

## HELLENIC DEFENCE INDUSTRIAL BASE IN THE ERA OF ECONOMIC CRISIS

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### **Abstract**

The Hellenic Defence Industrial Base (HDIB) is at a crossroads because of the reduced military spending and the absence of coherent policies for its further development. Neighbouring countries, such as Israel and Turkey, possess robust defence industrial bases that serve both their respective armed forces and their national economies. This paper argues that the HDIB should be considered an integral part of the Greek national defence framework. Consequently, the ownership structure and management of major defence industrial enterprises should be reformed within the European framework. A small but viable HDIB requires technology and skilled manpower. Greek institutions of higher education should support this effort.

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**Key Words:** Defence industry, Defence R&D, Dual Use technology, Military spending, Procurement

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## 1. Introduction

Greece is in the midst of a multiyear economic and fiscal crisis, which has depressed the economic output by 25% during the 2009-2015 time period, has caused massive unemployment, and has severely curtailed governmental spending, including expenditure on national security. Since 2009 defence spending has dramatically decreased, including money spent on new acquisition programmes. This reduction in acquisition programmes has affected the Hellenic Defence Industrial Base (HDIB), because of its dependency on contracts from the Hellenic National Defence Forces (HNDF) (IHS Jane's 2015a). Reduced dual-use domestic acquisition programmes, combined with the particular conditions of the Greek defence market (Research & Markets 2015), have decreased HDIB production activities and as well as revenues. The HNDF cannot be totally dependent on imports in the future — particularly in times of crisis or actual armed conflict — not only concerning advanced weapons systems, their major components, and spare parts, but also small arms, munitions, and consumables. As a matter thereof, the long-term sustainability of the HDIB in developing and introducing new products and technologies is of concern to the HNDF. Indeed, it is the author's view that the HDIB industrial concerns make it imperative it should implement diverse strategies in partnership with the HNDF.

Driven by such realities and assessments, this paper discusses potential policies so that the HDIB remains in business on a long-term basis, by keeping its production lines open. This in turn, will result in increasing its GDP, whilst adequately supporting HNDF's missions and tasks. The remainder of the paper is structured as follows: Section 2 presents a brief account of the theoretical perspective of the defence industrial base, and the impact of military spending on a country's economic growth and security. Section 3 introduces the necessity of military preparedness. Section 4 presents the current Turkish threat to Greece, which justifies the requirement for a defence industrial base. Section 5 briefly examines the development of the Israeli and Turkish DIBs. Section 6 presents the HDIB and Section 7 offers some recommendations for the future course of the HDIB, while concluding remarks are summarised in Section 8.

## 2. Theoretical Perspectives and Literature Review

Literature research conducted suggests that the reasons countries produce arms are mostly related with their national security. As Brauer (2007, 982) recounted: 'states produce arms for ostensibly defensive purposes, namely, the preservation of territorial integrity and the maintenance of spheres of influence.' He also indicated that a country's decision to import or produce arms depends on the level of the technical efficiency of its domestic defence industry and the scale of its military spending. By acknowledging the fact that companies produce for profit (Blanco 2015), governments may induce firms to design/offer specific products/services

through public demand to satisfy their needs and project “soft power” (Nye and Welch 2011, 42) to other countries through defence procurement.

Hartley (1991, 124) described what constitutes a country’s defence industrial base (DIB). He said that a country’s DIB could be defined as all its firms receiving ministry of defence contracts; or as a minimum core of key national defence assets; or as a system of defence industries that would be determined by market forces. He concludes that the defence industrial base includes all defence capabilities within a country, which makes possible or maintain a strong domestic defence production for the state’s military and strategic benefits. Hartley also (1991, 126) summarised the benefits and the cost for a country to sustain its own defence industrial base. He described benefits as a matter of independence, ‘security of supply and responsiveness in emergencies and war, the ability to be an informed buyer, together with the need to provide equipment specially designed for the requirements of national forces.’ Thus, military spending and the country’s relevant technical efficiency trigger and further enable the development of its own DIB.

Dunne (1995, 402) also highlighted the defence industrial base as those companies in the interior of a country that provide defence and defence-related equipment to the defence ministry. Watts (2008, 40) explained the relationships among defence industries, as well as between enterprises and the U.S. government. A country’s defence industrial base involves a network of heterogeneous actors. Such actors mainly include unions of states, alliances, governments, parliaments, governmental and non-governmental agencies, ministries of defence, armed forces and defence equipment companies.

