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Article

Nash equilibrium as an analytical tool for Public Administration: diagnosing pathologies and intervention strategies in the Greek context

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Abstract. This article applies Game Theory to diagnose persistent pathologies in public administration, such as bureaucratic inertia, as stable sub-optimal Nash Equilibria. Through a systematic literature review focused on the Greek context, it proposes a conceptual shift for public administration from a passive 'player' to a proactive 'game designer' who strategically alters incentives, rules, and information. The analysis reveals that this framework provides a practical roadmap for addressing deep-seated issues like tax evasion and inter-agency conflict by transforming dysfunctional equilibria. Ultimately, it offers an actionable model for designing effective reforms that can move complex administrative systems from deadlock toward sustainable cooperation.

Keywords: public administration, game theory, Nash equilibrium, institutional reform, decision making.
JEL classification: H; H11; D73; C70

1. Introduction

The functioning of modern Public Administration (PA) rarely resembles the image of a monolithic, hierarchical machine that executes commands with absolute predictability. In reality, it constitutes a complex ecosystem where government organizations, public bodies, interest groups, and individual citizens constantly interact, making decisions that mutually affect the outcomes for everyone. Particularly within the Greek context, chronic pathologies such as bureaucratic inertia, coordination failures between agencies (as dramatically demonstrated in the management of crises like the fire in Mati), inadequate provision of public goods, and the difficulty of implementing substantial reforms are often the collective result of individually rational choices (Lee & Park, 2007). The actors, from a ministry designing a reform to a region competing with another to attract investment, act based on their own incentives and their expectations of others' behavior, often trapping the system in dysfunctional states.

To decode these seemingly paradoxical dynamics, Game Theory offers an exceptionally powerful analytical framework, with Nash Equilibrium as its central concept. A situation is described as a Nash Equilibrium when none of the involved actors has an incentive to unilaterally change their chosen strategy, given the strategies chosen by the others. The significance of this concept for public policy is decisive, as it reveals that many persistent and dysfunctional situations are not random but constitute stable equilibrium points. The lack of cooperation between states on climate change (Zhu, 2022), the avoidance of responsibility in a public safety system (Johnson, Grossklags, Christin, & Chuang, 2010), or the insufficient voluntary contribution to the production of a public good (Palfrey & Rosenthal, 1984) can all be modeled as sub-optimal yet stable Nash Equilibria. Understanding these equilibria is, therefore, the first and most critical step in diagnosing the root of administrative pathology.

This article, through a systematic literature review, aims to move beyond simple diagnosis and offer a coherent framework for action. Its innovation lies precisely in bridging the gap between abstract academic theory and applied public policy, with a special emphasis on the Greek reality. Instead of treating Nash Equilibrium merely as a passive diagnostic tool, this study reframes it as an active and practical tool for designing solutions. Our central argument is that the role of modern public administration is not simply to act as another player within a given "game", but to assume the role of the "game designer". Through the strategic shaping of rules, the alteration of incentives, and the management of information, the PA can influence the strategic choices of actors and make cooperation and effectiveness a stable and sustainable equilibrium (Nyborg et al., 2003). This perspective transforms the analysis from an exercise in pessimism about inevitable deadlocks into an optimistic and realistic guide for institutional design, with specific application to the challenges of the Greek PA.

2. Literature review

Pathologies revealed by classical analysis: equilibrium traps and collective deadlocks

Understanding contemporary administrative phenomena requires moving beyond traditional models that treat organizations as simple hierarchies. The reality of the public sphere is one of constant strategic interaction. Game Theory provides the fundamental "grammar" for analyzing such interactions. A "game" is formally defined as a model consisting of a set of players, a set of strategies available to each player, and a payoff function that assigns a value (or utility) to each player for every possible combination of strategies (Gibbons, 1992).

Within this framework, the central solution concept is the Nash Equilibrium. An outcome constitutes a Nash Equilibrium if each player's strategy is the best possible response to the strategies of the others (Westhoff et al., 2012). Formally, a strategy profile $s^* = (s_1, s_2, ..., s_n)$ *is a Nash Equilibrium if, for every player i,* $u_i(s_i, s_{-i}) \geq u_i(s_i, s_{-i})$ for all $s_i \in S_i$, where u_i is the payoff for player i and s^*_{-i} represents the strategies of all other players. This stability, however, does not imply efficiency. Public administration is rife with such situations, which can be understood through three classic problems.

The "free-rider" problem perfectly models the endemic tendency of tax evasion in Greece. In a game where citizens are called to contribute (through taxes) to public goods (health, education), the individual incentive is to avoid contribution, expecting that others will cover the cost. This leads to a stable equilibrium of insufficient funding, where individual rationality undermines collective well-being (Palfrey & Rosenthal, 1984).

The "Prisoner's Dilemma" captures the failure of coordination between ministries or between central and local government. Each agency, in order to protect its competencies and budget ("silo mentality"), has a dominant strategy to act competitively rather than cooperatively. The result is a stable equilibrium of conflict (e.g., overlapping actions, wasted resources), which is clearly worse for everyone than a state of cooperation (Potoski & Prakash, 2004).

Finally, the "Tragedy of the Commons" explains phenomena such as unregulated construction in coastal and tourist areas of Greece. Each individual actor has an incentive to maximize their exploitation of the common resource (the landscape), collectively leading to its degradation, an outcome that harms everyone in the long run (Cardenas, Stranlund, & Willis, 2002). However, this pessimistic outcome is not inevitable. As noted in a recent critical analysis by Senatore, Bimonte, and Gatto (2025), contrasting non-cooperative models with Ostrom's framework, the transition from such "dead-end" tragedies to sustainable equilibria is possible. They argue that cooperative strategies can emerge through polycentric governance and specific institutional designs that effectively align individual incentives with collective welfare, shifting the game towards a Pareto-efficient equilibrium.

