Regulatory Governance, Managerial Decision-Making, and Safety Failure: The Boeing 737 Max Case

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Abstract: *The Boeing 737 MAX crisis offers a paradigmatic case study in the governance of private and public sector relationships in safety-critical industries. This article examines how the Federal Aviation Administration's progressive delegation of certification authority to Boeing, through the Organisation Designation Authorisation (ODA) programme, created structural conditions for regulatory and managerial failure. These conditions contributed to two fatal accidents in 2018 and 2019. Drawing on institutional theory, principal–agent frameworks, and organisational safety literature, the article analyses four interconnected dimensions of governance failure: the institutional design of the certification system; the informational asymmetries and incentive misalignments that shaped managerial decision-making; the governance of automation as a socio-technical challenge; and the contextual financial consequences of sustained governance failure. The article argues that the MAX crisis was not primarily a product of individual misconduct or isolated engineering error. Rather, it resulted from organisational and institutional structures that systematically discouraged transparency, independent oversight, and safety-first decision-making.*

Keywords*:* Boeing 737 MAX, corporate governance, principal–agent theory, automation governance, organisational decision-making

JEL: L93, L22, M14

1. Introduction

The relationship between private corporations and state regulatory authorities is one of the most consequential dimensions of modern governance. In sectors where technical complexity is combined with public safety, such as aviation, pharmaceuticals, and nuclear energy, effective regulatory oversight depends on the quality of organisational interfaces. These interfaces include the design of delegation mechanisms, the management of information flows, and the alignment of incentives between regulated entities and their regulators.

The Boeing 737 MAX crisis is one of the most thoroughly documented instances of governance failure at this interface in contemporary business history. On 29 October 2018, Lion Air Flight 610 crashed into the Java Sea twelve minutes after take-off, killing all 189 people on board. On 10 March 2019, Ethiopian Airlines Flight 302 went down six minutes after departure, killing all 157 passengers and crew. Subsequent investigations established that both aircraft had been brought down by the erroneous activation of the Maneuvering Characteristics Augmentation System (MCAS), a flight-control software that pilots had not been adequately informed about or trained to counter (Committee on Transportation and Infrastructure, 2020).

The central aim of this article is to examine the Boeing 737 MAX crisis as a failure of managerial governance at the interface of a private firm and a public regulator. The analysis focuses on how organisational design, incentive structures, and the management of automation produced systemic safety failure. Three specific research questions guide the analysis. First, how did the institutional design of the FAA–Boeing certification relationship create structural preconditions for governance failure? Second, how did information asymmetries and incentive misalignments shape key managerial decisions within Boeing and between Boeing and the FAA? Third, how does the way automation is managed within the organisation help explain the governance failures reflected in MCAS design, deployment, and disclosure decisions?

This article contributes to the management literature by integrating regulatory governance theory, principal–agent analysis, and automation governance scholarship into a unified analytical framework. The financial consequences of the crisis are treated as contextual evidence of the magnitude of governance failure, rather than as a primary analytical focus.

2. Literature Review and Analytical Framework

2.1 Regulatory Governance and the Firm–Regulator Interface

The governance of complex technological industries has long been characterised by the agency problem in regulation identified by Mitnick (1980). Regulated entities typically possess superior technical knowledge, which creates an informational advantage that regulators struggle to offset. Baldwin et alle (2012) argue that regulatory effectiveness depends on the degree to which regulators can access, interpret, and act upon information generated by the industries they oversee.

The concept of regulatory capture was first theorised by Stigler (1971) and subsequently elaborated by Carpenter and Moss (2013). It describes a process whereby a regulatory agency advances the commercial interests of the entities it regulates rather than the public interest. The FAA's progressive delegation of certification authority to manufacturers from the 1990s onward has been characterised as consistent with regulatory capture dynamics (Lutte, 2021; MacPherson and Dillingham, 2020). The ODA programme, formalised under the FAA Modernisation and Reform Act of 2012, institutionalised this delegation. It authorised manufacturers to designate their own employees to perform certification tasks on the FAA's behalf, a design that, according to Lutte (2021), generated structural tensions between independent oversight and commercial incentives.