Extensive research (Schofield 1993; Foray and Cowan 1995; Molas-Gallart 1997; Haico and Smit 2003) has highlighted the importance of a developing industry that produces dual-use equipment products and technologies, particularly in times of decreased defence expenditure. Such products either integrate technologies from the military into the civilian sector and vice versa, or, after some transformations, such technologies are used by both sectors. These researchers pointed out the importance of duality for a national defence industrial base. Industry duality enables timely transfers of advanced technologies as well as lower production costs. Korkmaz (2015) concluded that, while military spending in ten Mediterranean countries negatively affects their economic growth rates, the development of industry producing dual-use items and equipment may have an enhancing effect on employment. Indeed, such industrial duality may lead to multi-product firms and economies of scope (Panzar and Willig 1981), capable of delivering various military and civilian products in a wide range of sectors such as 3D printing or software development.

Markusen (2003, xv) highlighted the South Korean defence companies’ paradigm in the late 1990s: they managed to diversify their production, perceived their military industrial obligations as an opportunity cost, and increased their civilian output in

times of lower military spending. Markusen also pointed out that the governments of Israel, South Korea and Spain succeeded in applying strategic conversion plans so as to gradually privatise and reconstruct their state-owned defence industries, and achieved positive economic results.

Bitzinger (2009, 2) commented on the hierarchical nature of the global defence industry and categorised arms producing countries into three tiers: the U.S. and the four largest European arms producers (Britain, France, Germany, and Italy); a typical group of countries with advanced defence industrial capabilities; and countries with very limited and low-tech arms production capabilities. Ungaro (2013) pointed out the importance of collaboration for countries to peruse and implement initiatives, such as offset or co-production programmes. Blom, Castellacci, and Fevolden (2013) investigated innovation and defence industrial policy in the context of a European liberalised market and concluded that such a market would introduce into the Norwegian defence sector a higher degree of international competitiveness. Meanwhile, the transfer of technological innovation from the military to the civil sector and vice-versa can create a positive economic impact in producing countries (Sköns and Dunne 2008).

Wang, Shyu, and Chou (2012, 2104) present evidence, based on productivity analysis, that 'the appropriate allocation of defence expenditure can increase regional economic productivity effectively across Asia, Oceania, and Europe.' In such cases, 'the effective defence expenditure strategies undertaken \*by [a] government are important for improving economic productivity of countries together with their military preparedness.'

### 3. Military Preparedness

Hartley (2010, 413) evaluated security and observed that military spending is assumed to develop a country's capacity to protect its national interests and counter its enemies. Thus, it produces defence, and ensures national security, which is the classic example of a 'pure public good,' (Hartley 1991, 30; Córdoba and Torres 2016, 556). Although military spending has macro-economic implications because it affects a country's finances, nation-states spend on defence to maintain, and materially sustain armed forces for the preservation of their sovereignty and territorial integrity, as well as for the protection of their respective populations. Through the centuries, the reasoning of war and peace has remained unchanged. What Thucydides recounted in the Melian Dialogue is still more or less valid (Strassler 1996). It is usually true that, mutual respect exists between equals and 'as the world goes, [right] is only in question between equals in power [countries], while the strong do what they can and the weak suffer what they must.' Such mutual respect usually exists when there is relative balance of military power between countries. As Buchan (1968, 7; also quoted in Blainey 2013, 122) pointed out, lack of military balance between countries

increases fears for armed conflicts because such lack ‘creates a clear temptation to aggression,’ that can easily escalate to war.

As Gilpin (2001, 18) states “*national security is and always will be the principal concern of states. In a ‘self-help’ international system,[...] states must constantly guard against actual or potential threats to their political and economic independence. Concern with security means that power—military, economic, and/or psychological—will be vitally important in international affairs; states must be continually attentive to changes in power relations and the consequences for their own national interests of shifts in the international balance of power.*” Indeed, this fact has not changed much today, when actors or events around the globe are inter-dependent. As such, challenges are created that represent dilemmas to be faced and effectively addressed not only by a single country but by the entire global community (Nye and Welch 2011, 255).

The level of military spending affects the whole system of national defence. The amount of spending usually contributes to a nation’s military strength and preparedness (Galvin 2014) and its ability to protect its national interests, project power, or counter its rivalries. Collins (2004) argues that “*military preparedness demands personnel, weapons, equipment, and supplies of adequate quality in the proper mix and in sufficient quantities to accomplish assigned missions wherever and whenever directed. Preparations take present and projected requirements into account. Perceived threats, doctrines, plans, programs, military infrastructure, the industrial base, and budgets strongly shape results. Problems develop whenever any aspect becomes deficient.*”