Table 1. The Payoffs.

Table I: The Payoffs		
	Ministry B	
	Cooperate (Joint Action)	**Defect** (Unilateral Action)
Ministry A		
Cooperate (Joint Action)	(3, 3) *Synergy, maximum collective benefit*	(0, 5) *A bears the cost, B reaps the benefit*
Defect (Unilateral Action)	(5, 0) *B bears the cost, A reaps the benefit*	(1, 1) *Conflict, wasted resources, minimal outcome (**Nash Equilibrium**)*

Table 1 presents a 2x2 payoff matrix modeling a strategic interaction between two government ministries, labeled Ministry A and Ministry B. Each ministry can choose one of two strategies: 'Cooperate' (representing joint action) or 'Defect' (representing unilateral action). The matrix displays the numerical payoffs for each ministry for the four possible outcomes. Mutual cooperation yields a payoff of (3, 3) for each, described as synergy and maximum collective benefit.

If one ministry defects while the other cooperates, the defecting ministry receives the highest payoff of 5, while the cooperating ministry receives 0. The outcome where both ministries choose to defect results in a payoff of (1, 1) for each, which is characterized as conflict with wasted resources and is identified as the Nash Equilibrium of the game.

Beyond these fundamental models, classical Nash analysis offers a more detailed diagnosis of specific administrative pathologies. In the Greek context, the existence of multiple equilibria is evident: a "high-level equilibrium" (high compliance, quality services) can coexist with a "low-level equilibrium trap" (low trust, high tax evasion), where the system is trapped in the latter due to initial beliefs (Strand, 2012). In other cases, such as the competition between municipalities to attract tourism investments by offering excessive facilities, the system is driven into a "race to the bottom", a unique but systematically sub-optimal equilibrium (Bucovetsky, 2005).

Beyond the classic model: realistic approaches for administrative reality

Classical Nash Equilibrium, despite its strong diagnostic value, ignores critical real-life dynamics such as learning, reputation, and uncertainty. To address these challenges, game theory has developed more advanced equilibrium concepts, which offer a much richer and more realistic framework for analysis. As Gintis (2000) emphasizes, gaining insight into complex social and public systems requires grappling with mathematical models of strategic interaction that move beyond static classical analysis. He suggests incorporating evolutionary dynamics to explain how social norms and institutional behaviors develop over time, arguing that concepts like evolutionary stability are essential for understanding how institutional rules shape collective outcomes in the long run.

For dynamic interactions and the role of time, the fundamental tool is the Subgame-Perfect Nash Equilibrium (SPNE). This concept is crucial for assessing the credibility of government commitments over time. A reform promise that is not credible (i.e., the government will have an incentive to renege on its promise in the future) will be ignored by rational actors, making the reform unsustainable (Zhou, Lam, & Heydecker, 2005). For example, a government's declaration that it will "never bail out a problematic state-owned enterprise" may not be time-consistent. If the enterprise reaches the brink of collapse, the political cost of unemployment may create a strong incentive for the government to break its initial commitment. Anticipating this, the enterprise's management has no incentive to restructure, leading to an equilibrium where inefficiency is perpetuated. SPNE analysis allows us to distinguish empty threats from credible commitments.

To address uncertainty, the Bayesian Nash Equilibrium is essential. It allows for the modeling of incomplete information and trust, explaining how opacity and the lack of institutional memory, characteristics often attributed to the Greek PA, can lead to self-fulfilling prophecies of low trust and cooperation (Strand, 2012; Anderlini & Lagunoff, 2008). Consider a public procurement process where the contracting authority does not know the true quality ("type") of a potential contractor. The contractor can be either "high quality" or "low quality". Bayesian analysis allows for modeling how the authority's beliefs about the probability of the contractor being high quality affect the terms of the contract, and how these terms, in turn, can lead different types of contractors to self-select, indirectly revealing their quality.

Finally, the incorporation of behavioral and psychological factors provides a more realistic picture. Equity Theory explains why the perceived fairness of a tax measure in Greece can affect compliance more than the tax rate itself (Chan et al., 1997). It is not enough for a tax law to be economically efficient; it must also be and appear to be fair. If citizens perceive that the tax system allows certain groups to systematically evade taxes or enjoy unjustified privileges, their own willingness to comply decreases dramatically. The feeling of being a "sucker" can lead to a new equilibrium of low compliance, even if the individual incentives (fines) remain the same. The analysis of tipping points shows how a successful, even small-scale, intervention (e.g., the successful digitization of a service) can create positive momentum and push the system toward a new, superior equilibrium. However, it also warns of the risk of "crowding out", where a financial subsidy for a socially desirable action can undermine the internal, moral motivation of citizens to perform it voluntarily (Nyborg et al., 2003).

3. Methodology

This study adopts the methodology of a systematic literature review, conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement.

Protocol and registration

The systematic review protocol was not prospectively registered in a public repository. This decision was made due to the conceptual nature of the review, which aimed to synthesize theoretical frameworks concerning game theory and public administration rather than to aggregate quantitative evidence on a specific clinical or empirical question. The methodology, however, was rigorously defined internally prior to the search to ensure transparency and replicability.

Eligibility criteria

Studies were included if they met the following criteria: (1) explicitly applied the concepts of Game Theory or Nash Equilibrium to model or analyze a problem related to Public Administration, public policy, or institutional reform; (2) were published as peer-reviewed journal articles or book chapters to ensure academic rigor; and (3) were written in the English language. Exclusion criteria were: (1) studies using game-theoretic terms merely metaphorically without a formal analytical application; (2) purely mathematical or abstract economic papers without a clear and substantive link to public sector pathologies or governance; and (3) grey literature, including conference proceedings and unpublished working papers.

