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AN EVALUATION OF THE IMPACT OF THE CHANGING SECURITY PERCEPTIONS ON THE CORPORATE ORGANIZATIONAL STRUCTURES FROM A MACRO- INSTITUTIONAL THEORY PERSPECTIVE: THE CASE OF AN AIR DEFENSE INDUSTRY COMPANY¹

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ABSTRACT

This study aims to examine, within a holistic framework, the macro-institutional effects of changing security perceptions on air defense industry companies in Türkiye in the post-1980 period. It analyzes the decisive role of transformations in the global, regional, and local security climate on organizational structures, strategic orientations and institutional capacities of defense industry companies. The research adopts a qualitative, embedded single-case design with a multi-layered analytical framework. Descriptive analysis presents the historical transformation chronologically, while explanatory analysis examines causal relationships. A structured cross-period comparison of three temporal units (1980–2000, 2001–2010, and 2011–present) assesses the institutional responses of a single anonymized defense industry company. In addition, PESTLI analysis is employed to evaluate macro-level political, economic, social, technological, legal, and international factors. The findings indicate that shifts in security perceptions have accelerated the transition of defense industry companies from license-based production models to structures centered on R&D and indigenous design capabilities. The results demonstrate that security perception is a core macro-institutional variable triggering institutional transformation in the defense industry. By integrating macro-institutional theory with security studies, the study offers both theoretical and methodological contributions to the literature.

Keywords: Macroinstitutional Theory, Security Perception, Defense Industry

JEL Codes: L22, F53, H56

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1. INTRODUCTION

The transformation experienced by Türkiye's defense industry—particularly in the post-1980 period—provides a distinctive context for examining the macro-institutional effects of changing security perceptions. This transformation has not been limited solely to increases in technological capacity; rather, it has directly shaped organizational structures through the state's evolving threat definitions, defense policies, and industrial steering mechanisms (Yılmaz & Yorulmaz, 2003). Within this framework, the concept of the “security climate” is treated as an overarching analytical construct that determines state–defense industry interaction and reflects a shared understanding regarding threats, priorities, and the allocation of resources.

The security perception, however, is not a one-dimensional phenomenon. Instead, it is formed through simultaneous interactions at the global, regional, and domestic levels. The global security perception is shaped by the distribution of power in the international system, great-power competition (Huddy et al., 2007), technological rivalries, and the strategic orientations of alliances (Menon & Ruger, 2020) such as NATO. Regional security perception encompasses dynamics specific to Türkiye's surrounding security environment, including crises in the Middle East, increasing threats in the near periphery, and geopolitical vulnerabilities. Domestic security perception, by contrast, is grounded in the state's internal threat assessments, internal security priorities, counterterrorism strategies, and defense modernization objectives. The interaction among these three levels continuously reproduces the state's security climate and inevitably guides the organizational structures of defense industry firms. Accordingly, the research questions focus on disentangling the effects of these multilayered security dynamics on corporate structures.

In this context, the first research question is formulated as follows: “What types of state-supported transformations do changes in security perception generate in the organizational structures of firms operating in the Turkish air defense industry?” This question aims to identify the nature of macro-institutional influences that shape the organizational structures of defense industry firms. In particular, it highlights how flagship defense firms restructure themselves in alignment with state policies. Examining this question enables a detailed understanding of how changes in the security climate are transmitted to firms through legal regulations, incentives, strategic guidance, and procurement policies. At the same time, it demonstrates that internal organizational transformations are not random but rather develop in accordance with institutional pressures. In this respect, the first research question seeks to reveal a systematic relationship of dependence.

The second research question is posed as: “How has the structural development of the Turkish air defense industry responded to changes in the state's security priorities?” This question allows for an assessment not only of firm-level structures but also of the sector's

overall institutional evolution. Central to this question is how processes such as technological capability building, diversification of production infrastructure, and increasing domestic content ratios have adapted to fluctuations in the security climate. Thus, it becomes possible to reveal how the sector follows the state's changing threat perceptions and what kinds of institutional responses it generates. This facilitates an understanding of the "institutional field–organizational structure alignment" relationship, which constitutes a core claim of macro-institutional theory (DiMaggio & Powell, 1983; Hyatt & Berente, 2017). From this perspective, the second research question plays a critical explanatory role in understanding the strategic adaptations that emerge during sectoral transformation.

In light of these considerations, the following research proposition guides the analysis:

P1: Shifts in the multilayered security climate (global, regional, and domestic) are transmitted to defense industry firms through coercive, normative, and mimetic institutional mechanisms, producing observable transformations in their organizational structures.

Consistent with the study's qualitative, case-based design, this proposition is not tested statistically but examined through pattern matching between the institutional responses anticipated by macro-institutional theory and the organizational changes observed in the case. It thereby engages the core assumption of macro-institutional theory that organizational structures are shaped through state policies and regulatory and normative pressures.

1.1. Purpose of the Research

The primary objective of this research is to analyze, within a holistic framework, the macro-institutional effects generated by changing security perceptions on air defense industry firms in Türkiye. One of the main aims is to reveal how shifts in the security climate at the global, regional, and domestic levels reshape the organizational configurations of defense firms. Particular emphasis is placed on explaining the decisive role of state-supported transformations in shaping firms' strategic orientations and institutional capacities. Accordingly, the study examines the institutional adaptations developed by defense industry firms in response to external pressures, political steering, and sectoral norms. In doing so, it seeks to systematically uncover the causal mechanisms underlying structural transformations in the air defense domain. Another key objective of the study is to test the applicability of the assumptions of macro-institutional theory within the Turkish context.

