

Central and Eastern European countries: measures to enhance balanced defence industry in Europe and to address barriers to defence cooperation across Europe

Technical Annex: Country Profiles and Appendixes

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Preface

This technical annex supplements RAND's Report to the EDA on Balanced Defence Industry in Europe. It is intended to provide additional information in support of the main report presented to the EDA in relation to barriers to and opportunities for enhancing competitiveness and cooperation across the European defence industry, with a particular focus on identifying measures to facilitate the effective participation of Central and Eastern European (CEE) countries in cooperative programmes and cross-border supply chains, improving the visibility and effectiveness of the defence sector in those countries.

The 11 EDA participating member states (EDA MS) that form the subject of this study and annex are: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. As part of this study, the team at RAND Europe have conducted a systematic literature review, as well as engaging relevant stakeholders in CEE Ministries of Defence (MODs), national defence industry associations (NDIAs) and academia.

For each CEE EDA MS, this annex presents the following supplementary information: an overview of the historical, economic and policy context of the national defence industry; a high-level assessment of industrial capabilities, including key local industry players and niche technical areas; and identification of barriers and obstacles to international cooperation, opportunities and capacity-building needs.

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Abbreviations

BPBALV	Czech Association of Aviation Manufacturers
AMV	Armoured Modular Vehicle
AOBP	Czech Defence and Security Industry Association
APC	Armoured Personnel Carrier
ARP	Polish Industrial Development Agency
B2B	Business-to-Business
BAF	Bulgarian Armed Forces
BALTBAT	Baltic Battalion
BALTNET	Baltic Air Surveillance Network
BALTRON	Baltic Naval Squadron
BGN	Bulgarian Lev
BSA	Business Software Alliance
C2	Command and Control
C4ISTAR	Command, Control, Communications, Computers, Intelligence, Surveillance, Targeting Acquisition and Reconnaissance
CAF	Croatian Armed Forces
CAS	Close Air Support
CBRN	Chemical, Biological, Radiological and Nuclear
CCAI	Confederation of the Czech Aviation Industry
CCD COE	Co-operative Cyber Defence Centre of Excellence (NATO)
CEE	Central and Eastern European
COE	Centre of Excellence
ČVÚT	The Technical University Prague
CZK	Czech Koruna
DARPA	Defense Advanced Research Projects Agency
DDoS	Distributed Denial of Service

DOD	US Department of Defense
DLA	Hungarian MOD Development and Logistics Agency
DM	Deutsche Mark
DTIB	Defence Technology and Industrial Base
EC	European Commission
EDA	European Defence Agency
EDEM	European Defence Equipment Market
EDIA	Estonian Defence Industry Association
EDTIB	European Defence Technology and Industrial Base
EOD	Explosive Ordnance Disposal
EOD COE	Explosive Ordnance Disposal Centre of Excellence (NATO)
ESA	European Space Agency
ESSOR	European Secure SOftware designed Radio
EU	European Union
EUR	European Single Currency
G2G	Government-to-Government
GDP	Gross Domestic Product
HNS	Host Nation Support
HRK	Croatian Kuna
HUF	Hungarian Forint
IDEB	International Defence Exhibition Bratislava
IDET	International Exhibition of Defence and Security Technologies (Czech Republic)
ICT	Information Communication Technology
IFV	Infantry Fighting Vehicle
IP	Intellectual Property
IPR	Intellectual Property Rights
ISAF	International Security Assistance Force
ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance
IT	Information Technology
ITU	International Telecommunication Union
LGSPA	Lithuanian Defence and Security Industry Association

LOI	Letter of Intent
LPF	Level Playing Field
LRRV	Long-Range Reconnaissance Vehicle
LTDP	Long-Term Development Plan
MALE	Medium Altitude/Long Endurance
MBT	Main Battle Tank
MCM	Mine Countermeasures
MECT	Romanian Ministry of Economy, Tourism and Trade
MET	Hungarian Ministry of Economy and Transport
MFA	Ministry of Foreign Affairs
mm	Millimetre
MOD	Ministry of Defence
MOI	Ministry of Industry
MORS	Procurement Division of the Logistics Directorate of the Slovenian MOD
MOU	Memorandum of Understanding
MRAP	Mine Resistant Ambush Protected
MRO	Maintenance, Repair and Overhaul
MS	Member States
MSBS	Modular Small Arms System
MVSZ	Hungarian Defence Industry Association
NAF	National Armed Forces
NATO	North Atlantic Treaty Organisation
NBC	Nuclear, Biological, Chemical
NCI Agency	NATO Communications and Information Agency
NDIA	National Defence Industry Association
NORDEFECO	Nordic Defence Cooperation
NSIP	NATO Security Investment Programme
NSPA	NATO Support and Procurement Agency
OCCAR	Organisation for Joint Armaments Cooperation
OPV	Offshore Patrol Vessel
PATROMIL	Romanian Business Association of Military Technique Manufacturers
PLN	Polish Zloty

R&D	Research and Development
RON	Romanian Leu
S&T	Science and Technology
SAF	Slovenian Armed Forces
SALW	Small Arms and Light Weapons
SAM	Surface-to-Air Missile
SDR	Croatian Strategic Defence Review
SIPRI	Stockholm International Peace Research Institute
SIS	Slovak Information Service
SME	Small and Medium Enterprise
STEM	Science, Technology, Engineering and Mathematics
TMP	Armed Forces Technical Modernisation Plan (Poland)
UAV	Unmanned Air Vehicle
USD	US Dollar
UOR	Urgent Operational Requirement
V4	Visegrád Group (Czech Republic, Hungary, Poland, Slovakia)
WAT	Warsaw Military Academy of Technology
WTO	Warsaw Treaty Organisation
WZL	Wojskowe Zakłady Lotnicze
ZBOP	Slovak Defence and Security Industry Group

1. Introduction

1.1. This technical annex supplements RAND's study of barriers to, and opportunities for, balanced defence industry in Europe

This technical annex provides additional information in support of RAND's main report to the European Defence Agency (EDA) on the subject of 'Central and Eastern European countries: measures to enhance balanced defence industry in Europe and address barriers to defence across Europe' (15.ESI.SC.254).

As outlined in the Main Report, the 11 EDA participating member states (EDA MS) that form the subject of this study and annex are: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. As part of this study, the team at RAND Europe have conducted a systematic literature review, as well as engaging relevant stakeholders in Central and Eastern European (CEE) government ministries, national defence industry associations (NDIAs) and academia.

1.1.1. For each CEE member state, a country profile provides an overview of defence industrial capabilities, policy, opportunities and capacity-building needs

As outlined in the main report, the RAND team undertook a literature review, stakeholder interviews and a number of country visits to collate information on each of the 11 CEE countries addressed in this study. In Chapters 2–12, this annex presents country profiles for each EDA MS, each comprising the following supplementary information: an overview of the historical, economic and policy context of the national defence industry; a high-level assessment of industrial capabilities, including key local industry players and niche technical areas;¹ and identification of barriers and obstacles to international cooperation, as well as opportunities and capacity-building needs.

1.1.2. In addition, appendices provide further information on the conduct of the study

In addition to the country profiles, this technical annex also includes a number of appendices that provide further information on the methodology and management of the study. This includes a full copy of the interview protocol used as the basis of the RAND team's interviews with CEE stakeholders (Appendix A);

¹ Niche capabilities are those small but comparatively well-developed competences within a DTIB. In the case of the Czech Republic, for instance, its major industrial activity is in aerospace production, but the country is also home to smaller competitive firms specialising in training simulators or chemical, biological, radiological, nuclear (CBRN).

an overview of study visits made by the team to the Czech Republic, Estonia and Romania (Appendix B); a list of stakeholders who participated in telephone or face-to-face interviews, or else who provided written submissions (Appendix C) and a list of attendees at the study workshop (Appendix D). Finally, additional detail is provided on each of the principal recommendations made to the EDA in the main report (Appendix E).

A full overview of the study approach can be found in Chapter 2 of the main report.

2. Country profile: Bulgaria

2.1. Country at a glance

Bulgaria's defence industry is a medium-sized producer of small arms and light weapons (SALW), ammunition, communications, optics and military equipment, as well as maintenance, repair and overhaul (MRO) services. It also has niche capabilities in demilitarisation and ammunition recycling services, though in general investment in new technology, products or facilities has been limited in recent decades. Now mostly privately-owned, the local defence industry has endured significant disruption and decline since 1990, while government defence planning has been especially hampered since 2007–2008 by a sharp reduction in military spending and high turnover of high-level officials. The Bulgarian Ministry of Defence (MOD) has unveiled plans to modernise key equipment, boost the Armed Forces' capability to deploy on North Atlantic Treaty Organisation (NATO) missions and reduce the reliance on foreign components and repair services (especially those from Russia). However, mechanisms for industrial cooperation with overseas partners have often focused on lower-technology products (and non-EU partners) in the past, with less experience in collaboration with other CEE countries or, especially, with Western primes.

2.1.1. Context of industrial and economic restructuring

Historically, the sector produced a wide range of products for the Bulgarian Armed Forces (BAF), with 130 enterprises employing 150,000 people in the 1980s before a period of decline and transformation in subsequent decades.² During the communist era, the sector was an integrated part of the wider Warsaw Pact defence technological industrial base (DTIB), with around 90 per cent of production going to export and the country's industrial specialisation – for instance on armoured vehicles and electronics – dictated primarily by the needs of the wider alliance.³

The period since the fall of the Warsaw Pact has seen moves towards privatisation and even conversion – with mixed success – as well as significant job losses, rising debt levels and limited investment in new research or production facilities. Industrial re-structuring led to the break-up of many large enterprises into smaller companies, with a loss of the privileged position of the sector under the previous regime.⁴ For much of the 1990s, defence industrial policy was seen as short term or ad hoc, with the sector receiving

² Gobinet (2012).

³ Dimitrov & Ivanov (1993).

⁴ Dimitrov (1998).

little mention in the major guiding policy documents of the time, such as the *Law on Defence and the Armed Forces* (1995), *National Security Concept* (1998) or *Military Doctrine of the Republic of Bulgaria* (1999). Following the country's accession to NATO and the EU, Bulgaria's defence industry is now largely under private ownership and reported to employ around 25,000 workers. These are spread across 14 core companies who act as members of the Bulgarian Defence Industry Association (BDIA), as well as assorted other defence-related firms and SMEs.⁵ Major Bulgarian research centres include the Institute of Metal Science, Equipment and Technologies (part of the Bulgarian Academy of Sciences) and Kazanlak Science Research Technology Engineering, as well as R&D departments within private defence companies.

To meet domestic demand, core areas of competence include production of small arms, ammunition, military optics and radar systems, as well as MRO of land, maritime and air equipment – primarily Soviet-era systems used by the Bulgarian military, as well as products and services compliant with NATO standards. At the same time, the sector is active in exports to non-EU third markets, including Afghanistan, Algeria, India and Iraq, with the country looking to expand its arms exports to China and Vietnam.⁶ Local manufacturers are also seeking opportunities to collaborate with Western companies that may significantly advance Bulgarian skills and knowledge.⁷

2.1.2. Recent policy and defence spending

In 2012, Bulgarian deputy defence minister Valentin Radev set out the country's defence industrial development strategy – with emphasis on a 'Buy Bulgarian' policy and use of a defence industry forum created two years previously – so as to help prioritise future defence projects and promote greater coordination between business, government and relevant academic institutions. One of the forum's aims is to develop technology concepts spanning small arms, ammunition, optical equipment and IT technology.⁸ Procurement planning is then led through the Defence Investment Directorate of the MOD, having aligned practices with the European defence procurement directive 2009/81/EC in 2011 – with the latest Public Procurement Law, which enters into force in April 2016, making no provision for defence offsets. Against this industrial backdrop, the Bulgarian Armed Forces continue to draw primarily on ageing military equipment, much of it designed and built during the Warsaw Pact era. Since 2004, efforts have been made to reform and modernise the Bulgarian Armed Forces, although limited investment in procurement spending has limited the impact of these programmes. The Land Forces plan to form and equip an expeditionary battalion battle group (~1000 soldiers) that could participate in NATO operations as components for a multinational tactical level unit. The Air Force, meanwhile, is equipped mostly with Soviet-made and designed armaments such as MiG-29 fighters and S-75 Volokhov missiles, which has historically made Bulgaria reliant on Russia for spare parts and maintenance – though efforts are underway to reduce this dependency (see Section 2.4). The ground component of the Air Force

⁵ IHS Jane's (2015b).

⁶ Dunai (2012b).

⁷ IHS Jane's (2015b).

⁸ IHS Jane's (2015b).

has relatively a high capability with Russian long-range S-300 missile systems. As part of modernisation efforts, Bulgaria has recently acquired new transport aircraft and helicopters and now aims to buy eight fighter aircraft by 2015 and eight more by the second half of the decade. Bulgaria recently procured Western-designed and manufactured missile frigates for the Naval Forces and plans to upgrade the radio-navigation equipment.⁹

The onset of economic austerity following the financial crisis of 2007 has had a particular impact on defence; defence budgets are facing significant cuts and plans are subject to a period of political instability – with five different defence ministers serving in the two years 2013–2014. As a result, levels of compatibility and interoperability with NATO remain low and development has been mainly aimed at the units that participate in multinational forces. In 2011 Bulgaria adopted a new military investments plan for 2011–2020, outlining the implementation of most of the programmes included in the 2004 development plan, but revised down to a smaller scale. With the defence budget decreasing as a percentage of GDP out to 2019, the ability of the Bulgarian MOD to implement its future modernisation plans is unclear.¹⁰

Table 2.1 Defence spending in Bulgaria, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion*	-	0.604	0.570	0.538	0.623	0.680	0.668	0.662
Constant 2015 BGN billion*	-	1.130	1.067	1.007	1.167	1.273	1.250	1.239
% GDP (media figures)*	-	1.32%	1.23%	1.13%	1.27%	1.35%	1.28%	1.22%
% GDP (government figures)†	1.41%	1.49%	1.35%	1.30%	1.35%	1.28%	1.28%	-

Source: *IHS Jane's data (2015), included for consistency with other CEE country profiles. †Bulgarian MOD data (2016).

2.2. Defence industrial capabilities

2.2.1. General assessment by sector (land, air, naval, C4I)

In the land sector, Bulgaria is a traditional producer of SALW, antitank and air-defence systems, artillery and aviation ammunition (e.g. unguided missiles, bombs), pyrotechnical products, optics, radars and radio-communication equipment, although many products are relatively low-tech.¹¹ The Bulgarian Ministry of Economy reports that the sector has the necessary industrial infrastructure for cooperation in

⁹ Gotkowska & Osica (2012).

¹⁰ IHS Jane's (2015b).

¹¹ RAND Europe interview, August 2015.

system and component development,¹² while local industry also has some limited capabilities at the platform level.¹³ Bulgaria has also developed two amphibious infantry fighting vehicles (IFVs), the BMP-30 and the BMP-23; however, neither of these has been exported yet. Other products include Soviet-era 2C1 122 mm self-propelled howitzers, several versions of the MTLB tracked armoured vehicle and a range of optical surveillance systems, including first generation night vision.¹⁴ Bulgarian defence enterprises also provide some MRO services for land vehicles and artillery (Terem Ovech, Terem Khan Krum, Terem Ivailo), as well as conducting research into electronic, armour and aerospace materiel and software development.¹⁵

The country's industrial capabilities in the air, naval and C4I domains are more limited, reflecting Bulgaria's historic reliance on other CEE nations (including Russia) for development and maintenance of many systems in these areas. However, the local defence sector does provide MRO services for helicopters (Terem Letets, Avionams JSC), fixed wing aircraft (Avionams JSC) and naval vessels (Terem KRZ Flotsi), as well as producing a range of optics and military electronics, such as communication systems, radio jammers and radar (various, see below). Development and production is focused at the systems, sub-systems and components level, with Bulgaria, for instance, reliant on Russian and Polish support to maintain and overhaul its combat aircraft fleet.

In 2012, Bulgaria issued 499 licences for export and transfer of defence-related products, mainly to the United States, Egypt and Kazakhstan. The top three destination countries for exports were Algeria, Afghanistan and India.¹⁶ At the Hemus defence industry exhibition held in Plovdiv in May 2012, it was announced that the country's exports of ammunition and military equipment totalled EUR231 million (USD291 million) for 2011.¹⁷ The aim of the Hemus meeting was to bring together people from the defence industry, military officials and communication specialists to discuss issues around the future of Bulgaria's industrial base. Deals were signed totalling more than EUR165 million and included three major contracts. As Peter Dunai (2012b) reported, 'Kintex, a Bulgarian state-owned foreign trade company, concluded two deals: delivery of an unspecified package of military equipment to India, worth EUR55 million; and another unspecified sale of military equipment, valued at EUR36 million, to Algeria.' Bulgaria also announced a EUR70 million deal with Iraq for the sale of 500 second-hand modernised MT-LB multipurpose armoured vehicles – however, the agreement has not been finalised.¹⁸

¹² RAND Europe interview, August 2015.

¹³ IHS Jane's (2015b).

¹⁴ IHS Jane's (2014j).

¹⁵ IHS Jane's (2015b).

¹⁶ IHS Jane's (2014j).

¹⁷ Dunai (2012b).

¹⁸ Dunai (2012b).

2.2.2. Major industries

Bulgaria's major defence enterprises include:¹⁹

- **Arcus Co:** Producer of tools for machine-building industry, as well as munitions, fuzes and small arms, privatised in 2000.
- **Arsenal Company:** Manufacturer of arms and ammunition, including mortar bombs and unguided rockets, privatised in 2011.
- **Avionams JSC:** Aviation specialist offering range of services for the overhaul and modernization of civil and military helicopters (e.g. Mil Mi-8, Mi-17, Mi-24), as well as MiG- and Su- family fighter aircraft and L-39 trainer jets.
- **Dunarit:** Company selling artillery munitions (57 mm to 122 mm), aerial bombs and industrial explosives, including mortar bombs and unguided rockets, privatised in 2011.
- **Electron Corporation:** Privately-owned producer of defence electronics and sub-systems, communications R&D, meteorological radars.
- **Institute of Metal Science, Equipment and Technologies with Hydro-aerodynamics Centre:** Centre conducting both basic and applied research, part of the Bulgarian Academy of Sciences.
- **Kazanlak Science Research Technology Engineering:** Institute working on small arms, artillery, ammunition and the BRM-23 infantry fighting vehicle.
- **Kintex SHC:** Trading company with defence-related products and services;
- **MARS Armor:** Manufacturer of body armour for law enforcement, military and civilians.
- **Maxam Bulgaria JSC:** Specialist in explosives and ammunition.
- **Opticoelectron:** Privately-owned developer of optical systems (e.g. gun sights and night vision equipment) for both military and civil markets,
- **Optixco:** Privately-owned developer of optics (gun sights and binoculars).
- **Samel90:** Producer of military communications systems, including field telephones and radio jammers, employing around 400 workers and exporting 70 per cent of its products.
- **Tchernomore:** Privately-owned specialist in radar systems (both land and marine).
- **Terem:** State-owned MRO group, repairing systems in the land, naval and air domains. Sub-organisations include Terem Letets (helicopter MRO), Terem Evech (land vehicles and armour overhaul), Terem Khan Krum (armoured vehicles spare parts manufacturer), Terem KRZ Flotsi Arsenal (naval MRO), Terem Ivailo (artillery and weapon systems MRO), Terem Tzar Samuil (ammunition services).
- **VMZ Sopot:** Bulgaria's largest state-owned defence production complex, with a staff of around 3,000 producing anti-tank and guided missiles, as well as artillery ammunition. Privatisation efforts were launched in both 2011 and 2013.

Along with a range of SMEs, a number of specialist research centres are also active in defence and dual-use technical areas. The Kazanlak Science Research Technology Engineering, for instance, has worked on developing the BRM-23 infantry fighting and reconnaissance vehicle, and also produces small arms,

¹⁹ IHS Jane's (2015b).

artillery and ammunition. The Institute of Metal Science, Equipment and Technologies at the Bulgarian Academy of Science is currently developing armour plating and various anti-personnel, anti-tank and defensive mines, while other companies, such as Arsenal Co. and VMZ, have internal research centres focused on developing new infantry weapons.²⁰ Electron Corporation in Sofia and its Chernomorec Co. in Varna provide R&D services on defence electronics and electronic sub-systems, while the Space Research Institute in Sofia undertakes aerospace R&D activities.²¹

2.2.3. Niche areas

Bulgaria is a traditional producer of SALW and other military equipment, serving a variety of markets. While many products and services meet NATO standards, Bulgarian firms are also active exporters to countries operating Soviet-era equipment.²² Bulgaria has also developed niche capabilities in ammunition recycling and destruction capacities, boosted by the 2004 *National Programme for the Utilization/Recycling and Destruction of Surplus Ammunition on the Territory of the Republic of Bulgaria*. Indeed, many of Bulgaria's arms companies, such as Arsenal Arcus, include demilitarisation services in their portfolios, even if the companies prefer to focus on promoting their production capabilities.²³ As such, demilitarisation services are provided by Terem Kostenets, VMZ JSC, Expal Bulgaria, Arcus, Bereta Trading and others.²⁴

The Bulgarian defence sector has also made some moves into the market for tactical and specialist unmanned air vehicles (UAVs) – though its success in generating sales is unclear from open-source material. This includes the indigenous development by Armstechno Co. of the NITI tactical UAV, which had its maiden flight in 2006 but was subsequently rejected by the Bulgarian Ministry of Interior in 2011.²⁵ A number of small firms, such as Microdrones Bulgaria, Flyver and DroneSystems are also involved in the development of lightweight micro-UAVs and their control or imaging software.²⁶ In addition, the Bulgarian Air Force SAM (surface-to-air missile) Central Repair Facility in Bozhurishte also provides niche facilities for converting SAMs into high-speed target drones.²⁷

In the future Bulgaria is seeking to pursue international cooperation in a range of high-technology niche areas, including:²⁸

- **Force protection:** Personnel and vehicle armoured protection, counter-IED equipment.
- **Military electronics:** Electronic counter-countermeasures, flight systems, simulators, radars, optics (especially night-vision equipment), command information systems and networks.

