International Journal of Comparative Studies in International Relations and Development
p-ISSN: 2354-4198 | e-ISSN: 2354-4201
Volume 11, Number 1 February, 2026
IJCSIRD

Building Indigenous Defence Industries in Technologically Third-Tier Countries: The Cases of South Korea, Israel and Poland

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Article DOI: 10.48028/iiprds/ijcsird.v11.i1.05

Abstract

This thesis examines the evolution of indigenous defence industries in South Korea, Israel, and Poland, analysing how differing strategic contexts and technological capacities shaped their approaches to military production. While existing literature often focuses on single-country or region-specific case studies, there remains a limited comparative analysis that integrates multiple theoretical perspectives to explain divergent defence-industrial trajectories over several decades. Using three major theoretical frameworks in the defence sector: strategic adaptation, security of supply, and dual-use technology rationales, the study traces each country's defence-industrial trajectory from the 1960s to the present. South Korea's development is characterised by a ladder-of-production approach, leveraging US alliance support and the advantages of a large domestic market to develop indigenous weapon systems. Strategic adaptation best explains the development of major weapon systems, whereas dual-use technology remains a minor factor, playing a limited role outside of select subsystems. Israel, similarly, demonstrates how strategic adaptation driven by persistent conflict conditions and US support has underpinned breakthroughs in missile defence, unmanned systems, and other high-priority capabilities, while dual-use innovation has been more prominent than in South Korea. Poland's trajectory, shaped by Warsaw Pact-era cooperative production, evolved through post-Cold War restructuring toward integration with NATO supply chains while selectively preserving domestic production in areas of national priority. Across all these phases during the Cold War, in the run-up to NATO accession, and in the years after joining strategic adaptation remained the main driving force behind Poland's defence-industrial direction. The analysis reveals that in all three cases, albeit through differing paths, strategic adaptation is the dominant framework for explaining the evolution of major defence-industrial capabilities, while the role of dual-use technology varies significantly across contexts.

Keywords: *Defence, Weapon systems, Defence industries, South Korea, Israel, Poland, Security of supply, Dual-use technology, Strategic adaptation.*

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First Published: https://research-repository.st-andrews.ac.uk/handle/10023/33485

https://internationalpolicybrief.org/international-journal-of-comparative-studies-in-international-relations-and-development-volume-11-number-1/

Background to the Study

Why do some technologically third-tier countries persist in developing domestic defence industries capable of producing cutting-edge conventional weapon systems, while others scale back or abandon such efforts entirely? Can these trends persistence and scaling back emerge within the same country over different periods, and what explains this shift? This thesis addresses these questions by focusing on a distinct category of states: those that are technologically intermediate in defence production. These technologically third-tier countries are neither wholly dependent on foreign suppliers nor fully autonomous in defence research and development (R&D) and exports. Countries categorised as third-tier typically maintain modest but meaningful indigenous capability, enough to pursue self-reliance in selected sectors or to integrate into global production networks, but not enough to rival major arms producers. South Korea, Israel and Poland are among the most illustrative examples of this group. Despite sharing certain structural conditions, such as enduring security threats, alliance relations or industrial ambitions, these countries have exhibited different patterns of investment and institutional commitment. South Korea and Israel have relatively consistently expanded their indigenous defence sectors over the past several decades, often linking defence production to broader strategic objectives. Poland, by contrast, has shown a more inconsistent path, with episodes of explicit policy reversal, stagnation and renewed interest. Most existing literature focuses either on great power military-industrial complexes or on the dependency of weaker states, and much of the previous research

offers limited insight into the general strategic behaviours of third-tier producers. Moreover, many studies tend to concentrate on specific countries or regional clusters, such as Middle Eastern arms producers, post-communist European states or East Asian late industrialisers. Most of them emphasise context-specific or culturally distinctive explanations. Therefore, this thesis argues that a significant analytical gap remains and seeks to construct a more generalisable framework for understanding both continuity and scaling down in third-tier defence industrialisation.