Modern armed conflicts, even of a short duration, are highly intensive. For example, the U.S. aerial resupply effort for the State of Israel during the October 1973 war in the Middle East included conventional ammunition, main battle tanks, combat aircraft, electronic warfare systems, and precision guided munitions (Boyne 2003). If a country largely depends on imported munitions and materiel, this may pose considerable threat to its national defence, in particular during a period of crisis. Depending on the duration of an armed conflict, existing ammunition stocks and materiel may or may not be sufficient. However, the importation of such military consumables may be negatively impacted by political or economic factors, and potential unilateral or multi-lateral embargoes by exporting countries (e.g., embargoes of military exports to Greece 1967, Israel 1967, Turkey 1974-1978, Iran 1980-1988, etc.). Meanwhile, domestic ammunition production is not similarly constrained in the context of military preparedness and steady-rate production of long-runs. Solutions such as long-term purchasing contracts from abroad or last-minute purchases make a country vulnerable because the international system is mainly a self-help system. In this system “states must rely on themselves” to protect their national security interests (Goldberg 2016). “To do otherwise

runs the risk of manipulation or betrayal at the hands of another state' (Hastedt 2014, 35). Therefore, much of countries' spending is directed to their DIBs in an effort to reduce dependency on military technology imports, as well as to ensure arms exports and further boost their respective economies.

Driven by such motives for war and peace, or due to a realist's perspective when conducting international relations, Israel and Turkey have had the highest military spending in the Eastern Mediterranean region (IISS 2015). The existence of strong DIBs increases Israel's and Turkey's self-confidence when exercising their national security strategies and enables them to counter their security threats. Bitzinger (2009) places both countries in the second-tier arms producers of developing and newly-industrialised countries with advanced military-industrial complexes.

On the other hand, Greece could presently be categorised as being a third-tier arms producer country, because of current HDIB dynamics (Curtis 1994; Kollias and Rafailidis 2003; Dunne, Nikolaidou, and Mylonidis, 2003). The country mainly produces items of modest technological content that do not secure HNDF supply lines or sustainment. In the past, Greece had difficulties in sustaining its army in wartime or during crises. During WW II Greece was unable to convince Great Britain to dedicate one of its munitions factories to the production of ammunition for Hellenic Army weapons, particularly artillery (primarily of French, Czech, and German origin). During the 1963-1964 and 1974 Cyprus crises, when an armed conflict with Turkey was a distinct and imminent possibility, Greece increased ammunition imports from other countries. Given the current Turkish threat against Greece, the HDIB should increase its capacity and reduce the HNDF dependency on foreign imports, so that Greece can be adequately prepared for a potential crisis or even an actual armed conflict with Turkey.

#### **4. The Turkish Threat to Greece**

Greece and Turkey are long-term opponents in the region but allies within NATO (HIS Jane's 2016; Nation 2003; Couloumbis and Dokos 1994). Both countries also maintain close relations with the U.S. and other Western powers. Since the early 1970s, Turkish policies towards Greece have included elements of '*coercive gradualism*,' (as this term is defined by Pierce, Douds, and Marra 2015), i.e., Turkey advances its interests against Greece through a gradual systematic process and the use of threats and intimidation so as to achieve its national objectives at Greece's expense (Ploumis 2016, 34). In the Balkans, Turkey's leverage, combined with the on-going regional instability, gives the impression of the establishment of a 'Turkish network' in the region and arouses fear of isolation in Greece and Bulgaria (Couloumbis and Dokos 1994, 282). In the Eastern Mediterranean, the discoveries of confirmed and significant undersea natural gas deposits within the exclusive economic zones (EEZs) of Cyprus, Israel, Egypt, and Lebanon, further complicate

the existing geopolitical scene (Kariotis 2007; Tzanetakis 2014). Such undersea fuel deposits most probably also exist within the Syrian EEZ as well, but are not present within the Turkish EEZ.

Currently, while Greece is suffering from the economic crisis and large migrant inflows from the Middle East and Africa, the Hellenic National Defence General Staff (HNDGS 2016) reports that Turkey continues to challenge and violate Greek sovereignty even more intensively than in the past. Meanwhile, Turkey has adopted a rather risky foreign policy with active and counterproductive involvement in the Syrian crisis (Itani and Stein 2016; Grigoriadis 2015; Stein 2014) and continuous and unabated challenges to Greek and Cypriot sovereignty and territorial integrity (*To Vima* Newspaper 2016). It is also suffering from increased levels of unpredictable domestic political instability, especially after the failed coup in the summer of 2016 (*The Economist* 2016a; *The Guardian* 2016; Cook 2016). When comparing Turkey to Greece, Turkey has a military advantage (IISS, 2015) that will be increasing in the near future. Meanwhile, the relationship between Greece and Turkey has not been improved (Grigoriadis 2012). In the absence of a relative balance of forces, a limited or more conventional military confrontation between Greek and Turkish military forces is a distinct possibility (e.g., Cyprus 1974, Aegean Sea crises of 1976, 1987, and 1996 at the Imia islets).