²⁰ IHS Jane's (2014j).

²¹ IHS Jane's (2014j).

²² Gotkowska & Osica (2012).

²³ Gobinet (2012).

²⁴ Gotkowska & Osica (2012).

²⁵ 24yaca (2011).

²⁶ DroneBlog (2015).

²⁷ IHS Jane's (2014j).

²⁸ RAND Europe interviews, August 2015; Vodenitcharov (2014).

- **Chemicals:** Advanced energetic materials (e.g. sea mines, anti-assault mines, ‘intelligent’ fuzes), batteries (incl. armoured vehicles and vessels).
- **Protection of critical national infrastructure (CNI):** CBRN, cybersecurity, CNI security systems,
- **Unmanned systems:** UAVs, unmanned maritime systems (UMS), space platforms and systems.

2.3. Barriers and obstacles

2.3.1. Internal

A literature review and interviews with stakeholder experts suggest that the main internal barriers include the lack of a culture of cooperation or trust between different government and defence industry actors.²⁹ Similarly, there is a lack of understanding of the Western defence market and international procurement processes, while loss of qualified personnel brought on by past economic difficulties and limited domestic demand may pose a future threat to the development of the Bulgarian industry.³⁰ Corruption and limited transparency are also perceived to be important, related challenges.³¹ While the government has adopted anti-corruption mechanisms, the effectiveness of the implementation of these mechanisms and controls is uncertain.³² The risk attached to this perception may discourage foreign investment or cooperation.³³

Interviewees also report concerns over the clarity of the government’s vision for development of the defence industry.³⁴ Previous research has highlighted ‘soft skills’ – such as marketing, business planning or foreign languages – as a challenge for the sector, while a reported lack of understanding of international procurement processes and management culture is seen as exacerbating the situation.³⁵ On the technical side, not all arms manufacturers meet NATO standards and most of the products are aimed towards less-developed countries, with limited industrial investment in the past two decades in modern research or production facilities.³⁶ According to the Bulgarian Ministry of Economy, Bulgarian companies also tend to be risk-averse and focused on mutual competition rather than cooperation and information sharing.³⁷ The need to modernise or replace the aged military equipment and systems with equipment that is interoperable with NATO has taken a great toll on the national budget and the ability of the state to support the defence industry, with limited domestic demand further hampering efforts to reform the local defence sector for success on the international market.³⁸ The fall of the local demand for demilitarisation

²⁹ RAND Europe interviews, August 2015.

³⁰ RAND Europe interviews, August 2015.

³¹ IHS Jane’s (2015c).

³² Transparency International (2013).

³³ Transparency International (2013).

³⁴ RAND Europe interviews, August 2015.

³⁵ Kolin (2015).

³⁶ Gotkowska & Osica (2012, 87).

³⁷ RAND Europe interviews, August 2015.

³⁸ RAND Europe interviews, August 2015.

of ammunition due to defence budget restrictions, reliance on international assistance for demilitarisation programmes and a shift in strategic priorities may lead to losing this particular capacity.³⁹

2.3.2. External

Bulgarian producers are relatively small, which makes it more difficult for them to compete independently in the international market⁴⁰ and prevents them from accumulating the know-how and mutual trust enjoyed by primes and companies with a history of cooperation in the international market.⁴¹ The production of small arms and light weapons is gradually shrinking and this fact, combined with the mergers of large arms producers in Europe and the US, pose great difficulties to small Bulgarian producers that cannot compete independently in these markets. Bulgarian companies have won several foreign tenders in demilitarisation activities for Slovenia and Asian markets; however the demilitarisation services in the latter are reportedly less profitable as nearly 50 per cent of the contract costs are reportedly spent on logistics due to the distances involved.⁴²

In addition, the lack of overarching EU standards for military equipment⁴³ and production and the lack of EU-level export and transfer licences are perceived as impacting the competitiveness of the Bulgarian industry and making the interaction and export process considerably slower.⁴⁴ Furthermore, improved access by Bulgarian enterprises to European laboratories is also mentioned among the ways of improving mutual trust among the EU member states and the quality of the CEE products.⁴⁵

According to representatives of the Bulgarian government, the European Commission's Directive 2009/81/EC on defence and security procurement is seen as likely to harm the Bulgarian defence industry as a result of banning offsets. Since 2004, Bulgaria has exported EUR150 million (USD209 million) in high-tech military and civilian products and Bulgarian officials claim that offsets have been crucial in facilitating these exports.⁴⁶

³⁹ Gobinet (2012).

⁴⁰ Gounev et al. (2004).

⁴¹ RAND Europe interviews, August 2015.

⁴² Gounev et al. (2004).

⁴³ EU standards for military equipment refer to common, EU-wide, requirements for specific military equipment. A similar process has been conducted by NATO since shortly after its establishment in recognition that the coordinated development of policies, procedures and equipment of the member nations held great potential for enhancing the military effectiveness and efficiency of the Alliance. (NATO Standardization Office. n.d.)

⁴⁴ RAND Europe interviews, August 2015.

⁴⁵ RAND Europe interviews. August 2015.

⁴⁶ Wagstaff-Smith (2010).

2.4. Opportunities and programmes

In recent years a number of collaborative arrangements have been established with foreign defence industries and governments, which might form the basis for further future cooperation:

- **Bilateral G2G partnerships (EU countries):** Bulgaria has pursued closer defence industrial ties with a number of fellow EU member states, for example signing a defence industrial cooperation agreement with Poland in 2015 – paving the way for Polish firms to maintain Bulgaria’s fleet of MiG-29 fighters, despite protestations from Russia.⁴⁷ Similarly, in 2011 Bulgaria and Romania established mechanisms for annual intergovernmental consultations and have indicated that they might cooperate on joint purchase of military equipment, including fighter aircraft – with other regional allies Croatia and Turkey also previously mentioned as potential partners.⁴⁸
- **Bilateral G2G partnerships (non-EU countries):** Bulgaria has also pursued bilateral governmental agreements with countries further afield, especially in Asia. In early 2015, for instance, Bulgarian and Indian ministers co-chaired the 17th Joint Committee on India-Bulgaria Defence Cooperation in New Delhi,⁴⁹ while Bulgarian officials also took steps to promote the defence sector through a new Pakistan-Bulgaria Intergovernmental Commission on Economic Cooperation.⁵⁰ A number of other memoranda of understanding (MOUs) are also in place with South Korea⁵¹ and Vietnam,⁵² as well Middle Eastern nations such as Israel⁵³ and Turkey.⁵⁴ Bulgaria has also been working on promoting training in its firing ranges and has had success in this respect with Serbia.
- **Joint regional initiatives:** Bulgaria has also been trying to boost opportunities for its arms industry (optical, electronics and light weapons sectors) within the NATO framework of smart defence. As of 2015, the country is also home to the NATO Crisis Management and Disaster Response Centre of Excellence (COE), based in Sofia.⁵⁵

Interviews and a literature review suggest that there is also strong interest in the potential for intensive cooperation with Western defence manufacturers, with efforts continuing to adapt Bulgarian arms companies to meet NATO standards. After Bulgaria joined NATO in 2004, it was deemed essential that the Armed Forces’ stockpile of aging Soviet-era equipment should be gradually overhauled, upgraded and/or replaced – however, progress to date has been limited, with the local defence sector lacking the

⁴⁷ Sabak (2015).

⁴⁸ Kucic (2011).

⁴⁹ BTA (2015).

⁵⁰ Ministry of Finance, Revenue, Economic Affairs, Statistics and Privatization, Government of Pakistan (2015).

⁵¹ Grevatt (2015).

⁵² Voice of Vietnam (2013).

⁵³ Agence France-Press (2012).

⁵⁴ Novinite (2011).

⁵⁵ NATO (2015a).

close ties to European or US prime-contractors found in some other CEE countries (e.g. Poland).⁵⁶ As such, local manufacturers are seeking opportunities for further collaboration with Western companies, with a view to bringing investment in technology, production facilities and the local skills base.⁵⁷

2.4.1. Defence planning and future procurement programmes

In 2014, Bulgaria announced its plans to increase investments in military capabilities by between 15 per cent and 20 per cent of the defence budget. The Bulgarian MOD has outlined its procurement and modernisation plans for the period up to 2020, with BGN2 billion (USD1.5 billion) to be allocated for 13 major new projects and 29 ongoing projects; while up to 40 additional projects may be executed depending on future availability of funds.⁵⁸ Of these 13 new major MOD programmes to be pursued, two are anticipated to be worth more than BGN100 million each:

- **Air domain:** Purchase of multirole fighters along with a logistics support package.
- **Land domain:** Development of a complete deployable battalion group from a mechanised brigade, with updated, more modern equipment.

In addition, a range of programmes are also planned which would each cost between BGN50 million and BGN100 million, including:⁵⁹

- **Land domain:** Improving Special Forces' equipment,
- **Naval domain:** The modernisation of the navy's *Drazki*-class (formerly *Wielingen*-class) frigates, including the procurement of surface-to-surface missile systems with over-the-horizon capability; upgrades to the navy's navigational systems.
- **Air domain:** Extending the service life of the air force's MiG-29 fighters to keep them operational until 2025–2030, and/or acquiring new models; acquiring in-service support for Eurocopter AS 532AL Cougar and Eurocopter AS 565MB Panther helicopters.
- **C4I and surveillance:** Creating a command, control, communications, computers, and intelligence cell for Bulgarian deployable units; procuring a NATO Alliance Ground Surveillance terminal; developing a strategic-level reconnaissance command and control (C2) system.

According to Bulgaria's 2010 *Development Plan*, other new capabilities to be acquired in future include UAVs for reconnaissance and targeting, as well as the ability to provide joint mission logistics support.⁶⁰ Bulgaria is also hoping to expand its capabilities in the space domain, especially in relation to technologies related to monitoring, early warning, communication and navigation.⁶¹

⁵⁶ IHS Jane's (2014j).

⁵⁷ IHS Jane's (2014j).

⁵⁸ IHS Jane's (2015d).

⁵⁹ IHS Jane's (2015b).

⁶⁰ Brancato (2014).

⁶¹ Smith (2014).

2.5. Capacity-building needs

According to the Bulgarian Ministry of Defence, the Bulgarian defence industry needs to develop strong managerial capabilities and a proactive work culture, while more EU funding with a wider scope for the development of the EU capabilities could help achieve a balanced defence industry in Europe.⁶² On the governmental level, it is thought that improved coordination with industry, transparency over future MOD requirements and an increased appetite for innovation may also have a positive impact on industrial development.⁶³ Bulgaria's capacity-building needs also include development of the domestic R&D and science and technology (S&T) sectors to support the technological and production capacities of the country's defence industry. In addition, proper technology trends that can best support Bulgaria's defence industry need to be identified that can help introduce new niche areas to boost and diversify the capabilities of the domestic defence industry away from its reliance on SALW and 'legacy' products.⁶⁴ Since cybersecurity has been identified as an area of urgent priority that is key to critical infrastructure protection, it is expected that Bulgaria will become more active in this area and will make relevant investments to further explore the cyber domain field and bolster the county's respective capacities.⁶⁵

⁶² RAND Europe interview, August 2015.

⁶³ RAND Europe interviews, August 2015.

⁶⁴ Vodenitcharov (2014).

⁶⁵ Vodenitcharov (2014).

3. Country profile: Croatia

3.1. Country at a glance

The small Croatian defence industry has its core capabilities in the provision of MRO services for land vehicles; the manufacture of SALW and munitions; and the construction and maintenance of (mostly small) naval surface vessels. Though competences are typically focused at the components and systems levels, a small number of full platforms are produced locally, including specialist de-mining vehicles and Croatian variants on Finnish IFVs and Russian main battle tanks (MBTs).

The technical sophistication of local firms varies, with a number meeting NATO standards and exporting successfully to Europe and the US, while others primarily market more low-tech goods to non-EU countries. As a result of limited domestic defence spending, Croatia's defence industry is highly export-focused; while the Croatian MOD, in turn, relies on foreign suppliers to provide much of its larger equipment (e.g. combat aircraft). The local defence sector has fewer pre-existing defence industrial partnerships – with either CEE governments or Western prime-contractors – than many other CEE MS.

3.1.1. Context of industrial and economic restructuring

For much of the 20th century, the shape, size and specialisms of the Croatian defence industry was determined by its place within the former Yugoslavia, with the country declaring independence in 1991 before the onset of four years of fighting against pro-Yugoslav forces. With independence, the local defence industry inherited approximately 7 per cent of the former Yugoslav DTIB, including the main assembly plant for production of the M-84 MBT, a range of servicing facilities, the important Ruder Boskovic R&D centre in Zagreb, and the majority of the military and civilian shipbuilding. On the military side, the country also acquired stocks of Soviet-era equipment and materiel with which to equip its new independent Armed Forces.⁶⁶

For the war period in 1991–1995, the Croatian defence industry received heavy investment – around 15 per cent of the state budget – as well as strong political support from a government largely reliant on local firms to meet the urgent needs posed by Croatian military operations. As a result, the sector's decline from peak pre-1990 production levels was less sharp and immediate than in most CEE countries. Indeed, a number of civilian companies switched to military-related production, with facilities developed to supply SALW, munitions, mortars, mines and multiple launch rocket systems (MLRS), with experience gained

⁶⁶ IHS Jane's (1992); Kiss (2004, 2).

through a combination of trial, error and reverse engineering. Within a year of independence, some 62 defence-related firms had contracts with the new MOD, producing a range of weapons and providing maintenance support to the Croatian Armed Forces.⁶⁷

Following the conclusion of the war of independence in 1995, tensions elsewhere in the Balkan region postponed the introduction of political and economic reform into the early 2000s, at which time the country began its wider re-structuring and moves towards EU and NATO accession. With high wartime spending having exerted little pressure on the Croatian defence industry to restructure or increase efficiency, the decision was taken to move the sector towards privatisation, as well as to re-orient firms towards export markets in the light of the peacetime decline in domestic demand. By 2002, defence industry output had fallen to 15 per cent of the wartime peak achieved in 1993, with the sector comprising around 25 companies – approximately half of them in the private sector – employing a total of around only 1,500 people. While in some areas, facilities were mothballed for potential future use, other firms lost key technical competences or else have exited the defence market entirely.⁶⁸

3.1.2. Recent policy and defence spending

Following this period of wartime investment and sharp peacetime decline, the Croatian government has sought to restructure and re-invigorate the local defence sector, both to promote greater security of supply for the CAF's equipment and to offset the costs of R&D by expanding exports.⁶⁹ An important part of this strategy has been a drive to transition Croatian firms to NATO standards of quality and certification.⁷⁰ In April 2010, the Croatian MOD introduced the *Concept and Strategic Framework of the Programme of Croatian-Industrial Cluster* (HVIK), with the stated aim of improving coordination between government, industry and academia as a means to stimulating greater success in export markets and in international industrial cooperation.

Defence procurement is carried out by the Procurement and Acquisitions Department, part of the Material Resources Directorate of the Croatian Defence Ministry.⁷¹ The Croatian government has established Agencija Alan as a means of ensuring that the defence equipment trade will be transparent and in accordance with international obligations (e.g. NATO commitments). As a limited liability government-owned company for import and export of defence equipment, Agencija Alan seeks ways of exploiting financial resources for the purchase of defence equipment. It also serves as the link between producers and potential international buyers of armament and military products and acts as an agent in terms of contracting, technology transfer and international technical cooperation regarding armament.⁷²

⁶⁷ Kiss (2004, 23).

⁶⁸ Kiss (2004, 24).

⁶⁹ Simunovic (1998).

⁷⁰ Ministry of Defence of the Republic of Croatia (2015).

⁷¹ UKTI DSO (2011).

⁷² Global Security (2012).

Croatia has also made efforts to promote greater transparency in its defence procurement processes – having been more active in publishing data on defence contacts and plans since 2012.⁷³

Efforts to promote the local defence industry have, however, coincided with significant cuts in domestic defence spending. Though the *Strategic Defence Review* (SDR) of 2005 and the CAF *Long-Term Development Plan (LTDP) 2006-2015* set out plans for a large range of procurement and reform initiatives, the onset of the economic crisis in 2008 forced a sharp curtailment of the Croatian MOD's ambitions, with its budget cut of 21 per cent in real terms by 2014 – as reflected in an updated version of the SDR cancelling or postponing many programmes (see below). Having reached almost 10 per cent of GDP in the early 1990s, Croatia's defence spending has now declined to 1.3 per cent in 2015, or around USD0.8 billion. This has been mirrored in significant headcount reductions for the CAF, with total personnel numbers falling from around 100,000 in 1995 to just over 16,000 in 2011.⁷⁴ Despite these changes and the ambition of the *LTDP 2006–2015* to reduce personnel costs below 50 per cent of overall expenditure through professionalisation and other reforms, personnel-related costs continue to absorb around 65 per cent of the MOD budget. With an additional 20 per cent of funds allocated to other operational costs, investment spending has held at around 15 per cent since 2009, limiting the scope and frequency of recent procurements. At the same time, plans for a new loan mechanism with the Ministry of Finance – which would allow the MOD to borrow against future procurement budgets to fund new equipment – have reportedly been put on hold.⁷⁵

Table 3.1 Defence spending in Croatia, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 USD billion	0.842	0.841	0.792	0.772	0.757	0.776	0.801	0.830
Constant 2015 HRK billion	4.836	4.834	4.552	4.433	4.349	4.457	4.600	4.768
% GDP	1.44%	1.46%	1.38%	1.34%	1.28%	1.27%	1.27%	1.27%

Source: IHS Jane's (2015)

Notably, domestic demand for local defence industry products has been further depressed by Croatia's receipt of military equipment donated through the US Excess Defence Articles Programme. In 2015, for instance, Croatia revealed that it had obtained 212 used land vehicles through this initiative, including 162 M-ATVs, 30 MaxxPro mine resistant ambush protected (MRAP) vehicles and 20 Humvees.⁷⁶

⁷³ IHS Jane's (2015q).

⁷⁴ IHS Jane's (2015o).

⁷⁵ IHS Jane's (2015o).

⁷⁶ IHS Jane's (2015q).

3.2. Defence industrial capabilities

3.2.1. General assessment by sector (land, air, naval, C4I)

Many of Croatia's largest defence firms are focused on the land domain, reflecting the country's inheritance of the former Yugoslavia's production sites for armoured vehicles, as well as the development of a range of products in the SALW market following the 1991–1995 war. Industrial capabilities at the full platform level are primarily confined to manufacturing Croatian derivatives of the Soviet-designed T-72 MBT, such as the M-95 Degman or more recent M-84D – while local firm Duro Dakovic has also produced the Finnish-designed Patria Armoured Modular Vehicle (AMV) for the Croatian Army.⁷⁷ In addition, DOK-ING has developed a number of demining systems, with considerable success in this niche export market. Other Croatian companies are active in the armoured vehicle market through production of components and spare parts (e.g. SAS). In addition, SALW manufacturers make up a significant portion of Croatian defence industrial output and exports – with HS Produkt successfully marketing both assault rifles and pistols, including through a long-term contract with the major US-based Springfield brand.⁷⁸ Other products in this sector include grenade launchers (Metallic/Rijeka), CBRN protective equipment (Sestan-Busch), military uniforms and personal equipment (Kroko).⁷⁹

In addition to these land capabilities, the country has a number of shipyards engaged in both construction and repair of naval vessels. Primarily, the manufacture of new craft is focused on producing small surface vessels for both domestic and foreign customers, or else providing MRO services for these or larger ships. In September 2014, the latter competence led to the award of a USD23.3 million contract to the Viktor Lenac shipyard to carry out overhaul work on the flagship of the US Navy's Sixth Fleet, the amphibious command ship USS Mount Whitney, ahead of a number of international competitors.⁸⁰ Other yards produce a range of small craft, including patrol boats and coastguard vessels, while Montmontaza-Greben supplied the Korcula LM-51 minesweeper to the Croatian Navy in 2006, aided by specialist R&D centres such as the Institute for Naval Engineering or the Naval Centre for Electronics in Split.⁸¹

In addition to these surface vessels, the Brodosplit shipyard – Croatia's largest – has also produced patrol and midget submarines in the past, first for the Yugoslav Navy and then its Croatian successor; building on this, a potential programme to supply Croatian submarine technology to Indonesia was announced in February 2015 as part of Indonesia's preparations for its own production of Type 209 vessels.⁸² The Brodosplit yard's primary business remains focused nonetheless on surface vessels, both for the Croatian Navy and especially civilian clients through the production of oil tankers and passenger ferries.

Croatia's industrial capabilities in the defence aerospace sector are notably more limited than the land or naval domains. Competences are confined primarily to Zrakoplovno-tehnicki Centar, which provides

⁷⁷ IHS Jane's (2015e).

⁷⁸ HS Produkt (n.d.).

⁷⁹ IHS Jane's (2015e).

⁸⁰ Forrester & Dunai (2015).

⁸¹ Montmontaza Greben (n.d.)

⁸² Grevatt (2015a).

aircraft MRO for the MiG-21 fighter, Canadair 415 and Air Tractor 802 aerial firefighters, and the PC-9 and Zlin 242L trainers, as well as the Mil Mi-8, Mil Mi-17 and Bell-206B helicopters.⁸³ The country has previously expressed interest in using offsets from a potential purchase of Saab JAS-39 Gripen fighter aircraft to boost local industry – though it is unclear what level of technology transfer or supply chain involvement this would bring for Croatian aviation SMEs, with proposed offsets also reported to include investment in non-aerospace sectors such as shipbuilding.⁸⁴ Croatian industry has also taken a very limited step into complex weapons production, supplying small numbers of the truck-mounted Strijela-10CROA1 surface-to-air missile (SAM) system to the Croatian Army, using a variant of a Russian design.

