

### Topic and Research Question

Since the early 1990s, the role of North East Asia within the global arms trade has considerably shifted. In parallel to growing defence budgets and arms exports, imports have fallen. Both China and South Korea have emerged as major arms exporters, while Japanese enterprises have retained their position in the global ivy league of defence companies. The capability of national defence sectors to compete internationally and fulfil domestic demand is intrinsically linked to their innovativeness and its promotion by the state.

Available literature displays a **research gap** with respect to a coherent comparison of **defence innovation systems** in China, Japan and South Korea. Utilizing a sectoral focus of the **“national systems of innovation”** (NSI) approach, this thesis thus answers the subsequent research question and contributes both to the identified research gap and the overall field of defence innovation studies.

*What are the similarities and differences between the defence innovation systems in China, Japan, and South Korea during the period from 1991 to 2021?*

### State of the Art

According to Boekholt (2010), the theory of innovation evolved from the first-generation pipeline “push” model to the chain-linked and cluster models, emphasizing two-way information exchange, to the third-generation national systems of innovation (NSI) approach, focused on multi-directional networks. These advancements likewise affected policy, with government intervention promoting enablement rather direct intervention.

The NSI approach first introduced by Freeman (1987), was subsequently developed into an analytical tool (Lundvall 1992; Nelson 1993). It is an **open approach** adjustable for specific case studies. Originally static, it focused on formal structures at certain point in time (Edquist and Johnson 1997). Following critique (e.g. Liu and White 2001), Edquist (2005) developed the “process approach” centered on activities and change within the system. Fagerberg (2014) unified both with the **strategic innovation system management** (public policies) by Smits and Kuhlmann (2014) as the synthetic approach.

The **“synthetic approach”** has become the most comprehensive tool for the analysis of innovation systems. Malerba (2005) underlined the adaptability of the NSI approach both with respect to scope, such as for

sectors, and the variability of indicators. Respective research on the defence sector from the NSI perspective is limited and the sector itself displays very specific characteristics.

Most importantly, these are the presence of a monopsony, as well as monopolies and oligopolies, and the strong role of the government. Existing research (e.g. Molas-Gallart 2010) highlights the shift from a traditional to a **transitional defence sector**, characterized by the increasing importance of civilian dual-use technologies, the opening of the sector, the centralization of defence procurement agencies, and the creation of dedicated innovation agencies. Policies have likewise been adapted to emphasize collaborative knowledge transfers.

### Methodology and Approach

Considering available frameworks, the NSI approach presents the most utile tool for the analytical framework, both due to comprehensiveness and adaptability. The analytical framework applied in the thesis is a **NSI approach tailored for a top-down perspective on the defence innovation sector**.

Utilizing the “synthetic approach” the analytical framework consists of organizations, actors, networks and institutions, as first introduced by Edquist and Johnson (1997). Their element of actors has been split in (public) organizations that implement the policy portfolio, and (public and private) actors that provide products of the defence innovation system. The element of networks is constrained to formalized ones, such as agglomerations and clusters, as implicit ones are hardly assessable. Likewise, institutions are limited to laws and regulations, excluding normative and cultural-cognitive institutions. Considering the intricacies of the defence sector, the institutions assessed comprise of ownership and investment, defence market entry, and IPR regulations, and arms and technology export controls.

The **strategic innovation management system** presents the policy portfolio covered by the analytical framework: linkage, financial, acquisition and human resource policies. Since both the process and synthetic approaches emphasize the importance of change over time, the assessment timeframe covers the **period from 1991 to 2021**. Considering the three case studies, this timeframe proves the most valuable one: the end of the Cold War, the profound impact of the Iraq War 1991 on Chinese armament policy, the new South Korean defence reform drive, and the increased pressure on Japan by declining defence technology transfers.

### Main Facts

During the three decades of assessment the defence innovation systems of all three countries have undergone profound change in respect of all indicators.

In **China**, the defence industry was extracted from the governmental apparatus and in steps reformed into state-owned enterprise groups. The defence market was likewise opened to civilian firms and private investments in the 2000s and 2010s. The overarching integration of the civilian and defence sectors was steered by two major reforms efforts: the civil-military integration (2004) and military-civilian fusion (2014) policies. Procurement was centralized in two bodies of the Central Military Commission (2016) and deep systemic problems, specifically in linkages and human resources, solved.

**Japan**, commanding the most sophisticated defence industrial base in the early 1990s, already had integrated civilian and defence sectors. Procurement was centralized in a civilian agency (ATLA) in 2015 and the overarching arms and technology export ban abandoned in 2014. Despite these efforts, systemic problems remain in respect to linkages with the university sector and foreign partners, and in achieving export revenue.

**South Korea’s** defence sector displayed the least systemic problems and achieved the broadest network of foreign linkages. The reform drive following the Yulgok industrialization project has made the county one of the emerging global defence exporters. In 2009 the sector was opened to civilian industries and defence R&D work outsourced to private actors, facilitating a broad integration of the sectors. Already in 2006 defence procurement was centralized in a civilian agency (DAPA) and a broad spectrum of organizations was created to support linkage efforts.

### Results

The most important results yielded by the comparison are that 1) similarities have significantly increased during the assessment period; 2) DIS management is not linked to overarching economic models (South Korea shares as many similarities with China as Japan); and 3) linkage policy is central to all reform efforts.

Displayed in the triangle’s centre, all three DIS share the features of 1) **DPA centralization** both horizontally and vertically; 2) the **liberalization** of investments and market access; 3) the emphasis on **knowledge diffusion** within the DIS; and 4) the utilization of

**financial nurturing** instruments. There are also clear differences between each one of the countries and the other two, connecting the latter on the triangle’s edges.



Figure 1 – Most important similarities and differences

Considering these results, **no specific East Asian model** of defence innovation can be identified. Strong similarities exist, but notable differences remain. The analysis shows that all three industries have progressed to the transitional defence sector model and policy portfolios have evolved in line with evolving innovation theory. The tailored NSI approach of the analytical framework has proven valuable and provides a tool for further research in the field. The latter should comprise of a comparison with additional countries, most importantly those implementing defence innovation initiatives, e.g. NATO countries.

### References

All references can be found in the full version of the MA thesis available at [ubdata.univie.ac.at/AC16598160](http://ubdata.univie.ac.at/AC16598160).



### About the Author

Ulf M Steindl holds BAs in Geography and Political Science from the University of Vienna and studied the Master of Advanced International Studies at the Diplomatic Academy of Vienna. He currently works as Research Fellow with the Austrian Institute of European and Security Policy (AIES) in Vienna.



Contact information:  
[ulf.steindl@aies.at](mailto:ulf.steindl@aies.at)