These realities amount to a continuous and credible symmetric threat for Greek national security interests in the region. Meantime, as some scholars recounted (Sandler and Hartley 1999; Brauer, 2002), NATO does not provide any form of security guarantees to Greece in the event of a military confrontation with Turkey, since 'the allies are only pledged to consult as a group by Article 5 prior to determining the necessary response.' In such circumstances, as has historically been demonstrated in the past (Cyprus 1974, Imia Crisis 1996), the alliance goal is to preserve 'unity' in NATO's Southern flank (Bozikas 1998, 23; Kassimeris 2008, 104). The European Union (EU) is assumed to follow the same approach through its common foreign and security policy (CFSP) (Mix 2013, 8). NATO and the EU, as well as the U.S., only provide Greece fora to discuss actual and potential aggression and manage the peaceful resolution of friction and disputes with unclear results.

The preceding brief analysis demonstrates that Greece should maintain adequate military capabilities to protect its sovereignty and territorial integrity. The existence of a strong DIB would support sustainment of the HNDF combat capabilities and reduce Greek vulnerabilities and dependency on defence imports in case of crisis or war. In an effort to reform and improve the HDIB and reduce the defence import dependence, the Israeli and Turkish best practices of developing their respective DIBs provide concrete examples for further action and review.



## 5. Israeli and Turkish DIBs

In the second half of the 20<sup>th</sup> Century, both Israel and Turkey followed the theory of the developmental state (Gilpin 2001, 305) and generated programmes of import substitution in the development of their respective DIBs. At present, as indicated by the Stockholm Peace Research Institute (SIPRI 2015), both countries rank high as exporters of sophisticated defence items. These countries enabled their DIBs to grow by introducing various mechanisms to ensure that their national armed forces would award arms and munitions acquisition contracts to domestic industries. Furthermore, domestic military technology research and development (R&D, inclusive of 'reverse engineering' and appropriate combinations of foreign technologies, e.g., the Israeli Kfir fighter aircraft), has been and still is heavily supported through government funds. For example, from the free annual \$3 billion U.S. military assistance to Israel, 26.3% currently flows directly to the Israeli defence industry (Reuters, *The New York Times* 2016). It is worth mentioning, at this point, that Israel has managed to capitalise on this assistance by empowering its defence industry.

Israel started developing its DIB with modifications to imported military equipment, e.g., installation of U.S.-made engines and replacement of the central gun in British-made Centurion main battle tanks (MBTs) (Vekstein 1999). The French arms embargo on Israel, following the June 1967 Six-Day War in the Middle East, provided the impetus for the rapid evolution of the Israeli defence aerospace industry. Nowadays, despite the very respectable free annual United States military assistance to Israel, Israel itself ranks high as an exporter of sophisticated defence items to other countries, often in competition with U.S.-based defence industries (HIS Jane's 2015b; Metz 1990). Elbit Systems, Israeli Aerospace Systems and Rafael were among SIPRI's 100 top Israeli arms-producing global companies in 2015, generating sales worth \$7,710 million. These companies have also established a number of joint ventures and co-production schemes with U.S. firms for developing innovative weaponry, such as the Arrow Theater Missile Defense, the Iron Dome or equipment to counter drones (Defense One 2017; Defense Industry Daily 2017, 2016).

Turkey, Greece's main national security concern in the region, has also followed an ambitious and costly programme of import substitution in the development of its domestic defence industry (Eceral and Korglu 2015), particularly after the U.S. arms embargo following the Turkish invasion of Cyprus in 1974. The Turkish model is noteworthy because it has combined the development of the domestic defence industrial base with the role that the Turkish military command structure and its institutions have traditionally played in domestic Turkish economy (Tartter 1996). For example, OYAK, the supplemental retirement benefits institution for the Turkish Armed Forces, is the owner of major defence industries, such as ASELSAN (defence electronics) and ROKETSAN (rockets and missiles), while it also owns civilian manufacturing operations, such as the Renault automotive factory in Turkey, a major steel mill, and extensive real estate properties.



In this manner, successive Turkish governments have consistently supported the evolution of the domestic defence industrial base through both direct and indirect state subsidies. Although there are reasonable doubts as to whether domestic Turkish defence industries are financially self-sustained in the absence of continuous governmental support subsidies and procurement contracts from the Turkish armed forces, Turkey's exports of defence articles are on the rise, e.g., wheeled armoured vehicles. Furthermore, Turkish defence industrial enterprises are capable of producing weapons systems of increasing sophistication, e.g., reconnaissance and unmanned combat aerial vehicles (UAVs, UCAVs) (De Larrinaga, 2015), theatre ballistic missiles (TBMs), surface warships equipped with indigenous electronic systems, etc. Turkish defence equipment manufacturers have benefited from the inflows of military technology and 'know-how' from multiple countries and, indeed, at a high level. This has included the co-production of F-16 fighter aircraft (Turkish Aerospace Industries (TAI) and the U.S. Lockheed Martin), partnership involvement in the Lockheed Martin F-35 Joint Strike Fighter programme, and use of Chinese technology for developing the indigenous Yildirim TBM (IHS Jane's, 2013a).