A small number of Croatian defence and dual-use firms have also been active in the C4I domain. In 2010, local information technology (IT) business InSig2 became the first Croatian company to sign an agreement with NATO for the provision of IT security services, receiving a contract to provide digital security solutions to the Alliance's facilities in Naples, Italy. The company subsequently won a contract to develop security systems for the new NATO headquarters in Brussels, Belgium in 2013.⁸⁵

As a result of limited domestic defence spending, Croatia's defence industry is highly export-focused. Croatian defence exports reached EUR197.1 million (HRK1.5 billion) in 2014, marking a 20 per cent increase from 2013.⁸⁶ The US represents the country's largest single market, accounting for 60 per cent of arms exports in 2012. Main exports include small arms (HS Produkt), ammunition and protective equipment, (Sestan Busch, Kroko), with orders for larger equipment (e.g. armoured vehicles or ships) having proven more difficult to secure, outside of specialist niches such as de-mining.⁸⁷ Recent export markets for small naval or coastguard vessels include Bangladesh and Gibraltar.⁸⁸

3.2.2. Major industries

The major components of the Croatian defence and security sector include:⁸⁹

- **Adria Mar/Zagreb:** Producer of small naval patrol vessels.
- **Brodogradiliste Kraljevica:** Shipyard producing surface ships up to 120 m in length, as well as repairing and retrofitting naval vessels (patrol craft, missile corvettes, etc.).
- **Brodosplit Shipyard:** Croatia's largest shipyard, producing and repairing various civilian vessels (e.g. oil tankers, cruise ships, ferries), as well naval surface vessels (e.g. corvettes) and small submarines.
- **Dalit Duro Dakovic:** Armoured vehicle specialist, producing Croatian variants of the Patria AMV and Russian T-72, as well as components and spare parts.
- **DOK-ING:** Manufacturer of specialist mine-clearance land systems and equipment.

⁸³ IHS Jane's (2015e).

⁸⁴ SEE (n.d.).

⁸⁵ IHS Jane's (2015e).

⁸⁶ Ministry of Defence of the Republic of Croatia. (2015).

⁸⁷ Dunai (2014).

⁸⁸ Forrester & Dunai (2015).

⁸⁹ IHS Jane's (2015e).

- **HS Produkt:** Small arms producer, manufacturing the Croatian HS 2000 9 mm pistol and the 5.56 mm VHS assault rifle, with successful exports in US and Middle East.
- **InSig2:** IT company providing digital security solutions, including for NATO facilities.
- **Kroko International:** Manufacturer of camouflage uniforms and other personal military equipment.
- **Metallic/Rijeka:** Producer of grenade launchers.
- **Montmontaza-Greben Shipyard:** Shipyard, produced first Croatian minesweeper for Croatian Navy.
- **NCP Refit:** Shipbuilding (small craft) and repair.
- **RIZ Transmitters:** Producer of radio equipment and transmitters.
- **SAS:** Producer of parts for armoured vehicles.
- **Sestan-Busch:** Manufacturer of ballistic security equipment, CBRN protective kit (e.g. helmets).
- **Tehnomont Shipyard:** Manufacturer of patrol boats for police and coastguards.
- **Viktor Lenac Shipyard:** Ship repair and conversions.
- **Zrakoplovno-tehnicki Centar:** Aircraft MRO activities, both for fixed wing (e.g. MiG-21) and rotary wing craft (e.g. Mil Mi-8, Mil Mi-8). The centre includes various inspection and testing facilities, such as 'a metrological laboratory for calibration of measurement and testing equipment, a non-destructive testing laboratory, a chemical laboratory for polymer, elastomer, seal, coating and adhesives definition, and a universal test bench for rotating and non-rotating hydraulic components'.⁹⁰

3.2.3. Niche areas

In addition to the small Croatian's industry's core competences in armoured vehicles, SALW and shipbuilding or repair, the country has developed a successful niche in the production of specialist de-mining vehicles – that is, bespoke units rather than upgrades added to pre-existing armoured vehicles, as is often the case. Croatian firm DOK-ING Ltd has exported de-mining vehicles to 27 countries around the world, including significant sales to the US DOD, which has deployed the MV-4 machines to Afghanistan.⁹¹ Further expertise in this area is provided by the state-owned Agency for Technical and Research Development (ATIR), while the Montmontaza-Greben shipyard has also successfully developed a naval minesweeper.

In addition, Croatian industry is reportedly seeking to expand on its SALW experience into production of specialist weapons for Special Forces, as well as development of 'hybrid' weapons systems combining Western and Soviet-era technologies.⁹²

⁹⁰ Dunai (2015a)

⁹¹ UKTI DSO (2011).

⁹² IHS Jane's (2015e)

3.3. Barriers and obstacles

3.3.1. Internal

Despite Croatia's ambitious long-term modernisation plan, defence budget constraints are reported to be limiting major procurement, research and production programmes. The challenge this poses to local defence firms in terms of the available resources in the domestic market – resources that could be leveraged to pursue other contracts on a collaborative, international level – is further compounded by a preference within the Croatian MOD for acquiring 'off-the-shelf' solutions to military requirements rather than investing in new development.⁹³ With a lack of financial resources, Croatian SMEs encounter some difficulty in addressing the regulatory and administrative burdens of accessing the supply chains of Western European prime-contractors, as well as civilian markets.⁹⁴

Croatia is expected to be in a position fully to exploit existing research and production assets only after successful completion of the transformation of the Armed Forces, which may not occur until the end of this decade. Croatian firms actively seek work within the defence industrial sector to maintain their capabilities, but limited domestic demand means that many of these companies also pursue opportunities in the civilian sector.⁹⁵

The Croatian state is strategically committed to the preservation of its arms industry, especially key production lines – tanks, armoured personnel carriers, artillery, infantry weapons and ammunition and shipbuilding.⁹⁶ However, interviewees noted the lack of formal cooperation agreements between the privatised elements of Croatian industry and government, with a lack of structured involvement for industry in the development of long-term MOD requirements or facilitation by government for international industrial partnerships.⁹⁷ While the Croatian Chamber of Commerce brings some coordination to the national defence industry, its broad remit and primary focus on the rather different challenges facing firms in the civilian market is reported to limit the potential for greater collaboration.⁹⁸

This shortage of established, formal structures for coordination between national – let alone international – defence sector actors is reportedly exacerbated by the public sector's organisational culture, with a lack of trust and mutual understanding limiting the development of informal networks or connections. Indeed, the public sector is also described as having a high aversion to risk, which can potentially hinder involvement or investment in innovative or high-risk ventures – including international programmes.⁹⁹

Despite these internal challenges, interviewees also cited a number of competitive advantages for Croatian firms that may incentivise Western European prime-contractors to take on more partnerships with them

⁹³ RAND Europe interviews, August 2015.

⁹⁴ RAND Europe interviews, August 2015.

⁹⁵ Simunovic (1998).

⁹⁶ Simunovic (1998).

⁹⁷ RAND Europe interviews, August 2015.

⁹⁸ RAND Europe interviews, August 2015.

⁹⁹ RAND Europe interviews, August 2015.

in future – especially related to the favourable labour rates for Croatia’s workforce, the opportunity to access niche local skills and the political imperative to boost European-level security of supply.¹⁰⁰ Examples of niche areas of potential interest to outside actors include SALW, specialist textiles and robotics.¹⁰¹

3.3.2. External

Limited data was available on Croatia’s experience and perceptions of external barriers to defence industrial collaboration, given the limited prior exposure of local firms to the specific challenges of international programmes. However, primary concerns were reported to include the administrative, regulatory and political barriers to the participation of Croatian SMEs in major European supply chains; as well as the lack of coordinated, joint development and production within the CEE countries to pool each country’s limited financial resources, knowledge and R&D infrastructure.¹⁰²

3.4. Opportunities and programmes

In recent years a number of collaborative arrangements have been established with foreign defence industries and governments, which might form the basis for further future cooperation:

- **Bilateral business partnerships:** A small number of Croatia’s defence firms have long-standing relationships with foreign firms, with HS Produkt supplying SALW to the US market through American company Springfield. Armoured vehicle manufacturer Duro Dakovic is also producing the Finnish-designed Patria AMV for the Croatian Army, as well as having signed an agreement with Norwegian company Kongsberg for joint development and commercialisation of the 30 mm Protector remote weapons system (RWS).¹⁰³
- **Bilateral G2G partnerships:** In April 2011, Croatia joined with Serbia and Slovenia in an agreement to pool resources and jointly pursue export contracts for local defence industry, rather than competing in ‘third markets’ in the Middle East, North Africa and Russia. Croatia has also pursued memoranda of understanding on defence industrial collaboration with countries further afield; they proposed a programme of cooperation and technology transfer with Indonesia in February 2015, including transfer of Croatian expertise in construction of submarines and development of satellite systems. However, while Croatia is aiming at further expanding its defence exports through such defence cooperation with Indonesia, it is worth noting that the two countries have no history of prior defence trade or related industrial collaboration.¹⁰⁴ A memorandum of cooperation in the defence sector was also recently signed with Kazakhstan during a trade visit to the Central Asian state.¹⁰⁵

¹⁰⁰ RAND Europe interviews, August 2015.

¹⁰¹ RAND Europe interviews, August 2015.

¹⁰² RAND Europe interviews, August 2015.

¹⁰³ IHS Jane’s (2015q).

¹⁰⁴ Grevatt (2015a).

¹⁰⁵ Dalje (2015).

Croatia is also home to the Adriatic Sea Defence and Security Exhibition (ASDA) in Split, which provides an opportunity for local firms to market their products to foreign government and industry delegations, with the event having a particular focus on countries from South East Europe.¹⁰⁶

3.4.1. Defence planning and future procurement programmes

Though Croatia became a full NATO member in 2009, the probable timescale for full implementation of the CAF's long-term plan to modernise and integrate its forces into NATO and EU operations remains uncertain. With budget reductions having led to the downscaling, postponement or cancellation of many programmes in the *Long-Term Development Plan 2006–2015*, a new *LTDP 2015–2024* has been introduced, outlining USD1.4 billion (HRK10 billion) in procurement spending for the next decade.¹⁰⁷

Despite financial challenges, a number of planned programmes may thus provide some opportunity for defence industrial collaboration with other CEE states or with Western European partners. Priority programmes include: replacement of MiG-21 combat aircraft, patrol vessels and other ships, communication systems (for naval vessels), non-combat vehicles and (unspecified) CBRN equipment.¹⁰⁸ The Army has an outstanding requirement for a new 155 mm self-propelled artillery system, new assault rifles, machineguns and night vision systems. Other outstanding requirements for the Army include new heavy equipment transporters, communications systems, air surveillance radar and weapons-locating radar.¹⁰⁹

However, due to an inadequate defence budget, it is now anticipated that Croatia's Mikoyan MiG-21 combat aircraft will remain in service until at least 2019, while the number of Pilatus PC-9M advanced military training aircraft will also be reduced. The country's Antonov An-32 transport aircraft has also been decommissioned, with no replacement planned until at least 2020 and a number of other defence procurement projects – such as modernisation of Croatian armour and air defence systems or acquisition of unmanned underwater vehicles – are reported to have been cancelled or delayed.¹¹⁰

3.5. Capacity-building needs

To encourage development and training of qualified personnel, Croatia has developed a proposal to integrate the subject of defence into higher education programmes, whereby core or elective programmes may be enhanced by specific defence-related training elements – allowing skilled students and junior researchers to participate in the development of defence products, sharing their innovative ideas and skills in exchange for practical experience of industry. The aim is to provide specialised courses to students who are interested in working in both the defence and civilian sectors, especially in engineering.¹¹¹

¹⁰⁶ Global Security (2012).

¹⁰⁷ IHS Jane's (2015e).

¹⁰⁸ UKTI DSO (2011).

¹⁰⁹ Global Security (2012).

¹¹⁰ IHS Jane's (2015e).

¹¹¹ Stojkovic et al. (2009).

Other potential capacity-building opportunities include support for development of more formal cooperation structures within Croatia to align local industry with MOD needs, as well as to allow the MOD to develop its competence as a potential ‘broker’ for international collaboration.¹¹² In addition, interviewees noted the potential benefit of pooling physical production and research infrastructure with other CEE countries to boost innovation and competitiveness on the global export market, in the light of the limited capabilities (and appetite) of many Croatian firms to act or invest on their own.¹¹³

¹¹² RAND Europe interview, August 2015

¹¹³ RAND Europe interview, August 2015

4. Country profile: Czech Republic

4.1. Country at a glance

Given its small size, the Czech Republic has a relatively strong arms industry, with several historic defence brands, a well-developed production base, sizeable local workforce, and advanced technological expertise in a range of specialist areas. It is especially focused in the areas of aerospace, military electronics, SALW and heavy transport trucks.

4.1.1. Context of industrial and economic restructuring

Before 1990, traditional heavy weapons production was a key economic pillar of a united Czechoslovakia, with the country playing a significant role in the integrated Soviet-era defence industrial base of the Warsaw Treaty Organisation (WTO).¹¹⁴ The Czech Republic possesses a strong legacy of modern armaments production, stretching back to the early 20th century, with Czechoslovakia ranked the sixth largest defence exporter in the 1980s, as well as the world leader in terms of jet trainer aircraft production. At its peak in 1988–1989, this output was valued at US\$623 million, representing approximately 24 per cent of the country's machinery and electronics production, almost 11 per cent of all industrial production and over three per cent of GDP. Small arms, aircraft, armoured vehicles and electronics were produced to local designs, while tanks, artillery, combat aircraft and missiles were built under Soviet licence.¹¹⁵ The Czechoslovakian defence sector employed approximately 80,000 people directly and a similar number indirectly – with the new Czech Republic inheriting just under half of this total workforce, as well as around 90 per cent of the aerospace factories, when the country became independent and diverged from its Slovak neighbour.¹¹⁶

Following the end of the Cold War and the declaration of Czech independence in 1993, a period of governmental and economic restructuring ensued, with the Czech Republic joining the OECD in 1995, NATO in 1999 and the EU in 2004. For the local defence industry, the loss of traditional export markets, a collapse in domestic defence spending and a policy of converting 'tanks into ploughshares' under Czechoslovakia's President Václav Havel presented the sector with significant economic challenges.¹¹⁷

¹¹⁴ Kiss (1999, 1).

¹¹⁵ Kiss (1993, 1045-1047).

¹¹⁶ Kiss (2014, 243).

¹¹⁷ Kiss (2014, 243).

While the dissolution of Czechoslovakia had left the Czech Republic with the large majority of the country's aviation and electronic industries, many heavy armaments production sites had been lost. From the early 1990s, the Czech Republic shifted away from Havel's policy of conversion in favour of selective promotion of the defence industry, mixing a *laissez-faire* approach of privatisation and foreign investment with targeted state intervention to reform certain industrial capabilities thought essential to national security but in need of restructuring before exposure to market forces.¹¹⁸

Central to plans for industrial modernisation was an ambitious programme of investments and restructuring for Aero Vodochody, manufacturer of the L-39 trainer and L-159 light combat aircraft. The firm entered a joint venture with US aerospace giant Boeing in 1998, but the failure of this partnership to bring about desired improvements in efficiency and profitability led the Czech government to buy out Boeing's share in 2004.¹¹⁹ With state assistance and funding concentrated on the Aero-Boeing venture and subsequent attempts to secure Aero's long-term future, other parts of the defence industry underwent significant economic adjustment in the 1990s and 2000s. A number of well-known defence brands such as Tesla and Slavičín went bankrupt, with many other firms converting to civil or dual-use production.¹²⁰

For those enterprises that continued to produce military equipment, by 2015 the sector had undergone a general reorientation towards exports, in the light of falling domestic defence spending and the Czech industry's success in maintaining a portfolio of historic brands (e.g. Aero), proven platforms (e.g. the L-159) and high-technology niche products (e.g. the advanced VERA radiolocation system) popular abroad.¹²¹ Estimates of total employment in the sector vary, with Kiss (2014) suggesting a figure of 27,000 employees in 2010, including 10,000 in the aviation industry (both civil and military), down from a peak of over 73,000 in 1989.¹²²

4.1.2. Recent policy and defence spending

In 2010, the Czech MOD signed a cooperation agreement with the Czech Defence Security Industry Association (AOBP) with the stated goals of improving cooperation on defence industrial matters, facilitating cooperation across the sector and boosting the transparency of defence-related tenders.¹²³ Traditionally, however, the Czech Republic has not had a defined national strategy for development of its defence industrial base,¹²⁴ having instead intervened in the sector on a case-by-case basis to bolster key strategic firms in financial difficulty (e.g. Aero) and procured the majority of new equipment from overseas suppliers.¹²⁵

¹¹⁸ Kiss (2014, 201).

¹¹⁹ Martin (2014). In: Kiss (2014, 202).

¹²⁰ Kiss (2014, 201).

¹²¹ RAND Europe interview, July 2015.

¹²² Kiss (2014, 201).

¹²³ Kiss (2014, 214).

¹²⁴ IHS Jane's (2014b).

¹²⁵ Kiss (2014, 200-204).

Indeed, Czech procurement policies were subject to high-profile public criticism and restructuring during the 2000s. During this period, the Czech MOD was criticised for opaque procurement processes, poor communication of requirements and mismanagement of funds, with major acquisition programmes such as the JAS-39 Gripen or Pandur fighting vehicle dogged by high-profile allegations of corruption.¹²⁶

Following the dismissal of a deputy defence minister over allegations of misconduct in 2010,¹²⁷ the Czech Supreme Audit Office issued a report in June 2011 confirming that misspending and a lack of transparency or oversight for procurement practices had contributed to the MOD's growing financial difficulties. The audit's findings criticised the failure of the MOD adequately to identify equipment needs, assign tasks to designated personnel, justify the purchase of certain equipment or maintain proper accounting practices. Six major MOD acquisitions with a combined value of US\$1 billion were scrutinised, uncovering incidents of spending above the levels approved by the Finance Ministry, avoiding use of tenders or even procuring redundant, obsolete or incompatible kit.¹²⁸ In addition to this internal review, in 2009 the European Commission launched a lawsuit related to the Czech MOD's US\$180 million purchase of four EADS CASA transport aircraft. The Commission also conducted investigations of the 2006 acquisition of 556 TATRA trucks and 2008 purchase of German-made Dingo-2 armoured vehicles, all without tender.¹²⁹

In 2011 the Czech government decided to abandon the previous policy of using intermediaries such as Omnipol and MPI Group to negotiate military procurement, amid allegations that this process had engendered bias and inflated costs. The Czech senate approved amendments to the public procurement law, implementing EU directives, extending a requirement for all personnel involved in procurement decisions to undergo security vetting and tightening rules for placing orders without competitive tender – the practice that had generated controversy over a number of deals in 2010. From 2012, a newly established National Armaments Office (NUV) was responsible for the acquisition of new military equipment for the Czech Armed Forces, although procurement decisions for spare parts and fuel remained under the direct authority of military commands.¹³⁰

The NUV was restructured in late 2014, with the new MOD Procurement and Acquisition Section established as its replacement in January 2015 under the leadership of the first deputy minister of defence. As with the NUV, the new MOD authority handles all equipment procurement besides spares and fuel – with ammunition acquisition handled through the NATO Support and Procurement Agency (NSPA). In addition to the Procurement and Acquisition Section, the MOD's separate Central Acquisition Office is tasked with 'planning, placing, and implementing public tenders in the area of technical revaluation of immovable infrastructure including related movable property, procurement of services for operation, maintenance, and repairs of immovable assets'.¹³¹

¹²⁶ EI5 (2013).

¹²⁷ Lehane (2010).

¹²⁸ Kiss (2014, 222).

¹²⁹ Contiguglia (2011).

¹³⁰ IHS Jane's (2015f).

¹³¹ IHS Jane's (2015f).

In the past two years, the Czech MOD has initiated ambitious plans to address a number of the challenges outlined above. In May 2014, a dedicated department for defence industrial cooperation was established within the MOD, while in the following year the country embarked on a systematic review of how the Defence Concept is developed. The stated goal is to establish more direct coordination between the MOD's strategic threat assessment, the capability development plan of the Czech Armed Forces, and, for the first time, specific policies for defence innovation and the defence industry.¹³² This process is scheduled to be completed in late 2015, and has involved Czech industry and academia in the policy formulation process.¹³³ Authority for funding defence-related research, unusually, remains under the purview of the Czech Ministry of Education – a factor that has been criticised by defence sector stakeholders as a barrier to investment in defence innovation or international collaborative programmes.¹³⁴

Alongside the shifts in defence industrial policy, the Czech Armed Forces have undergone significant cuts in overall numbers and funding during the past decade, comprising 28,351 personnel in 2015 (including 7,487 civilian staffers), down from 44,447 when the Czech Republic joined NATO, or 39,433 in 2005, when the country began a decade-long policy of defence spending cuts.¹³⁵ Since January 2005, the Czech military has been fully professional and formally consists of a combat component (Land and Air Forces) and a logistics component. In 2015, the Czech Land Forces have 123 combat tanks and 442 armoured vehicles, while the Air Force operates 39 fighter jets (JAS-39 Gripen and the L-159 light attack jet) and 17 armed helicopters.¹³⁶ These combined forces have made significant contributions to international missions in Iraq, Afghanistan and most recently NATO's Very High Readiness Joint Task Force. The Czech Republic has also contributed to EU Battle Groups and is an active member of the Visegrád Group. In 2015, it has military and defence-advisory personnel in Afghanistan, Kosovo, Somalia, Bosnia and Herzegovina, Mali and other places.

Despite these commitments, Czech government spending on defence has been declining since 2005 and is projected to drop to just 1.04 per cent of GDP (approximately EUR1.6 billion) in 2015.¹³⁷ In the light of this long-term decline and growing concern over the security situation in Central and Eastern Europe, the current coalition government pledged in 2014 to raise military spending to 1.4 per cent of GDP by 2020.¹³⁸ About 30 per cent of the current budget is spent on international mission commitments, primarily those underway in Afghanistan and Kosovo, and 35 per cent is spent on salaries and mandatory expenditures. This leaves 15 per cent – approximately €240 million in 2015 – for allocation to procurement.¹³⁹ Recent and projected defence spending are shown in Table 4.1.

