CONTEMPORARY FORMS OF CARTEL CONDUCT IN OLIGOPOLISTIC MARKETS: COMPARATIVE PERSPECTIVES, DIGITAL CHALLENGES, AND UZBEKISTAN'S REGULATORY PRACTICE

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Abstract: Cartel agreements continue to constitute one of the gravest violations of competition law due to their direct and long-term impact on consumer welfare, market efficiency, economic development, and public trust in market institutions. In contemporary global markets, however, cartel behaviour has evolved far beyond the traditional model of explicit price-fixing agreements concluded during secret meetings among competitors. The digitalization of economic activity, the growing concentration of oligopolistic markets, the emergence of artificial intelligence systems, algorithmic pricing mechanisms, and increasingly sophisticated forms of tacit coordination have transformed the nature of anti-competitive conduct and complicated its detection by competition authorities. This article argues that classical antitrust enforcement mechanisms, which were historically designed to combat explicit cartel agreements, are increasingly insufficient for addressing modern forms of coordinated conduct in digital and concentrated markets, particularly in developing and transition economies such as Uzbekistan.

The article undertakes a comparative legal and economic analysis of contemporary cartel regulation in the United States, the European Union, the United Kingdom, Australia, and Uzbekistan, focusing particularly on leniency programs, whistleblower systems, bid rigging, digital monitoring tools, algorithmic collusion, and pharmaceutical cartels. The article demonstrates that modern cartel enforcement increasingly relies not merely on voluntary disclosures through leniency applications, but also on proactive ex officio investigations, digital procurement monitoring, artificial intelligence-based risk analysis systems, and cross-border regulatory cooperation. Particular emphasis is placed on Uzbekistan's evolving competition law framework, including the strengthening of the Competition Committee, the implementation of digital procurement risk-analysis modules, and the growing role of whistleblower and leniency mechanisms within domestic enforcement practice.

The article concludes that contemporary competition governance requires a transition from reactive and formalistic enforcement toward technologically integrated, intelligence-driven, and internationally coordinated regulatory systems capable of addressing sophisticated cartel behaviour in both traditional and digital markets. It further argues that developing economies face heightened vulnerability to cartelization due to institutional weaknesses, concentrated market structures, and limited technological enforcement capacities, thereby making comprehensive modernization of antitrust systems a strategic necessity rather than merely a legal reform objective.

Key words: Cartels; Competition Law; Anti-Competitive Agreements; Oligopolistic Markets; Tacit Collusion; Price Fixing; Bid Rigging; Leniency Program; Whistleblower Protection

It is widely recognized that economic competition constitutes one of the essential foundations of a functioning market economy. Effective competition promotes innovation, improves the quality of goods and services, encourages technological advancement, reduces prices, increases productivity, and ensures efficient allocation of economic resources. At the

same time, however, economic actors frequently attempt to avoid the uncertainties and pressures associated with competitive markets by coordinating their conduct with competitors in order to stabilize prices, divide markets, restrict output, or manipulate procurement processes. Such anti-competitive coordination commonly manifests itself in the form of cartel agreements, which are universally regarded as among the most dangerous violations of competition law.[1]

A cartel may generally be defined as an agreement or coordinated practice between independent undertakings aimed at restricting, distorting, or eliminating market competition through collective control of economic behaviour. Cartels typically involve price fixing, market allocation, production quotas, bid rigging, customer allocation, or the exchange of commercially sensitive information capable of reducing strategic uncertainty between competitors. Although traditional cartel theory often emphasized explicit agreements and formal coordination mechanisms, modern cartel conduct increasingly operates through indirect communication, tacit coordination, algorithmic pricing systems, and technologically facilitated information exchange. Consequently, contemporary competition law faces a growing challenge in distinguishing legitimate parallel behaviour from unlawful collusion.[2]

Research demonstrates that cartel agreements generate substantial economic harm both for consumers and for national economies as a whole. Empirical studies indicate that prices in cartelized markets are frequently between 15 and 30 percent higher than under conditions of effective competition, thereby imposing significant financial burdens upon consumers and distorting market efficiency.[3] Global cartel activity is estimated to cause more than 100 billion US dollars in annual economic damage worldwide, with developing and transition economies suffering disproportionately because of concentrated market structures, limited institutional enforcement capacity, and weak regulatory oversight mechanisms.[4] Robert Bork famously described cartels as “the supreme evil of antitrust,” emphasizing that coordinated market restrictions fundamentally undermine the competitive process upon which market economies depend.[5]

Cartels are particularly likely to emerge in oligopolistic markets characterized by a limited number of dominant firms. In such markets, companies become economically interdependent because the strategic decisions adopted by one undertaking directly influence the profitability and market position of competitors. Patrick Rey notes that cartel formation becomes especially likely where high market concentration combines with substantial barriers to market entry.[6] Under such circumstances, firms can monitor competitors more easily, punish deviations from coordinated strategies, and maintain stable supra-competitive pricing structures over prolonged periods.