Information sources and search strategy

A comprehensive literature search was conducted across four major academic databases: Scopus, Web of Science, Google Scholar, and Semantic Scholar. The search was completed in February 2025 and included all publications regardless of their publication date to ensure a thorough historical overview of the topic. The search strategy was designed to capture the intersection of game-theoretic concepts with the domain of public administration. An exemplary search string, adapted for the Scopus database, is provided below:
(TITLE-ABS-KEY("Nash Equilibrium" OR "Game Theory") AND TITLE-ABS-KEY("Public Administration" OR "Public Policy" OR "Governance") AND TITLE-ABS-KEY("Institutional Design" OR "Collective Action"))

Study selection, data extraction, and synthesis

The initial search yielded a total of 627 records. After the removal of 137 duplicates, 490 unique records were screened based on their titles and abstracts, leading to the exclusion of 441 records that were clearly irrelevant. The full texts of the remaining 49 articles were then retrieved and assessed for eligibility against the predefined inclusion and exclusion criteria. The entire selection process is visually detailed in the PRISMA flow diagram (Figure 1).

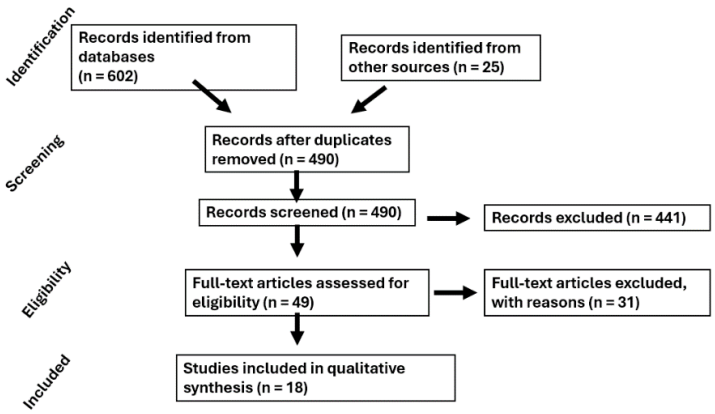

Figure 1. PRISMA 2020 flow diagram illustrating the study selection process.

From the 49 articles assessed in full, a detailed data extraction process was undertaken, resulting in the collection of 231 distinct analytical notes. These notes captured key theoretical arguments, model assumptions, case study applications, and policy implications relevant to the research question. The extracted notes were imported into the Qualitative Data Analysis Software (QDAS) NVivo for systematic organization and analysis. A thematic synthesis was conducted to identify, code, and categorize recurring patterns and core concepts. The final selection of 18 studies for the narrative synthesis was based on a criterion of theoretical and analytical significance.

Specifically, we prioritized seminal works that established foundational models and contemporary studies that offered novel applications or critiques, ensuring both historical depth and current relevance. This purposive selection aimed to capture the most influential contributions that directly informed the development of the "game designer" framework, rather than achieving an exhaustive quantitative aggregation. This approach acknowledges the conceptual nature of the review while maintaining systematic rigor.

4. Results

The systematic analysis of the body of research reveals that the application of Nash Equilibrium in public administration functions simultaneously as a diagnostic tool for pathologies and as a guide for designing interventions. The findings are organized into three interconnected thematic axes: Diagnosis, Dynamics, and Design.

Axis 1 – Diagnosis: inertia, inaction, and reform failure

One of the most powerful conclusions drawn from the systematic review of the literature is that Nash Equilibrium provides an exceptionally accurate interpretive matrix for administrative inertia, strategic inaction, and reform failure, phenomena endemic to the Greek Public Administration. The analysis demonstrates that these situations are not simply products of mismanagement, individual negligence, or organizational pathology, but are often stable, predictable, and rational collective equilibria. In an environment where actors (e.g., civil servants, political officials, administrative units) compete for limited resources, promotions, or simply to avoid political and administrative costs, a situation is formed where no one has an individual incentive to unilaterally deviate from established behavior.

The concept of "strategic inaction", as described by Johnson et al. (2010), is central here. This is not simple inertia, but a rational choice based on the expectation of others' behavior. Taking an innovative initiative can be individually costly and carry significant personal risk if other actors continue to operate in the old way. When taking responsibility entails a high probability of exposure and a low probability of reward, inaction becomes the best response for everyone. As Lee and Park (2007) point out, when all players adjust their behavior based on expectations of others' behavior, a stable, though potentially inefficient, system is created, in which deviation is disadvantageous for each individual. This dynamic explains why, in many Greek public organizations, adherence to outdated procedures is maintained, not from a lack of alternatives, but because change requires a coordination that is difficult to achieve.

This situation leads to the formation of an "inertia trap", which explains the extraordinary resilience of dysfunctional practices. The system self-corrects towards stagnation, as, according to Lee and Park (2007), "mutual waiting and strategic coexistence minimize the possibility of innovation or rupture with the establishment". This form of "habitual equilibrium", which arises not

only from conscious strategy but also from habits, adjustment mechanisms, and embedded institutional structures, makes the implementation of reforms exceptionally difficult. Lee and Park (2007) indicate that achieving a reform requires the simultaneous shift of all involved parties from their established strategies. If this does not happen, the system inevitably reverts to the previous equilibrium, maintaining the status quo. When the involved actors (e.g., politicians, senior officials, administrative units) remain "locked" into their old strategies to preserve their positions and power balances, any attempt at change crashes against the endogenous stability of the old equilibrium. Nash Equilibrium, therefore, is not just a theoretical possibility, but the de facto operating model of many public organizations, explaining why reforms often fail not at their legislation, but during their implementation.