¹³² RAND Europe interview, July 2015.

¹³³ RAND Europe interviews, July 2015.

¹³⁴ RAND Europe interviews, July 2015.

¹³⁵ Ministerstvo obrany (Ministry of Defence) (n.d.-a).

¹³⁶ Armáda České republiky (n.d.).

¹³⁷ Ministerstvo obrany (Ministry of Defence) (n.d.-b).

¹³⁸ Wirnitzer (2015).

¹³⁹ IHS Jane's (2015f).

Table 4.1 Defence spending in Czech Republic, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	2.202	2.097	2.049	2.111	2.247	2.505	2.768	3.082
Constant 2015 CZK billion	43.474	42.053	41.990	43.783	47.500	53.829	60.616	68.790
% GDP	1.07%	1.03%	0.98%	0.99%	1.02%	1.09%	1.17%	1.26%

Source: IHS Jane's (2015)

4.2. Defence industrial capabilities

4.2.1. General assessment by sector (land, air, naval, C4I)

Given its small size, the Czech Republic has a relatively strong arms industry, with several historic defence brands, a well-developed production base, sizeable local workforce and advanced technological expertise in a range of specialist areas.

Czech defence firms are represented by the Defence Security Industry Association (AOBP). The association has 108 members,¹⁴⁰ of which 67 per cent are involved in manufacturing and 55 per cent have R&D capability. The sector represented by AOBP employs about 15,000 people and has a combined annual turnover of about €1.1 billion.¹⁴¹ Its members spend approximately €40 million on research and development¹⁴² and export €150-300 million worth of military equipment and technology annually.¹⁴³ In addition, some 10,000 employees are estimated to work in the Czech aerospace industry (many on civil aircraft), which is represented by the Association of Aviation Manufacturers in the Czech Republic (ALV) as well as the Confederation of the Czech Aviation Industry.

The Czech defence industry's largest production centres focus on air systems and military logistics vehicles, with a range of full platforms successfully marketed for export abroad, including the L-39 jet trainer, L-159 light attack aircraft, TATRA T 6x6 and 8x8 military transport trucks and tactical heavy vehicles. Other key capabilities at the system, sub-system and component level include aerospace structures, radiolocation systems, IT and simulation equipment, military electronics, small arms and ammunition.¹⁴⁴ Czech firms are also active in maintenance, repair, upgrade and other services, including

¹⁴⁰ Neumannová (2015).

¹⁴¹ Neumannová (2015).

¹⁴² Neumannová (2015).

¹⁴³ Cesky Rozhlas (2015).

¹⁴⁴ RAND Europe interviews, July 2015; cf. IHS Jane's (2014b).

training and demilitarisation. Its industry has undertaken several overhauls and upgrades of Soviet-era equipment, including the T-25 and T-72 tanks, BMP IFVs and Mi-8/17/171 helicopters.

Capabilities are by contrast lacking in the field of complete weapons systems design and heavy land and armour design or development. The Czech arms industry's capabilities in the maritime domain are also extremely limited, reflecting the country's landlocked geography and the absence of a domestic naval force.¹⁴⁵

The Czech arms industry has been relatively successful in promoting defence exports compared to other CEE countries, with many local firms heavily dependent on foreign markets in the light of the limited domestic appetite for spending on procurement.

The Czech aviation industry experienced notable past success exporting the L-39 Albatros jet trainer aircraft, with over 2,800 aircraft shipped to more than 30 air forces worldwide. In July 2014, Aero Vodochody announced it was resuming production of the aircraft, which first flew in the late 1960s, in the light of demand for a new generation variant from countries in Africa, Southeast Asia, Latin America and the Middle East. The Czech manufacturer has also recently sold the L-159 light attack aircraft to Draken International, a US-based corporation, and the Iraqi Armed Forces (see below).¹⁴⁶

Given this range of export products, in 2013 a total of 1,128 licences were issued for the export of military material, worth €486.6 million. The value of trade deals made on the basis of licence usage, including licences granted in previous years ('usage') was €286.1 million.¹⁴⁷ The largest value of exports went to Vietnam (€43.3 million), the USA (€28.2 million), Egypt (€24.3 million), the Slovak Republic (€17.9 million), Poland (€12.63 million), Austria (€12.6 million) and Bulgaria (€8.7 million).¹⁴⁸ Other notable recent sales have involved Germany, Israel and India.

4.2.2. Major industries

The Czech defence sector is host to a number of major industrial players in several clusters for aerospace, land vehicles, small arms and military electronics:¹⁴⁹

- **Aerospace:** Following a lengthy period of modernisation in the late 1990s and early 2000s, Czech manufacturers of military aircraft and aerospace parts integrated into the global supply chain of the aerospace industry. Aero Vodochody, for instance, provides services to clients including Boeing, Sikorsky, Alenia Aeronautica, Sonaca, Latecoere, Saab, Spirit Aerosystems and Embraer. The main products exported are L-159 light trainer/combat aircraft (Aero), the LET L-410 commuter aircraft series (LET Aircraft Industries), and the Skyleader ultra-light aircraft (Skyleader). Other major producers include GE Aviation Czech (producer of motors for L-410 and other aircraft), Honeywell Czech, První brněnská strojírna Velká Bíteš, PRAGA, PBS Group, Robodrone (for micro UAVs) and LOM Praha. Professional associations include ALV and CCAI.

¹⁴⁵ RAND Europe interviews, July 2015.

¹⁴⁶ Mueller (2015)

¹⁴⁷ Mueller (2015)

¹⁴⁸ Ministerstvo Prumyslu A Obchodu (2013).

¹⁴⁹ RAND Europe interviews, July 2015; cf. IHS Jane's (2014b)

- **Land vehicles:** The heavy trucks manufacturer Tatra (part of Excalibur Group) as well as SVOP (with a focus on armouring) and VOP (for on maintenance, repair and modernisation) are the largest producers of land-based systems in the country. This includes production of fixed or self-propelled artillery – such as the upgraded DANA-M1 CZ 152mm system used by the Czech Army – as well as turrets and other weapon systems.
- **Small arms and light weapons:** Production of small arms and ammunition has been a core strength of the local arms industry for several decades. Among the leading export products are rifles, submachine guns and grenade launchers, small arms ammunition, mines, explosives and propellants, medium-calibre ammunition and aircraft gun pods, with key producers including Česká Zbrojovka (small arms), ZVI (medium calibre weapons), Sellier & Bellot (ammunition), Explosia (explosives and propellants), Poličské strojírny (anti-tank mines) and Banzai (military equipment trader).
- **Military surveillance and radar systems:** The country has a strong legacy in primary and secondary surveillance radars (Eldis Pardubice and Retia), passive surveillance systems for electronic intelligence systems (ERA, now part of Omnipol) and mobile surveillance systems for airport applications (Evpu Defence). Intensive cooperation on air traffic systems for UAVs or unmanned combat air vehicles (UCAVs) takes place between the private sector and the Technical University Prague (ČVÚT). For export, Czech industry has had particular success with the VERA passive radio-location system, which is in use with militaries in Europe, the US and elsewhere. In 2014, the NATO Communications and Information Agency (NCI Agency) selected a bid from Czech Republic-based ERA to fulfil the Alliance's Deployable Passive ESM Tracker (DPET) requirement for Air C2 Surveillance and Identification.¹⁵⁰

4.2.3. Niche areas

In addition to the major production clusters for air, land and military detection systems, Czech industry has established a range of niche capabilities in several areas, including:

- **Chemical, biological, radiological and nuclear warfare (CBRN):** With Czechoslovakia formerly a COE for CBRN during the Warsaw Pact years, Czech industry has continued to develop internationally competitive capabilities in CBRN detection and protection systems. In recognition of this niche expertise, the Czech Republic is involved in a specialist CBRN defence battalion and host to the NATO Joint CBRN Defence COE, which opened in Vyskov in July 2007.¹⁵¹ Leading firms in this area include: B.O.I.S. Filtry (individual and collective NBC protection, including respirators, and camouflage equipment); Gumárny Zubří (CBRN suits); Oritest (CBRN detection kits); VOP (ACHR-90M decontamination vehicle); Recue Technical and Training Institute in Liberec (collective protection systems); AVEC CHEM, EGO Zlín, and VARIEL (shelters for NBC applications); SVITAP (protective fabrics for CBRN applications); Vakuform (plastic products for military applications) and EST+ (decontamination equipment).

¹⁵⁰ Peruzzi (2014).

¹⁵¹ Kiss (2014, 199).

- **Synthetic environments and military training:** A particularly strong, niche capability is in virtual battlefield simulations, largely connected to a thriving IT industry in the country. Leaders in the field include Bohemia Interactive Simulations, E-COM, VR Group and ČVÚT. Bohemia Interactive Simulations has achieved high-profile success in producing military-grade simulations for the US, Australian, Canadian, Dutch, New Zealand and Swedish Armed Forces, as well as transferring this knowledge into production of popular videogame franchises ‘Operation Flashpoint’ and ‘ARMA’.¹⁵²
- **Other military ICT applications:** Also active in the military ICT market are ALES-Automated Aviation Systems (information management systems, air traffic control systems, and military C2 systems); AURA (information systems for military logistics and related applications); BULL (IT systems and applications for law enforcement and intelligence agencies); Corpus A (IT security and data analytical services); ELDIS Pardubice (radar technologies and air traffic control systems); Tesla (communications), Rohde Schwarz (communications) and others.
- **Space:** Leveraging the strength of Czech industry in aerospace, dual-use Czech enterprises have been involved in European Space Agency (ESA) programmes, with a number of technologies having potential military application.¹⁵³
- **Demilitarisation:** Building on Czech experience in decommissioning or converting Soviet-era military equipment and factories, the Czech Republic’s MPI Group and Poličské Strojírny provide a range of demilitarisation services.
- **Advanced materials:** A number of Czech firms are also active in developing polymers for various military and civil applications, such as: Magna Exteriors and Interiors, Automotiv Lighting, Visteon Autopal, Mecaplast CZ, Robert Bosch, Hella Autotechnik, Faurecia Interior Systems Bhomeia, Eugen Wexler, Koito, Grupo Antolin and Hettich. In addition, Czech industry is involved in the field of nanotechnology through organisations such as ELMARCO, CONTIPRO, TESCANA, Delong Instruments or the research centres at the Brno University of Technology and the Technical University in Liberec.¹⁵⁴
- **Lasers:** The Czech research and industrial base is also reportedly home to the world’s first boron laser, developed by the Czech Academy of Sciences and by ESP, as well as the HiLASE centre in Dolní Břežany.¹⁵⁵

4.3. Barriers and obstacles

4.3.1. Internal

Although there is not an extensive academic or grey literature addressing the Czech defence industry, a literature review and interviews identify a number of potential internal barriers to greater competitiveness and collaboration on the international market.

¹⁵² Purslow (2013).

¹⁵³ RAND Europe interview, July 2015.

¹⁵⁴ RAND Europe interview, Dec. 2015.

¹⁵⁵ RAND Europe interview, Dec. 2015.

A key barrier to involvement in international competition or collaboration is perceived to be the limited availability of capital. Limited Czech MOD procurement and the reluctance of commercial banks to invest in defence are seen as limiting many firms' ability to accept involvement in collaborative projects, given the associated set-up costs, political risk and uncertain time horizon on financial return. A unique characteristic of the Czech context is the role of the Ministry of Education in funding and directing defence-related research, which is seen as a significant barrier to involvement in international R&D programmes.¹⁵⁶

Such challenges are compounded by a lack of long-term planning and budgeting by the Czech MOD in the past, a trend exacerbated by frequent changes of political leadership, high turnover of MOD personnel and repeated restructuring of internal budgetary authorities (e.g. the NUV). This not only makes it difficult to harmonise requirements with foreign countries on cooperative programmes, but also acts as a disincentive to risk-taking or capital investment on the part of Czech industry.¹⁵⁷

In addition, a range of perceived barriers relate to the structure of the Czech DTIB, as well as the specificities of its existing networks and connections. Before 2014, the Czech defence sector lacked a dedicated MOD agency for promoting defence industrial cooperation, as well as a clear and well-supported defence industrial policy. A further perceived issue is the lack of a Czech prime or large single 'national champion' to promote Czech industry at home and abroad, or take the lead on major international programmes.¹⁵⁸ Although leading aviation companies such as Aero Vodochody have had considerable success in integrating into global supply chains, many Czech SMEs struggle to provide credible references, given the lack of domestic defence spending to act as an opportunity to prove their products in the field.¹⁵⁹ Indeed, Czech SMEs are primarily oriented towards export to non-EU countries, with many European markets dominated by firms from Western Europe or the US.¹⁶⁰ Furthermore, cooperative projects with third countries often offer far greater opportunity for Czech companies to act as prime, allowing them to maintain greater business control and visibility for their involvement, compared to lesser roles on EU or NATO projects.¹⁶¹ Where Czech firms seek to engage in collaborative European programmes, interviewees reported a variety of issues, including companies' fear of the bureaucratic burdens associated with such projects, a lack of awareness of how to navigate EDA procedures and concern that EU policies to promote EDTIB consolidation will mean the liquidation of CEE firms.¹⁶²

Other barriers pertain to organisational culture within Czech defence institutions, with past interactions between Czech and US aviation firms reportedly posing a number of challenges in terms of different processes and management styles – although these are reportedly becoming more aligned.¹⁶³ There is also perceived to be a high level of distrust and mutual suspicion even between Czech firms, especially those

¹⁵⁶ RAND Europe interviews, July 2015.

¹⁵⁷ RAND Europe interviews, July 2015.

¹⁵⁸ RAND Europe interview, July 2015.

¹⁵⁹ RAND Europe interviews, July 2015.

¹⁶⁰ RAND Europe interviews, July 2015.

¹⁶¹ RAND Europe interview, July 2015.

¹⁶² RAND Europe interviews, July 2015.

¹⁶³ RAND Europe interviews, July 2015.

with a lack of historical involvement in cooperative ventures or a corporate culture still dominated by the top-down approach of the previous command economy.¹⁶⁴

Talent and skills issues are not perceived to be as significant a challenge for Czech industry – despite some concerns over emigration and competition for top engineers from the civil sector – although improvements in managerial, language and marketing skills are seen as beneficial.¹⁶⁵

Interviewees also identified shortages of certain types of physical infrastructure as a barrier to greater Czech involvement in some international programmes. In particular, the country lacks domestic capacity for testing UAVs, with the Czech MOD currently assessing options to address this shortfall.¹⁶⁶ At the same time, much of the Czech Republic's infrastructure remains underutilised, given the dramatic decline in the size of the Armed Forces and defence industry since 1990, meaning opportunities may exist to develop this further at low cost in future. Other physical constraints reflect the Czech Republic's geographical position as a landlocked country, with a strong perception that policies for issuing transit licences for Czech defence exports in neighbouring countries do not offer equal access to seaports for Czech companies.¹⁶⁷

4.3.2. External

Wider external barriers to competitiveness and collaboration are thought to include:¹⁶⁸

- Lack of harmonisation of procurement requirements and defence industrial policies across CEE and other EDA member states.
- Limited defence budgets across Europe, including the proportion spent on procurement.
- Mistrust in Western defence sectors of CEE industry, with a perception that CEE countries represent only markets rather than potential collaborators.
- Successful lobbying by Western European and some CEE defence industries to influence domestic government procurement spending in favour of 'national champions'.

4.4. Opportunities and programmes

Despite the barriers and obstacles identified above, the Czech Republic has a number of recent collaborative arrangements and ongoing procurement plans, both of which may provide a basis on which to build international defence industrial cooperation in future.

Collaboration of this kind is perceived by the Czech MOD and NDIA as an opportunity to boost national sovereignty and security of supply across the life cycle of key Czech Armed Forces systems, as well as to promote innovation, inward investment into the country and profitable export relationships with third markets.¹⁶⁹ Increasing the importance of the Czech Republic as a supplier to major European allies is

¹⁶⁴ RAND Europe interview, July 2015.

¹⁶⁵ RAND Europe interviews, July 2015.

¹⁶⁶ RAND Europe interview, July 2015.

¹⁶⁷ RAND Europe interviews, July 2015.

¹⁶⁸ RAND Europe interviews, July 2015.

¹⁶⁹ RAND Europe interviews, July 2015.

also seen as a valued foreign policy goal and reinforcement of the country's active role in EU and NATO missions.¹⁷⁰

Potential incentives and benefits for other EDA member states looking to establish cooperative partnerships are thought to include:¹⁷¹

- Affordable labour rates relative to many Western European economies.
- High levels of technical expertise and industrial skills.
- Proven, high-quality production capabilities, especially in aviation, electronics and niche areas.
- A successful technical education system.
- New ways of working and innovative approaches.
- Czechoslovakian legacy as a past defence industry 'superpower', with historic brands and long-standing relations with certain foreign markets.

In recent years a number of collaborative arrangements have been established with foreign defence industries and governments, which might form the basis for further cooperation in the future:

- **Bilateral business partnerships:** Czech firms have pursued a number of international partnerships, with particular success in integrating into the global supply chains of US and European aerospace prime contractors. Aero Vodochody, for instance, provides systems, components and services to global firms including Boeing, Sikorsky, Alenia Aeronautica, Sonaca, Latecoere, Saab, Spirit Aerosystems and Embraer.¹⁷² In August 2013, Czech small arms manufacturer Česká Zbrojovka established a joint manufacturing venture in Brazil with local firm RT Trading.¹⁷³ Many Czech firms also work closely with Slovakian counterparts. In June 2012, for instance, Czech firm CZUB and Sitno Holding announced plans to open a new firearms production site in Kremnické Bane in Slovakia to supply the Slovakian Armed Forces.¹⁷⁴ Czechoslovakian cooperation also includes an annual arms exhibition that alternates between the two successor countries: the International Defence Exhibition Bratislava (IDEB) in Slovakia and International Exhibition of Defence and Security Technologies (IDET) in Brno.¹⁷⁵
- **Bilateral G2G partnerships:** The Czech Republic has also pursued bilateral governmental agreements with local neighbours (e.g. Slovakia), as well as further afield in emerging markets. In 2012, for instance, the Czech MOD signed a memorandum of understanding (MOU) on defence cooperation with Vietnam, including promotion of industrial collaboration and potential sales of the VERA-E system. In the same year, the Czech and US governments also formalised an agreement on mutual procurement that will enable Czech firms to participate in tenders issued by the US DOD and other US federal agencies.¹⁷⁶

¹⁷⁰ RAND Europe interview, July 2015.

¹⁷¹ RAND Europe interviews, July 2015.

¹⁷² IHS Jane's (2014j).

¹⁷³ IHS Jane's (2014b).

¹⁷⁴ Kiss (2014, 252).

¹⁷⁵ Kiss (2014, 243).

¹⁷⁶ IHS Jane's (2014j).

- **Joint regional (e.g. Visegrád) programmes:** The Czech Republic is an active member of the Visegrád Four (with Hungary, Poland and Slovakia), participating in a joint Battlegroup and other regional initiatives. Although this regional collaboration has not successfully generated joint procurement programmes as of yet – in the light of disagreements over work share and technical requirements – high-level political commitments have been made to promote such projects in future.

4.4.1. Defence planning and future procurement programmes

In addition to the Czech defence sector's participation in the cooperative mechanisms outlined above, a number of upcoming procurement programmes from the Czech MOD may offer opportunities for international industrial collaboration. Ongoing or anticipated acquisition programmes include:

- **Light and medium helicopters:** The Czech Air Force has an outstanding requirement to replace its ageing fleet of Soviet-designed Mil Mi-8, Mi-17 and Mi-24 helicopters. Having invited proposals from potential bidders in the US, France and Italy, the Czech MOD announced in August 2015 that it would be seeking to acquire 'several dozen' helicopters rather than the order of 12 originally planned. In addition, the Czech government has decided to modernise the military's newer PZL W-3 Sokol helicopters, produced by Polish company PZL-Swidnik.¹⁷⁷
- **Air surveillance radar:** The Czech MOD has also stated its requirement to obtain a new 3D mobile air defence radar capability, with a contract expected to value around US\$70 million. According to IHS Jane's, '[a]mong the key criteria of the tender is that participants are either headquartered or have subsidiaries based in the Czech Republic and that domestic component suppliers be included in any consortium'. This tender announcement puts to an end attempts in 2014 by the ReUNION consortium (led by Czech firm Retia) to act as a sole-source supplier for a new 3D radar system to the Visegrád Group countries.¹⁷⁸
- **Mine resistant, ambush-protected (MRAP) vehicles:** In January 2015 the Czech MOD outlined its intentions to acquire up to 62 MRAP vehicles for the Czech Army, to be procured in two tranches from 2015 onwards.¹⁷⁹
- **Armoured repair and recovery (ARRV) vehicles:** The Czech MOD is expected to launch a tender in 2015 for five ARRVs to support its fleet of 107 Pandur-2 armoured vehicles. This follows an aborted procurement attempt in October 2014, when the Czech MOD was criticised for cancellation of a tender in favour of ordering the desired vehicles from its state-owned subsidiary, the Military Technical Institute (VTU) – with foreign tender participants filing complaints that the original tender favoured a vehicle based on the Czech TATRA platform offered by VTU.¹⁸⁰
- **Special forces land vehicles:** In February 2015, the commander of the 601st Special Forces Group announced that a procurement programme will be launched to acquire light armoured vehicles for special operations, following the cancellation of previous plans in late 2011.¹⁸¹

¹⁷⁷ Adamowski (2015c).

¹⁷⁸ IHS Jane's (2014i).

¹⁷⁹ IHS Jane's (2014i).

¹⁸⁰ IHS Jane's (2014i).

¹⁸¹ IHS Jane's (2014i).