While there are differences between Greece, Israel, and Turkey, all three countries have some common ground in the process of developing their respective DIBs that highlight some of the Israeli and Turkish efforts as best practices for Greece. The main difference between Greece and the two countries is the fact that these states intensified their efforts to develop their respective DIBs after they had to undergo arms embargos. Arms embargos were major incentives that led both countries to reduce their dependency on arms-producing countries. Another difference is that Greece is a European Union (EU) member and has to manage governmental initiatives for the HDIB within the EU framework. Therefore, Greece implements the European legislation on defence contracting (EUR-Lex 2013) (e.g. Directive 2009/81/EC) that places EU's defence sector in the context of a liberalising market (Hartley 2003), while it also observes the rules and provisions of the European Defence Agency (EDA).

On the other hand, Greece, Israel and Turkey are close allies with the United States, and have been recipients of U. S. Security Assistance programmes since WW II (U.S. military assistance to Turkey was partially interrupted in 1974-1978) (Bozikas 1998, 15; Aseltine *et al*, 2015, A2-5). Under the legal framework of the U.S. Foreign Assistance Act (FAA), and the U.S. Arms Export Control Act (AECA), the U.S. has provided finance, arms sales, and technological support to these countries so that they might develop their respective DIBs through various programmes including co-production, licensed production, out-sourcing, or military technology transfer arrangements. Israel and Turkey have taken advantage of these programmes in an evolutionary fashion and largely developed their respective DIBs by primarily using their high military spending to fund domestic defence industrial production and import substitution. In the recent past, both countries, and Israel in particular, succeeded in becoming major arms exporters further developing the technological capabilities of their respective DIBs.

The HDIB has partially benefited from U.S. military assistance programmes in the past. However, despite the high level of Greek defence expenditure prior to the recent economic crisis, the HDIB did not follow the strategic course of import substitution. Rather, it could be argued that the transfer of military equipment under the U.S. Military Assistance Programme (MAP) at an initially low capital cost in the 1950s and 1960s, actually acted as a disincentive for more robust development of the HDIB. Although more serious attempts were made in buttressing the HDIB during the late-1970s (aftermath of 1974 Cyprus crisis), and in the 1980s, a clear preference for imported military technology clearly deviated from the targets that governed corresponding Israeli and Turkish defence industrial policies.

## **6. The Hellenic Defence Industrial Base**

The majority of Greek defence enterprises produces components, such as metalworking, casts and moulds, mechanical engineering, electrical and electronic equipment, or provide defence contracting services. The HDIB includes shipyards (e.g., Hellenic Shipyards, Neorion-Elefsis Shipyards, etc.) with a dual civilian and military role, as well as some very innovative enterprises with a significant amount of exports of cutting-edge defence equipment. The latter are specialised systems producers or manufacturers of complete sub-systems, assemblies, and major components (e.g., the Hellenic Aerospace Industry (HAI), the Intracom Defence Electronics (IDE), ISI-Signaal Hellas, SSMART S.A., Theon Sensors, etc.). HDIB annual sales are below €500 million (SIPRI 2015). In the absence of detailed data regarding the Hellenic defence industry itself (GDDIA 2017; Frost & Sullivan 2004), empirical research (AMEF 2015; ICMAIF 2015) indicates that of the total sales, about €200 million represent exports, while the rest is attributed to HNDF contracting.

In the 1980s and 1990s, the Hellenic Ministry of Defence (HMOD) promoted offset initiatives in the procurement of major weapons systems (Antonakis 1996). Due to these initiatives, the Greek domestic defence industry managed to develop and gain valuable experience through various practices, such as licensed co-production or other collaborative programmes. Collaborative defence production projects in Greece, based on offset arrangements, have included the joint construction and/or modification of Hellenic Navy U209/214 submarines of German design, between HDW and the Hellenic Shipyards; the Greek assembly, by Hellenic Defence Vehicle Systems, of 90 Leopard 2A6 HEL MBTs of the 126 procured from the German firm of Krauss-Maffei Wegmann (IHS Jane's 2013b); the co-production of rear fuselages for F-16 fighter aircraft, between Lockheed Martin and the HAI, and other programmes, such as the unmanned aerial combat vehicle or UCAV nEUROn, involving the French Dassault Aviation, other European aerospace and defence electronics firms (e.g., EADS, Saab, Thales, etc.) and the HAI. However, some military procurement offset arrangements with foreign firms were directed towards

non-defence related economic activities, such as the development of tourism or the promotion of agricultural exports and did not provide any recurring benefits to the HDIB (e.g., through continuous transfers of military technology ‘know how’).