A further objective is to explain the differentiation of institutional structures of defense industry firms across historical periods by linking them to changes in the security climate. In this respect, the study examines the periods 1980–2000, 2001–2010, and 2011–2026 separately, analyzing the distinct security context of each period. The year 1980 is

considered a critical turning point marked by the military coup, which redefined the state's security understanding and reinforced a centralized, statist structure in the defense domain. The year 2001 is treated as the beginning of a new period due to the post-September 11 reshaping of the global security paradigm around terrorism, asymmetric threats and preventive defense. The Arab Spring, which began in 2011, represents another structural rupture by directly influencing defense industry policies and institutional priorities through instability and regional security risks in Türkiye's immediate neighborhood. For each period, political priorities, procurement strategies, state investment tendencies, and international security dynamics exerting pressure on defense firms are examined in detail. This periodization facilitates the identification of continuity and rupture points in macro-institutional change, enabling comparative analysis and clearer identification of institutional transformation processes. The overarching aim is to provide a theoretical framework that explains historical structural differentiation through changes in security perception.

Another important objective of this research is to address the lack of macro-institutional theory perspectives in the Turkish defense industry literature. Existing studies largely focus on technology development processes, foreign-policy-oriented defense modernization, or sectoral incentive mechanisms. By theoretically and empirically examining the relationship between institutional structures and the security climate, this study seeks to fill a significant gap in the literature. Accordingly, the research adopts a holistic approach to analyzing how changes in security perception affect both organizational structures and the sector's overall configuration. In this respect, making an original contribution to the literature constitutes another key objective of the study.

Understanding the institutional effects of Türkiye's defense policies is of critical importance for more effective strategic planning in the future. Therefore, another objective is to provide policymakers, sector managers, and scholars with a comprehensive analytical framework for better understanding the relationship between the security climate and institutional transformation.

1.2. Significance of the Research

The significance of this research lies in its status as one of the first comprehensive studies to explain, at the macro-institutional level, the effects of multilayered changes in security perception on the organizational structures of defense industry firms in Türkiye. Given the inherently strategic nature of the defense industry, understanding the institutional pressures underlying corporate transformations is of considerable importance.

By addressing changes in the security climate not only in geopolitical terms but also through the lens of institutional theory, this research makes an original contribution to the literature. Examining how defense industry firms are structured under state guidance, regulations, and strategic imperatives is critical for understanding sectoral transformation processes. Accordingly, the study adds substantial academic value to the

intersection between macro-institutional theory and security studies. Moreover, when evaluated from the perspective of Whitley's National Business Systems approach, the study holds particular value in conveying Türkiye-specific experiences to the international literature.

Another significant contribution of this study is that it constitutes the first comprehensive academic work to integrate macro-institutional theory and international relations theory within a single analytical framework. While existing literature typically addresses security perceptions within foreign policy or strategic studies, their effects on organizational and institutional transformation have been examined only in a limited manner. By explaining the institutional pressures exerted on defense industry firms by local, regional, and global security perceptions through the conceptual tools of macro-institutional theory, this research fills an important interdisciplinary gap. Security perception is thus positioned not only as a determinant of foreign policy production but also as an institutional variable that transforms organizational structures. This synthesis between international relations literature and organizational theory adds theoretical depth to defense industry studies and represents a pioneering academic contribution.

Another important contribution of the research is its theoretical demonstration—through Proposition P1—that systematic and meaningful relationships exist between changes in security perception and the structural transformations of defense industry firms. The proposition assumes that domestic security priorities at the local level, environmental threat perceptions at the regional level, and power competition within the international system at the global level simultaneously influence firm structures. Consequently, organizational transformations in defense industry firms are treated not as outcomes of isolated policy decisions but as products of a multilayered security climate. This approach differentiates the study from works that explain institutional change solely through technical or managerial rationales and analytically reveals how state-supported transformations develop in coordination with changes in security perception.

Another notable aspect of the research is its integrated treatment of global, regional, and domestic changes in security perception within a single analytical framework. The literature generally focuses on single-level analyses and tends to overlook the multilayered nature of security dynamics. However, Türkiye's geopolitical position leads to simultaneous changes in security perception across different scales. By treating these multilevel dynamics as explanatory variables of institutional change, the study makes an original contribution both methodologically and theoretically. This approach enables a more holistic evaluation of the defense sector by clarifying the relationship between external pressures and internal threat perceptions.

Additionally, the research is significant in demonstrating that the organizational transformations of defense industry firms are shaped not only by strategic and technological factors but also by institutional factors. By applying this theoretical

approach to the Turkish defense industry context, the study contributes both empirical findings and a conceptual perspective to the literature. This allows for a more comprehensive understanding of the causes and consequences of structural transformations in defense firms.

Furthermore, by illustrating the firm-level consequences of changes in state security priorities, the study provides a valuable reference for policymakers. Understanding the mechanisms through which institutional transformations occur contributes to the development of more effective policy instruments. Therefore, the research findings are of high practical as well as academic significance.

Finally, the study is important for introducing methodological diversity into defense industry research. Since most studies are technically and engineering-oriented, social-science-based analyses remain limited. By combining descriptive and explanatory analysis with a structured cross-period comparison and PESTLI analysis, this research examines the Turkish air defense industry from a social science perspective. In doing so, it demonstrates the applicability of organizational theory in the defense domain and highlights the importance of interdisciplinary approaches. This methodological contribution offers valuable insights for researchers seeking to bridge security studies and institutional theory, underscoring the study's high theoretical, methodological, and practical relevance.

1.3. Assumptions

This research is based on the assumption that changes in the security climate generate period-specific macro-institutional effects. It is assumed that institutional changes in the defense industry do not occur with equal intensity across all periods but manifest more strongly in some periods and more limitedly in others. Accordingly, the periodized structure of the research is grounded in this assumption. Given that each period is assumed to have its own distinct security dynamics and institutional pressures, period-based analyses are expected to enhance explanatory power. This assumption facilitates the identification of historical rupture points and allows the findings to gain meaning within their respective temporal contexts.

Another assumption is that the data analyzed through case study methods are sufficient to render visible the relationship between the security climate and institutional change. Although access to certain data in the defense industry is restricted, it is assumed that open sources, official reports, academic studies, strategic documents, and sectoral analyses provide adequate information for the research. The diversity of data sources and reliance on multiple independent sources constitute key foundations of this assumption.