Identifying the shared strategies and mechanisms employed by third-tier arms producers is academically and policy-wise significant for several reasons. First, it allows scholars to move beyond case-specific narratives and generate comparative insights into how random third-tier states with limited resources and strategic clout nonetheless attempt to develop indigenous defence industries. By revealing recurring patterns, researchers can better understand the structural drivers and constraints shaping defence industrial development across different contexts. Second, from a policy perspective, such findings offer valuable lessons for latecomer states seeking to build or reform their own defence production capabilities. They help identify what types of institutional arrangements, technological pathways, and international partnerships are more likely to yield sustainable outcomes under conditions of resource scarcity or geopolitical pressure. Furthermore, recognising common trajectories among third-tier producers from different regions also allows policymakers to anticipate potential risks, such as dependency traps, inefficient diversification or limited commercial spillovers, thereby informing more realistic and adaptive defence planning. In a world of increasingly fragmented supply chains and shifting security alignments, recognising what third-tier producers have in common is key to understanding emerging patterns of global defence industrialisation. This research offers an in-depth examination of conventional cutting-edge weapon systems, whose definition is inherently fluid and context-dependent. What qualifies as cutting-edge varies across time and states, shaped by each nation's capacity to integrate advanced technologies with evolving military doctrines (Allen 2021, 280- 290). The primary purpose of defence industrial policy is to enhance military strength and operational effectiveness. Broadly, this policy serves two core functions: first, supporting the construction of military power by improving combat capabilities; and second, maintaining the defence industrial base in preparation for war, thereby ensuring long-term combat sustainability (Ministry of Defence 2022, 5, 16 and 49). These dual aims form the backbone of most national defence industrial strategies. In particular, the latter pertains to contributing to domestic economic development (exports, industrial growth and job creation). It also supports the strategic enhancement of military power through more efficient project management and cost-effective capability development. In doing so, defence industrial policy establishes a critical link between national security and economic prosperity, reinforcing the idea that a resilient defence sector contributes not only to deterrence and warfighting capacity but also to national economic stability.

The defence sector is characterised by a set of economic and structural features that distinguish both its market dynamics and its industrial base from those of the civilian sector. First, the defence market operates outside conventional supply and demand dynamics, with governments—often the sole buyers shaping prices through budgetary decisions and negotiated contracts rather than open competition (Ministry of Defence, 2022, 33). Suppliers, facing limited competition and opaque pricing structures, aim to secure profit margins through political bargaining rather than market forces (Taylor and Terhorst 2025, 11-12). This results in an asymmetric market frequently structured as a bilateral monopoly, especially for complex weapon systems and specialised components, where a single government negotiates with a few qualified suppliers. Such arrangements further complicate procurement negotiations, oversight and cost verification, highlighting the unique structure of the defence market compared to typical commercial markets.

Within this distinctive market environment, the defence industry faces structural and operational constraints that further separate it from civilian industries. Most notably, the defence industry is marked by highly specific and constrained demand, which, unlike in the civilian sector, typically results in small-scale production runs and irregular production runs (Ministry of Defence 2022, 24). This limited volume often leads to underutilised facilities and a heavier burden of fixed costs, as defence firms must maintain production capabilities that exceed actual order quantities to meet potential fluctuations in national defence requirements. The defence industrial sector involves high levels of technological and financial risk (Ministry of Defence 2022, 27). The defence industry is traditionally regarded as "*one of the most regulated sectors* (Hoeffler 2012, 435)." It is essential to recognise that the development of a domestic defence-industrial base is an exceptionally demanding endeavour, requiring long-term investment, high financial risk, and extensive institutional preparation. These extended development cycles and high sunk costs mean that a substantial portion of public defence spending is devoted to R&D, often with no guarantee of success, particularly in the early stages of platform or system development.