**Table 1.** The 7 Biggest Hellenic Defence Industries

	Sector	Total (€)/ FY	Sales	Employees	Arms Share of total sales (%)	Exports share (%)	Status
Metka	Comp & sup (MV, Sub)	606491000 (2013)		800	3.2%	95%	Pr/Vent
HAI	Comp & sup (Ac /UAVs, El)	88230099 (2013)		1369	97%	52.5%	Sta/own
EAS	SA/A	54019575 (2013)		533	100%	73%	Sta/own
IDE	Comp & sup (El)	49855647 (2013)		393	100%	98.4%	Pr/Vent
Elefsis Sh.	Sh	43227880 (2013)		585	86.67%	0%	Pr/Vent
Hellenic Sh.	Sh, Sub	26318045 (2011)		1300	N/A	N/A	Pr/Vent
ELVO	MV	5817951 (2012)		376	99,6%	N/A	Sta/con

**Notes:** Comp & sup = components & supply; MV = Motor Vehicles; Sub = submarines; Ac = aircraft; UAVs = unmanned aerial vehicles; El = electronics; SA/A = small arms /ammunition; Sh = ships; Pr/Vent= private venture; sta/own = state-owned; sta/con = state controlled; N/A= Not Available; Sales in € at current prices and exchange rates.

**Source:** The author created this table based on data received from companies’ publicly available annual balance sheets & websites, as well as from the companies’ responses to a questionnaire prepared by the author.

Since 2009, the majority of Greek defence contractors have had difficulties in sustaining operations, because of reduced military spending, and the consequences of the unification of the European defence market (Giannitsopoulos 2016; 2015). After the last Memorandum of Understanding for the Greek economy (EC 2015, 7) between the European Commission and Greece, Greece has had to further reduce its military spending on procurement, which, in turn, will further affect the HDIB. Consequently, the vast majority of the HNDF’s procurement concerns upgrades of existing major weapons systems and platforms, such as the upgrade of five P-3 Orion maritime surveillance aircraft that belong to the Hellenic Navy and Hellenic Air Force inventory.

**Table 2.** Greece's Defence Expenditure 2009-2016 (€ million current prices)

	Defence Expenditures	<i>Distribution of Defence Expenditure by Category (%)</i>			
		Equipment	Personnel	Infrastructure	Other
2009	7.311	27.75	56.52	0.84	14.88
2010	5.966	17.98	65.07	0.76	16.19
2011	4.934	5.86	76.03	1.26	16.84
2012	4.384	7.47	73.19	0.79	18.55
2013	3.999	12.06	74.56	0.63	12.75
2014	3.939	8.17	77.18	1.10	13.55
2015	4.190	12.77	70.04	0.77	16.42
2016	4.155	14.91	69.93	0.49	14.67

**Source:** NATO (2016). Figures for 2016 are estimates. The author created the table using information from the source.

Meanwhile, the HDIB has been negatively affected by the introduction of European Directive 2009/81/EC concerning defence contracting, which was incorporated into the Greek legislative system in 2011. This directive established a unified defence market between European countries (TNO 2009) by abolishing the existing protective measures for the DIBs of EU member states. The unification of the defence market in Europe led to further shrinkage of the small HDIB, because the latter faced fierce competition from major Western European defence equipment firms with longer production runs and lower average and marginal costs. With long production runs, the average unit cost of a defence item declines and better absorbs initial ('up front') and sunk R&D economic costs. Similarly, with an embedded technological and industrial production base, a major military equipment manufacturer can produce additional units of a defence item at a marginally lower cost. Thus, a major defence manufacturer with significant economies of scale can better price-compete for defence contracts.

This outcome has also reduced the confidence level of the HNDF when it comes to relying on the HDIB for its on-going supply and sustainment needs. Consequently, the HDIB covered only 9% of the HNDF procurement needs in 2016 while the Hellenic Ministry of Defence target announced is 20% (Vivienne 2016). This development is disturbing for a number of reasons. The HNDF would definitely prefer to rely for its procurement on a larger share of domestic content. However, the defence items at issue need to be timely delivered and must meet prerequisite specifications, because such deliveries affect the HNDF's readiness and deterrence capabilities. In the context of the ongoing economic and fiscal crisis, the majority of the HNDF military mission and task requirements cannot yet be met by the HDIB output except in few cases.

Under the provisions (Article 346) of the Treaty on the Function of the European Union (TFEU), (EUR-Lex 2007), European countries have the right to protect their domestic defence production when they appropriately justify any essential national security interests. Although Greece had the opportunity to legislate exemptions from this general rule, such legislative initiatives have not been undertaken. Instead, Greece unified its small DIB with the strong European defence industrial base (EDIB) and military equipment acquisition market.