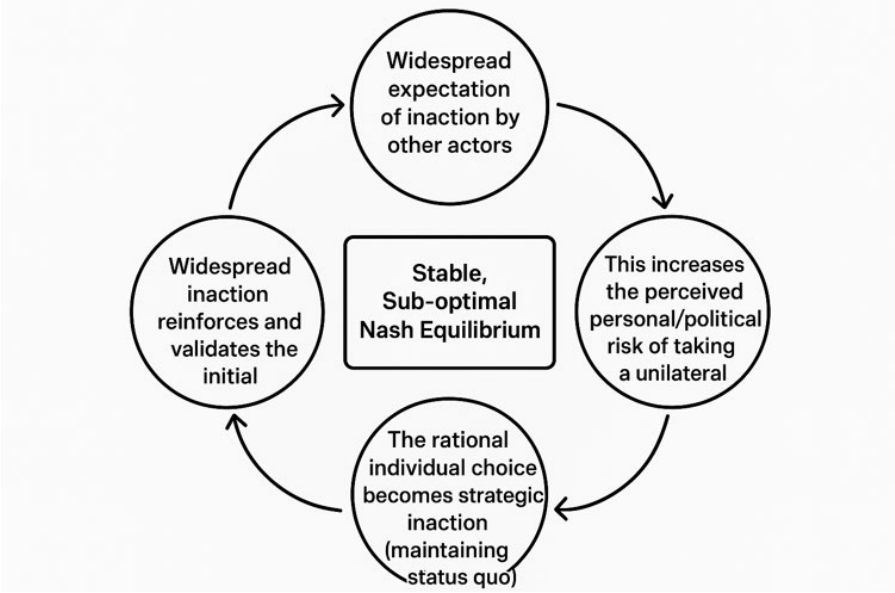

Figure 2. The Vicious Cycle of the 'Inertia Trap'.

Axis 2 – Dynamics: competition and cooperation in the public sector

A methodological clarification is necessary when extending the analysis from individual agents to collective organizations such as ministries or agencies. Game Theory is founded on methodological individualism, modeling the choices of rational utility-maximizing individuals. Treating a ministry as a unitary actor is a useful analytical simplification, a "black box" approach common in international relations and institutional analysis. This paper adopts this simplification while acknowledging its limitations. We assume that organizations, guided by leadership or dominant internal coalitions, act to maximize institutional goals (e.g., budget, competencies, political influence), which serve as the proxy for utility. While this glosses over internal politics, it allows for a tractable analysis of inter-organizational strategic interactions, which remains highly insightful for understanding systemic pathologies like coordination failure.

The analysis of Nash Equilibrium proves equally revealing when shifted from the interior of an organization to the relationships between public bodies. The findings from the literature consistently show that, in the absence of appropriate institutional frameworks, non-cooperative

competition between rational public actors leads almost inevitably to collectively sub-optimal outcomes. The achievement of cooperation, on the other hand, does not arise spontaneously but depends on the careful and strategic design of institutions.

A classic example of this dynamic is inter-regional competition for attracting mobile factors of production, such as investment or specialized labor. In Greece, this phenomenon is often observed in the competition between municipalities and regions to attract tourism investments. As analyzed by Bucovetsky (2005), each local government, acting individually, has an incentive to offer the most attractive conditions, leading to a destructive "race to the bottom". This dynamic is further complicated by the vertical "principal-agent" game between central and local governments. As Zhuang et al. (2024) demonstrate in their evolutionary game analysis of national park management, local governments often prioritize regional economic interests over central mandates due to bounded rationality. Their findings suggest that an ideal evolutionary stable strategy, where the central government strengthens authority and local governments strictly implement policies, is highly conditional on minimizing rent-seeking behaviors and optimizing reward mechanisms.

The same dynamic of cooperation failure characterizes the management of cross-border problems, such as environmental pollution. The analysis by Zhang et al. (2019) of a pollution game is directly applicable to problems like the pollution of a river that crosses multiple regions in Greece. Recent research by Yan and Cao (2024) on marine environmental compensation extends this to a three-party evolutionary game (Central Government, Local Government, Enterprises). They reveal that while compensation systems can incentivize enterprises, local governments often face a "failure" in incentive due to high supervision costs. Their simulation shows that imposing strict fines on both non-compliant enterprises and non-supervising local authorities is critical for stabilizing the system at an ideal equilibrium. This confirms that the solution implies the active intervention of the higher authority to change the structure of the game. Through supervision and the imposition of credible sanctions, the higher authority alters the payoff matrix so that cooperation becomes the dominant strategy, pushing the system towards a socially superior Nash Equilibrium.

Finally, even the formation of alliances and collaborations between agencies can be modeled as a set of Nash Equilibria. As Lee & Park (2007) show, a stable configuration is one where no agency has an incentive to leave its alliance or join another one. However, their analysis reveals a critical finding: the system does not necessarily reach the globally optimal cooperation structure (global optimum). Often, it gets trapped in the nearest "local minimum", a stable but sub-optimal equilibrium. The final outcome is critically dependent on history and initial conditions (path dependence), often leaving the majority of actors unsatisfied. This explains why many inter-municipal or inter-regional cooperations in Greece remain at a performance level lower than what is potentially achievable, as the transition to a superior structure would require overcoming an existing, stable equilibrium.

Axis 3 – Design: Nash equilibrium as a tool for policy design and evaluation

Beyond its strong diagnostic capability, the systematic review of the literature demonstrates that the analysis of Nash Equilibrium is evolving into an exceptionally practical and powerful tool for the

proactive design and ex-ante evaluation of public policies. This transition from description to prescription is perhaps the most significant contribution of game theory to modern public administration. The analysis is no longer confined to explaining why things go wrong but offers the ability to simulate how different interventions can lead to better, stable equilibria.