According to David Ricardo's classical theory of comparative advantage, a country should specialise in producing goods for which it has a lower opportunity cost than its trading partners, while importing other goods from abroad (Ricardo 1821, 139- 149). When applied to the defence sector, the theory suggests that states should invest in the development and production of weapon systems and components for which they are relatively more productive and efficient, and import more complex or less efficient systems from countries with a comparative advantage in those areas. Theoretically, such specialisation not only ensures optimal resource allocation but also allows states to pursue economies of scale by exporting weapon systems in which they hold a comparative advantage, reinvesting the gains into further technological advancement. However, contrary to these expectations, a growing number of states actively pursue the indigenous development of weapon systems despite lacking a comparative advantage in this sector. This behaviour reflects a notable departure from Ricardian logic and deserves closer scholarly attention. This indicates that the pursuit of a domestic defence industry is not merely a matter of market efficiency, but is instead shaped by strategic, political and technological considerations that lie beyond the explanatory scope of classical trade theory. High-value assets such as stealth aircraft or ballistic missile defence systems cannot always be substituted through imports. In this context, the comparative advantage framework fails to account for critical non-economic variables such as national security, operational sovereignty, and long-term strategic autonomy. While reliance on foreign suppliers may appear efficient in peacetime, it can become a severe vulnerability in wartime. The development of a domestic defence industry, therefore, cannot be justified solely through short-term economic efficiency. Instead, it reflects a broader national strategy to secure technological independence and future strategic choice. This discrepancy between classical economic expectations and empirical state behaviour underscores the need to re-examine defence industrial development through a multidimensional lens.

Literature Review

The existing literature has largely focused on two interrelated dimensions:

1. The justification frameworks that states employ to rationalise investment in domestic weapons production; and
2. The structural and operational challenges encountered by third-tier arms countries that pursue such development despite lacking a Ricardian comparative advantage. Yet, the persistent deviation from the logic of comparative advantage raises deeper questions about the underlying rationale and strategic calculus that shape defence industrial development in states with modest military technological capabilities.
3. Existing literature identifies five key motivations that shape indigenous defence industrial development, particularly among technologically third-tier producers.

First, action-reaction dynamics highlight how states respond to regional threats or shifting military balances by pursuing domestic arms production.

Second, strategic autonomy and security of supply reflect a desire to reduce dependence on foreign suppliers and ensure access to critical military systems during crises.

Third, economic rationales encompass industrial growth, job creation and diversification, with defence sectors often viewed as catalysts for broader technological and economic advancement.

Fourth, technonationalism and symbolic politics frame defence industry development as a source of national pride and technological prestige, often tied to domestic legitimacy or international status.

Existing literature has addressed three major interfering factors that many states often underestimate: a lack of political consensus, poor economies of scale and scope and bottleneck technologies. First, a lack of political consensus often leads to inconsistent support for defence industrial policies (Hoyt 2007, 5). Second, poor economies of scale and scope limit the sector's growth potential. Due to the smaller size of their domestic and export markets, third-tier countries often struggle to generate sufficient revenue or justify the high costs of research, development and production. This leads to inefficiencies, inflated unit costs and limited sustainability of weapon development projects. Third, bottleneck technologies represent a critical hurdle. Many states lack access to or control over essential technologies, critical subsystems and skilled human capital for production know-how, forcing reliance on foreign suppliers or creating vulnerabilities in the supply chain.

These changes were driven by Poland's national objective of achieving efficient strategic adaptation through developing weapons better suited to its strategic needs. As military reforms during this period, aimed at meeting NATO standards, began, they vividly revealed the path-dependent nature of Poland's defence industrial capabilities. The ambition to join NATO began to introduce new complexities and challenges in weapons development. Indeed, following the development.

An additional classification system, proposed by Richard Bitzinger, categorises arms producers from first-tier to third-tier according to each producer's possession of defence-industrial technologies and R&D capacities (Bitzinger 2003, 6-7). In Bitzinger's definition, the US, the UK, France, Germany and Italy are the first-tier weapons manufacturing states. Those classed as second-tier suppliers must fulfil one of the following conditions:

1. Smaller industrialised nations with sophisticated technological skills (e.g., Japan, the Czech Republic and Sweden)
2. Newly developing industrialised states with modest defence industrial bases, such as South Korea, South Africa, Israel and Indonesia
3. States like China and India possess the possibility of development but have limited R&D and defence-industrial capacities to manufacture advanced conventional weapon systems.