2.2 Principal–Agent Problems in Certification Systems

The principal–agent framework offers a productive lens for analysing the FAA–Boeing relationship. The FAA, as principal, delegates certification authority to Boeing, the agent, expecting Boeing to act in the public interest. Agency theory predicts that agents will act in their own interests when monitoring is imperfect and incentives are misaligned (Jensen and Meckling, 1976). The United States Senate (2020) documented precisely this dynamic. Boeing employees acting as ODA designees faced internal pressures to accelerate certification timelines, creating a structural conflict of interest that may have influenced the integrity of their assessments.

Coglianese and Lazer (2003) argue that management-based regulation is effective only when accompanied by robust external auditing and transparent information disclosure. The Boeing case illustrates what may occur when these conditions are absent. The FAA's capacity to exercise independent oversight was constrained by staffing limitations, and key decisions about MCAS were made by Boeing engineers who were simultaneously subject to internal commercial pressures.

2.3 Automation Governance and Human–Machine Interaction

Wiener et all (2019) argue that automation introduces categories of failure not addressed by traditional crew resource management frameworks. According to Bainbridge (1983) identified what is called the Ironies of Automation. Automation tends to reduce human proficiency in manual tasks precisely at the moments when manual intervention becomes most necessary. This dynamic was consequential in both MAX accidents: pilots confronted an automated system acting against their inputs under time-critical emergency conditions.

Casner and Hutchins (2019) argue that pilots cannot effectively monitor or override automated systems whose operating parameters have not been disclosed to them. Dekker (2014) observes that system accidents are caused by the interaction of multiple system components rather than by individual error, and therefore require systemic responses. Both perspectives apply directly to the MAX case, where MCAS-related failures reflected a combination of software design choices, inadequate disclosure, and the absence of sensor redundancy.

2.4 Organisational Culture and the Normalisation of Deviance

Vaughan's (1996) analysis of the Space Shuttle Challenger disaster introduced the concept of the normalisation of deviance. This refers to the gradual organisational acceptance of practices that deviate from safety standards when those deviations produce no immediately visible adverse consequences. The framework is applicable to Boeing's handling of MCAS. The decision to classify it as a non-essential system for pilot training appears to reflect a pattern of incremental risk normalisation rather than a single deliberate choice.

Reason (1997) and Hollnagel (2014) emphasise the role of latent failures. These are organisational and managerial deficiencies that create preconditions for active failures at the operational level. Reason's Swiss Cheese Model is particularly relevant here. The MAX accidents illustrate how multiple governance layers exhibited aligned gaps that allowed systemic risk to propagate undetected. These layers included internal safety oversight, ODA certification, FAA independent review, and pilot training standards.

Based on the reviewed literature, the analysis that follows is structured around four analytical dimensions: (1) institutional design and delegation mechanisms; (2) information asymmetry and incentive misalignment; (3) automation governance and human–machine interaction; and (4) the contextual financial consequences of regulatory failure. While prior studies often examine these dimensions in isolation, this article integrates the first three to analyse how managerial and organisational decisions at the firm–regulator interface generated systemic safety failure. The financial dimension is treated only indirectly, as contextual evidence of cumulative governance costs.

3. Institutional Design and Delegation Failure

The institutional design of the FAA–Boeing certification relationship reflects decades of progressive delegation. While this delegation was justified as a means of leveraging manufacturer expertise, it created structural conditions in which independent oversight became increasingly difficult to exercise. The ODA programme placed Boeing employees in a structurally ambiguous position. They were formally acting on the FAA's behalf, but organisationally embedded within Boeing management. This dual accountability structure represents a textbook precondition for principal–agent failure (Jensen and Meckling, 1976).

