algorithmic collusion might happen: autonomous machine, hub-and-spoke conspiracy, predictable agent, and messenger scenario. Algorithmic collusion is a developing topic in India, particularly in online advertising and markets. Customers may have fewer options, greater costs, and less competition as a result. The Act is supervised by the Competition Commission of India (CCI) in order to promote competition and shield consumers from anti-competitive practices. Businesses that engage in anti-competitive behaviour risk being looked into and facing penalties. However, in order to promote fair and transparent competition in online marketplaces, the CCI and other Indian competition authorities must fight algorithmic collusion. Algorithmic collusion can occur in industries like as social media, ride-hailing, and e-commerce; in 2014, the CCI looked into price cartels in the airline industry.

To counteract algorithmic collusion and other anti-competitive practices in India, the Competition Commission of India (CCI) has implemented a multipronged approach. In order to detect and address anti-competitive behaviour, the CCI has implemented market research in a number of areas, including e-commerce. If the CCI finds that a company has engaged in algorithmic collusion, it can impose penalties and take other measures to bring competition

back to the affected market. Nevertheless, algorithmic collusion, lack of transparency, and technological advancements present difficulties for the Act.

Intangible assets like data control, user attention, network effects, and algorithmic reach are examples of digital supremacy, which presents serious problems for contemporary competition law. Multifaceted markets are operated by platforms such as Google, Amazon, Facebook, and Apple, which concentrate enormous economic and informational power in one organisation. Examining platform activity, the CCI has started looking into claims of power abuse by companies like Google in the Android ecosystem, Amazon and Flipkart in e-commerce, and food delivery aggregators like Zomato and Swiggy. The changing nature of digital platforms' dominance necessitates a paradigm shift in competition law enforcement.

Since ChatGPT's November 2022 launch, generative artificial intelligence (GenAI) has had a major impact on corporate and regulatory developments. Data, machine learning models, and computational resources are three essential components for developers. Model developers have teamed up with large cloud computing providers due to the restricted availability of computing resources, which may promote competition but may also result in negative behaviours like tying. Text, images, videos, and music are examples of input data that machine learning models utilise to generate output. Model developers compete with one another based on things like task criteria, language limitations, and model size. The concentration of global hyperscales in the cloud industry worries competition authorities around the world. Interoperability issues, switching obstacles, software licensing regulations, and data transmission costs can all lead to competition issues. The competition between model developers is determined by criteria including model size, language restrictions, and job needs. Both closed-source and open-source machine learning models are created from input data.

Digital markets have been greatly impacted by artificial intelligence (AI), which has put established competition law systems to the test. Three distinct regulatory models—the US, India, and the EU—each have their own legal customs, enforcement strategies, and policy philosophies. While India is just beginning to grapple with AI and market power dynamics, the European Union has led the way in ex ante regulation aimed at digital gatekeepers. In order to encourage contestability and equity, the Digital Markets Act (DMA), a ground-breaking piece of EU law, imposes limitations on platforms acting as "gatekeepers" in the digital sector. The DMA is influenced by EU competition law policy, especially recent infringement findings and investigations, and operates in conjunction with existing EU competition rules. The requirements for DMA compliance are quantitative thresholds, and

not all large digital enterprises are covered. Qualitative elements like network effects, data-driven advantages, business user and end user lock-in, and conglomerate corporate structure may also meet the requirements.

Before a corporation to be subject to the obligations and behavioural constraints of the Digital Markets Act (DMA), the European Commission must designate it as a gatekeeper. Within two months of reaching the quantitative levels specified in Article 3(2), corporations are required to notify the Commission. The Commission must submit a list of relevant CPSs and decide whether to designate the gatekeeper within 45 working days. A landmark piece of legislation, the Digital Services Act (DSA) focusses on transparency, content management, and platform requirements in an effort to make the internet a safer and more responsible environment. By implementing regulations that reduce information asymmetries and gatekeeper control over user data and access, it subtly encourages a more competitive digital ecosystem. By implementing the EU competition rules specified in Articles 101 and 102 of the Treaty on the Functioning of the European Union (TFEU), the TEFU permits the competition authorities of EU member states to enforce competition laws in a decentralised manner.

The European Union (EU) has processes in place to look into corporate power abuse, including figuring out whether a company is dominant and whether predatory pricing is an example of how that dominance is being abused. Competition authorities have the same investigative authority over defence rights, the SOs system, commitment judgements, penalties, and compensation. Although the US has a long history of enforcing antitrust laws, it does not have a distinct legal framework for markets that are influenced by artificial intelligence or digital technology. Digital platforms that use artificial intelligence and algorithmic decision-making are being monitored by the Department of Justice (DOJ) and the Federal Trade Commission (FTC). The Algorithmic Accountability Act is one piece of proposed legislation that will regulate AI by limiting automated decision-making and enhancing corporate transparency. Antitrust law is significantly shaped by the US judicial system, particularly when it comes to instances utilising digital platforms and artificial intelligence. The high standard of proof needed to establish antitrust crimes, the dispersed enforcement, regulatory capture, and lobbying pressure from influential IT firms are some of the difficulties. Congress has stalled efforts to strengthen federal antitrust law, underscoring the political difficulties of taking on entrenched corporate interests.