1.4. Limitations of the Research

The primary limitation of this research is that a significant portion of information in the defense industry is not publicly available due to confidentiality and strategic sensitivity. The internal structures, management processes, and strategic decision-making mechanisms of defense firms are largely subject to restricted access. Consequently, the data used in this study rely predominantly on open sources, existing literature, reports, and strategic planning documents. While this limits the level of detail of certain findings, open-source data nonetheless provide a sufficient analytical framework.

Another limitation is that the study is confined exclusively to the air defense industry. Although the defense industry constitutes a broad ecosystem, this research examines macro-institutional effects only within the air defense domain. Institutional transformations in land, naval, or space defense sectors therefore fall outside the scope of the study. While this limitation enables a more focused analysis, it may constrain the generalizability of the findings across the entire defense industry. Accordingly, the results should be evaluated with due consideration to this sectoral limitation. The relatively intensive managerial and technical steering characteristic of the air defense industry further accentuates this limitation.

A third limitation concerns the conceptual tools used to measure changes in security perception. Since the security climate is a multilayered and abstract concept, precise quantitative measurement of changes is not feasible. Consequently, the analysis relies primarily on conceptual frameworks, historical assessments, and interpretations of strategic documents. Restricting global, regional, and domestic security perceptions to concrete indicators may, in some cases, complicate interpretation. This limitation stems from the inherently variable nature of security perception. Nevertheless, conceptual analysis provides a sufficiently robust approach for evaluating macro-institutional effects in the defense industry.

2. METHODOLOGY

This study adopts a qualitative, embedded single-case design (Yin, 2018) to examine how transformations in security perception have shaped the institutional structure of a firm operating in the Turkish air defense industry. A single anonymized company constitutes the case, and three historically delimited periods—1980–2000, 2001–2010, and 2011–present—serve as embedded temporal units of analysis. Within this design, four complementary analytical strategies are employed: descriptive analysis, which establishes the chronological structure of the transformation; explanatory analysis, which identifies the causal mechanisms linking the security climate to organizational change; a structured cross-period comparison, which renders institutional differentiation between the embedded units visible; and a PESTLI-based macro-level assessment, which situates

the case within its political, economic, social, technological, legal, and international context.

This methodological architecture is grounded in the core assumption of macro-institutional theory that organizational behavior is shaped by macro-level political, economic, and technological structures (Scott, 2013). In a state-oriented and strategically sensitive sector such as the defense industry, producing a meaningful and holistic explanation through a single method is not feasible; therefore, a multi-strategy approach was deliberately adopted. This design provides a systematic structure that enhances theoretical explanatory power within qualitative research (Hammersley & Atkinson, 2019). Moreover, the period-specific nature of variables such as security perception necessitated a multidimensional methodological framework.

The methodological choices were informed by the fundamental premises of macro-institutional theory, which conceptualizes organizational behavior within the context of environmental institutional pressures (Meyer & Rowan, 1977). According to this perspective, organizations are shaped not only by internal strategic rationality but also by higher-level structures such as state policies, threat definitions, technological paradigms, and international norms. Consequently, a study focusing on changes in security perception requires a methodological framework capable of rendering these macro-level structures visible. The structural dependence of defense industry firms on the state further reinforces this requirement (Özlü, 2022). Methodological flexibility allows for a multidimensional analysis of critical rupture points, including the 1999 Defense Industry Reforms, post-2010 localization policies, and doctrinal shifts following 2016. For this reason, the research adopts a hybrid structure that is simultaneously historical, comparative, and explanatory in nature.

Consistent with qualitative case-study logic, the study does not test a statistical hypothesis but is guided by a research proposition assessed through pattern matching (Yin, 2018): for each period, the institutional responses predicted by macro-institutional theory under the prevailing security climate are compared with the organizational changes documented in the empirical record. The proposition is stated as follows:

P1: Shifts in the multilayered security climate (global, regional, and domestic) are transmitted to defense industry firms through coercive, normative, and mimetic institutional mechanisms, producing observable transformations in their organizational structures.

Within the study, the transformation process—from the definition of the “Security Climate,” through the “Impact Mechanism,” to the resulting “Institutional Output”—is illustrated through a transformation matrix presented in Table 1.

Table 1. Security Climate → Mechanism → Institutional Transformation Table

SECURITY CLIMATE (Macro Level)	INFLUENCING MECHANISM (Macro-Institutional / State-Centered)	INSTITUTIONAL OUTPUT (Firm / Sector Level)
Cold War and NATO-Centered Collective Security (1980s–1990s)	• NATO norms and alliance pressure	• Organizations focused on licensed production and maintenance
	• Incentives for licensed production	• Limited indigenous R&D capacity
	• Dependence on access to Western technology	• Hierarchical and state-guided institutional structures
Regional Conflicts and Embargo Risk (1990s – Gulf War)	• Threat of supply disruption	• Domestic production discourse entering the institutional agenda
	• Questioning external dependency in security	• Stronger state steering in state-firm relations
Defense Localization Policy (2000–2010)	• SSM / SSİK decisions	• Establishment of R&D centers
	• State incentives and R&D funding	• University–industry collaborations
	• Public procurement guarantees	• Organizational structures based on functional specialization
Asymmetric Threats and Counterterrorism (Late 2000s)	• Operational feedback from the field	• Integration of design–production–maintenance functions
	• Need for rapid procurement and flexible production	• Project-based organizational structures
Regional Power Aspiration and Operational Autonomy (2011–2020)	• Cross-border military operations	• Field-proximate R&D and maintenance units
	• Time pressure in defense production	• Institutional learning and operations-driven innovation
	• Public–private coordination mechanisms	
Strategic Autonomy and Technological Independence (Post-2016)	• F-35 crisis and export restrictions	• Indigenous engine, radar, and critical subsystem projects
	• State pressure for technology localization	• Firms’ transformation into “strategic technology developers”
Global Power Competition and Supply Security (Post-2020)	• U.S.–China rivalry	• Institutionalization of national supply networks
	• Disruptions in global supply chains	• Strategic stockpiling and alternative supply policies
Digitalization and Cybersecurity Threats	• Digital twin, AI, and PLM systems	• Establishment of cybersecurity units
	• Rising cyber-attack risks	• Public–private cyber threat intelligence sharing
Export-Oriented Defense Policy	• International certification and regulatory pressure	• Institutionalization of quality, documentation, and compliance processes
	• Security-based export controls	• Multi-layered governance structures
Persistent Security Uncertainty (Neorealist System Structure)	• Survival logic under uncertainty	• Flexible, modular, and adaptive organizational structures
	• State’s steering and regulatory role	• Resilience-oriented institutional strategies

Source: Produced by the authors.