The behaviour of firms operating within oligopolistic markets is frequently explained through game theory, particularly through the concepts of the prisoners’ dilemma and Nash equilibrium developed by John von Neumann and Oskar Morgenstern.[7]These theoretical frameworks demonstrate why rational firms may choose coordinated behaviour over aggressive competition even in circumstances where collusion remains formally prohibited by law. The prisoners’ dilemma illustrates that although cartel members collectively benefit from coordinated conduct, each participant simultaneously possesses incentives to secretly deviate from the cartel agreement in order to obtain additional market advantages. Nash equilibrium theory further

[1] N Ahmedov, *Iqtisodiy raqobat va uning huquqiy tartibga solinishi* (Fan va texnologiya 2019) 44–47.
[2] A Rustamov, *Raqobat qonunchiligi va uning amaliy ahamiyati* (Adolat 2020) 63–70.
[3] Organisation for Economic Co-operation and Development (OECD), *Hard Core Cartels: Third Report on the Implementation of the 1998 Recommendation* (2005).
[4] OECD, *Cartels and Anti-Competitive Agreements* (2021).
[5] Robert H Bork, *The Antitrust Paradox* (Basic Books 1978) 263.
[6] Patrick Rey, ‘Economic Analysis and the Fight Against Cartels’ (OECD Global Forum on Competition 2006).
[7] John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior* (Princeton University Press 1944).

explains why firms may adopt parallel pricing strategies and coordinated market conduct even without explicit communication or formal agreements. Consequently, modern competition authorities increasingly confront situations in which anti-competitive coordination occurs through tacit or algorithmic mechanisms that produce cartel-like outcomes without traditional evidence of collusion.[8]

The contemporary digital economy has further transformed cartel behaviour. Artificial intelligence systems, algorithmic pricing mechanisms, digital procurement platforms, and real-time market analytics have enabled undertakings to coordinate behaviour more efficiently, more discreetly, and with greater market predictability. Regulatory authorities in the European Union, the United States, and the United Kingdom have increasingly warned that algorithmic systems may facilitate coordinated pricing and anti-competitive outcomes even in the absence of direct human communication.[9] As a result, classical antitrust tools that rely primarily upon documentary evidence and direct communications between competitors are becoming increasingly insufficient for addressing technologically sophisticated forms of cartel conduct.

Against this background, this article argues that contemporary cartel regulation must evolve from reactive enforcement based predominantly upon voluntary disclosures toward technologically integrated, intelligence-driven, and internationally coordinated systems of competition governance. Particular attention is devoted to Uzbekistan's evolving competition law framework and the necessity of strengthening legal, technological, and institutional mechanisms capable of addressing contemporary forms of cartelization in transition economies.

Cartel agreements emerge most frequently within oligopolistic market structures because such markets naturally create incentives for coordinated conduct. Unlike perfectly competitive markets, oligopolies are characterized by a limited number of dominant undertakings whose strategic decisions are highly interdependent. Each firm operating within such a market understands that modifications in pricing, production levels, market allocation, or technological strategy adopted by one competitor will inevitably affect the profitability and strategic behaviour of all remaining participants. Consequently, oligopolistic firms often prefer stable and predictable market conditions that maximize collective profitability rather than aggressive competition capable of reducing profits for all market participants.[10]

Economic theory has long recognized that oligopolistic markets create particularly favourable conditions for cartelization. High market concentration facilitates monitoring among competitors, while substantial barriers to market entry reduce the likelihood that new firms will disrupt coordinated pricing structures. Patrick Rey observes that developing countries are especially vulnerable to cartelization because their markets frequently combine concentrated industrial structures with weak regulatory institutions and limited enforcement capacities.[11] In transition economies such as Uzbekistan, where significant sectors of the economy remain dominated by a limited number of large undertakings or state-affiliated enterprises, these structural characteristics further increase the risks associated with anti-competitive coordination.