The Boeing 737 MAX was not a new aircraft type. It was a redesign of the established 737 Next Generation platform, driven primarily by competitive pressure from Airbus's A320neo family. By preserving the MAX's classification as a 737 derivative, Boeing limited the scope of oversight applied to significant engineering changes, including those related to MCAS. Under FAA certification rules, a derivative aircraft is subject to less rigorous independent evaluation than a new type certificate (United States Senate, 2020). This classification illustrates how delegation mechanisms can enable regulatory arbitrage when the boundaries between derivative and novel engineering changes are institutionally ambiguous.

FAA engineers responsible for reviewing MCAS's system safety assessment were not consistently informed of the full scope of changes Boeing had made to the system. Significant portions of the review were conducted by Boeing engineers who were simultaneously subject to internal scheduling pressures (United States Senate, 2020). The FAA lacked the engineering staffing capacity to independently verify delegated assessments. This was not an incidental deficiency but reflected deliberate policy choices about the appropriate scope of government regulatory activity. The result was a configuration in which managerial incentive misalignment and insufficient monitoring capacity reinforced each other.

4. Information Asymmetry, Incentives, and Managerial Decision-Making

The governance failures observable in the MAX case were shaped by informational and incentive dynamics that influenced managerial decision-making at multiple organisational levels. Two dimensions are analytically important. The first is the asymmetry between Boeing and the FAA regarding MCAS's technical parameters. The second is the internal incentive environment within Boeing, which appears to have discouraged full disclosure of safety-relevant information.

Regarding the Boeing–FAA informational relationship, Boeing engineers substantially expanded MCAS authority during development. The maximum stabiliser deflection was increased from 0.6 degrees per activation in the original certification configuration to 2.5 degrees per activation in the final operational version, a fourfold increase. This change was made without updating the system's safety assessment or communicating it to the FAA's certifying engineers (Committee on Transportation and Infrastructure, 2020; Lutte, 2021). This represents a significant informational asymmetry of the kind that Baldwin et all (2012) identify as a central challenge in governing technically complex industries.

Regarding Boeing's internal incentive environment, organisational pressures appear to have discouraged full upward disclosure of safety-relevant information. The competitive urgency to match Airbus's A320neo, the commercial importance of maintaining the derivative classification, and the financial penalties Boeing faced for delivery delays created an environment where raising safety concerns carried high institutional costs. Vaughan's (1996) normalisation of deviance framework suggests that individual decisions in such environments are rarely straightforwardly unethical. Rather, they represent incremental accommodations to institutional pressures, each locally rational, whose cumulative effect is to erode safety margins.

The decision not to document MCAS in pilot operational manuals illustrates this dynamic clearly. The choice was framed internally as a determination that MCAS was a non-essential system from a training perspective. However, this classification carried significant commercial implications. Disclosure would have triggered simulator training requirements and eliminated one of the MAX's principal competitive advantages. The decision was therefore primarily a managerial one, shaped by competitive and financial incentives rather than by independent safety analysis.

5. Automation Governance and Human–Machine Interaction

MCAS was designed to address an aerodynamic characteristic of the 737 MAX arising from the repositioning and enlargement of the CFM LEAP-1B engines. At high angles of attack, the engine nacelles generated additional aerodynamic lift, increasing the nose's tendency to pitch upward. The system was intended to command the horizontal stabiliser to trim the nose downward automatically when the aircraft's angle of attack exceeded defined parameters (Gelles et al., 2019). From a governance perspective, the critical issue is not the technical design of MCAS per se. It is the managerial and organisational decisions that shaped how MCAS was developed, disclosed, and integrated into the broader socio-technical system in which it would operate.