In the area of market regulation, Nash analysis allows policymakers to simulate the consequences of their decisions before they are implemented. The study by Genc & Sen (2008) on the Ontario electricity market is a case in point. The researchers used a dynamic Nash Equilibrium model to compare two alternative policies: maintaining the market with three large players versus increasing competition with the entry of two new players. The simulation showed with quantitative precision that the policy of increasing competition would lead to a new Nash Equilibrium with a 25% drop in average annual prices and a 29% reduction in price volatility. The model also accurately predicted the reduction in the market share of the dominant player, confirming the regulatory authority's forecasts. This demonstrates the immense value of game theory as an evaluation tool: it allows public administration to make informed decisions based on data rather than mere assumptions. Similarly, indicators for monitoring competition, such as the Hirschman-Herfindahl Index (HHI), which are derived directly from equilibrium analysis, give regulators the ability to predict strategic behaviors and intervene proactively to ensure competition (Dotoli et al., 2014).

In the design of institutions and rules, the logic of Nash Equilibrium is even more fundamental, as it allows for the design of "smart" institutions that align individual incentives with the collective good. The classic analysis by Palfrey & Rosenthal (1984) on the provision of public goods is enlightening. They showed that the introduction of a simple rule of refunding contributions if the good is not provided radically changes the structure of the game. This rule does not change the cost of contribution, but it eliminates the risk of loss in case of failure, making individual contribution a much more attractive strategy. In the extreme case of a unanimity rule (where everyone must contribute for the good to be provided), contribution is transformed into a dominant strategy, completely eliminating the "free-rider" problem. This highlights how administrative design can solve fundamental problems of collective action. Similarly, in the design of clinical trials, adopting a randomization procedure based on Nash Equilibrium, where the probability of assigning a treatment is strategically adjusted as the best response to the researcher's likely actions, leads to a measurable reduction (by 31% in one scenario) in selection bias compared to standard procedures (Grant & Anstrom, 2008). Finally, in the design of tax systems, Nash analysis, as pointed out by Yalaman & Yıldırım (2019), indicates that a policy combining a low tax rate with a high penalty for tax evasion can create a stable Nash Equilibrium where tax compliance is the best strategy for citizens, making compliance a rational choice and not just a moral imperative.

Table 2 summarizes how the synthetic "game designer" framework proposed in this article goes beyond previous, mainly diagnostic, applications of game theory in PA.

Table 2. The "Game Designer's" comparison with the state of art.

Table II: The "Game Designer's" Comparison with the State of Art		
Characteristic	**Classic/State of Art Applications**	**Proposed "Game Designer" Framework**
Main Purpose	Diagnosis & Explanation (Descriptive)	Design & Intervention (Prescriptive/Normative)
Role of PA	Player within the game	Designer of the game
Focus of Analysis	Identifying the existing (often sub-optimal) equilibrium.	Identifying levers to shift towards a desired equilibrium.
Final Outcome	Understanding why problems persist.	A practical, structured framework for action for policymakers.

Table 2 provides a comparative analysis contrasting the classic, state-of-the-art application of game theory in public administration with the proposed 'Game Designer' framework. The comparison is structured across four key characteristics: Main Purpose, Role of PA, Focus of Analysis, and Final Outcome. For each characteristic, the table shows how the 'Game Designer' framework shifts the perspective from a descriptive and diagnostic role (identifying existing problems) to a prescriptive and normative one (designing interventions and solutions for policymakers).

5. Discussion

Interpretation of findings: from diagnosis to therapy

The findings of this systematic review strongly confirm that Nash Equilibrium functions as a powerful interpretive prism, offering what social scientists call a "micro-foundation" for macroscopic observations of administrative pathologies. In other words, the theory is not content to describe what is going wrong (e.g., "there is bureaucracy", "services do not coordinate"), but provides a causal explanation for why these dysfunctions persist, by analyzing the underlying strategic choices of individual actors. This shift from the macroscopic symptom to the microscopic cause is the first step in moving from simple diagnosis to effective therapy.

The analysis of administrative inertia, for instance, through this prism reveals that it is not about a vague organizational "culture", but the result of a stable equilibrium. As Johnson et al. (2010) point out, "strategic inaction" is the best response of a public employee in a system where taking initiative entails high personal risk (e.g., disciplinary liability, exposure to political criticism) and offers low personal reward. Stagnation is a Nash Equilibrium because, for each individual player, doing nothing is safer and more rational than acting alone. Similarly, the failure of coordination between agencies, as analyzed by Bucovetsky (2005) in inter-regional competition, is revealed as a classic "Prisoner's Dilemma" type of Nash Equilibrium. Each agency, regardless of what others will do, has a dominant strategy to act competitively to maximize its own benefit (e.g., to secure the

largest budget). The result is a stable equilibrium where everyone is in a worse position compared to a state of cooperation, which, however, no one has an individual incentive to pursue unilaterally.
The importance of this approach is immense, especially for the complexity of the Greek Public Administration. It shifts the analysis from the search for "culprits" (e.g., "lazy civil servants", "incompetent politicians") to an understanding of the systemic incentives that make dysfunctional behavior rational. It reveals that individual rational behaviors can often aggregate into collectively irrational and dysfunctional outcomes. This explains why many reforms based on moral appeals, wishful thinking for cooperation, or the simple change of personnel fail: they do not change the fundamental incentives and the structure of the "game" that the actors are playing. The recognition that inefficiency is a stable equilibrium, and not a random deviation, is the crucial realization that opens the way for the design of substantive interventions. Instead of trying to persuade players to play irrationally (i.e., against their interest within the existing game), we must change the game itself, so that the desired behavior becomes the new, rational Nash Equilibrium.

The "Game Designer" in dialogue with contemporary administrative theory

The "Game Designer" in Dialogue with Contemporary Administrative Theory
The proposal to reframe Public Administration (PA) as a "game designer" offers a novel approach to the classic structure-agency problem in sociology and public administration. This framework provides a micro-foundation for macro-level phenomena by explicitly modeling how institutional structures (the rules of the game) shape the strategic behavior of individual agents, and how, in turn, a strategic agent (the designer PA) can alter those structures. It thus enters a critical dialogue with dominant administrative theories like New Public Management (NPM) and Governance, as well as with the foundational literature on Mechanism Design.