Countries that do not meet the above criteria are classified as third-tier states. These states typically possess limited technological capacity and minimal indigenous arms production capabilities. Bitzinger identifies Egypt and Mexico as representative examples of this category.

Summary of Findings

Three key findings emerge. First, the development of Poland's defence industry—both under the Soviet system and after NATO accession—was shaped primarily by strategic adaptation rather than by supply security or dual-use technology concerns. During the Soviet period, Poland served as a manufacturing hub within the Warsaw Pact and faced little vulnerability in acquiring weapon systems (Checinski 1981, Its role was to support operational effectiveness within the Soviet framework by tailoring domestic production to bloc needs. By taking over pilot training, it freed Soviet-made combat aircraft for operational missions, reduced costs, and accelerated pilot transition. Similar to South Korea and Israel, Although political leaders recognised the value of dual-use technologies, Poland's actual strategy relied more on absorbing advanced foreign military technologies. While Poland played a crucial role in Soviet military strategy, specialising in tank, aircraft, and communication system production, it also pursued a degree of independence in its defence policies, as seen in efforts like the Rapacki Plan. During the war, under German occupation, Poland's remaining industrial facilities were repurposed to manufacture German- designed weaponry for the Wehrmacht—an arrangement driven by coercion rather than policy.

After the war, however, Soviet authorities restructured Poland's defence industry to serve the needs of the Warsaw Pact. Instead of restoring the pre-war tradition of indigenous innovation, Poland was tasked with producing Soviet-designed equipment under strict central planning guidelines.

Despite importing considerable military equipment from the Soviet Union, Poland experienced a continuous wave of defence industrial development throughout the early 1970s (Soroka 2017 56).

However, when Poland attempted to cross the limits set by the Soviet Union, the outcome was markedly different. Indeed, the Soviet Union exerted strong influence over the Polish aviation industry by blocking other independent aircraft projects and maintaining control over Poland's military production. This decision reinforced Moscow's control over advanced military technologies, ensuring they remained concentrated within the USSR.

Poland's first domestically-built jet-propelled plane, had its maiden flight on February 5, 1960 In this regard, the TS-11 Iskra held both strategic importance and symbolic significance as the foundation of Poland's jet aircraft development. Following the successful development of the TS-8 Bies, there was a clear need for a more advanced jet trainer to transition pilots smoothly from propeller-driven aircraft to jets (Morawski 2012. This development necessitated the urgent requirement for a new generation of trainer aircraft, capable of both weapon operations and equipped for instrument navigation and night flying. In conclusion, the development of the PT-91 demonstrates Poland's strategic pursuit of military independence, even amid external geopolitical shifts and the pressures of NATO integration. In the wake of the Soviet Union's collapse and the dissolution of the Warsaw Pact, Poland decided to conduct significant internal transformations while continuing the PT-91 development.

Conculsion

In conclusion, scholarly analysis has often remained limited to single-country case studies or region-specific comparisons, making it difficult to identify the broader transferable logics behind the long-term continuous efforts in the development of defence industries. South Korea's defence industry reflects a complex interplay of motivations and constraints, but it is strategic adaptation, supported by enabling domestic and external conditions, that best explains its long-term trajectory toward high-end weapon systems. . As such, the experiences of these three countries may serve as a roadmap for new actors seeking to build resilient, adaptive, and strategically coherent defence industries in an increasingly multipolar security environment.

Recommendations

Base on the study, the following reommendation was sa follows:

1. By identifying the key enabling conditions, institutional arrangements, and strategic rationales that facilitate indigenous defence industrial development, the framework allows governments to construct predictive models for how latecomer states may evolve their military-industrial capacities
2. By linking industrial growth patterns to broader security strategies and geopolitical ambitions, policymakers can move beyond reactive approaches and adopt more forward-looking, preemptive strategies

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