MCAS highlights the risks that emerge when automation is governed primarily as a technical solution rather than as a socio-technical management system. Three specific governance dimensions are analytically relevant. First, MCAS relied on input from a single angle-of-attack sensor without redundancy. Aviation design standards generally require redundancy for flight-critical systems. This requirement was not applied to MCAS because the system had not been categorised as flight-critical in the aircraft's Failure Modes and Effects Analysis. This categorisation was itself a managerial and regulatory determination. A flight-critical classification would have triggered more rigorous certification requirements and potentially more extensive pilot training.

Second, the absence of pilot awareness of MCAS created a human–machine interaction gap of the kind that Casner and Hutchins (2019) identify as a central risk in automated systems. Pilots who had not been trained on MCAS were unable to recognise its activation, diagnose its behaviour, or implement the procedures that could have counteracted it. Bainbridge's (1983) observation that automation reduces human proficiency in precisely the areas where it intervenes was directly operative in both accidents.

Third, the governance of MCAS disclosure illustrates Dekker's (2014) point that system accidents reflect organisational and managerial choices as much as technical design decisions. The decision not to document MCAS in pilot operational materials was an organisational choice. It was made within an institutional environment that structured the costs and benefits of disclosure in ways that discouraged transparency. Managing automation as an organisational system would have required explicit processes ensuring that automated system parameters were communicated to all relevant stakeholders, including the pilots who depended on understanding those parameters for safe operation.

6. Contextual Note: Financial Consequences of Governance Failure

The financial consequences of the MAX crisis are treated here as contextual evidence of the cumulative magnitude of the governance failures examined above, rather than as a primary analytical focus. Table 1 presents Boeing's consolidated financial performance from 2018 to 2024, based on the company's annual reports (Boeing, 2020; Boeing, 2021; Boeing, 2023; Boeing, 2024a; Boeing, 2024b).

Table 1. Boeing consolidated financial performance, 2018–2024.

Year	Revenue (USD bn)	Net Profit/Loss (USD bn)	Net Margin (%)
2018	101.1	+10.460	+10.3%
2019	76.6	−0.636	−0.8%
2020	58.2	−11.873	−20.4%
2021	62.3	−4.202	−6.7%
2022	66.6	−5.053	−7.6%
2023	77.8	−2.242	−2.9%
2024	66.5	−11.829	−17.8%

Source: Boeing Annual Reports (2019–2025).

Boeing's revenues declined from USD 101.1 billion in 2018 to USD 76.6 billion in 2019. The commercial aircraft segment contracted by 43.9% following the grounding of the MAX fleet in March 2019. The compound effects of the MAX crisis and the COVID-19 pandemic produced a net loss of USD 11.873 billion in 2020 (Boeing, 2021). Across the period 2019–2024, Boeing recorded cumulative net losses of approximately USD 35.8 billion (Boeing, 2024b). Its shareholder equity turned negative from 2020 onward. These outcomes illustrate a central proposition of governance theory: the short-term competitive advantages obtained through regulatory arbitrage were substantially exceeded, over time, by the costs of the governance failures they enabled.

7. Discussion: Managerial and Governance Implications

7.1 Implications for Corporate Governance

The Boeing case suggests that corporate governance frameworks in safety-critical industries need to structurally separate safety authority from commercial authority. When safety assessments are produced within organisational units subject to commercial performance pressures, the institutional conditions for normalisation of deviance are systematically present (Vaughan, 1996). Effective governance requires internal escalation channels that give safety concerns a structural pathway to senior decision-makers. These channels must be insulated from commercial deadline pressures. Board-level safety oversight, distinct from financial performance monitoring, is also necessary.

The ODA programme's structural design highlights an additional corporate governance dimension. When a firm's employees are authorised to certify the firm's own products on behalf of a public regulator, the firm's governance structures bear direct responsibility for the integrity of that certification process. The absence of internal governance mechanisms able to protect ODA designees from commercial pressures represents a corporate governance failure, not merely a regulatory design problem.