Our framework's direct intellectual antecedent is Mechanism Design theory, the "engineering" side of Game Theory pioneered by Hurwicz, Maskin, and Myerson. While standard Game Theory analyzes outcomes given a fixed set of rules, Mechanism Design inverts the problem: it starts with a desired outcome (e.g., efficient public good provision) and asks what game structure would produce that outcome as a Nash Equilibrium (Myerson, 2008). The "game designer" is essentially the public sector agent tasked with implementing such mechanisms. This reframing moves the analysis from passive diagnosis to active, purposeful institutional engineering, providing a rigorous theoretical foundation for our prescriptive claims.

In relation to New Public Management (NPM), which focuses on performance incentives (payoffs), our framework offers a deeper, more robust approach. NPM often led to unintended consequences where actors would "game the system" because the reform only altered payoffs without changing the underlying game structure. The "game designer" model recognizes that effective reform requires a holistic approach that may involve altering not just incentives, but also the rules (e.g., who can act, in what sequence) and information structures, making the system more resistant to strategic manipulation.

Similarly, the "game designer" provides the analytical engine that is often missing from Governance theory. Governance correctly identifies the importance of networks and cooperation but often struggles to explain persistent coordination failures. Our framework allows for the diagnosis of

these failures as sub-optimal equilibria (e.g., Prisoner's Dilemmas in inter-agency networks). By identifying the specific strategic dilemma, the designer can deploy targeted interventions, be it through credible commitments, altered information, or new rules, to shift the network from a state of conflict to one of stable cooperation, much like the institutional solutions for common-pool resource management analyzed by Ostrom (1990).

Consequently, the "game designer" framework does not replace NPM or Governance. Instead, it underpins them by providing the missing link between structure and agency. It offers the strategic depth of Mechanism Design to avoid the pitfalls of naive NPM incentives and the analytical precision needed to make the normative goals of Governance achievable. It positions the PA as a meta-strategic actor, capable of shaping the context of interaction to guide a system toward superior equilibria.

Practical application of intervention levers in Greece

Reframing the PA from a player to a "game designer" offers a powerful and practical framework for policymaking, specifically tailored to Greek challenges. The three intervention levers can be applied directly.

The Incentives Lever (changing the payoffs): The most direct and frequently used intervention lever available to Public Administration as a "game designer" is changing the players' payoffs. In the language of Game Theory, every strategic choice is associated with a specific benefit or cost for the actor. The incentives lever consists of direct intervention in this cost-benefit calculation. Recent research by Ma and Yang (2024) on government-industry-university collaboration reinforces this, demonstrating that the government acts as a crucial "ripening agent" to catalyze cooperation. Their evolutionary game analysis highlights that while positive incentives are important, the implementation of strict penalty mechanisms for breach of contract is often more effective in accelerating the convergence of stakeholders toward a stable collaborative equilibrium. The goal is to make socially desirable behavior more attractive (by increasing its benefit) and undesirable behavior more costly (by increasing its cost).

The Greek Public Administration extensively uses this lever in various policy fields. For example, subsidy programs like the "market pass" or heating allowances aim to alter the payoffs of households' economic decisions, increasing their purchasing power. However, one of the most characteristic examples of the strategic use of this lever in Greece is the policy of linking tax returns with the collection of electronic receipts. Before this policy, the "game" of tax evasion had a stable equilibrium: both consumers and businesses had an incentive to prefer transactions without a receipt (the former for a possible discount, the latter to conceal income). The introduction of the incentive (a tax reduction for those who collect receipts) drastically changed the payoffs for one player: the consumer. Suddenly, not getting a receipt had a clear opportunity cost (lost tax relief). This turned millions of consumers into de facto "auditors", changing the best response for the other player, the business. For the business, the potential benefit of concealed income was now clearly

outweighed by the increased risk of losing a customer, thus shifting the entire system towards a new Nash Equilibrium with higher tax compliance.

However, the effectiveness of this lever depends on a "behaviorally informed" design. The simple introduction of economic incentives can have unpredictable results if psychological and social parameters are not taken into account. As Nyborg et al. (2003) warn, there is always the risk of the "crowding out" phenomenon. If a behavior, such as voluntary blood donation or recycling, is motivated by internal, altruistic incentives, the introduction of a small monetary reward can transform a moral act into a poorly paid job, undermining the original motive and ultimately leading to a decrease in supply. Furthermore, as indicated by Equity Theory (Chan et al., 1997), the perceived fairness of an incentive is crucial. An allowance that is considered by the majority to be unfair or poorly designed can provoke reactions that undermine its original goal. Therefore, the challenge for modern PA is not just to offer incentives, but to design them in a way that respects, utilizes, and does not undermine the internal motivations and perceptions of justice of the citizens.

The Rules Lever (changing the game structure): Beyond the simple modification of payoffs, a more powerful and fundamental lever available to Public Administration as a "game designer" is the ability to change the very structure of the game. This corresponds to changing the rules of the interaction themselves: who the players are, what moves are allowed, and which commitments are credible. This approach aligns with the "grammar of institutions" proposed by Crawford and Ostrom (1995), who argue that understanding institutional compliance requires analyzing the interplay between formal sanctions and the subjective valuations ("delta parameters") agents assign to obeying or breaking rules. They demonstrate that the mere existence of a norm is often insufficient; specific monitoring costs and normative weights are required to shift the dominant strategy from defection to cooperation. As Palfrey and Rosenthal (1984) also showed, the simple introduction of a refund rule transforms a game with uncertain equilibria into one where cooperation becomes likely.

This lever is particularly crucial for the Greek administrative system, which has historically been characterized by structural problems that create games with sub-optimal Nash Equilibria. Poly-nomy and overlapping competencies between ministries and agencies create a coordination game with high transaction costs and ambiguity. In this game, the strategy of inaction or "buck-passing" often becomes the dominant one, as taking initiative involves the risk of conflict with other bodies. The lack of transparency in decision-making processes creates games with asymmetric information, where players with privileged access can exploit the system, leading to equilibria of low trust and high corruption.