- **Command and control (C2) staff vehicles:** In January 2015, the Czech MOD announced it would procure 20 Pandur-2 armoured vehicles in two command variants, to be delivered into service between 2017 and 2025.¹⁸²
- **Mortar systems:** The Czech MOD reportedly intends to provide CZK80 million to procure nineteen 81 mm mortar systems through the NATO Support and Procurement Agency.¹⁸³
- **'Future Soldier' programme:** Having already signed a major CZK1.23 billion contract with Česká Zbrojovka to supply a range of small arms and light weapons as part of the second stage of the Czech Army's rearmament programme, the Czech MOD is also understood to have a range of possible 'Future Soldier' requirements, including C4ISTAR equipment, night vision systems and laser rangefinder systems for light anti-tank weapons.¹⁸⁴

4.5. Capacity-building needs

Interviews and a literature review identify a number of potential capacity-building needs for the Czech defence sector, corresponding to the various barriers and obstacles to greater competitiveness outlined above:¹⁸⁵

- Assistance with strategic forward planning and long-term defence budgeting.
- Ongoing development of a clear defence industrial policy with high-level political support, industry involvement and clear metrics and timelines for future progress updates.
- Promotion of 'soft skills' for both industry and MOD (e.g. project management, languages and marketing) as well as improved awareness (e.g. through training courses) of international procurement procedures and market opportunities (e.g. key industrial players, upcoming requirements of foreign MODs, specificities of managing multilateral defence programmes with different partner countries).
- Legal and practical advice (e.g. secondment of an expert team to Czech MOD) on how to transpose EU directives into national legislation and defence industrial policy.
- External support for relocating authority for defence R&D funding away from the Czech Ministry of Education to the Czech MOD, aligning the country with general practice in EU and NATO member states.
- Potential creation of a dedicated CEE forum or roundtable within EDA to allow CEE countries to pool expertise, share personnel and build common positions ahead of EDA negotiations.

¹⁸² IHS Jane's (2014i).

¹⁸³ IHS Jane's (2014i).

¹⁸⁴ IHS Jane's (2014i).

¹⁸⁵ RAND Europe interviews, July 2015.

5. Country profile: Estonia

5.1. Country at a glance

Like other Baltic states, Estonia has a limited defence budget (in absolute, if not GDP terms) and a very small defence industrial base, comprising SMEs with a range of niche products at the systems, sub-systems and component level. Despite its extremely small scale, however, the sector has built a record of successful export or international cooperation on cyber, border surveillance and other military ICT applications. Estonia is involved in collaboration with its Baltic neighbours, EDA and the Nordic Defence Cooperation (NORDEFECO) organisation. There is a comparatively large literature covering Estonia's investment in innovation, ICT, a cyber COE and SMEs exporting niche technology products. With growing concern over the security situation in Eastern Europe, Estonia recently embarked on plans to modernise its small Armed Forces.

5.1.1. Context of industrial and economic re-structuring

Unlike the majority of CEE countries, Estonia and the other Baltic states formed a fully integrated part of the Soviet Union until independence in 1991. In the decade following independence, Estonia began to develop independent defence institutions for the first time in over 50 years – a task that posed considerable challenges in terms of building the requisite skills, experience, infrastructure and resources.¹⁸⁶ At the same time, the wider Estonian economy underwent a series of reforms to become a market economy, with particular government efforts to develop the local banking, energy and ICT sectors. These included skills initiatives such as the Tiigrihüpe project, which invested in network infrastructure and computer science education. At the same time, a number of SMEs were established in the defence and security market to contribute to the new Estonian military's equipment requirements, although the inability of local firms to produce full platforms or systems has necessitated heavy reliance on foreign suppliers for key materiel.

Estonia successfully completed accession to EU and NATO membership in 2004. Three years later, the country was subjected to a major distributed denial of service (DDoS) cyber-attack, prompting heavy subsequent government investment in cybersecurity institutions, training and capabilities.

¹⁸⁶ RAND Europe interviews, August 2015.

5.1.2. Recent policy and defence spending

Unlike a number of other CEE countries, Estonia publishes an official defence industrial policy, implementation of which is supervised by the government's Defence Industry Council. This reflects the political and strategic perception of the sector as an essential component in the country's national sovereignty, as well as a potential driver of economic growth. The *Defence Industry Policy 2013–2022* places significant emphasis on the importance of coordinating industrial policy with the government programme for defence-related R&D, with an updated implementation plan for the Estonian MOD's *Strategy for Defence-Related Research and Development* (2008) developed in 2012–2013 to align these two strategic visions. The MOD's investments are also included as a line item in metrics (e.g. 'Increasing the Social and Economic Benefit of R&D') published as part of the government's *Estonian Research and Development and Innovation Strategy 2014–2020*.¹⁸⁷

In the latest policy, Estonia remains committed to open and transparent competition in procurement, rather than a 'made in Estonia' approach, except in key instances of national security. However, it states that close coordination across the local defence sector is the '*sine qua non* [sic] of successful implementation of the defence industry policy'.¹⁸⁸ Recognising that domestic defence spending is too limited to sustain local defence firms, the policy is strongly export-oriented, emphasising a desire to support 'innovative, high-tech, high-value-added, international-calibre competitive and high-export-potential activities' among Estonian SMEs.¹⁸⁹ The policy sets out a range of priority actions for the MOD, MOI, NAF and Estonian Defence Industry Association (EDIA), including an annual implementation plan, collation of a register of local industrial capabilities, state grants for marketing, research and development, and the organisation of a range of forums, seminars and other events.¹⁹⁰

Representation on the industry side is provided by the EDIA, which, as in other Baltic countries, is a relatively young organisation, having been established in 2010. The EDIA has recently created the Defence and Security Cluster as a forum and broker to promote cooperation between the sector's various SMEs, offering support for innovation, commercialisation and export.¹⁹¹ This includes coordination with the country's research centres and business incubators (e.g. Tallinn University of Technology's Centre for Defence and Security Studies, or the Mektory Incubator). Since 2014, the EDIA has also sat alongside the MOD and NAF on five joint working groups, covering personal equipment, manoeuvre, C2, engineering and maintenance. Plans exist for the possible extension of this framework to include three new working groups for 'Future Soldiers', simulation and medical. Long-term goals for the industry include leveraging Estonia's wider 'brand' for innovation (e.g. its experience with Skype, cyber, e-government) to promote SMEs abroad and integration into the supply chains of large primes.¹⁹²

¹⁸⁷ Government of Estonia (2014).

¹⁸⁸ Government of Estonia (n.d., 2).

¹⁸⁹ Government of Estonia (n.d., 2).

¹⁹⁰ Government of Estonia (n.d., 3).

¹⁹¹ RAND Europe interviews, August 2015.

¹⁹² RAND Europe interview, August 2015.

In comparison to other CEE countries, defence spending in Estonia is tightly limited, although the small nation has outstripped its Baltic neighbours as the only country to surpass the NATO defence spending target of 2 per cent of GDP. In 2015, Estonian defence spending stood at €412 million, or 2.05 per cent of GDP, representing an increase of €28 from 2014.¹⁹³ Though high in terms of GDP spent, in absolute terms the Estonian defence budget is still only equivalent to around 4 per cent of the budget for the Polish MOD.¹⁹⁴

Disaggregating the total defence spend, Estonia aims at earmarking 25 per cent of the military budget for investments rather than current activities, in accordance with NATO guidelines.¹⁹⁵ However, government budget allocations for defence-related R&D have historically been extremely limited, with the Estonian MOD subsidising only 50 projects, with a combined value of €6.53 million, in the period 2001–2010.¹⁹⁶ In 2012, Estonia spent 0.18 per cent of its defence budget on R&D (€650,000), although this was still significantly higher than the other Baltic states, Lithuania (0.04 per cent, or €102,000) and Latvia (no budget at all).¹⁹⁷

Table 5.1 Defence spending in Estonia, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	0.487	0.494	0.515	0.549	0.584	0.601	0.610	0.622
Constant 2015 €billion	0.367	0.372	0.387	0.413	0.440	0.453	0.459	0.468
% GDP	1.93%	1.93%	1.97%	2.05%	2.09%	2.06%	2.01%	1.98%

Source: IHS Jane's (2015)

Reflecting these financial constraints, the Estonian Armed Forces (NAF) are small in size and operate a system of conscription, with a peacetime force of 5,000 troops increasing to 30,000 in time of war (150,000 including the home guard). The NAF's Land Force is focused around an infantry brigade operating older types of heavy armament (e.g. XA-180 APCs from Finland and the Dutch, as well as towed artillery donated by Nordic allies), with the Navy and Air Force limited to minor capabilities in mine countermeasures and transport respectively.

Given Estonia's recovery from the recent financial crisis, an increase in defence spending and growing concern over the security environment following the destabilisation of Ukraine, the latest Estonian Armed

¹⁹³ The Baltic Course (2014).

¹⁹⁴ IHS Jane's (2014f). Note that this procurement expenditure excludes funds for F-16 payments from outside the regular budget.

¹⁹⁵ Gotkowska & Osica (2012, 56).

¹⁹⁶ Parve (2013).

¹⁹⁷ Jermalavicius (2012, 8).

Forces development plan provides for comprehensive changes in the military's structure, organisation and equipment. The main priorities are to increase Estonia's ability to defend its territory through its own potential and through allied support – i.e. to develop the military infrastructure necessary to receive and support the operations of allied NATO forces – as well as to increase the combat capabilities of air defence and surveillance through technological upgrades.¹⁹⁸ Despite this ambition, the small size of Estonian procurement spending means SIPRI has ranked the country only 100th in the world for arms imports during the period 2010–2014.¹⁹⁹

5.2. Defence industrial capabilities

5.2.1. General assessment by sector (land, air, naval, C4I)

Estonia does not have a traditional defence industry, lacking the technical or production base for heavy armaments found in many former Warsaw Pact countries. The EDIA is made up of around 80 members, comprising local SMEs in private hands, many of them operating in dual-use niches, with no major 'national champion' defence manufacturer. These SMEs offer a range of niche products at the systems, subsystems and component level, as well as defence-related services. Relative to the sector's small scale, however, this includes successful export or international cooperation on cyber, border surveillance and other military ICT applications.

Local SMEs produce surveillance technology, small UAVs, bomb shelters and containers, medicine, electronics, clothing and transportation equipment, as well as providing MRO and inspection services in support of the NAF. Estonia also has a very small shipbuilding industry that has delivered five patrol vessels to the Swedish Coast Guard (Baltic Workboats) and smaller boats up to 15 m in length for use on Lake Geneva in Switzerland.²⁰⁰

Due to the tightly limited scale of the internal market, most Estonian companies are focused on opportunities in foreign markets.²⁰¹

5.2.2. Major industries

Key firms in the sector include:²⁰²

- **A24 Grupp:** Transportation, flatbeds, trailers, etc.
- **Cybernetica:** Cryptography, cyber and space. First Estonian firm to receive a contract from the US DoD's Defense Advanced Research Projects Agency (DARPA).
- **Defendec:** Surveillance technology. Operates offices in Estonia, the US and Singapore. Smartdec technology is now being used at many international borders, including those of NATO and the

¹⁹⁸ Gotkowska & Osica (2012, 56).

¹⁹⁹ SIPRI (2015a).

²⁰⁰ Estonian Defence Industry Association (EDIA) (n.d.).

²⁰¹ IHS Jane's (2014c).

²⁰² Estonian Defence Industry Association (n.d.).

EU, to help deal with a variety of criminal and terrorist threats. Finally, Defendec is broadening its scope to expand into critical infrastructure surveillance and protection.

- **ELI Military Simulations:** Synthetic environments and tactical UAVs/target drones.
- **Galvi-Linda:** Military clothing and personal kit.
- **Ionix Systems:** Electrical wiring for jet engines.
- **Maru Metall:** Steel manufacture and military container solutions.
- **Milrem (Military Repair, Engineering and Maintenance):** Provides MRO services in two facilities (Tallinn and Voru) and also is developing its own mobile command post and an unmanned tracked vehicle for military purposes. Cooperates with BAE Systems Haggblunds.
- **Rantelon:** Electronics.
- **Semetron:** Medicines.
- **Telegrup:** Telecommunications and network security.
- **Thread Systems:** Has developed a range of different UAVs.

5.2.3. Niche areas

Estonia focuses on IT and cybersecurity as the areas with the highest value added. Since the DDoS attack on the Estonian economic infrastructure in 2007, Estonia has developed significant expertise in cyberdefence and security and today hosts the NATO Co-operative Cyber Defence Centre of Excellence (CCD COE).²⁰³ According to the global cybersecurity index of the International Telecommunication Union (ITU), Estonia is ranked fifth in the world in the field, while a recently published Business Software Alliance (BSA) report categorises Estonia alongside Austria and the Netherlands as the most cybersecure countries in Europe.²⁰⁴ Estonia is leveraging its expertise by providing training to defence officials from Ukraine²⁰⁵ and Colombia (in cooperation with the US firm Bell Helicopters).²⁰⁶ Ongoing international partnerships in this field include an agreement between the Estonian MOD and the US firm Raytheon, signed in 2015.²⁰⁷

In the light of these niche areas of expertise, Estonian exports are particularly focused on dual-use goods, especially telecommunications. According to the Strategic Goods Commission of the Estonian MFA in 2013, new customers for military goods included Indonesia, Columbia and South Africa. Notably, nearly 90 per cent of the total export turnover was for telecommunications equipment, through one company, showing that ‘the Estonian defence industry will have plenty of room for development in the future’.²⁰⁸ According to the government’s development plan, the aim is to secure five large-scale sales of innovative Estonian products on export markets by 2022, as well as to attract at least four defence industry companies of international fame to make investments in Estonia over the same timeframe. A further aim is

²⁰³ Estonian Defence Industry Association (n.d.).

²⁰⁴ Oll (2015b).

²⁰⁵ Tambur (2015).

²⁰⁶ RCN La Radio (2014).

²⁰⁷ Adamowski (2015d).

²⁰⁸ Ministry of Foreign Affairs, Strategic Goods Commission (2013, 5-6).

to create at least one new national defence product or service every year that supports the implementation of the NAF's own modernisation programme.²⁰⁹

5.3. Barriers and obstacles

5.3.1. Internal

A literature review and interviews identify a number of potential internal barriers to greater competitiveness and collaboration on the international market.

Most notable is the Estonian defence sector's limited size and the absence of large-scale domestic defence spending (in absolute rather than GDP terms) to provide a local market for the development of new products. With limited availability of capital from this source, and a small pool of human resources upon which to draw, it can be difficult for Estonian SMEs to invest in marketing, business development or attendance at EDA and other forums designed to promote export or cooperative projects. In addition, the small size of the Armed Forces and the disconnect between many of their equipment needs and the products manufactured locally have historically presented difficulties in proving new products in the field or acquiring references for export from the Estonian military. However, interviewees noted that a significant effort has been made to mitigate this challenge in recent years, with increased attempts by the NAF to conduct tests (or otherwise offer up infrastructure for SMEs to do so) of Estonian products, even if they are not able to afford to procure them; with a further initiative being trialled in 2015 to allow the NAF personnel involved in this testing to attend international arms exhibitions and promote Estonian goods (at SMEs' expense). As well as limited procurement funding, the small scale of R&D budgets is also cited as an important barrier.²¹⁰

Organisational culture and access to human resources are also highlighted as key considerations. While interviewees praised the various cooperative frameworks established between EDIA and MOD, as well as a generally collaborative culture within industry, they also recognised that a number of firms and elements of the NAF remain dominated by 'old school thinking' – for instance, a view that Estonia should attempt to manufacture all of its required materiel domestically, or that the NAF should be less open in dealing with industry.²¹¹

The fact that both the MOD and the industry are relatively young means that there is comparatively little first-hand experience and understanding of the industry, as well as private and public cooperation.²¹² Because of the small scale, there is also a limited number of personnel both in the MOD and the industry able to specialise in these issues, as well as a lack of dedicated defence attachés in Estonian embassies abroad.²¹³ Furthermore, top talented personnel are in high demand and often rotated between Estonia's

²⁰⁹ Danish Embassy in Tallinn (2014).

²¹⁰ RAND Europe interviews, August 2015.

²¹¹ RAND Europe interview, Aug. 2015.

²¹² Gotkowska & Osica (2012, 11)

²¹³ RAND Europe interviews, August 2015.

various MOD departments and overseas commitments (e.g. postings to NATO or EDA), with high levels of turnover undermining the creation of long-term connections with key industry actors. In the field of R&D, a lack of technical knowledge, administrative capacity and market intelligence activities within the defence ministry are seen as limiting its competence as an 'intelligent customer' and ability to act as a 'knowledge brokering' hub for promoting collaborative research.²¹⁴

Similarly, interviewees report a lack of knowledge on the part of some industry firms on how to participate in international tenders or network successfully with primes.²¹⁵ The industry reportedly often misses out on opportunities such as seminars and training organised by the EDA because of the financial resources needed to attend them, which has slowed the learning process of the industry.²¹⁶ There is a large perceived emphasis on the need for international networking with potential cooperation partners and customers, but lack of knowledge on how to do this.²¹⁷ Consequently, given the need for rapid financial returns on investment, some SMEs tend to focus on the needs of the immediate market rather than plan for the future market.²¹⁸

5.3.2. External

The reported external challenges include both political and practical issues. Interviewees reported a perception that logistics, MRO and through-life cycle management (e.g. areas in which Estonia and small CEE countries often focus their industrial capabilities) received little high-level political attention in international negotiations or accords over defence industrial cooperation, which tend to focus on large-scale joint procurement or development programmes that are seen as difficult for CEE firms to participate in.²¹⁹ Indeed, participation in international tenders and projects (e.g. Horizon 2020) is costly and a heavy administrative burden on businesses.²²⁰ Similarly, the lack of coordinated procurement and financial planning among the Baltic and European states makes joint procurements problematic.²²¹

Furthermore, interviewees suggest that Estonia does not have enough experience in economic diplomacy and in the promotion of its defence companies overseas.²²² Together with the general lack of information about Estonian manufacturing abroad, this means that Estonia is little known for its manufacturing abilities. This has prompted some companies to focus on the markets that have been familiar with Estonian products, mainly those in Central and Eastern Europe. Engaging with Western markets is seen as difficult because of Estonian firms' lack of established networks in those countries, concerns over

²¹⁴ Jermalavicius (2012, 10).

²¹⁵ RAND Europe interview, August 2015.

²¹⁶ RAND Europe interviews, August 2015.

²¹⁷ RAND Europe interviews, August 2015.

²¹⁸ RAND Europe interviews, August 2015.

²¹⁹ RAND Europe interview, August 2015.

²²⁰ RAND Europe interview, August 2015.

²²¹ Postimees (2015).

²²² RAND Europe interview, August 2015.

protectionism and a perception that Western companies are unwilling to take the risk of cooperating with small companies in case they are unable to deliver.²²³

5.4. Opportunities and programmes

Despite the barriers and obstacles identified above, Estonia has a number of recent collaborative arrangements and ongoing procurement plans, both of which may provide a basis on which to build international defence industrial cooperation in future.

Potential incentives and benefits for other EDA member states looking to establish cooperative partnerships are thought to include:²²⁴

- Transparency of future requirements, e.g. as outlined in the *National Military Defence Development Plan 2013–2022*.
- Affordable labour rates relative to many Western European economies, although not as low as in other CEE or non-EU countries.
- High levels of technical expertise in certain niche areas, e.g. cyber, other ICT.
- Past examples of successful international R&D, e.g. Cybernetica's work for DARPA in the US.
- Attractive local tax system and regulatory environment.
- An entrepreneurial culture, with Estonia home to the highest number of start-ups per capita.
- New ways of working and an innovative approach.
- Transparency of competitive procurement processes.

In recent years a number of collaborative arrangements have been established with foreign defence industries and governments, which might form the basis for further cooperation in the future:

- **Business partnerships:** Ongoing international partnerships in this field include an agreement between the Estonian MOD and the US firm Raytheon, signed in 2015.²²⁵ Foreign members of the EDIA include BAE Systems, General Dynamic, MBDA, RUAG and Saab.
- **Bilateral defence cooperation with Finland:** In 2009–2014, the two countries jointly procured 14 Ground Master 403 radars from France (12 to Finland, two to Estonia; €172 million and €28 million respectively),²²⁶ citing the potential for a lower unit cost from joint procurement.²²⁷ In spring 2015, Estonia is set to join the Finnish-Irish battalion in Lebanon. The Estonian parliament will decide in the near future about the participation of up to 50 troops in the UN UNIFIL mission. It will be Estonia's biggest ongoing military operation abroad and the largest international operation together with the Finns. Estonia uses Pasi armoured infantry fighting vehicles and SAKO rifles manufactured in Finland.

²²³ RAND Europe interview, August 2015.

²²⁴ RAND Europe interviews, August 2015.

²²⁵ Adamowski (2015d).

²²⁶ SIPRI (2015a).

²²⁷ Kunnas (2015).

- **Joint regional (e.g. Baltic) initiatives:** The three Baltic countries already run a series of collaborative projects (often with either Nordic or NATO support), such as the Baltic Defence College, BALTRON, Baltic Battalion, etc. They are also involved in Nordic-Baltic frameworks, working for instance with NORDEFECO. In 2012, the Baltic governments announced a joint €50 million acquisition of ammunition for the Carl Gustav anti-tank recoilless rifle, with the involvement also of the Czech Republic and Poland.²²⁸ In 2014, a further cooperation agreement was signed between the three countries, in Paris.²²⁹ In April 2015, the Estonian and Latvian prime ministers held a joint press conference to announce that they planned to make coordinated military procurements in future, both bilaterally as well as with other countries in the region.²³⁰
- **Wider international cooperation:** Estonia participates in European research efforts (e.g. FP7, H2020) as well as the NATO Science and Technology Organisation.²³¹ In 2015, the Japanese vice-minister of defence visited Estonia to promote closer cooperation between the two countries, especially in relation to cybersecurity.²³² A similar visit took place in 2013 involving the Swiss foreign minister.²³³ In 2015, the EDIA also signed an MOU with the British ADS to promote further collaboration between UK and Estonian defence firms. Estonia and Sweden has also shared joint defence technology and innovation seminars.²³⁴

5.4.1. Defence planning and future procurement programmes

In addition to the Estonian defence sector's participation in the cooperative mechanisms outlined above, a number of upcoming procurement programmes from the Estonian MOD may offer opportunities for international industrial collaboration.