7.2 Implications for Managerial Decision-Making

Deadline pressure and cross-functional organisational silos appear to have constrained the upward flow of safety-relevant information within Boeing. The engineers who understood MCAS's operational parameters were not consistently in communication with those responsible for pilot training documentation. Neither group was institutionally empowered to delay commercial delivery commitments on the basis of safety concerns that had not yet produced observable adverse outcomes. This pattern is consistent with Reason's (1997) analysis of latent failures.

The conditions for active failure were created not by a single managerial decision but by the cumulative effect of numerous locally rational choices made within an institutional environment that systematically underweighted long-term safety risks. Managers in analogous environments may benefit from structural mechanisms requiring explicit, documented safety trade-off analysis at key decision points. Accountability for those analyses should be independent of commercial performance metrics. The Boeing case suggests that normalisation of deviance is primarily an organisational design problem requiring institutional solutions.

7.3 Managing Automation as an Organisational Risk

The MAX case illustrates the risks that arise when automation is treated as a self-contained technical system rather than as an organisational and managerial system. Automation in safety-critical systems creates categories of organisational responsibility. These include ensuring that automated system parameters are communicated to all relevant stakeholders, designing human–machine interfaces comprehensible under conditions of stress, and establishing governance processes that treat software-based safety systems as requiring the same standard of independent review as structural or mechanical safety systems.

Where automation is used to compensate for design constraints, the governance of that automation requires particular rigour. When a software system is introduced to manage aerodynamic characteristics that would otherwise require structural redesign, the system inherits the safety criticality of the characteristic it addresses, regardless of how it is classified in internal documentation. Managerial processes for classifying automation systems by safety criticality should be subject to independent review and transparent to all relevant stakeholders.

8. Limitations

This study has several limitations. First, the analysis relies primarily on secondary sources, including official investigation reports, publicly available corporate documentation, and peer-reviewed scholarship. While these sources are authoritative, they do not permit direct observation of internal managerial deliberations. The reconstruction of decision-making processes necessarily involves inference from documented outcomes and institutional records.

Second, the study focuses on the U.S. regulatory context and the specific institutional design of the FAA–Boeing relationship. Generalisation of these findings to other regulatory regimes would require careful contextual analysis. Delegation structures and regulatory design vary significantly across jurisdictions.

Third, the article adopts a qualitative, analytically driven approach rather than a causal empirical design. The analysis aims to underline the governance mechanisms through which systemic safety failure was produced. It does not seek to establish quantified causal effect sizes. The theoretical propositions advanced here should be understood as analytically grounded arguments rather than as empirically demonstrated causal claims.

9. Contributions and Conclusions

This article conceptualises the Boeing 737 MAX crisis as a failure of managerial governance at the interface of private firms and public regulators. It extends regulatory capture theory and principal–agent analysis into the domain of organisational decision-making processes. Second, the article integrates institutional design analysis, incentive-based decision-making theory, and automation governance scholarship into a single analytical framework. This demonstrates how decisions across multiple organisational levels and functions interact to produce systemic safety failure. Third, the article advances the literature on managing automation. It argues that software-based safety systems must be governed as organisational and managerial artefacts, not solely as engineering solutions.

The Boeing 737 MAX crisis is one of the most consequential and thoroughly documented failures of public and private sector cooperation in the history of commercial aviation. This article has argued that the crisis was not primarily the result of isolated misconduct or individual engineering error. It resulted from structural deficiencies in the institutional relationship between Boeing and the FAA, deficiencies that were themselves the product of deliberate policy choices, competitive pressures, and decades of progressive regulatory delegation.

Addressing these structural deficiencies requires more than regulatory reform, though regulatory reform is necessary. It also requires managerial governance frameworks that separate safety authority from commercial authority, create institutional channels for the transparent upward communication of safety-relevant information, and treat automation governance as an organisational responsibility rather than a purely technical one. The Boeing 737 MAX case underlines that public safety in aviation can be guaranteed only through genuinely transparent, institutionally robust, and managerially disciplined cooperation between private manufacturers and government regulatory authorities.

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