2.1. Research Design: Embedded Single-Case Study

The study follows an embedded single-case design in which one organization is analyzed longitudinally across three temporal sub-units. The single-case design is justified on revelatory and critical-case grounds: the selected company is the first and principal national actor in aviation engine technologies, a domain in which the state's security steering is most direct and in which the consequences of external dependency have been most visible. The three embedded units correspond to externally documented rupture points in Türkiye's security paradigm: the post-1980 restructuring of the state's security understanding; the post-2001 global reconfiguration of the security agenda around terrorism and asymmetric threats; and the post-2011 regional transformation initiated by the Arab Spring and deepened by the post-2016 strategic-autonomy turn. Analyzing the same organization across these units enables a quasi-comparative logic while holding firm-level idiosyncrasies constant.

2.2. Case Selection and Anonymization

The case was selected purposively according to three criteria: continuous operation across all three periods, allowing longitudinal observation; location in a technology domain (gas turbine engines) explicitly designated as critical in successive national strategy documents, ensuring direct exposure to state steering; and sufficient availability of open-source documentation, including corporate annual reports, official program records, and academic accounts. Other defense industry organizations (e.g., ASELSAN, Roketsan, TUSAŞ) are referred to in the analysis solely as contextual sectoral background and do not constitute cases.

The company is anonymized and referred to as "the Company" throughout. Anonymization reflects the strategic sensitivity of the sector and the fact that the analysis represents the authors' independent academic interpretation rather than an authorized corporate account. All information used in the study derives exclusively from publicly available sources; no confidential, proprietary, or internally provided material was used. The authors acknowledge that complete anonymity cannot be guaranteed given the specificity of the sector, and the anonymization should therefore be understood as a marker of analytical distance rather than concealment.

2.3. Descriptive Analysis

Descriptive analysis was employed to render visible the historical structural transformation of the defense industry sector. Through this strategy, a chronological mapping of changes in both state policies and corporate structures since the 1980s is constructed. In particular, the Defense Industry Reforms following the Council of Ministers' decisions in 1998, the proliferation of R&D centers after 2010, and the reconfiguration of the security paradigm after 2016 are treated as critical periodization points. Descriptive analysis supports the explanatory dimension of the research by

systematically organizing structural changes observed during these periods through qualitative indicators.

For instance, the gradual decline in dependence on foreign supply chains after the 2000s and the transformation of corporate identity integrated with the discourse of the “National Technology Initiative” are examined within this descriptive framework. The strategy enables the systematic classification of historical data and provides a structured foundation for subsequent analysis.

The primary data set used in the descriptive analysis consists of defense industry strategy documents, development plans, reports issued by the Presidency of Defence Industries (SSB), Grand National Assembly of Türkiye (TBMM) proceedings, and corporate annual reports. The acceleration of R&D centralization throughout the 2010s and the integration of technology roadmaps into corporate strategies constitute key findings of this period. The descriptive analysis also examines ideological transformations in corporate discourse; for example, the increasing incorporation of concepts such as “national technology,” “defense autonomy,” and “development of critical subsystems” into corporate identity after 2010. In this way, descriptive analysis provides a historical grounding for the causal mechanisms explored in the explanatory analysis.

In summary, the descriptive analysis was conducted through the following steps:

- Detailed description of the historical development of the Turkish air defense industry examined within the scope of the research and the organizational effects observed across historical processes,
- Objective and chronological identification of the security climate, political environment, and institutional structure applicable to each period,
- Analysis of state-led institutional regulations and strategic documents concerning the defense industry,
- Avoidance of causal explanations in the descriptive phase, focusing instead on presenting a systematic overview of existing conditions,
- Organization of descriptive findings in a manner that provides a foundation for the explanatory analysis and cross-period comparison conducted in the study.

2.4. Explanatory Analysis

Explanatory analysis constitutes the principal strategy for uncovering cause–effect relationships within the research and was selected to understand the mechanisms through which structural transformations in the defense industry occur. This strategy enables a clearer explanation of how state policies influence the institutional configurations of defense firms. Within this framework, post–Cold War threat diversification, technological modernization after the 2000s, and the deterrence-centered security paradigm emerging after 2016 are systematically analyzed.

The explanatory analysis links firm behaviors—such as the expansion of R&D structures, scaling up of production capacity, and acceleration of localization policies in subsystems—to security-driven transformations. This approach strengthens the analytical foundation of Proposition P1 and grounds the impact of changes in security perception on institutional transformation within a causal framework. Through this strategy, institutional response mechanisms become analytically visible.

During the application of the explanatory analysis, findings were examined across three levels of security perception: Global Effects, Regional Effects, and Domestic Effects. Each level generated distinct institutional transformation mechanisms within firms. For example, increased regional threat perceptions triggered accelerated R&D investments in missile, radar, and electronic warfare systems in organizations such as Roketsan and ASELSAN (Savunma Sanayii Müsteşarlığı, 2009; ASELSAN, 2010). Global competitive pressure, by contrast, reinforced orientation toward engine and aircraft technologies that enhance platform independence in firms such as TEI and TUSAŞ (Savunma Sanayii Müsteşarlığı, 2017; Akşit, 2022). These data were systematically classified based on strategy documents, SSB reports, and corporate activity records. Consequently, the explanatory analysis provides a detailed account of the causal effects of security variables on organizational behavior.