Research concluded indicates that a number of European countries tend to ignore competition procedures *per se*. Indeed, Germany recently announced that it will issue its industry with a €1.5bn for the purpose of purchasing warships (Reuters 2017), while France proclaimed the nationalisation of its biggest shipyard at St-Nazaire (Topham 2017). Moreover, other European firms are free to enjoy government economic assistance even if engaging in purely commercial ventures (e.g., the undertaking of Electricité De France (EDF) and the nuclear equipment manufacturer Areva to build a two-unit nuclear power generating station in the UK) (Landauro 2016; Macalister 2016). In the aftermath of the United Kingdom's referendum vote for Brexit, the situation in the European defence industry is becoming much more uncertain (Ghez *et al.* 2017, 8).

The realities of the protracted economic and fiscal crisis, combined with Greece's security concerns, demand a national strategy for restructuring and optimising the HDIB. This restructuring and optimisation need to take place in the context of the overall Greek national security strategy, i.e., this strategy does not and cannot rest on the resources and capabilities of the HNDF alone. This restructuring must explicitly recognise the existing and future environment of symmetric and asymmetric national security threats that Greece has to overcome based on its *own* ways and means of national power. The conventional thinking is that an economically viable HDIB must be able to compete in the international and European defence equipment markets. However, the involvement in new technologies -enhanced through collaborative R&D projects (e.g., EU and NATO defence research grants)- and better utilisation of highly educated Greek human capital can create a more adaptable and cost-effective HDIB.

## 7. The Way Forward

Appropriate allocation of defence expenditure from European governments can support their respective defence industrial bases on national security grounds and, hence, increase the country's economic productivity (EC 2016, 4; Vitsas 2016). Because of the dramatic economic change in Greece over the last 8 years, the Greek government should negotiate with the European Commission an appropriate legal framework that will enable its defence industry to remain in business within the single European market for defence. This approach must also highlight 'the

paradox that is required by the European Union and NATO to increase their defence expenses' and 'at the same time, Greece's, while the country also has to reduce its defence budget by up to 30%' because of the economic crisis (Kammenos 2017).

In the absence of new enabling legislation, Greece must comply with applicable EU rules and provisions. For example, in the dual-use industry, if government aid investment is used for both economic and military purposes, and no separate accounts are kept, the European Commission will still scrutinise the economic activity for overcompensation under article 107 TFEU (Jensen 2013), as the European Court of Justice (2013) ruled in case C-246/12P – *Ellinika Nafpigeia v. Commission* in 2013. Meanwhile, Greece should be actively engaged in the effort to establish the common European defence. Within this context, Greece should request that the European Commission support the country's industry through adequate funding from European Defence Fund, or, where possible, from the EU budget (EC 2016, 5) for research, and defence capabilities development.

The Greek government should also examine the issue of a sustainable HDIB in a comprehensive manner that encompasses the support of the several small and medium-sized (SMEs) private defence enterprises. Mergers and synergies to face the competition from abroad should be encouraged. In addition to this, re-structuring, re-capitalisation and modernisation of the corresponding state-owned or state-controlled companies is deemed to be of importance.

As regards the latter, it is the author's view that the Greek government, after undertaking a study on a firm-by-firm basis, should develop strategic conversion plans involving organisational restructuring, gradual privatisation and a focused conversion policy. The piecemeal 'privatisation' and/or outright liquidation of these firms will only provide a temporary solution (i.e., a short-term reduction of budgetary deficits that also goes hand-in-hand with a commensurate increase in national unemployment levels). Such a solution is inimical to the long-term interests of Greek national security. An alternative route involves a new form of ownership, recapitalisation and management of major defence enterprises in Greece so that they may participate in multi-national programmes or privatisation, and a focused conversion, in a "way that will safeguard both Greek national security and economic interests" (Dokos and Kollias 2013).

Research concluded suggests that the in-country highly qualified scientific potential is indeed supportive to such initiatives on purely business grounds. Additionally, initiatives, such as the conversion of the HDIB into dual-use or multi-product industry, would keep industrial production lines open and enable domestic producers to remain in the market for the benefit of HNDF sustainment (Xenokostas 2015). Greek shipyards are very well suited for this role (Grevatt 2016), as they seem to have a comparative advantage with regard to building ferries and cruise ships, providing a competitive ship-repair zone (Soumeli 2000) while also simultaneously supporting the Hellenic Fleet.

In this era of economic crisis, Greek contractors have struggled to ensure entering new markets abroad, even though they have the technological foundations and the necessary workforce skills. Therefore, the Greek government should support their efforts to access new markets. Events, such as the annual Association of the United States Army (AUSA) arms exhibition in Washington, D.C. or elsewhere, provide fora for Greek defence equipment enterprises and the Greek government should actively support their presence at such venues. Similarly, procurement of new military equipment or modernisation of existing weapons systems should involve co-production and military technology transfer arrangements with foreign defence firms (a perennial tactic for Turkey's military procurement programmes), rather than the loosely defined and often unproductive economic offset arrangements of the past.