The Estonian military has embarked on a major modernisation programme, although initially this proved abortive and had to be reset.²³⁵ In 2009, Estonia's government approved the *Estonian Long-Term Defence Development Plan 2009–2018*, which set out the main development areas for the Estonian military and proposed €3.6 billion in future spending. However, budgetary constraints and delays in implementing the plan led to the subsequent adoption of a revised *National Military Defence Development Plan 2013–2022*, which nonetheless envisages an ambitious target for increasing defence spending from €361 million to €60 million in the ten-year period.²³⁶

A total of €111.5 million was allocated for procurement in 2014 to accelerate the modernisation of the country's Armed Forces under this plan. Priority acquisition programmes include anti-tank missile

²²⁸ EDA (2013).

²²⁹ LGSPA (n.d).

²³⁰ Postimees (2015).

²³¹ Jermalavicius (2012, 9).

²³² Kaitse Ministerium (Ministry of Defence, Estonia) (2015).

²³³ Anderson (2013).

²³⁴ Noges (2014).

²³⁵ Collier (2014).

²³⁶ IHS Jane's (2015g).

systems, armoured fighting vehicles, 155 mm self-propelled howitzers, mine warfare systems, development of the Ämari airbase and, crucially, boosts to the country's air defence and air surveillance capabilities.²³⁷

5.5. Capacity-building needs

A literature review identifies a number of potential capacity-building needs for the Estonian MOD and defence industry, corresponding to the various barriers and obstacles to greater competitiveness outlined above. These include measures to:²³⁸

- Boost the technical knowledge and administrative capacity of the Estonian MOD.
- Promote exchange of 'lessons learned' and best practice between different European defence sectors via toolkits and secondments.
- Provide guidance to SMEs on procurement processes (both domestic and international).
- Provide legal guidance on implementation of the EU procurement directive and protection of IPR.
- Assist EDIA and other national defence associations from small countries to access funding to pay for membership of the European association of aerospace and defence industries (ASD) as well as to maintain a staff presence in Brussels.
- Offer more EDA training on accessing and managing international collaborative programmes, to take place in local capitals to cut travel costs for attendees.
- Assist SMEs and EDIA with marketing skills to promote visibility of the local defence sector, as well as market intelligence on potential collaborators and foreign export destinations (e.g. key actors, relevant procedures, upcoming opportunities).
- Facilitate the creation of a regional cluster with other CEE countries to increase production rates and minimise delivery times, backed by common or aligned industrial strategies.

In addition to these specific opportunities for Estonia, the literature review also identified studies that have focused on recommendations applicable at the wider Baltic level. This is particularly the case for analysis of defence-related R&D in the three countries, with a view to using cooperation in this field as both a proof-of-concept and springboard for subsequent potential collaboration on procurement. Jermalavicius (2012) suggests that advances in defence understanding of R&D (and collaboration on R&D) will have knock-on effects for the technical and programme management competences of Baltic defence organisations, identifying these as the prerequisites for intelligent acquisition, maintenance and use of military capabilities.²³⁹ His recommendations include:²⁴⁰

- Advancing trilateral R&D collaboration by means of a BALTDEFCOL-led research consortium of national defence academies, mentored by a non-Baltic NATO or EU nation with significant experience in R&D.

²³⁷ IHS Jane's (2015g)..

²³⁸ RAND Europe interviews, August 2015.

²³⁹ Jermalavicius (2012, 3).

²⁴⁰ Jermalavicius (2012, 3).

- Tying research themes to existing trilateral collaboration projects and organisations to generate some common ‘pull’ for R&D efforts to support their development and functioning (e.g. research in maritime mine countermeasures to support the further evolution of BALTRON).
- Synchronising the setting of national capability requirements and strategy with R&D investments.
- Aligning defence-related industrial policy with defence-related innovation strategy (or develop one if it does not exist, as in Latvia). In turn, aligning defence innovation strategy with wider national innovation strategy or priorities.
- Focusing on carefully chosen interdisciplinary themes that branch out into civilian (‘dual use’) S&T, with human factors and medicine, organisational management and modelling and simulation being potential contenders, followed by areas such as C4ISR, information assurance, autonomous vehicle technology and electromagnetic spectrum technologies.
- Relaunching the Baltic Defence Research and Technology Conference as a biennial event, preceded by a series of workshops and seminars run by thematic research groups.

6. Country profile: Hungary

6.1. Country at a glance

In 2015, the Hungarian defence sector is now one of the smallest of Central and Eastern Europe's EDA member states. According to Hungarian defence industry association (MVSZ) figures, in 2013 there were 493 companies registered for defence industry activities; however, in reality, only around 120 have involvement in defence, of which 10–20 operate in the sector continuously, constituting an estimated total of 1,777 employees.²⁴¹ Although the industry is largely privatised, the employment figures are dominated by the part state-owned Rába, which has almost 1,500 employees, outstripping Hungary's various defence-related SMEs.²⁴² The sector supplies a range of local customers, including the MOD, interior ministry, police, fire service and disaster relief agencies. Industrial competences are focused on land systems, telecommunications, electronics and helicopter MRO activities.

6.1.1. Context of industrial and economic restructuring

Unlike others members of the WTO, Hungary maintained a relatively small indigenous defence industry even during the Cold War era. At its peak in 1988, Hungarian defence output constituted US\$370 million, representing only three per cent of the country's industrial production, in comparison to almost 11 per cent in Czechoslovakia.²⁴³ Military production was focused on certain land systems, military communications and electronics, as well as MRO services for the Hungarian Defence Force's own Soviet-era equipment, much of which was imported from other Warsaw Pact countries.

The collapse of the Warsaw Pact in 1991 exposed the Hungarian defence industry to a variety of economic challenges shared across many CEE countries. These included: a sharp decline in domestic defence spending; the loss of traditional export markets; the removal of subsidies, privileged access to raw materials and other elements of political support; difficulty in disposing of unwanted stock and capital assets; and accrual of bad debts.²⁴⁴ Although a Military Industrial Office was set up within the Ministry of Economy and Transport (MET) in the early 1990s, and substantial funds pledged to save endangered firms and rebuild the country's DTIB, mounting economic difficulties led to such plans being abandoned.

²⁴¹ MVSZ (n.d.).

²⁴² MVSZ (n.d.).

²⁴³ Kiss (1993, 1045-1047).

²⁴⁴ Kiss (2014, 139).

In the following decade, the value of Hungarian defence production fell to US\$32.8 million per annum, less than 10 per cent of its 1980s level, with a sharp reduction in the workforce from around 20,000 employees down to fewer than 1,600. After this early failed attempt at state interventionism, 'Hungarian defence industrial policy... remained largely neutral with no comprehensive guidelines to protect or promote defence-related projects or companies' until the creation of the MOD's HADIK plan in 2012.²⁴⁵

During the 1990s and early 2000s, the defence sector underwent a period of significant restructuring and uneven progress towards privatisation, with the government maintaining controlling stakes in strategically important firms or those whose initial attempt at privatisation had proven unsuccessful.²⁴⁶ State agencies also helped establish the biannual Central European Defence and Aviation (C+D) exhibition in Budapest, arrange offset deals on behalf of local companies and promote alignment with NATO standards upon Hungary's accession to that organisation in 1999.²⁴⁷ However, despite ambitious plans from MET officials for NATO membership to bring US\$210–245 million per annum of orders to Hungary's defence industry, renewed economic difficulties and a commitment to balance state budgets led to a modification or cancellation of many MOD modernisation programmes.²⁴⁸

After the creation of the EDA in 2004, Hungary initially opted to stay out of the European Code of Conduct on Defence Procurement²⁴⁹ amid concerns over the risks of exposing Hungarian defence firms to open international competition or the limitation of offsets.²⁵⁰ However, in 2007 Hungary abandoned this policy, pledging to align with European directives, liberalise trade, make its MOD procurement plans public and promote Hungarian participation in international industrial programmes.²⁵¹ To ensure greater coordination with industry, the Defence and Security Cooperation Forum (VBEF) was established to formalise cooperation between the MOD, MET and MVSZ. Within the MOD, a number of budgetary and contracting authorities were also centralised to create the MOD Development and Logistics Agency (DLA), with responsibility for defence R&D and procurement. The official statement inaugurating the DLA noted that 'in order to be efficient, the agency will count on the new Hungarian defence industry'. The DLA's goals were to promote high-technology prototypes, international collaboration and local involvement in ambitious plans for a 15–20 per cent increase in funds for Hungarian military modernisation.²⁵²

However, despite these ambitious political goals and modest foreign investment in the sector (much of it related to Hungary's offset deal for the newly acquired Saab Gripen fighter aircraft), the Hungarian defence industry continued to be affected by financial difficulties, a lack of new technology or capital investment, poor knowledge of foreign markets, and a disconnect between the products industry offered

²⁴⁵ Kiss (2014, 132).

²⁴⁶ Kogan (2005, 18-21).

²⁴⁷ Kiss (2014, 133).

²⁴⁸ Vigh (2001), cit. in Kiss (2014, 134).

²⁴⁹ IHS Jane's (2006); cf. Lakatos (2007).

²⁵⁰ EDA (2005).

²⁵¹ Defense Aerospace (2007).

²⁵² Kiss (2014, 137-138).

and the products procured by the Hungarian Defence Force. Government figures suggest that defence industrial output dropped by 17 per cent between 2009 and 2010,²⁵³ as well as a further 31 per cent in the following year, reaching a level of US\$74 million, employing 1,497 workers. In 2011, the industry produced some €12.8 million of land vehicles, €12.4 million of military electronics and €5.1 million of electronics,²⁵⁴ with only 22.6 per cent of the total output exported, compared to a peak of 76 per cent in 1988.²⁵⁵ What limited presence Hungarian firms did have in exports was primarily focused on key markets in the USA, Czech Republic, Italy, Germany and India.²⁵⁶ Analysis by IHS Jane's suggested: 'What remains of the industry may just survive on the back of NATO membership... Defence companies need to specialise in niche capabilities and strengthen their role as suppliers for large international prime contractors like BAE Systems if they are to survive – and thrive – in the long term.'²⁵⁷

6.1.2. Recent policy and defence spending

In recognition of the challenges facing the Hungarian defence sector in this context, in 2012 the Hungarian MOD unveiled a wide-ranging proposal for the modernisation of the local DTIB as part of the country's economic growth plan. Termed the HADIK plan, this initiative included proposals to increase the sector's competitiveness through tax breaks, boost R&D activities, generate jobs and promote MRO, after-sale and training services to foreign customers. It was also designed to give better support to exports through diplomacy and greater coordination with Hungary's foreign and economic ministries.²⁵⁸

The HADIK plan refers explicitly to NATO's 'Smart Defence' concept, seeking to promote greater coordination with Hungary's allies in developing and maintaining capabilities. Focus areas identified by the plan include defence electronics, radar, ammunition and diversification into dual-use products, as well as the establishment of a national military quality assurance and certification system. The initiative also outlined the creation of holdings and manufacturing clusters in a number of other niches, including special-purpose land vehicles, small arms, defence-related chemical industry, military clothing and a wide range of MRO capabilities for aircraft, combat vehicles and electronic systems.²⁵⁹ However, the tangible implications of the HADIK plan remain uncertain, given that many of its initiatives remain 'proposals' rather than policy, and given the continued decline in Hungarian MOD budgets.²⁶⁰

Internal MOD responsibility for improving the status of the Hungarian defence industry underwent reform in December 2014, with the establishment of the MOD Armaments Development Department. This new body includes a commitment to: find opportunities for international cooperation to help local industry access funding; reduce the technological gap with foreign firms; improve experience of managing

²⁵³ Hungarian Trade Licensing Office (2011).

²⁵⁴ Hungarian Trade Licensing Office (2012).

²⁵⁵ 24hu (1999), cited in Kiss (2014, 145).

²⁵⁶ Kiss (2014, 146).

²⁵⁷ IHS Jane's (2012).

²⁵⁸ Dunai (2012c).

²⁵⁹ Dunai (2012c).

²⁶⁰ RAND Europe interview, August 2015.

international cooperative programmes; facilitate technology transfer and the creation of joint ventures; and promote Hungarian defence exports abroad.²⁶¹

As with Hungarian defence industrial policy, modernisation plans for the Hungarian Defence Force have been subject to a number of revisions in the past decade. The onset of the economic crisis in 2008 accelerated a long-term trend of decline in Hungarian defence budgets, which ‘all but eliminated funding for the modernisation of the Hungarian Defence Force and the acquisition of new equipment’ (see Table 6.1).²⁶²

Table 6.1 Defence spending in Hungary, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	1.027	1.218	1.213	1.198	1.383	1.450	1.531	1.635
Constant 2015 HUF billion	295.15	283.06	281.83	278.42	321.51	336.96	355.76	380.00
% GDP	0.93%	0.87%	0.84%	0.81%	0.91%	0.93%	0.96%	0.99%

Source: IHS Jane’s (2015)

However, in the light of growing concern over the security situation, improvements in the European economy and pressure from allied nations, the Hungarian government has committed to increasing defence spending gradually from its current level of 0.8 per cent of GDP up to 1.39 per cent in 2022, with budgets to rise from 2016.²⁶³ As part of the *National Military Strategy* unveiled in 2012, defence funding was reduced in real terms in the projected period 2012–2016 in anticipation of using the savings to help finance the transformation plan from 2016 onwards. This includes an ambition to rebalance the distribution of the defence budget, aiming to allocate 40 per cent of spending to personnel (down from over 50 per cent), 30 per cent to operations and maintenance and 30 per cent to procurement and R&D (currently 12–15 per cent).

At the same time, however, the MOD plans to increase wages by around 30 per cent from July 2015 with the introduction of a new career model, with subsequent annual rises of five per cent for each of the next four years.

²⁶¹ RAND Europe interview, August 2015.

²⁶² IHS Jane’s (2015a).

²⁶³ Majer (2015).

6.2. Defence industrial capabilities

6.2.1. General assessment by sector (land, air, naval, C4I)

The Hungarian defence sector's industrial competences are focused on land systems, telecommunications, electronics and helicopter MRO activities. Although Hungarian industry primarily operates at the system or component level, a small number of niche platforms have also been developed indigenously, including the RDO-3221 Komondor MRAP armoured vehicle from Respirator and two UAV demonstrators, BORA and IKRAN, developed by CURRUS and HM EI respectively.²⁶⁴ The electronics sector has traditionally been the 'driving force behind the defence industry' in Hungary, with past exports of military communications equipment and other systems to countries such as India, Libya and Syria.²⁶⁵ Following reorganisation and restructuring (including several high-profile bankruptcies of large firms), 'what remains of the sector is fairly competitive in the EU market'.²⁶⁶

The Hungarian aviation sector was involved in offset arrangements with Saab over Hungary's leasing of the Gripen fighter aircraft, although some commentators judge this to have brought 'no benefits to the domestic aviation sector', leaving its long-term future in doubt.²⁶⁷ IHS Jane's assesses that Hungarian firms need to specialise and integrate into global supply chains if they are to survive and prosper.²⁶⁸

As a landlocked country, Hungary's defence industrial capabilities in the maritime domain are extremely limited, confined to technologies and systems transferable from related work (e.g. telecommunications) in the land and aerospace domains.

In the light of limited domestic demand, international relationships have been a longstanding goal for Hungarian defence firms, with exports and technology transfer key objectives for the industry even during the Cold War era.²⁶⁹ However, the Hungarian defence sector has achieved only very limited levels of export following the industry's sharp decline in the 1990s and 2000s. According to the United Nations Register on Conventional Arms, Hungary failed to export any military equipment in 2012 or 2013, with many exports in the past decade in fact government sales or donations of excess Soviet-era equipment, parts and ammunition, rather than new indigenous Hungarian defence products. This includes the donation of surplus T-72 battle tanks and other equipment to Iraq in 2005, the supply of rockets to Ukraine in 2011 and sales of Soviet-era helicopters, while a high-profile but unsuccessful attempt to sell retired MiG-29 fighters and Aero L-39 jet trainer aircraft was made in 2010.²⁷⁰

²⁶⁴ IHS Jane's (2015a).

²⁶⁵ Kogan (2008, 103).

²⁶⁶ Kogan (2008, 103).

²⁶⁷ Kogan (2008, 103).

²⁶⁸ IHS Jane's (2015a).

²⁶⁹ Germuska (2011, 89).

²⁷⁰ IHS Jane's (2015a).

6.2.2. Major industries

Key Hungarian defence industrial actors include:²⁷¹

- **ArmCom:** Supplies and repairs electronic and communications equipment.
- **Arzenál:** Missile repair facility for AGM-65 Maverick (with US firm Raytheon).
- **CURRUS:** MRO of tanks and other armoured vehicles, as well as producing emergency vehicles (e.g. fire trucks) for the Hungarian military.
- **Milipol:** Privately owned producer of specialist platforms (e.g. Cougar explosive ordnance (EOD) vehicle), small arms (AK-63) and software.
- **MOD Electronics, Logistics and Property Management Co:** Supplies electronic communication and navigation devices.
- **Pannox-Flax NyRt:** Specialist textiles for military kits.
- **RÁBA:** Manufactures truck components and other vehicles for both military and civil use.

6.2.3. Niche areas

In addition to the industry's core focus on military electronics and MRO activities, the Hungarian defence sector has also developed a number of emerging niche specialisms. These are reported to include microwave technology, ICT, decontamination technologies and equipment, hand guns, cybersecurity, biological detection, software design and cognitive radio technology, armour, radar, UAVs and military trucks.²⁷² Hungary also hosts the NATO Military Medical COE in Budapest.

Although these niches are often focused on the supply of subsystems, components or MRO services, a small number of niche platforms have been developed indigenously in the field of special-purpose land vehicles. This includes the prototype Komondor MRAP armoured vehicle designed by Respirator, which is also available in a CBRN configuration. Hungarian firms Rába Jármű Ltd and CURRUS have worked to produce and upgrade the UNIMOG-4000 EOD patrol vehicle, which was delivered to the Hungarian Defence Force in 2013.²⁷³

6.3. Barriers and obstacles

6.3.1. Internal

Although there is not an extensive academic or grey literature addressing the Hungarian defence industry, a number of studies have identified potential internal barriers to greater competitiveness and collaboration on the international market.

A key issue affecting the Hungarian industry is the small size of the domestic market and the sector's limited previous success in promoting exports, leading to a shortage of capital to invest in new products,

²⁷¹ IHS Jane's (2015a).

²⁷² RAND Europe interviews, August 2015; cf. UKTI DSO (2013b, 6).

²⁷³ IHS Jane's (2015a).

business development or international collaborations. In addition to a sharp decline in overall Hungarian defence spending, a large proportion of the procurement budget is directed towards imports of foreign goods or international programmes, with limited involvement from Hungarian industry; interviewees cite the example of the new 3D radars acquired through NATO.²⁷⁴ The lack of funding is also perceived to cause difficulties in taking R&D ideas through to commercialisation and eventual export, creating a disconnect between the country's research base and defence sales.²⁷⁵

The defence industry's financial issues are also seen as being compounded by the high degree of political risk in MOD procurement programmes and the limited time horizon for planning. Recent ambitious modernisation efforts have been subject to repeated budget revisions, delays or cancellation, with a further concern that the military requirements-setting process has not been adequately coordinated with defence industrial or R&D policy.²⁷⁶ 'Policy guidelines, procurement decisions and measures to downgrade or upgrade weapons [have] usually [been] the result of interaction between various, often contradictory political forces [and] have frequently been chaotic and short-lived.'²⁷⁷ The resultant degree of uncertainty about the forward programme makes it difficult for Hungarian industry to plan ahead or make investments with the limited internal resources available, given the risk attached.²⁷⁸

Access to other sources of capital (e.g. bank loans or venture capital) is also seen as highly limited, given a perceived reluctance from investors to associate with defence and liquidity issues in the local banking sector. In addition, the Hungarian government is reported to prioritise EU structural funds for investment in rural areas rather than the more developed central region around Budapest, limiting the options for defence firms, which are mainly clustered near the capital.²⁷⁹

Skills and talent also present a number of issues. A lack of internal or foreign investment has reportedly eroded the technological edge of Hungarian firms in a number of areas.²⁸⁰ This limits the sector's international competitiveness, its efforts to maintain existing technical skills and its ability to attract new generations of talent away from civil industry giants such as Bosch or Siemens. The primary issue, however, is perceived to be 'quantity rather than quality', with the very small size of the Hungarian defence industry (fewer than 1,800 employees) and its MOD leaving both managers and technical experts overstretched, with engineers unable, for instance, to support sales or business development adequately. The challenges presented by scale are further exacerbated by emigration and demographic trends, with industry expressing concern over the pipeline of future talent available from Hungary's limited annual pool of new science, technology, engineering and mathematics (STEM) graduates.

²⁷⁴ RAND Europe interview, August 2015.

²⁷⁵ RAND Europe interview, August 2015.

²⁷⁶ RAND Europe interviews, August 2015.

²⁷⁷ Kiss (2014, 132).

²⁷⁸ RAND Europe interviews, August 2015.

²⁷⁹ RAND Europe interview, August 2015.

²⁸⁰ RAND Europe interview, August 2015.