In summary, the explanatory analysis was conducted through the following steps:

- Identification of the causal relationship between changes in security perception and institutional transformations in defense industry firms, in line with the core objective of the research,
- Development of an analytical framework focused on “why” and “how” questions, consistent with the explanatory nature of the study,
- Determination of the periods to be examined based on rupture points in the security climate,
- Analysis of state security priorities, defense policies, and institutional steering mechanisms for each period,
- Explanation of the macro-institutional mechanisms through which changes in the security climate are reflected in firms’ organizational structures,
- Evaluation of institutional outputs within a cause–effect framework,
- Theoretical interpretation of findings within the frameworks of Macro-Institutional Theory and Neorealist Security Theory.

2.5. Cross-Period Comparison

Because the design embeds three temporal units within a single case, a structured cross-period comparison substitutes for the cross-case comparison of a multiple-case design. The same analytical framework—security climate, influencing mechanism, institutional output—is applied to each period, enabling the identification of shared trends, period-

specific institutional responses, and points of continuity and rupture. The comparison revealed that some organizational developments emerged as rapid responses to coercive state pressures, while others took the form of mimetic institutional behaviors during periods of uncertainty.

The cross-period comparison also demonstrates in detail how coercive, normative, and mimetic institutional pressures operate within the sector. The Company exhibited the highest sensitivity to coercive pressures, including directives from the Ministry of National Defense, budgetary steering, and doctrinal changes. Normative pressures operated through engineering standards, quality management systems, and international certification requirements. Mimetic pressures became most visible during periods of strategic uncertainty, when the Company emulated the structures and practices of internationally competitive engine and platform developers such as TEI and TUSAŞ. The varying degrees of influence exerted by these three types of pressures across the three periods explain the diversity observed in institutional transformation processes. Thus, the cross-period comparison directly addresses the research questions.

In summary, the cross-period comparison was conducted through the following steps:

- Examination of simultaneous, multi-scale effects occurring across the three periods in the Turkish air defense industry,
- Ensuring comparability by applying the same analytical framework and variables to each period,
- Analysis of how changes in the security climate are reflected in the Company's institutional structure in each period,
- Comparative assessment of shared trends, similar institutional responses, and differentiated structural transformations,
- Demonstration of how macro-institutional pressures become institutionalized at the sectoral level,
- Evaluation of results in terms of inter-period continuity and rupture.

2.6. Data Sources and Analysis Procedure

The documentary corpus consists exclusively of open-source materials published between 1980 and the present. Documents were included if they were issued by an official body, the Company, or a peer-reviewed academic outlet, and if they substantively addressed defense industrialization, engine technologies, or national security strategy. Table 2 summarizes the corpus.

Table 2. Documentary Corpus of the Study

SOURCE CATEGORY	EXAMPLES	NUMBER OF DOCUMENTS	PERIOD COVERED
Official strategy documents⁴	SSM Sectoral Strategy Document 2007–2011	6	2007–present
	SSM Strategic Plan 2009–2011		
	SSM Strategic Plan 2012–2016		
	SSM Strategic Plan 2017–2021		
	SSB Strategic Plan 2019–2023		
	SSB Strategic Plan 2024–2028		
Executive decisions	SSİK decisions (incl. 2004 decisions on engine technologies)	1	2004–present
Parliamentary and planning records	TBMM proceedings; National development plans	N number of referrals; 2	1980–present
Academic and sectoral sources	Peer-reviewed studies; TÜBA volumes; sectoral analyses	6	1980–present

Source: Produced by the authors.

Data were analyzed through qualitative document analysis with directed (theory-driven) coding (Bowen, 2009; Hsieh & Shannon, 2005). The coding framework was derived deductively from macro-institutional theory and is operationalized in the Security Climate → Mechanism → Institutional Output matrix (Table 1): textual segments were coded for the level of security perception they express (global, regional, or domestic), the institutional mechanism they document (coercive, normative, or mimetic), and the organizational outcome they record (structural, strategic, or discursive change). Coding was performed independently by the authors, and divergences were resolved through discussion until consensus was reached.

Trustworthiness was pursued through four measures. First, data-source triangulation: every substantive empirical claim is supported by at least two independent document categories. Second, an audit trail: coded excerpts, their sources, and coding decisions were recorded in a structured matrix available from the authors upon reasonable request. Third, peer debriefing among the authors at each analytical stage. Fourth, external validation of the periodization: the boundaries of the three embedded units correspond to rupture points independently documented in the security studies literature rather than being induced from the case material itself.

2.7. PESTLI-Based Macro-Level Assessment

Another component employed in this research is the PESTLI Analysis. The PESTLI framework examines six core factors shaping transformation in the defense industry: Political, Economic, Social, Technological, Legal, and International. The framework is labeled PESTLI because the conventional PESTL dimensions are extended with an explicit International (I) dimension; in the defense industry, international factors—alliance

⁴ To avoid repetition within the table, only the titles of the official documents are presented here; their complete information is provided in the References section.

obligations, NATO standardization, export-control regimes, and embargo experiences—constitute a distinct and decisive layer of institutional pressure that cannot be subsumed under the political or legal dimensions. The political factors represent the state’s security strategies, defense investments, and institutional steering capacity. The economic factors encompass defense budgets and vulnerabilities in global supply chains. The social factors address societal security perceptions and the influence of national technology discourse on corporate identity. The technological factors explain innovation capacity in defense R&D and technology-intensive production paradigms. This comprehensive scope facilitates a more nuanced understanding of how defense industry firms develop behavior under multidimensional institutional pressures.

The PESTLI framework particularly enhances the visibility of legal (SSB regulations, export controls) and international (NATO standardization pressures) factors shaping the defense industry. This expanded framework played a critical role in examining the proposition, demonstrating that transformations in security perception generate structural effects not only in political but also in legal and international domains. Accordingly, changes in firms’ institutional structures are linked to multidimensional superstructural pressures. This method significantly strengthens the macro-level dimension of the research.

In summary, the PESTLI-Based Macro-Level Approach was applied through the following steps:

- Identification of Political (P), Economic (E), Social (S), Technological (T), Legal (L), and International (I) factors affecting the defense industry for each examined period,
- Analysis of state security priorities, defense policies, and institutional steering instruments within the political dimension,
- Evaluation of economic factors in terms of defense budgets, public incentives, and financing mechanisms,
- Examination of domestic production, R&D capacity, digital transformation, and critical technologies within the technological dimension,
- Analysis of legal and international factors in relation to export controls, embargoes, NATO obligations, and other international commitments,
- Assessment of social factors from the perspectives of skilled labor and corporate culture.