The HDIB can benefit from the formal renegotiation of older military assistance agreements with other countries, e.g., the defence economic/industrial cooperation agreements (DECA/DIECA 1997) with the U.S. In this manner, the HNDF can enjoy better and long-term benefits through domestically produced advanced military technology. A similar agreement can be pursued with Germany with the unsettled Greek WW II reparation claims at its core (e.g., paralleling the Israeli approach for the acquisition of modern German-built and financed submarines), (Nuclear Threat Initiative 2015; *The Economist* 2016b).

It is the author's view that in order to have a small yet viable HDIB, project-prioritisation and the call for integrated solutions are of paramount importance so as to facilitate sustainability, in particular during periods of economic downturns. This should cover a wide and diverse market range from joint projects, upgrades and maintenance to the development of "smart" solutions for countering rivalries with advance technologies through spending less money. Certain HDIB industrial concerns can continue to focus on heavy industrial production designed to sustain the HNDF needs, e.g., production of ammunition and other consumables, maintenance and retrofit of armoured vehicles, warship and combat aircraft upgrades, etc. Other HDIB concerns need to focus on cutting edge technologies and more closely and *institutionally* collaborate with human resources available at Greek academic institutions and the indigenous R&D and production elements of the HNDF. For example, the rapidly evolving technologies of computer controlled three dimensional (3-D) printing can provide the basis for cost-effective but limited production runs for manufacturing essential parts that can keep major HNDF combat systems operational, thus foregoing the importation of expensive spare parts. There needs to be a renewed emphasis on defence electronics and a rejection of the "we cannot produce anything" syndrome (i.e., the reverse engineering that has been practised for a long time by Israeli and Turkish defence firms is an example). Greece possesses both the human capital and the technical resources needed for



the development and operational deployment of unmanned aerial and sea vehicles. In view of the protracted economic and fiscal crisis, it is self-evident that the use of UAVs for tactical and strategic area reconnaissance is a more cost-effective method than the routine and continuous employment of very expensive and valuable manned platforms that must be preserved for more critical military missions and tasks.

Integrated solutions should engage all key-stakeholders. For example, the concept of national security is often -and erroneously- viewed as 'the job' of the HNDF alone. This provides an unbalanced frame of reference and, unlike Israel and Turkey, does not involve essential actors. A small but viable HDIB requires technology and skilled manpower. In turn, this mandates the concrete involvement of Greek institutions of higher education in conjunction with the HNDF and domestic defence firms.

In the past, Greek civilian institutions of higher education were largely reluctant to become involved in defence-related research or accept NATO research grants, despite the existence of such programmes (Fenstad 2009, 491, 494). Such steps were taken long ago in Israel (1950s) and, more recently, in Turkey. HMOD needs to develop initiatives and connect HDIB with higher educational institutions in Greece and abroad and NATO (2015), as well for HNDF benefit. Since the [Metsovio] National Technical University of Athens faculty and students were able to develop appropriate and predictive software for automotive traffic patterns for Athens metropolitan area well in advance of parallel smart phone applications or 'apps,' (NTUA 2017), such institutions can easily provide software solutions for military technology applications (e.g., command, control, communications, computers and intelligence or C4I), and for information and cyberspace warfare. They can also engage in technological dual-use leaps, e.g., composite materials and 3-D printing (Song, 2012; Tadjdeh, 2014; Walsh 2015) for the domestic production of essential weapons systems components and spare parts.

It is a well-known fact that the rapid development of high technology firms and output within the Israeli economy has been and still is the result of the synergistic effect between the Israeli Defence Force (IDF), the Israeli DIB, and Israel's institutions of higher education. The collaboration of young Israelis while serving at the IDF often formed the basis of high technology ventures that became mutually supportive, while continuing to operate in Israel (*The Economist* 2016c). This approach, which is well known as the national innovation system concept (Lundvall 2007; Freeman 2002), could be used by Greek Authorities as an effective paradigm.

## 8. Concluding Remarks

This paper concludes that the HDIB suffers from the absence of a long-term national strategy for enabling its evolutionary and viable development, and the lack of an appropriate legal protective framework in an era of reduced Greek military spending for arms acquisition programmes.

Furthermore, it should be stated that the HDIB forms an integral part of the Greek national defence framework, and serves long-term national security interests. Israel and Turkey have set the example and created robust DIBs which benefit both their countries' economies through high exports, and the sustainment of their respective national armed forces. The Greek government, on national security grounds, should follow their example and negotiate appropriate paths within the European Union. The ownership and management structure for major defence industrial enterprises in Greece is in dire need of fundamental change and these enterprises must be treated as a genuine and integral part of the national defence framework. Such a change should be accompanied by much needed re-capitalisation, modernisation, and fundamental improvements in efficiency and productivity. The Greek government needs to develop a strategy that will enable the development of the HDIB and should use such a plan and direction to ensure that Greece's limited military spending promotes the development of its domestic arms production.

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