In this context, significant institutional reforms in Greece can be interpreted as conscious (or unconscious) attempts to change the structure of the game.

The creation of Independent Authorities, such as the Independent Authority for Public Revenue (IAPR-AADE), is a characteristic example. This reform did not just change personnel; it changed the rules of the tax collection game. By severing the tax administration from direct political influence, the game was transformed from a repeated game where political intervention was an expected move, into one where the technocratic and impartial application of the rules became the new, credible strategy. This reduced the incentive to seek political "favors" and increased the

credibility of audits.

The introduction of digital platforms that enforce transparency, such as the "Diavgeia" program and the gov.gr portal, is another radical change of rules. "Diavgeia" changed the game of public spending by making it mandatory to publish every decision. This dramatically increased the cost of opaque action, as every move became visible to all players (citizens, media, opposition). Similarly, gov.gr changes the rules of the citizen-state interaction. It replaces a game where personal contact, hassle, and the possibility of "mediation" were part of citizens' strategy to be served, with a new game of standardized, impersonal, and transparent procedures.

These interventions, by changing the structure of the game, increase the cost of opaque and non-cooperative behavior and reduce the cost of compliance and transparent action. In this way, they make good governance and cooperation not just a moral imperative, but a more attractive, and over time, dominant strategy for the system's actors.

The Information Lever (changing beliefs): The third and perhaps most complex intervention lever of the "game designer" is the strategic management of information with the aim of changing the players' beliefs. In classical models, players are assumed to have complete information about the rules, the other players, and the payoffs. In reality, and especially in complex social and administrative environments, actors operate under conditions of uncertainty and incomplete or asymmetric information. Here, decisions are based not only on objective data, but also on the beliefs that each player has about the intentions, abilities, or "type" of the other players. Bayesian Nash Equilibrium is the theoretical tool that allows us to analyze such games, where beliefs are as important as the payoffs themselves.

This lever acquires immense importance in an environment of low social and institutional trust, such as the Greek one. When the generalized belief prevails that "others will evade taxes" or "the administration is corrupt", rational actors adjust their behavior accordingly, creating a self-fulfilling prophecy. This dynamic is quantitatively supported by Dulia and Shihab (2024) in their game-theoretic analysis of public-private partnerships. They identify "citizen distrust" as a critical constraint, demonstrating that while private investment increases financial returns, it can simultaneously decrease the government's utility due to public dissatisfaction, effectively creating a ceiling for optimal private participation. Without managing beliefs, the system gets trapped in a sub-optimal "low-level equilibrium trap" (Strand, 2012), where low trust leads to non-cooperative behavior, which in turn validates and reinforces the initial lack of trust.

Public Administration can intervene actively to break this cycle, acting as a manager of information and a shaper of beliefs. The success of a policy in such a context depends not only on its technocratic correctness, but also on its ability to signal credibility, commitment, and fairness. The interventions include:

Communicative Transparency and Information Campaigns: The simple provision of clear and credible information can function as a coordination device. As Nyborg et al. (2003) report, information campaigns that promote the idea that "more and more citizens are recycling" do not just convey information, but change each individual's beliefs about the behavior of others, making participation in recycling a more attractive strategy. In Greece, campaigns that transparently

document the use of tax revenues could change beliefs about good management and increase voluntary compliance.

Creation of Institutional Memory and Reputation Mechanisms: The lack of institutional memory, as analyzed by Anderlini & Lagunoff (2008), prevents the maintenance of long-term cooperation, as each "new generation" of players (e.g., a new government) starts from scratch, unbound by the reputation of the past. The creation of credible reputation mechanisms, such as public and accessible evaluation systems for public services by citizens, changes the game. When services and employees know that their performance is recorded and affects their reputation, they have a stronger incentive to adopt cooperative strategies. This transforms the interaction from an anonymous, one-shot game to a named, repeated game, where a good reputation becomes a valuable asset.

Overall, the information lever is the key to transitioning from an equilibrium based on suspicion to one based on trust. For the Greek Public Administration, this means that a successful policy must not only be institutionally sound and economically effective, but also communicatively transparent and capable of building credibility, changing the beliefs that keep the system trapped in sub-optimal states.

Table 3. The "Game Designer's" toolkit for policymaking in Greece

Table III: The "Game Designer's" Toolkit for Policymaking in Greece		
Intervention Lever	**Mechanism of Action (How it works)**	**Illustrative Greek Example**
1. Change Incentives	Alters the payoffs of each strategic choice. Makes desired behavior more rewarding and/or undesired behavior more costly.	The policy of linking tax returns to the collection of electronic receipts to combat tax evasion.
2. Change the Rules	Alters the very structure of the game: who the players are, what moves are allowed, in what sequence, and which commitments are credible.	The creation of Independent Authorities (e.g., IAPR-AADE) that decouple administration from direct political influence, or digital platforms (e.g., gov.gr) that standardize procedures.
3. Change Information & Beliefs	Alters the players' beliefs about the state of the game, the intentions of others, or the consequences of actions, thereby shifting their strategy.	The creation of public reputation systems (e.g., service evaluations) and campaigns that transparently document the use of tax revenues.

Table 3 outlines the 'Game Designer's' practical toolkit for policymaking, presenting three primary intervention levers with their mechanisms of action and illustrative examples from the Greek context. The first lever, 'Change Incentives,' works by altering the payoffs of each strategic choice, exemplified by the policy of linking tax returns to electronic receipts. The second lever, 'Change the Rules,' involves altering the fundamental structure of the game itself, exemplified by the creation of Independent Authorities. The third lever, 'Change Information & Beliefs,' focuses on

altering players' beliefs about the game, exemplified by public reputation systems and transparency campaigns.