In addition, the table presenting period-specific factors used in the PESTLI analysis is provided below as Table 3.

Table 3. PESTLI Analysis Factors

DIMENSION	1980-2000	2001-2010	2011-2026
P – Political	• NATO-centered security approach	• Defense localization becoming official state policy	• Strategic autonomy doctrine
	• Cold War and post-Cold War alliance priorities	• Institutional empowerment of the Undersecretariat for Defence Industries (SSM)	• National Technology Initiative
	• State's controlling and regulatory role	• Security-industry integration	• Defense industry becoming a core component of security policy
E – Economic	• Limited defense budgets	• Increasing defense expenditures	• Supply chain disruptions
	• Cost structures based on licensed production	• R&D incentives and public funding	• Costs of domestic production and strategic stockpiling
	• Externally dependent procurement	• Project-based financing	• Long-term public procurement guarantees
S – Social	• Limited engineering and R&D human capital	• Growing attractiveness of engineering professions	• Pressure to retain highly qualified human capital
T – Technological	• Maintenance, repair, and assembly-oriented structure	• Development of design and engineering capabilities	• Indigenous development of critical technologies (engines, radar, artificial intelligence)
	• High dependence on foreign technology	• Establishment of R&D centers	• Digital twins, artificial intelligence, and cyber-physical systems
	• NATO standards and licensing agreements	• Institutionalization of defense industry legislation	• Export controls
L – Legal	• Limited scope of national defense legislation	• Public procurement and incentive regulations	• Expanding regulatory compliance requirements
I – International	• Cold War power balances	• Defense cooperation with the U.S. and the EU	• Global power competition

DIMENSION	1980-2000	2001-2010	2011-2026
	• Alliance dependence and Western-centered security	• Rising regional security risks	• Intra-NATO tensions

Source: Produced by the authors.

2.8. Methodological Integration

The four analytical strategies contribute complementary elements to the assessment of Proposition P1: descriptive analysis establishes what changed and when; explanatory analysis establishes why and how it changed; the cross-period comparison establishes how institutional responses differed across security climates; and the PESTLI assessment establishes the macro-environmental pressures within which these responses unfolded. In this way, the research questions are addressed from multiple analytical dimensions.

This methodological integration provides a level of analytical depth that cannot be achieved through a single method in a complex and highly multi-actor field such as the defense industry. At the same time, it establishes the multidimensional evidentiary structure necessary for examining the research proposition. This integrated design significantly enhances the methodological robustness of the study.

Within this framework, the applicability of macro-institutional theory to the defense industry is assessed, and the effects of changes in security perception on organizational structures are analyzed in a comprehensive manner.

3. FINDINGS

The development of the Turkish air defense industry constitutes one of the most visible domains in which the state's changing security priorities are reflected. New threat perceptions that emerged in the post-Cold War era led the state to redefine its defense industry policies, a process that directly affected the organizational structures of institutions. Since engine technologies represent a core component of both independent defense capability and strategic deterrence in the field of air defense, localization policies in engine production have occupied a central position in Türkiye's long-term strategic vision (Akşit, 2022).

Within this context, the institutional trajectory of a defense industry company established in response to the state's security priorities (hereafter referred to as the Company) closely parallels transformations in Türkiye's security paradigm. Following the 1974 arms embargo, the state experienced first-hand how external dependency could turn into a security vulnerability and consequently adopted a strategy centered on domestic production to address this weakness. The Company represents the first concrete step of this strategy in the field of engine technologies. Its establishment through a partnership

with a foreign firm aimed to facilitate technology transfer and instill production discipline within Türkiye.

In this study, changes in the Company's organizational structure are explained not only by economic or environmental factors but also by the security priorities defined by the state. The historical trajectory of the Company's institutional development is examined across three main periods, each characterized by a distinct redefinition of state security priorities and corresponding corporate strategies:

1980–2000: Establishment, Dependent Partnership, and Organizational Development Period

2001–2010: Security, State Policy, and Institutional Restructuring Period

2011–2026: Macro-Institutional Transformation and Indigenous Engine Development Period

3.1. 1980–2000: Establishment, Dependent Partnership, and Organizational Development Period

The establishment of the Company represents an institutional reflection of a structural rupture in Türkiye's security paradigm. The arms embargo imposed after the 1974 Cyprus Peace Operation revealed that external dependency constituted a fundamental security vulnerability, prompting the state to adopt a new strategic orientation prioritizing domestic production and technology acquisition. Founded in the 1980s, the Company emerged as the first major initiative in engine technologies within this strategic framework. Its establishment model was built upon objectives such as achieving technology transfer through a foreign partner, instilling production discipline in Türkiye, and creating maintenance, assembly, and testing infrastructure aligned with NATO standards.

During the Cold War, Türkiye's security perception was largely based on deterring external threats and maintaining collective defense within the NATO alliance (Ergüvenç, 2001). Accordingly, the defense industry—particularly in complex domains such as engine technologies—operated within a structure integrated into Western systems. The Company's early years were shaped by this paradigm. At the time, the state adopted licensed production as a strategic instrument to sustain its position as a reliable NATO ally and ensure uninterrupted access to Western technologies. Consequently, the Company's manufacturing capabilities remained limited to externally sourced technology transfer. However, this situation should not be interpreted negatively. From an institutional perspective, this period reflects the dominance of a "dependent learning model." While producing under license, the Company internalized engineering knowledge through training provided at the foreign partner's facilities, incorporated quality control processes, and embedded manufacturing discipline into its institutional identity. Although

original design activities were absent during this period, the training received laid the foundation for the engineering backbone that would later support R&D activities. Thus, the period between 1980 and 2000 constituted a “learning phase” in which the foundations of technical development were established.