‘Soft skills’, such as marketing and foreign languages, are also highlighted as areas of concern,²⁸¹ with a particular shortage of MOD and industry staff experienced in international collaborations as project managers, engineers or IPR experts.²⁸² An unsuccessful attempt to develop a joint Czech-Hungarian UAV in the 1990s and 2000s was cited as one example of a programme that failed due to lack of experience in the specific challenges of managing international cooperation.²⁸³

A number of related issues pertain to the structure and composition of the Hungarian defence sector, as well as its internal and external networks and connections. Interviewees noted that the small size of Hungarian firms and limited salaries mean that major foreign prime contractors are more likely to buy out a Hungarian company, its intellectual property or its key employees than to enter into a cooperative arrangement.²⁸⁴ With limited financial resources, Hungarian SMEs reportedly do not feel able to afford international patents or the legal costs of contesting potential violations by large prime contractors.²⁸⁵ Another issue is the limited awareness in many firms of market opportunities, specificities, key actors and procedures in other countries. This reflects the limited financial and human resources available to most of Hungary’s defence SMEs to invest in market intelligence or business development where there is not a high degree of certainty and a short time horizon on commercial returns.

This may also reflect the legacy of export management in Hungary, with a 100-strong state agency responsible for managing export relationships at the end of the Cold War, but key personnel and trade knowledge lost during the transition period of the 1990s.²⁸⁶ This challenge is compounded by the lack of strong formal ties between the Hungarian MOD and the MVSZ forum, with interviewees noting a concern among many officials that closer ties would infringe Hungary’s public procurement rules.²⁸⁷ Also limiting the visibility and influence of Hungarian industry may be the lack of a large leading firm to act as a ‘national champion’ alongside or in place of the MOD, promoting the sector at home and overseas.²⁸⁸

Limited investment in infrastructure is also cited as an impediment to the modernisation of both the Hungarian Defence Force and local industry. Interviewees note that new procurement contracts often require Hungarian firms to invest in entirely new production machinery or facilities, given the lack of large-scale production lines or advanced technology, with the fragile financial state of many Hungarian defence firms having left them unable to invest in new or expanded factories without the guarantee of future orders.²⁸⁹ The resultant time delays in initiating projects and the unproven ability of many companies to fulfil large order sizes limit the potential for Hungarian involvement in major collaborative programmes or exports. One example cited was the requirement for €7 million of infrastructure

²⁸¹ RAND Europe interviews, August 2015.

²⁸² RAND Europe interview, August 2015.

²⁸³ RAND Europe interview, August 2015.

²⁸⁴ RAND Europe interview, August 2015.

²⁸⁵ RAND Europe interview, August 2015.

²⁸⁶ RAND Europe interview, August 2015.

²⁸⁷ RAND Europe interview, August 2015.

²⁸⁸ RAND Europe interview, August 2015.

²⁸⁹ RAND Europe interview, August 2015.

investment, which hampered Hungarian competitiveness in a major electronics tender with the Indian MOD.²⁹⁰

Other physical constraints pertain to Hungary's geography as a landlocked country, with interviewees noting that foreign neighbours had previously blocked transit rights for Hungarian defence exports or firms attempting to ship products to overseas trade exhibitions.²⁹¹

6.3.2. External

Wider external barriers to competitiveness and collaboration are thought to include:²⁹²

- Lack of common interest, harmonisation of procurement requirements and defence industrial policies across the CEE and other EDA member states.
- Limited defence budgets across Europe, including the proportion spent on procurement.
- Overcapacity and duplication of effort.
- Regulatory barriers, with open and fair competition not seen as a reality.
- Perception of CEE countries as only a market, rather than as potential manufacturers or suppliers.
- Successful lobbying by Western European and some CEE defence industries to influence government procurement spending in favour of 'national champions' in order to maintain existing market dominance.
- Perceived disconnect between the ability of large countries, e.g. the UK, France, Poland, to assert national sovereignty in defence industrial or procurement decisions compared to smaller actors like Hungary.
- Perceived lack of incentive for prime contractors to use SMEs from foreign countries as suppliers, when it is more low-risk to use existing networks and proven supply chains.
- Large scale of NATO or EDA cooperative programmes means that contracts are seen to be ultimately geared towards large prime contractors, rather than small firms from CEE countries.
- Extant tools (e.g. EDA's CODABA database) and forums (e.g. NSPA mechanisms) for promoting joint procurement or defence industrial cooperation are beneficial. However, these formal mechanisms can lack metrics for assessing tangible progress, cannot substitute for personal ties or informal bonds of common interest and may be perceived as an end in and of themselves.²⁹³

6.4. Opportunities and programmes

Despite the barriers and obstacles identified above, Hungary has a number of recent collaborative arrangements and ongoing procurement plans, both of which may provide a basis on which to build international defence industrial cooperation in future.

²⁹⁰ RAND Europe interview, August 2015.

²⁹¹ RAND Europe interview, August 2015.

²⁹² RAND Europe interviews, August 2015.

²⁹³ RAND Europe interview, August 2015.

Collaboration of this kind is perceived by the Hungarian MOD and NDIA as an opportunity to: reduce the technological gap with other European countries; improve the financial resilience of Hungarian industry; decrease the reliance on limited domestic defence spending by opening up third markets; boost project management experience of major international programmes; incentivise investment in new products and production facilities; and improve national security by promoting ‘security of supply’ and integrating Hungary into other allies’ supply networks.²⁹⁴

Potential incentives and benefits for other EDA member states looking to establish cooperative partnerships are thought to include:²⁹⁵

- Affordable labour rates relative to many Western European economies.
- High levels of technical expertise and other industrial skills, especially in niche areas.
- Innovative and different ways of working, which may bring new perspectives to outside firms.
- Higher security of supply, with Hungary an EU and NATO member, as compared to involvement with non-European suppliers or markets.

In recent years a number of collaborative arrangements have been established that might form the basis for further cooperation in the future:

- **Bilateral business partnerships:** A small number of Hungarian firms have been successful in developing international partnerships. In December 2008, for instance, Hungary’s Arzenál partnered with Raytheon to open a maintenance facility, Maverick Logistics, for Raytheon AGM-65 Maverick air-to-surface missiles, drawing on US\$20.3 million of investment from the US prime.²⁹⁶ As well as servicing other AGM-65 users in the region, in 2009 this site went on to undertake the upgrade of Poland’s AGM-65 guidance control systems, representing the first time such work had been conducted in a CEE country.²⁹⁷ International partnerships have also been promoted through Hungary’s offset arrangements for the Saab Gripen, which committed the Swedish firm to US\$1.14 billion of offsets to the defence, electronics, ICT, biotech and other sectors,²⁹⁸ although their long-term effects have been questioned.²⁹⁹ Since 2007, Hungarian and Swedish bodies have also cooperated successfully on a project to develop materials that can absorb radar waves at high temperatures for low observability.³⁰⁰
- **Bilateral G2G partnerships:** The Hungarian government has also pursued a number of bilateral memoranda of understanding and cooperation agreements to promote defence exports. These include an announcement in 2012 of plans for a potential ten-year programme for electronics cooperation with the Indian MOD worth US\$231 million, leveraging India’s past experience

²⁹⁴ RAND Europe interviews, August 2015.

²⁹⁵ RAND Europe interviews, August 2015.

²⁹⁶ Gyurosi (2008).

²⁹⁷ IHS Jane’s (2015a).

²⁹⁸ IHS Jane’s (2015a).

²⁹⁹ Kogan (2008, 103).

³⁰⁰ RAND Europe interview, August 2015.

with Hungarian suppliers for electronic warfare equipment developed in the 1980s and now in need of upgrading.³⁰¹

- **Joint regional (e.g. Visegrád) programmes:** Hungary is an active member of the Visegrád Four (with the Czech Republic, Slovakia and Poland), participating in a joint Battlegroup and other regional initiatives. Although this regional collaboration has not successfully generated joint procurement programmes as of yet – in the light of disagreements over workshare and technical requirements – high-level political commitments have been made to promote such projects in future.³⁰²
- **Involvement in wider European mechanisms:** In addition to EU funding frameworks (e.g. FP7 or Horizon 2020 research), Hungary has also been involved in a number of cooperative arrangements, such as NATO Science and Technology Organisation panels, or EDA CapTechs and Project Teams. Budapest is also home to the NATO Military Medicine COE, which received accreditation in 2009.³⁰³

6.4.1. Defence planning and future procurement programmes

As outlined above, the Hungarian defence industry perceives international collaboration as an opportunity to promote an influx of foreign capital and technology to the sector, as well as to generate jobs, innovation and other spillovers for the wider Hungarian economy. A firm distinction is drawn, however, between mechanisms like licensed production or foreign acquisition of a Hungarian company, which may create jobs but see profits and intellectual property flow back to overseas owners, and more long-term relationships built around Hungarian exports through global supply chains.³⁰⁴ Industry interviewees also noted that offsets can have similar mixed results, although they may successfully expose foreign companies to new Hungarian suppliers they would not otherwise have considered using. Interviewees cited the example of German firms choosing to build long-term relationships with Hungarian SMEs that proved their reliability and value, after having initially being forced to work with them due to offsets.³⁰⁵

Recent modernisation plans for the Hungarian Defence Force have been subject to delays, modification or cancellation in the light of budgetary limitations. However, a small number of future programmes are anticipated that might provide opportunities for Hungarian (and other CEE) defence firms to collaborate, either with each other or with Western European prime contractors. These include:

- **Light and medium transport helicopters:** In July 2014, the Hungarian MOD announced that it was intending to procure light and medium helicopters to meet the needs of both the HDF and paramilitary organisations, such as search and rescue. Acquisition of a new transport helicopter fleet was labelled the ‘top priority’ for the Hungarian Air Force after the recent election, with the air branch of the HDF reportedly struggling to maintain and acquire parts for its ageing Russian-made Mi-17 and Mi-8 craft. Previous proposals by the US in 2011 to donate 32 used Marine

³⁰¹ IHS Jane’s (2015a).

³⁰² RAND Europe interviews, August 2015.

³⁰³ NATO (2015a).

³⁰⁴ RAND Europe interview, August 2015.

³⁰⁵ RAND Europe interview, August 2015.

Corps UH-1N Hueys were judged to be too expensive in terms of associated maintenance costs.³⁰⁶ Despite this 2014 announcement, the anticipated €550 million helicopter programme has been postponed in the light of budget limitations.

- **Fixed-wing transport aircraft and attack helicopters:** In addition to new transport helicopters, the HDF is also reportedly examining options to replace its ageing Antonov An-26 transport aircraft,³⁰⁷ while the future of its attack helicopter capability is unclear after the country's fleet of Mi-24 craft was unexpectedly retired in 2013 and put in storage pending upgrade or sale.³⁰⁸
- **Close air support (CAS) upgrades for Gripen:** Hungary also hopes to upgrade the ground-attack capabilities of its Gripen fighter aircraft to enable it to support ground operations of the HDF and Visegrád EU Battlegroup. This would include acquisition of laser and GPS guided bombs, training weapons, night-vision goggles and ROVER terminals for forward air controllers to download video imagery from the Hungarian Gripen's existing Rafael Litening advanced targeting pods.³⁰⁹
- **Air surveillance and anti-air missiles:** Having installed a new 3D defence radar in 2015, Hungary is planning to increase its air defence capabilities. In August 2014, Hungary signed a contract with MBDA to upgrade the Mistram SAM systems of the Hungarian Defence Force, with plans to implement this agreement between 2016 and 2018.
- **Land domain:** With the air force having received the majority of acquisition funding allocations, no major procurement of land systems is underway. However, the Hungarian MOD has stated plans to procure new infantry fighting vehicles to replace the BTR80A/M, with an initial tender planned for 2014 now delayed to the end of the decade.³¹⁰ The MOD has also expressed hopes to undertake a 'Future Soldier' programme.³¹¹
- **Cyber and electronics:** Hungary aspires to boost cyber capabilities and improve border surveillance when budgets allow, although it is unclear how many of these programmes will be fulfilled.³¹²

In recent years, the Hungarian MOD has also invested in a number of priority defence R&D programmes, with a particular focus on development of a heavy anti-armour sniper weapon, a fast attack land vehicle and UAV prototypes.³¹³

³⁰⁶ Osborne (2014, 7).

³⁰⁷ Dunai & de Larrinaga (2013).

³⁰⁸ Osborne (2014, 7).

³⁰⁹ IHS Jane's (2015p).

³¹⁰ IHS Jane's (2015p).

³¹¹ UK Trade and Investment (2013b, 1).

³¹² UK Trade and Investment (2013b, 1).

³¹³ IHS Jane's (2015a).

6.5. Capacity-building needs

Interviews and a literature review identify a number of potential capacity-building needs for the Hungarian MOD and industry, corresponding to the various barriers and obstacles to greater competitiveness outlined above:³¹⁴

- Assisting Hungarian defence sector stakeholders to align military requirements, R&D priorities and defence industrial policy (e.g. EDA guidance on creation of a relevant White Book).
- Improving transparency of future Hungarian procurement requirements and promoting greater awareness of market opportunities, actors and specificities in other EDA member states.
- Establishing training courses or secondments and sharing 'lessons learned' guidance to improve the pool of expertise and experience in the management of international cooperation programmes.
- Promoting more personal ties and informal networks between European National Armaments Directors and other MOD actors, in addition to existing formal forums.
- Boosting language and marketing skills in industry, as well as awareness of cultural specificities of exporting to certain markets, e.g. in Asia and the Middle East.
- Investing in technology, factories and infrastructure to improve Hungarian firms' ability to cooperate on major international programmes.

Other potential solutions suggested by Hungarian stakeholders included:³¹⁵

- Use of offset arrangements or favourable tax incentives to expose prime contractors to new potential suppliers in CEE countries.
- Incentivising defence industrial cooperation by awarding extra points to 'mixed' tenderers (e.g. comprising both Western and CEE industry, large and small firms, etc.) during the evaluation of proposals to European programmes.
- Specific initiatives to increase the involvement of CEE representatives in international cooperation forums at both EDA and NATO level.
- Support from the EDA (technical, managerial, contractual and legal/IPR) for regional collaboration programmes when they appear, as for instance through the Visegrád Group.

³¹⁴ RAND Europe interviews, August 2015.

³¹⁵ RAND Europe interviews, August 2015.

7. Country profile: Latvia

7.1. Country at a glance

Latvia's industrial sector comprises civilian and dual-use SMEs supplying goods and services for the national defence, security and civil sector, with a subset of companies also integrated into international supply chains. Generally the Armed Forces import high-tech products, while local producers provide more low- and medium-tech products and services.³¹⁶ As such, the Latvian Armed Forces are fully dependent on external supplies of armaments and military equipment to ensure its key capabilities.³¹⁷ The recent developments in Ukraine have brought about new concerns and focus on the MRO aspect of military capability and an increased awareness of the importance of security of supply, focusing on the abilities of Latvian companies to contribute to national defence.³¹⁸

7.1.1. Context of industrial and economic restructuring

Like Estonia and Lithuania, Latvia was previously a fully integrated part of the Soviet Union's defence technological and industrial base, with independence necessitating the construction of new local defence institutions and industry. During the 1990s and 2000s, however, tight limits on defence spending and the small size of the local skills base and production infrastructure prevented Latvian industry from achieving the scale or sophistication required to fulfil all Latvian MOD requirements or those of prospective export customers.

7.1.2. Recent policy and defence spending

A number of national policy documents are aimed at the development of innovation and production in Latvian industry, though often with little specific strategy for the defence sector. The development of local production is an aim that has been included in all main policy documents; however, there are no special references to defence production. This approach can be explained by the overall understanding that the state's support for enterprise development needs to be overarching and it is up to the free market to define the most promising sectors.³¹⁹ Academic research is coordinated by the MOD personnel development department that manages the procurements of scientific research necessary for military needs, cooperation

³¹⁶ Baltic Defence Research and Technology Conference (2009).

³¹⁷ Gotkowska & Osica (2012, 55-56).

³¹⁸ RAND Europe interview, August 2015.

³¹⁹ Latvijas Zinātņu Akadēmijas ekonomikas institūts (Latvian Economic Institute) (2009).

with research and professional organisations in Latvia and coordinates the participation of Latvian participants in EDA, NATO and other international formats. The guidance document *Military Technical Research* (2009) suggests that the need for defence-related research should be prescribed by the NAF development programme and that the MOD and NAF need their own research structure to coordinate and carry out research projects. This structure could be based at the Riga Technical University.³²⁰

However, financial constraints have severely limited the ability of the Latvian MOD or industry to invest in new technology, facilities or production. In the period 2005–2008, for instance, the Latvian MOD funded only 15–24 scientific projects every year,³²¹ although a study on shipbuilding opportunities in Latvia resulted in the Riga Shipyard receiving a national order for coastguard patrol ships.³²² When the financial crisis hit Latvia in 2008, R&D support programmes were cut and currently there is no governmental support aimed specifically at defence R&D. The Latvian MOD does not procure sufficient volumes of locally produced equipment to sustain a national defence industry on its own; as a result, many companies are seeking export opportunities through participation in EU programmes and integration in the supply chains of Western prime contractors.³²³

The defence budget dynamics have been largely negative, the MOD suffering a 55 per cent budget cut in 2007–2012, with an increase of 14.9 per cent during the last few years to €254 million.³²⁴ Currently the Latvian defence budget is around one per cent of GDP and is due to increase gradually. In May 2012, the Latvian parliament approved a new *National Defence Concept* with the aim to increase defence spending to meet the two per cent target by 2020 and complete the adaptation to NATO standards to enable participation in multilateral international operations. In light of recent changes in the security environment, the Latvian MOD is developing a new focus on three strategic principles: high-level political and operational capabilities; effective deterrence; and territorial defence. This also includes addressing measures short of war, such as the ‘hybrid’ threat.³²⁵

There has recently been a decision to increase the defence budget more rapidly, reaching two per cent of GDP by 2018. Thus the gradual increase of the defence budget will be one per cent or €259 million in 2015, 1.4 per cent or €368 million in 2016, 1.7 per cent in 2017 and two per cent in 2018.³²⁶ As of 2012, approximately 80 per cent of the military budget is spent on current activities, rather than procurement or R&D.³²⁷ Most recently the Minister of Finance, Jānis Reirs, has announced plans to finance the defence

³²⁰ Latvijas Zinātņu Akadēmijas ekonomikas institūts (Latvian Economic Institute) (2009).

³²¹ Areas include (inter alia): radiation protection, impact of radar electromagnetic field on human health, operational oceanography model system for waters under Latvian jurisdiction, use of microorganisms in degradation of explosive substances.

³²² Latvijas Republikas Aizsardzības ministrija (Latvian Ministry of Defence) (2008).

³²³ RAND Europe interview, August 2015.

³²⁴ SIPRI (2015b).

³²⁵ RAND Europe interview, August 2015.

³²⁶ Diena (2015), data supplied by the Latvian MOD, December 2015.

³²⁷ Gotkowska & Osica (2012).

sector beyond the agreed budget. The MOD is likely to receive additional financing from the New Policy Initiatives budget to allow it to fulfil its long-term development plan.³²⁸

Table 7.1 Defence spending in Latvia, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	0.295	0.292	0.301	0.343	0.488	0.628	0.783	0.783
Constant 2015 €billion	0.161	0.160	0.227	0.259	0.368	0.473	0.590	0.590
% GDP	0.99%	0.94%	0.95%	1.04%	1.4%	1.7%	2.00%	2.00%

Source: IHS Jane's (2015), Latvian MOD (2015).

7.2. Defence industrial capabilities

7.2.1. General assessment by sector (land, air, naval, C4I)

Locally, the two most important producers for the MOD are the specialist textile industry that supplies the Latvian Armed Forces and the small shipbuilding industry.³²⁹ Industrial capabilities are confined almost entirely to the components and systems level, with highly limited levels of employment or production capabilities and a heavy reliance on imports for the Latvian MOD. The country's civil material and technological resources enable the NAF to carry out basic inspections and small overhauls of some types of equipment. Otherwise the Latvian NAF are fully dependent on external supplies of armaments and military equipment.³³⁰ The recent developments in Ukraine have brought about new concerns and focus on the MOR aspect and an increased awareness of the security of supply, focusing on the abilities of Latvian companies to contribute to national defence.³³¹

The textile industry is an important supplier of the Latvian Armed Forces as almost all uniforms, badges and flags are made by local producers.³³² As a result of a joint MOD and Ministry of Economy research project to promote the military industrial sector, the Riga Shipyard won a large public contract in the late 2000s to build patrol boats (SWATH-125t patrol vessels, designated *Skrunda-class*) for the Latvian Navy³³³ in cooperation with the Abeking & Rasmussen shipyard in Germany.³³⁴ Able to carry a mission

³²⁸ Finansu ministrija (2014).

³²⁹ Latvijas Zinātņu Akadēmijas ekonomikas institūts (Latvian Economic Institute) (2009).

³³⁰ Gotkowska & Osica (2012).

³³¹ RAND Europe interview, August 2015.

³³² Latvijas Zinātņu Akadēmijas ekonomikas institūts (Latvian Economic Institute) (2009).

³³³ IHS Jane's (2014d).

³³⁴ SIPRI Arms Transfer Database (2015a).

module equal to the size of a 20 ft container and weighting up to six tons, this vessel represents Latvia's largest potential export product at the full platform level.

7.2.2. Major industries

Main companies include:³³⁵

- **Riga Shipyard:** A dual-purpose shipyard that produces *Skrunda-class* patrol vessels for the Latvian Navy and provides overhaul of commercial and naval vessels.
- **Komercentrs DATI:** ICT management with an emphasis on security system integration and management. Currently involved in the NATO Alliance Ground Surveillance as a provider of management software.
- **D Dupleks:** Shotgun ammunition.
- **SRC Brasa:** Clothing and other fabric products for military application (e.g. uniforms).
- **Valpro:** Fuel and liquid containers for military and civilian application.
- **C2:** Supplier of unmanned ground vehicles, CBRN products and information security products.
- **Axon' Cable SIA:** Electric and hydroelectric wires, cables and harnesses, connectors and other components for military purposes.

7.2.3. Niche areas

Some of the niche areas in Latvia are:

- ICT solutions and cybersecurity
- Environmental modelling
- Dual-use robotics³³⁶
- Complex systems modelling languages
- Composite materials research³³⁷
- Nanotechnology
- Electrical, optical and communications equipment
- Construction
- Polymer mechanics, solid state physics
- Satellite technologies
- Manufacturing of parts and components on demand³³⁸
- Rail transit of non-military cargo to/from Afghanistan via the Northern Distribution Network.³³⁹

³³⁵ IHS Jane's (2015h).