Game theory provides one of the most influential theoretical frameworks for understanding cartel behaviour. Developed primarily by John von Neumann and Oskar Morgenstern in the mid-twentieth century, game theory explains how rational economic actors behave under conditions of strategic interdependence. Within oligopolistic markets, firms continuously evaluate the likely reactions of competitors before adopting pricing or production decisions. Consequently, strategic coordination may emerge even in the absence of explicit agreements because firms understand

[8] R Husain, *The Identification of Tacit Collusion in Oligopolistic Markets* (Kobe University).
[9] Slaughter and May, Global Cartel Enforcement Trends 2024.
[10] Luca Rubini, *The Definition of Subsidy and State Aid: WTO and EC Law in Comparative Perspective* (Oxford University Press 2009) 5–9.
[11] Patrick Rey (n 5).

that aggressive competition may provoke retaliatory responses capable of reducing collective profitability.

The prisoners' dilemma remains particularly significant in explaining both the formation and instability of cartel agreements. The model demonstrates that although firms collectively benefit from maintaining supra-competitive prices, each participant simultaneously possesses incentives to secretly undercut competitors in order to gain additional market share. This inherent instability explains why modern competition authorities increasingly rely upon leniency programs and whistleblower systems designed to encourage cartel participants to defect from anti-competitive arrangements by offering immunity or reduced penalties in exchange for cooperation with regulatory authorities.

Closely related to these concepts is the notion of Nash equilibrium, which exists when no market participant wishes to modify its strategy because it believes the existing strategy produces the most favourable outcome considering the anticipated behaviour of competitors. Nash equilibrium helps explain why parallel pricing behaviour and coordinated market conduct frequently occur within oligopolistic markets even without direct communication between firms.[12] However, this phenomenon simultaneously creates one of the most difficult challenges within modern competition law: distinguishing legitimate conscious parallelism from unlawful tacit collusion.

The emergence of digital technologies and algorithmic pricing systems has significantly intensified these difficulties. Contemporary firms increasingly rely upon artificial intelligence tools capable of continuously monitoring market conditions, predicting competitor behaviour, and automatically adjusting prices in real time. Competition authorities in the European Union and the United Kingdom have warned that algorithmic pricing systems may facilitate tacit collusion by reducing strategic uncertainty between competitors and stabilizing supra-competitive pricing outcomes. Thus, contemporary cartel conduct increasingly involves indirect and technologically facilitated coordination mechanisms that challenge traditional legal understandings of collusion.

Price-fixing remains the most classical and severe form of cartel conduct. Under such arrangements, competitors coordinate prices, discounts, surcharges, production costs, or pricing formulas in order to eliminate genuine price competition and maximize collective profits. In most jurisdictions price fixing constitutes a per se violation of competition law because it directly undermines the functioning of competitive markets.

One of the most significant examples of modern price-fixing cartels involved the European Union Trucks Cartel case decided in 2016. In this case, major truck manufacturers including MAN, Daimler, Volvo/Renault, Iveco, and DAF coordinated truck prices and delayed the introduction of environmentally friendly technologies over approximately fourteen years. MAN ultimately disclosed the cartel through the European Union's leniency program and received full immunity from approximately €2.93 billion in fines because it became the first undertaking to cooperate with competition authorities. This case demonstrates both the scale of economic harm generated by modern cartels and the growing importance of leniency systems in cartel detection.

Another prominent example concerns the Vitamins Cartel of the 1990s, involving multinational corporations such as Roche and BASF. These companies coordinated global prices for vitamins including Vitamins A, C, and E over extended periods, resulting in substantial overcharges worldwide. The cartel ultimately generated billions of dollars in penalties and remains one of the largest and most influential cartel cases in modern antitrust history.

Contemporary price-fixing arrangements increasingly rely upon indirect mechanisms rather than explicit agreements. Firms may exchange commercially sensitive information regarding prices, future market strategies, production volumes, or customer data through trade

[12] John Nash, 'Equilibrium Points in N-Person Games' (1950) 36 *Proceedings of the National Academy of Sciences* 48.

associations, industry conferences, digital communication platforms, or algorithmic pricing systems. Such practices reduce market uncertainty and facilitate coordinated conduct without requiring formal cartel agreements. Consequently, competition authorities increasingly focus not only upon explicit agreements but also upon indirect information exchange capable of producing anti-competitive market outcomes.

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