From a theoretical standpoint, the Company’s structure during this period was shaped by a search for legitimacy in response to external pressures. The concept of “institutional isomorphism,” as articulated by DiMaggio and Powell (1983), was clearly observable in the Company’s organizational architecture. Quality standards, production processes, and engineering protocols defined by the foreign partner were directly integrated into the Company’s managerial structure. While this facilitated international compatibility in the short term, it constrained domestic design and innovation capacity in the long term.

In the 1990s, the end of the Cold War significantly altered Türkiye’s security perception. Threat perceptions shifted from external to internal dimensions, emphasizing regional instability, cross-border terrorism, and supply risks. The Gulf War and restrictions imposed on certain weapons systems clearly demonstrated that external dependency posed a long-term security risk. These developments triggered a state-supported transformation in defense industry policies aimed at increasing domestic production capacity. As part of this transformation, from the mid-1990s onward, the Company began transitioning from a structure focused solely on licensed production to one that also engaged in maintenance, assembly, and testing activities.

The period from the Company’s establishment until 2000 represents both a learning phase and a critical period during which the strategic consequences of external dependency became evident. While the Company achieved significant institutional gains by leveraging the advantages of a technology-dependent production model, it simultaneously experienced the structural limitations of this model. By the end of the period, the Company internally recognized the necessity of transcending its role as merely a manufacturing, maintenance, assembly, and testing center and began laying the institutional foundations required for a vision centered on indigenous design and original engine development. This awareness marked the starting point for the subsequent phase of institutional transformation and domestic engine development initiatives.

3.2. 2001–2010: Security, State Policy, and Institutional Restructuring Period

The 2000s marked a period of substantial change in Türkiye’s security policies in terms of both content and priorities. The transformation of post–Cold War security perceptions, increasing regional instability, and the elevation of counterterrorism to a strategic priority redefined security as a multidimensional concept encompassing not only military threats but also technology, economy, and energy. The post–September 11 global security paradigm further accelerated this transformation, reshaping Türkiye’s defense industry strategies around the objectives of localization, strategic autonomy, and self-sufficiency.

During this period, localization in the defense industry became an explicit state policy. Decisions were taken to increase domestic contribution in defense projects, promote R&D investments, and reduce external dependency in critical technologies. Decisions of the Defense Industry Executive Committee (SSİK), particularly those involving the cancellation of existing platform tenders, indirectly positioned engine production as a critical domain for Türkiye's strategic independence. The 2004 SSİK decisions, in particular, defined the development of indigenous design capability in engine technologies as an indispensable component of national security. Consequently, the role of the state evolved from that of a mere financier to an active institutional actor engaged in strategic steering and policy formulation.

The Company's transformation after 2000 represented not merely a process of technical modernization but also a profound organizational restructuring. One of the key catalysts of this transformation was the 2009 "one minute" crisis. Following this crisis, Türkiye's inability to operate UAVs required for counterterrorism due to Israel's refusal to provide engine maintenance and refurbishment services had a direct impact on the Company's institutional vision. This episode demonstrated the unsustainability of a defense procurement model dependent on political conditions and rendered visible the risks associated with reliance on foreign sources for engine technologies. Consequently, the state's security bureaucracy elevated engine technologies to a more strategic axis, and the objective of "indigenous engine development" emerged not merely as a technical capacity-building goal but as a security strategy supporting foreign policy autonomy. In the aftermath of the crisis, the Company systematically transitioned from a structure primarily engaged in licensed production, assembly, and maintenance to an engineering-oriented organization. Design, analysis, and advanced manufacturing units were established, leading to an expansion of the value chain from production to design.

Furthermore, during this period, knowledge transfer conducted within the framework of foreign partnerships acquired a strategic character. The company engineers, who previously played limited roles in foreign projects, became active participants in design and development phases of international programs. This contributed to the strengthening of professional technical identity, specialization of decision-making processes, and the emergence of a degree of institutional autonomy within the Company.

These developments are closely aligned with neorealist security theory. From a neorealist perspective, states seek to enhance their own capabilities in response to uncertainty and threats within the international system. In the 2000s, regional threats confronting Türkiye transformed the need for "intra-alliance autonomy" into a national security imperative. Consequently, localization in engine technologies emerged not as a purely economic objective but as a direct security necessity. The politically contingent nature of external procurement revealed the potential for operational constraints stemming from engine dependency in critical defense platforms, rendering the Company's transformation a rational response to systemic uncertainty.

From a macro-institutional perspective, the Company enhanced its organizational learning capacity during the 2000s and redesigned its engineering capabilities in line with the strategic vision articulated by the state. Internal processes were reorganized in accordance with the state's steering role, while continued integration into global supply chains strengthened the Company's "hybrid institutional identity." On one hand, compliance with global norms, quality standards, and competitive production processes persisted; on the other, a national-security-oriented mission of domestic production endowed the Company with a dual institutional structure.

By 2010, the Company had transformed into an engineering organization possessing R&D and design capabilities alongside existing competencies. A strong alignment was achieved between the state's security vision and the Company's institutional strategies, laying the organizational groundwork for original engine projects and advanced technological initiatives in the post-2010 period.

3.3. 2011–2026: Macro-Institutional Transformation and Indigenous Engine Development Period

The post-2010 period represents a phase of pronounced transformation in Türkiye's security policies, with direct implications for the defense industry. During these years, the Company evolved from a firm engaged solely in engine production into an institutional entity representing the state's defense vision. State-supported projects coordinated by the Presidency of Defence Industries (SSB) strengthened the Company's R&D-centered structure, while its organizational model was reconfigured around vertical integration, project-based governance, and internal control mechanisms. State-supported R&D programs accelerated, expanding the Company's institutional capacity in both technical and managerial dimensions.

At the outset of this period, Türkiye's security paradigm underwent a radical regional transformation. The Arab Spring, the Syrian civil war, and escalating regional terrorist threats reshaped Türkiye's security perception, shifting from an inward-focused security approach toward a "regional stabilizing power" mission. This new security understanding fostered state policies that conceptualized the defense industry not merely as an instrument of military modernization but as a source of power generated through technological production. Within this context, the Company's role evolved from engine manufacturer to the developer of national propulsion systems. The projects such as the aviation engine developed for various UAV platforms, representing Türkiye's first indigenous aviation engine initiative, acquired symbolic significance in both engineering and security-paradigm terms. Concurrently, the establishment of domestic test centers, combustion laboratories, materials analysis units, and internal entities such as the Company Academy—designed to cultivate design-capable qualified human capital—enhanced R&D capability and accelerated institutional knowledge production.