Challenges and prerequisites for application in the Greek context

Reframing Public Administration as a "game designer" offers a powerful analytical and practical framework, yet its application in the Greek administrative and political context encounters significant challenges and obstacles. Overlooking these obstacles would render the proposal overly optimistic and academically naive. The transition from player to designer is not a technical procedure, but a profound political and institutional shift that requires overcoming three fundamental barriers: political cost, limited institutional capacity, and the resistance of vested interests.

First, political will is often undermined by political cost. Any attempt to change the rules of a "game" inevitably creates winners and losers. Sub-optimal equilibria, such as clientelistic relationships or the opaque allocation of resources, may be dysfunctional for society as a whole, but they are extremely functional for powerful interest groups (political, economic, union) that benefit from them. A government attempting to change these rules will face the fierce reaction of the "losers" of the reform, who are often more organized and have a stronger voice than the diffuse and often silent "winners". In a political system with intense competition and a short-term horizon, the anticipated short-term political cost of a substantial intervention can outweigh the uncertain long-term benefit, leading to strategic procrastination.

Second, the role of the "designer" requires specialized institutional capacities that are often absent from the Greek Public Administration. The design of "smart" institutions presupposes advanced analytical skills: the ability to model strategic interactions, conduct ex-ante impact assessments of potential consequences, understand behavioral biases, and continuously monitor and adapt policies. The Greek PA, despite significant progress, is still characterized by a lack of specialized personnel in these areas, insufficient use of data in decision-making, and an inability to coordinate among the "designers" themselves (e.g., different ministries designing conflicting policies). Without the systematic cultivation of these capacities, the "designer" risks designing rules that are either ineffective or have unforeseen negative consequences.

A third barrier is the resilience of informal institutions. The "game designer" framework primarily focuses on altering the formal rules of the game (laws, regulations, procedures). However, in administrative systems like the Greek one, informal norms and equilibria (e.g., clientelism, norms of low trust) often override formal rules. A brilliantly designed formal mechanism may fail if it conflicts with deeply embedded informal practices. Therefore, an effective designer must not only change the formal payoffs but also leverage the "Information Lever" to alter beliefs and norms, or design formal rules that are robust to, or even co-opt, existing informal incentives.

Finally, the most difficult obstacle is the endogeneity of the designer. The "game designer" model, presented heuristically, might imply a benevolent, exogenous actor, an assumption rightly challenged by Public Choice theory. In reality, the designer is endogenous to the system it seeks to reform. The state and the Public Administration are not monolithic, neutral entities; they are arenas of conflict, constituted by the very players (politicians, high-ranking officials, pressure groups) whose

behavior the new rules are meant to regulate. This creates a fundamental paradox: how can an institution reform itself when the agents of reform have vested interests in the existing equilibrium? The possibility of endogenous reform, therefore, depends not on a hypothetical benevolent planner, but on specific political and institutional conditions. Reform becomes possible when coalitions of actors emerge whose interests are better served by a new equilibrium, or when external shocks (e.g., fiscal crises, technological disruptions) alter the payoffs sufficiently to break the existing deadlock. The role of the "designer" is then not one of imposing a solution from above, but of identifying and empowering these pro-reform coalitions, creating institutional spaces for credible commitments, and strategically sequencing changes to overcome the resistance of vested interests. The stability of dysfunctional equilibria in Greece is due precisely to the fact that the mechanisms for change are often controlled by those who benefit from their preservation, highlighting that institutional reform is primarily a political, not a technical, challenge.

Generalizability of the framework

Although the examples in this article are drawn from the Greek context, the theoretical model of the "game designer" is potentially generalizable. It is particularly applicable to any administrative system characterized by: (a) high fragmentation of power, (b) low levels of social and institutional trust, (c) strong informal institutions that coexist with formal rules, and (d) strong path dependency. Such characteristics are often found in countries in Southern Europe, Latin America, or in states in transition, making the framework more broadly useful for comparative administrative analysis.

Limitations of the study

The limitations of this research are inherent in its methodology. As a literature review, it is based on the analysis and synthesis of secondary data and does not produce primary empirical findings. Furthermore, while the article attempts to connect theory with the Greek context, the application of the proposed interventions requires deeper empirical investigation of the specific conditions of each case, taking into account the cultural and historical factors that shape strategic interactions in Greece.

Proposals for future research

Based on the above, clear proposals for future research emerge. First, the application of the "game designer" framework to specific case studies within the Greek PA (e.g., the investment licensing process, coordination between ministries in a crisis, the implementation of the National Recovery and Resilience Plan) would be extremely fruitful. Second, conducting economic experiments with a Greek population could examine the influence of cultural factors (e.g., levels of trust, individualism) on strategic choices. Finally, the development of computational agent-based models or stylized formal models of specific administrative games (e.g., a Stackelberg model of a regulator-firm

interaction, as suggested by recent literature) that simulate interactions within the Greek PA could serve as a dynamic laboratory for testing and optimizing public policies before their implementation.

6. Conclusions

This article has argued that Nash Equilibrium is an essential tool for understanding and reforming Public Administration. By highlighting chronic administrative pathologies as stable, albeit sub-optimal, equilibrium points, the analysis shifts from simply assigning blame to a deeper understanding of the systemic incentives that trap actors in collective deadlocks. This approach is particularly crucial for analyzing the Greek case, where persistent dysfunctions often resist conventional, top-down reform efforts.

The central and innovative contribution of this work lies in the proposal of a coherent, practical framework for action, where Public Administration is not just a player, but the "game designer". Through the strategic use of three levers, incentives, rules, and information, policymakers can actively shift equilibria towards socially desirable outcomes. For the Greek Public Administration, adopting this perspective is not an academic luxury, but a practical necessity for addressing endemic problems such as opacity, lack of coordination, and low trust, transforming theoretical analysis into an applicable guide for reform.

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