With courts playing a critical role in adapting antitrust theory to new technology, the U.S. approach to artificial intelligence and competition law is anticipated to develop gradually

through litigation and regulatory enforcement. In order to help antitrust enforcement, agencies such as the FTC and DOJ are working together to create technical frameworks for auditing algorithmic systems. The Indian Competition Commission (CCI) is in charge of preserving and promoting market competition as well as dealing with the effects of technological developments, especially artificial intelligence's ability to predict supply and demand. Competitive marketplaces may face obstacles from AI technologies, such as market dominance and algorithm-induced collusion. Since the 2002 Act is no longer in effect, figuring out how to prevent self-learning algorithms from working together is one of the hardest tasks competition law enforcement has ever faced.

Although the debate about using antitrust or competition laws to regulate AI is very young, competition law is very important when it comes to data collecting and processing procedures. Competition law enforcement organisations must take a proactive approach to data-driven mergers and acquisitions, such as Facebook-WhatsApp, Microsoft-LinkedIn, and Yahoo-Verizon. The Competition Commission of India punished Google for abusing its monopoly in the internet search sector in the Google/DoubleClick case, which brought attention to the tension between technology and competition.

The market economy and free trade depend on intellectual property to fund scientific and technological progress. While nations with copyrights, designs, trademarks, and geographical indications may produce things that last longer, nations with strong patent laws are regarded as safe for commerce. A stronger legal framework is needed to protect trade secrets because they are delicate and impacted by secrecy. The rules of founding nations over trade secrets should be recognised by international principles.

Since the middle of the 19th century, the United States has been a major exporter of technology, which has prompted the adoption of laws protecting intellectual property. The Trade and Tariffs Act of 1984 made intellectual property a new commercial concern, and because of its dynamic nature, it had an impact on other jurisdictions. The Defend Trade Secrets Act of 2016 was passed as a result of anomalies in state trade secret laws, which were standardised by the Uniform Trade Secrets Act of 1979. The EU's Trade Secrets Directive went into effect in 2016 and must be incorporated into national laws of member states by 2018. Not all member governments, however, abided by the TRIPS Agreement; some saw trade secrets as intellectual property or protected them under local legal doctrines.

When compared to the US and other countries, India's trade secret regime is still in its "embryonic stage" and has the lowest Trade Secret Protection Index. The Indian Contract

Act of 1872, the Copyright (Amendment) Act of 2012, the Information Technology Act of 2000, and the SEBI Regulations of 1992 all provide protection for trade secrets. With a distinct legal framework that takes into account factors like employee mobility, freedom of the press and expression, unfair commercial practices, and harassment, India must prioritise protecting trade secrets.

SUGGESTIONS

For companies, governments, and lawyers, the junction of artificial intelligence and competition law offers a paradigm change. Although artificial intelligence has great potential to spur creativity and efficiency, it also brings new, difficult-to-identify anti-competitive hazards using conventional legal systems. From algorithmic collusion to data-driven market dominance, the legal system must negotiate problems that blur the boundaries between deliberate misbehaviour and autonomous machine behaviour. Competition law has to change as digital markets grow and algorithmic tools get more sophisticated to guarantee fair markets, stop consumer damage, and maintain the fundamental ideas of economic justice.

- **Update Legal Definitions and Frameworks**

Legislatures should revisit the definitions of agreement, concerted practice, and market power in competition statutes to include algorithmic and data-driven conduct. A broader conceptualisation will allow regulators to address collusion and abuse of dominance in AI-governed markets.

- **Mandate Transparency in Algorithmic Decision-making**

Firms using pricing or recommendation algorithms should be required to disclose the basic functioning of such systems, particularly when they influence market outcomes. Regulatory guidance could promote algorithmic transparency without compromising proprietary information.

- **Adopt Ex-ante Regulation for High-risk AI Practices**

Instead of relying solely on ex-post penalties, competition authorities should consider implementing ex-ante controls for high-risk AI applications. Pre-emptive scrutiny, especially in digital markets, could deter abuse and promote proactive compliance.

- **Enhance Inter-agency and International Cooperation**

AI systems operate across borders and are deployed by multinational firms. Global competition authorities should collaborate to develop uniform standards and share best practices for AI governance. This will ensure consistency and reduce regulatory arbitrage.

- **Encourage AI Ethics Integration in Compliance Policies**

Firms should incorporate ethical AI principles into their competition compliance frameworks. Internal audits, human oversight of algorithms, and training for legal teams can help prevent unintended violations of competition law.

- **Strengthen Technological Capacity of Regulators**

Competition authorities must invest in data science, AI tools, and interdisciplinary expertise. Enhancing technical capacity will enable regulators to better investigate and interpret algorithmic conduct.

- **Promote Consumer Awareness and Data Literacy**

Empowering consumers through awareness campaigns on how AI-driven markets work can reduce information asymmetries. Greater scrutiny by informed consumers may also discourage anti-competitive practices.

- **Facilitate Regulatory Sandboxes for AI Tools**

Sandboxes could provide a controlled environment where companies and regulators can test AI applications for competitive effects before full-scale deployment. This model could foster innovation while ensuring accountability.

- **Introduce Safe Harbours for Responsible Innovation**

Companies that demonstrate responsible algorithm design and conduct regular impact assessments could be granted safe harbours, offering legal certainty while encouraging compliance with competition norms.

- **Periodic Review of AI and Competition Interactions**

Given the rapid technological change, regulators should undertake periodic reviews of the impact of AI on market structures and competition dynamics. This would support evidence-based policymaking and future-proof competition law.