The post-2016 period marked a critical rupture in which “strategic autonomy” became the defining concept of Türkiye’s security policy. Following the transformation of the Undersecretariat for Defence Industries (SSM) into the SSB, the Company was redefined as a strategic technology developer, and all organizational processes were aligned with the state’s technology-centered security vision. The R&D activities became the core of the Company’s operations. The engineering staff expanded rapidly, while university–industry collaborations facilitating technology acquisition assumed strategic importance. Under the SSB’s “Technology Acquisition Obligation” framework, responsibilities assigned to the Company necessitated the formation of a domestic supply chain, prompting the Company to shape not only its internal capacity but also a national propulsion industry ecosystem. Initiatives such as domestic material development projects, establishment of test infrastructures, and integration of domestic suppliers into engine programs further strengthened the Company’s relationship with its macro-institutional environment. As a result, the Company emerged not merely as an industrial enterprise but as a direct carrier of the state’s security vision.

The period after 2017 represents the phase of highest transformation velocity in the Company’s institutional history. The experiential learning derived from developing an indigenous aviation engine generated institutional momentum for jet engine development projects required by the state. In this context, the National Engine Design Project (MMTP) was initiated under the leadership of the SSB and the Company in 2017. With the launch of the MMTP, the organizational structure was reconfigured to accommodate project requirements, and new units were established. The MMTP constituted not only an engine design initiative but also a comprehensive program aimed at developing the infrastructure and ecosystem required for the specialized manufacturing and testing of gas turbine engines (turbojet, turbofan, turboshaft, turboprop).

The Company’s transformation during this period extended beyond engine projects to encompass advanced material technologies. Collaborative projects with institutions such as the SSB, TÜBİTAK, and TUSAŞ were launched, and the adoption of a project-based management model enabled successful project completion. Advanced technologies implemented through completed projects were utilized in new platforms and engines, elevating the Company to a globally competitive position in engine technologies. Consequently, the Company transcended its role as a mere implementer of state strategic objectives in indigenous engine production and emerged as an active institutional actor influencing the formulation of those objectives.

During this period, the Company’s workforce expanded from approximately 600 to over 5,000 employees, with engineers comprising more than 40 percent of personnel. University collaborations integrated doctoral-level R&D projects into corporate culture, while the establishment of a Corporate Information Technologies Directorate institutionalized knowledge management processes. Thus, the Company transitioned from a production-oriented organization to a knowledge-based institutional structure.

In conclusion, the 2010–2026 period represents the phase in which the Company evolved from a conventional engine manufacturer into the institutional embodiment of Türkiye’s security paradigm. Throughout this process, the Company internalized the state’s objectives of strategic autonomy and technological independence, integrating its organizational identity with the national security vision. The Company is no longer merely an industrial firm but a fundamental institutional carrier of Türkiye’s structural transformation in defense technologies.

4. DISCUSSION AND CONCLUSION

Ultimately, the Company is not merely a derivative of the state’s security priorities but also an institutional actor that contributes to transforming those priorities. The period between 1980 and 2026 demonstrates that the relationship between state security policies and organizational structure has evolved from a one-directional hierarchy into a form of reciprocal interaction. While the Company’s institutional configuration has been shaped by the state’s security vision, it has simultaneously matured the technological and managerial capacities required to operationalize that vision. In this sense, the organization has become not only an “institutional instrument of the state’s strategic autonomy objective,” but also a structural stabilizer that sustains the continuity of this objective.

From the perspective of Neorealist Security Theory, the Company’s development represents the institutional projection of Türkiye’s effort to act as an autonomous actor within the international system. This effort is grounded not only in perceptions of external threats but also in the nature of regional competition. When examined through the lens of Institutional Theory, the Company’s trajectory reveals its search for legitimacy under external pressures and its role in redefining local norms. Macro-institutional theory, in turn, clarifies the ideological ground that connects these three levels—global, regional, and domestic: the ideal of “national technology” has functioned both as a state ideology and as a source of organizational motivation.

This study demonstrates that the combined use of four analytical strategies makes it possible to understand organizational transformation in the defense industry in a multidimensional manner. The descriptive analysis captures internal structural changes within the organization; the explanatory analysis identifies the causal drivers behind the Company’s historical restructuring; the cross-period comparison reveals continuity and rupture across the three temporal units; and the PESTLI analysis highlights the influence of strategic environmental factors on institutional decision-making.

When these four approaches are evaluated together, the Company’s evolution can be interpreted not merely as technological progress but also as a form of institutionalization of Türkiye’s security paradigm. The 1980–2000 period constituted an “institutional learning” phase in which external dependency was rationalized; the 2001–2010 period symbolized a restructuring effort accompanied by alignment with state policy; and the

2011–2026 period represents a transformation process in which strategic capacity and domestic production reached maturity, accompanied by a macro-institutional shift toward the development, manufacturing, and operational deployment of indigenous engines.

In this context, the Company is not simply a manufacturing firm but an institutional structure that translates the state's security ideology into technological reality. Its historical trajectory has progressed in parallel with the variable nature of Türkiye's foreign policy orientations and security strategies. The Company's organizational resilience has become a critical factor for the sustainability of the state's security strategy.

In conclusion, the Company's 1980–2026 trajectory constitutes Türkiye's transition narrative "from security perception to institutional capacity." This narrative reflects the transformation of the state's security approach from a structure that merely reacts to threats into a strategic actor that builds its own technological ecosystem. The Company is both a cause and a consequence of this transformation: it has been nourished by the state's security vision while simultaneously reproducing that vision. In this respect, the Company is not merely an industrial organization within Türkiye's national security architecture, but an "institutional security instrument".

COMPLIANCE WITH ETHICAL STANDARD

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