³³⁶ RAND Europe interview, August 2015.

³³⁷ Riga Technical University (2015).

³³⁸ Baltic Defence Research and Technology Conference (2009).

³³⁹ Latvijas Republikas Aizsardzības ministrija (Ministry of Defence Latvia) (2014).

Although many research institutions have not, to date, specialised in the defence area, there is also a wider potential to develop products relevant for the sector, such as wireless technologies for heart-rate monitoring, technologies for water sterilisation in battle conditions, microclimate conditioning systems and energy conservation.³⁴⁰

7.3. Barriers and obstacles

7.3.1. Internal

A number of internal barriers are related to the limited financial, technical and human resources available within the small Latvian defence sector. Latvian companies mostly provide products at the component level and find it difficult to penetrate the supply chains of the western primes.³⁴¹ As such, there is a perceived need to encourage local SMEs to develop niche areas of relevance to the western defence and civilian industry, specifically because the local market for defence and security products is very small.³⁴²

Related challenges include the high administrative burden for SMEs to participate in national and international tenders; lack of information on the long-term needs of the MOD; and the perceived lack of proactivity on the part of the MOD to communicate information about national or international tenders, although information on MOD opportunities is published on the webpage of the Procurement Monitoring Bureau.³⁴³

Furthermore, when national procurements do occur (thus providing opportunities for both local and international firms), some past programmes have encountered difficulties related to a lack of transparency around acquisition requirements, compounded by project governance and management issues. For instance, the procurement of five *Alkmaar-class* minehunter vessels from the Netherlands in 2005 for more than LVL40 million was reportedly subject to mismanagement leading to increased costs and delivery delays – with at least one of the vessels needing repair work even before the delivery to Latvian ports.³⁴⁴

In addition, there is reportedly a limited understanding of the civilian and defence industry, as well as the research sector, within the Latvian MOD. The lack of technical knowledge and administrative capacity within the MOD limits its competence as an ‘intelligent customer’ and its ability to act as a ‘knowledge-brokering’ hub to bring together defence industry, civilian industry and military needs (or domestic firms with foreign opportunities).³⁴⁵ Indeed, there is reportedly a wider problem of limited understanding among local defence actors of the relationships and approaches required to navigate the procurement processes of major export markets, e.g. US or UK.

³⁴⁰ Latvijas Republikas Aizsardzības ministrija (Ministry of Defence Latvia) (2014).

³⁴¹ RAND Europe interview, August 2015.

³⁴² RAND Europe interview, August 2015.

³⁴³ Procurement Monitoring Bureau (n.d.).

³⁴⁴ Joshi (2009).

³⁴⁵ Jermalavicius (2012, 10).

Indeed, this lack of understanding is further reinforced by a perceived reluctance among MOD officials to consult industry representatives on requirements or strategy, for fear of the possible perception of conflict of interest.³⁴⁶ Close relations between government and local industry are further hampered by the relatively high rotation of the personnel in the Ministry of Defence and the Ministry of Foreign Affairs, and indeed by the comparatively limited number of personnel in these institutions. For its part, the private sector is similarly affected by the emigration of talent prompted by comparatively low wages.³⁴⁷ Continuity of strategy is also affected by limited long-term planning, although the NAF long-term development plan offers some projections for the coming decade.³⁴⁸

On the question of support for defence-related innovation, the literature notes that 'R&D in Baltic states has played a marginal role in the development of defence strategies, capabilities and organisations due to modest levels of investments and organisational capabilities.'³⁴⁹ As mentioned earlier, the Latvian MOD does not have any budget programme for R&D.³⁵⁰ Although the national defence budget has been augmented in recent years, following the drastic budget cuts during the financial crisis in 2008, it is still too small to cover both the stated NAF modernisation programmes (mainly off-the-shelf procurement) and R&D. Compared to the other two Baltic states, Latvia has the smallest investment and activity related to defence-related R&D activities.³⁵¹ Although the Ministry of Economy provides support to enterprises that are seeking ways to export their products, there is no specific defence-export programme.³⁵² There is fragmented cooperation among the defence research organisations and producers and a lack of information on the commercial aspects of R&D in research institutions,³⁵³ which results in research being carried out as an academic exercise rather than being commercialised.³⁵⁴ More broadly, Latvia has had little experience with protection of critical defence-related intellectual property rights.³⁵⁵

In this difficult fiscal context, organisational culture may also pose challenges to Latvia's ability to bear risk and plan for innovation. With a reportedly conservative mentality and existing regulations limiting the ability to take risky decisions, a number of stakeholders felt that the MOD is not active or assertive in promoting and assisting the defence industry.³⁵⁶ Although there is often a need for formal strategies to boost processes, there is no extant formal innovation strategy tied into the wider strategic planning for military needs.

³⁴⁶ RAND Europe interview, August 2015.

³⁴⁷ RAND Europe interview, August 2015.

³⁴⁸ Ministry of Defence of Latvia (2014).

³⁴⁹ Jermalavicius (2012, 5).

³⁵⁰ RAND Europe interview, August 2015.

³⁵¹ RAND Europe interview, August 2015.

³⁵² RAND Europe interview, August 2015.

³⁵³ RAND Europe interview, August 2015.

³⁵⁴ RAND Europe interview, August 2015.

³⁵⁵ RAND Europe interview, August 2015.

³⁵⁶ RAND Europe interview, August 2015.

7.3.2. External

External barriers include the lack of joint or coordinated procurement planning and processes across Europe in general, as well as the perceived complexity of integrating SMEs into the supply chains of western companies, given the administrative and networking burdens that this involves. There is also a reported lack of coordination in the planning and timing of procurements between different European states,³⁵⁷ as well as different strategic priorities, even among the Baltic states.³⁵⁸ Baltic cooperation has been further hindered by the limited potential of the Baltic states' Armed Forces, their disparate equipment and the divergent development directions of their respective military forces.³⁵⁹ Cooperation regarding international procurements has been largely focused on big partners, e.g. Estonia (US, UK and Finland), Lithuania (US and Poland) and Latvia (US).³⁶⁰

Where Latvian firms are able to access foreign supply chains or partnerships, the small size of Latvian defence firms raises concerns about their ability to deliver adequate supplies at scale.³⁶¹

There is also a perceived need to motivate and incentivise the primes to become interested in cooperating with local businesses, as well as a perceived inequality in the application of European legislation (such as the EU procurement directive) between small and large EU member states.³⁶² The EU ban on offsets is also regarded by some local actors as an obstacle to the development of the sector,³⁶³ as offsets were regarded as a possible way to attract investment and cooperation with primes.

7.4. Opportunities and programmes

There has recently been some formal progress in defence procurement and industrial cooperation with other countries. In 2012, the Baltic governments announced a joint €50 million acquisition of ammunition for the Carl Gustav anti-tank recoilless rifle.³⁶⁴ In April 2015, the Estonian and Latvian prime ministers held a joint press conference to announce that they planned to make coordinated military procurements in future, bilaterally as well as with other countries in the region.³⁶⁵ In 2015, the UK defence association ADS signed an MOU with the Latvian, Lithuanian and Estonian NDIA's to promote greater industrial collaboration.³⁶⁶ In 2015, the Latvian and Danish governments renewed an MOU on defence cooperation, including procurement, previously signed in 1994.³⁶⁷ Cooperation has also been

³⁵⁷ Postimees (2015).

³⁵⁸ RAND Europe interview, August 2015.

³⁵⁹ Gotkowska & Osica (2012, 11).

³⁶⁰ Gotkowska & Osica (2012, 11).

³⁶¹ Rutenberga-Berzina (2010).

³⁶² RAND Europe interview, August 2015.

³⁶³ RAND Europe interview, August 2015.

³⁶⁴ Gotkowska & Osica (2012, 13).

³⁶⁵ Postimees (2015).

³⁶⁶ Machinery Market (2015).

³⁶⁷ Sargs (2015).

established among the Baltic states, especially with regard to Host Nation Support (HNS) exercises. Lithuania, Latvia and Estonia have declared that they would be willing to extend this cooperation to include more effective use of firing ranges and training centres and, possibly, to pursue some specialisation in this area.³⁶⁸

On the industrial side, on 18 June 2014, the defence industries of Estonia, Latvia and Lithuania signed an MOU to increase cooperation between the three countries and explore export opportunities.³⁶⁹ Between 2011 and 2014, the Latvian government received delivery of five SWATH-125t patrol vessels (designated *Skrunda-class*) built in cooperation between the Abeking & Rasmussen shipyard in Germany and Riga Shipyard in Latvia.³⁷⁰ Two of the five vessels (the P-07 Viesite and P-09 Rezekne) were constructed primarily at the Riga Shipyard. As such, a range of cooperation links have been established among the NDIAAs, MODs and MFAs of the Baltic states, with ongoing discussion of the possible joint acquisition of air surveillance and defence systems in future.³⁷¹

7.4.1. Defence planning and future procurement programmes

As of May 2012, the Latvian MOD has a new State Defence Concept outlining a 72-point plan for defence, including provisions for boosting procurement investment and support of defence industry, indicating that no less than 20 per cent of the NAF budget must be allocated for the acquisition of armament and equipment, while personnel costs may not exceed 50 per cent. The document also prioritises military procurements with other Baltic states, promoting Latvian private enterprises and their inclusion in NATO industrial supply and transit chains and promoting military exercises in Latvia that allow local companies to participate in the provision of HNS and local suppliers to be involved in large-scale military goods contracts.

There is limited publicly available information about Latvia's future procurement plans. However, the Latvian MOD is reportedly interested in acquiring further armoured vehicles to supplement its recent order of CVR-Ts from the UK,³⁷² as well as the Spike anti-tank missile system.³⁷³ Air surveillance and defence has also been identified as a priority area (in line with similar Estonian and Lithuanian planning), in the light of growing concern over potential Russian aggression. In July 2014, Defence Minister Raimonds Vējonis reported that Latvia needed to invest around €140 million over eight years in air defence, including acquisition of advanced radar systems and the Stinger SAM.³⁷⁴ Procurement is expected to begin in 2015.³⁷⁵ The current MOD development priorities include mechanisation and general

³⁶⁸ Gotkowska & Osica (2012, 14).

³⁶⁹ Likumi (n.d.).

³⁷⁰ Naval Today (2011).

³⁷¹ RAND Europe interview, August 2015.

³⁷² Romanovs (2014).

³⁷³ Romanovs (2014).

³⁷⁴ LSM (2014).

³⁷⁵ BNN (2014).

development of the Land Forces and providing HNS to NATO forces.³⁷⁶ Considering the fact that the tripartite minehunter vessels owned by the Latvian Navy are 30 years old, and judging by the plans of the Dutch and Belgian navies, which use the same class of vessels, to retire these minehunters, the Latvian Navy may be looking for ways to replace the current capacity within the next 10–15 years.

Alongside imports of some sophisticated systems, the domestic demand for local products is expected to cover such low-tech areas as different types of uniform, training simulators and accommodation essentials, such as tents and heating solutions.³⁷⁷ The projected defence budget increase in coming years could also pave the way for potential R&D investment programmes that could help research institutes.

7.5. Capacity-building needs

Industry representatives have suggested that '[t]he greatest support which the Ministry [of Defence] can give to us is information about potential clients and planned procurements. What is more, there could be more and broader information from other ministries, because that does not require additional resources.'³⁷⁸ According to the Latvian NDIA, there is also a need for EU-funded projects aimed at defence capability development, as well as more discussions on the products that need to be produced within the EU.³⁷⁹ However, some private companies have limited trust in the ability of EU institutions and frameworks to support defence and dual-use sector development, citing a perception of challenging administrative burdens in working with such bodies.³⁸⁰

According to the NDIA, Latvia and the other Baltic states need to improve strategic decisionmaking and develop a unified strategic approach, seek closer coordination on defence procurements and improve MOD cooperation with industry. There is also a reported need to boost the technical knowledge and administrative capacity of the MOD as well as links with foreign defence sectors to promote Latvian SMEs. Support is also desired for development of physical infrastructure and technical skills in industry, as well as the institutions of the NDIA itself; this body was only established in recent years, limiting its experience and network of contacts.³⁸¹

In addition to these specific opportunities for Latvia, a literature review also identified studies that have focused on recommendations applicable at the wider, Baltic level. This is particularly the case for the analysis of defence-related R&D in the three countries, with a view to using cooperation in this field as both a proof-of-concept and springboard for subsequent potential collaboration on procurement. Jermalavicius (2012) suggests that advances in defence understanding of R&D (and collaboration on R&D) will have knock-on effects for the technical and programme management competences of Baltic

³⁷⁶ RAND Europe interview, August 2015.

³⁷⁷ Latvijas Zinātņu Akadēmijas ekonomikas institūts (Latvian Economic Institute) (2009).

³⁷⁸ Rutenberga-Berzina (2010).

³⁷⁹ RAND Europe interview, August 2015.

³⁸⁰ RAND Europe interview, August 2015.

³⁸¹ RAND Europe interview, August 2015.

defence organisations, identifying these as the prerequisites for intelligent acquisition, maintenance and use of military capabilities.³⁸² His recommendations include:³⁸³

- Advancing trilateral R&D collaboration by means of a BALTDEFCOL-led research consortium of national defence academies, mentored by a non-Baltic NATO or EU nation with significant experience in R&D.
- Tying research themes to existing trilateral collaboration projects and organisations to generate some common ‘pull’ for R&D efforts to support their development and functioning (e.g. research in maritime mine countermeasures to support further evolution of BALTRON).
- Synchronising the setting of national capability requirements and strategy with R&D investments.
- Aligning defence-related industrial policy with defence-related innovation strategy (or develop one if it does not exist, as in Latvia). In turn, aligning defence innovation strategy with wider national innovation strategy or priorities.
- Focusing also on carefully-chosen interdisciplinary themes that branch out into civilian (‘dual-use’) S&T, with human factors and medicine, organisational management and modelling and simulation being potential contenders, followed by areas such as C4ISR, information assurance, autonomous vehicle technology and electromagnetic spectrum technologies.
- Relaunching the Baltic Defence Research and Technology Conference as a biennial event, preceded by a series of workshops and seminars run by thematic research groups.

³⁸² Jermalavicius (2012, 3).

³⁸³ Jermalavicius (2012, 3).

8. Country profile: Lithuania

8.1. Country at a glance

As in other Baltic countries, Lithuanian defence sector institutions are small and relatively immature, having been founded only after the country's independence in 1990. Lithuania became the last EU member state to establish an NDIA, in 2014.³⁸⁴ Today, the Lithuanian Defence and Security Industry Association (LGSPA) has some 35 members representing approximately 100 firms, all SMEs with no major 'national champion' defence enterprise.³⁸⁵ The combined turnover of all LGSPA members was reported at only €128 million for 2014, including both defence and civil market sales.³⁸⁶ Defence-specific exports for the same year totalled €32 million, with the LGSPA targeting growth to €40 million in 2015.³⁸⁷

Unable to produce indigenous platforms or major systems in land, air, naval or C4I domains, Lithuania's civil material and technological resources confine it to carrying out basic inspections and small overhauls of some types of equipment.

8.1.1. Context of industrial and economic restructuring

Along with the other Baltic nations, Lithuania was previously a fully integrated part of the Soviet Union's defence technological and industrial base, home to a number of specialist R&D centres (e.g. textiles) as well as MRO facilities for Soviet helicopters and armour.

The country's independence in March 1990 brought a period of instability for the local defence industry, with a loss of jobs, market share and historic export relationships. Limited defence spending ensured that domestic demand for the defence sector was highly limited, a trend compounded by the availability of stocks of cheap Soviet-era equipment and donations of second-hand materiel from European countries.

In the 1990s and early 2000s, Lithuania's security policy goals focused on achieving integration into the EU and NATO.³⁸⁸ In this period, Lithuania's *National Security Strategy* (2002) suggested that the key strategic challenges facing the nation were transnational, threats such as terrorism, organised crime and

³⁸⁴ Grizibauskienė (2015).

³⁸⁵ Grizibauskienė (2015).

³⁸⁶ ELTA (2015a).

³⁸⁷ ELTA (2015a).

³⁸⁸ Lawrence & Jermalavicius (2013, 5).

epidemics rather than conventional state warfare.³⁸⁹ Nonetheless, the country's reliance on Russian energy supplies and its wider concerns over its larger neighbour led Lithuanian defence planners to pursue close ties with NATO, the US and Poland, with a number of other collaborative partnerships also emerging with NORDEFECO and the Baltic states (see below).

8.1.2. Recent policy and defence spending

The onset of economic crisis in 2007 brought significant cuts to Lithuania's already limited defence spending, which fell from 1.2 per cent of GDP in 2007 to 0.8 per cent in 2011, with the MOD budget totalling only US\$327 million in 2012.³⁹⁰ During the same period, the Lithuanian Armed Forces transitioned from a conscript to a professional force of 8,500, or 15,700 including the National Defence Volunteer Forces as a reserve. According to the Polish think tank OSW, these forces are 'poorly equipped (even accounting for size), but relatively well-trained', with over 85 per cent of defence spending going to personnel costs and current activities, rather than procurement of new equipment or R&D.³⁹¹

Table 8.1 Defence spending in Lithuania, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	0.345	0.360	0.412	0.563	0.751	0.853	0.928	0.990
Constant 2015 €billion	0.897	0.938	0.311	0.425	0.566	0.643	0.699	0.746
% GDP	0.76%	0.77%	0.85%	1.12%	1.44%	1.56%	1.62%	1.66%

Source: IHS Jane's (2015)

With renewed concern over the potential existential threat posed by Russia emerging in the wake of the Ukraine crisis, the Lithuanian government initially committed to gradually increasing the defence budget towards the NATO target of two per cent of GDP by 2020.³⁹² In September 2015, however, the MOD's draft budget outlined an intention to expand defence spending by 35 per cent in 2016. The country has outlined plans to update the capabilities of its Armed Forces in a number of areas during the period 2014–2023, including mechanisation of its Iron Wolf Brigade and acquisition of anti-tank missiles and SAM. Involving local Lithuanian industry in these plans is seen as an opportunity to bring economic and knowledge spillovers, generate jobs, promote R&D and ensure greater security of supply across the life cycle of military systems.³⁹³

³⁸⁹ Mannik (2013, 25).

³⁹⁰ IHS Jane's (2015q).

³⁹¹ Gotkowska & Osica (2012).

³⁹² IHS Jane's (2015q).

³⁹³ RAND Europe interviews, August 2015.

Before these plans were initiated, SIPRI ranked Lithuania the 87th country in the world by value of arms imports 2010–2014, although this already-low figure was inflated by the 2013 purchase of three Eurocopter Dauphin helicopters, supported by EU funds.³⁹⁴ This deal alone constituted US\$72 million out of the Lithuanian military's total of US\$88 million in imports over the five-year period.³⁹⁵ Other recent procurements include a €4.4 million deal in 2011 to acquire 12 Norwegian Land Cruiser APVs for use in Afghanistan,³⁹⁶ a 2012 contract for five ScanEagle tactical UAV systems from the US, the receipt in 2013 of two former UK Royal Navy *Hunt-class* minehunter vessels refurbished by Thales UK and the acquisition of GROM MANPADs from the Polish firm MESKO.³⁹⁷

8.2. Defence industrial capabilities

8.2.1. General assessment by sector (land, air, naval, C4I)

Against this backdrop, the Lithuanian defence sector is small (with a total turnover of €128 million in 2014), privately owned and focused primarily around the provision of MRO and defence services, as well as some minor subsystems or component manufacture.³⁹⁸ Unable to produce indigenous platforms or major systems in either the land, air, naval or C4I domains, and with the local industry consisting entirely of SMEs, Lithuania's civil material and technological resources confine it to carrying out basic inspections and small overhauls of some types of equipment. Areas of activity include:

- **Small arms ammunition and personal military equipment:** Ammunition to NATO and eastern standards (GGG Giraites Armament Factory); military clothing, protective gear and personal equipment (Garlita, Survival), including CBRN and forensic kit (Arveka); textiles (Lithuanian Textile Institute); laser simulators for rifles.
- **Aerospace maintenance, repair and overhaul (MRO):** Aircraft spare parts and MRO; helicopter modernisation for Mi-types and Kamov (ASU Baltija); test ranges for complex weapons, aircraft and UAVs (Ignalina aerodrome).
- **Maritime and defence services:** Military small boats (ASU Baltija); private base and maritime security; VIP protection and explosive ordinance disposal (RAE LT, Argus).
- **Military communications, electronics and ICT:** ICT, radio and UAV information systems (Elsis Group)³⁹⁹; shortwave RF devices (Geozondas); radar, air traffic control equipment and upgrade of air defence missile systems (LitakTak); radiation detection devices (Polimaster); cybersecurity and digital surveillance technologies (NRD Cyber Security); robotics (Rubedo Sistemas); lasers (Lithuanian Laser Association).

³⁹⁴ SIPRI (2015a).

³⁹⁵ SIPRI (2015a).

³⁹⁶ SIPRI (2015a).

³⁹⁷ SIPRI (2015a).

³⁹⁸ ELTA (2015a).

³⁹⁹ Elsis (n.d.).

- **Miscellaneous:** Dry food rations (Pakma); medical equipment (Jugrita); biotechnology (BioTech Valley); solar energy and biogas (Renvia); space science and technology (SSTI); military topographic maps.

Given the limited industrial capabilities of local firms, the Lithuanian Armed Forces are almost fully dependent on external supplies of armament and military equipment.⁴⁰⁰ Approximately 90 per cent of the Lithuanian defence equipment budget is spent abroad, according to the LGSPA, with very limited acquisition of military supplies from domestic firms.⁴⁰¹ As such, export is a focus of many companies.⁴⁰² However, IHS Jane's (2014) suggests that 'Lithuanian defence exports are minimal, with markets including other NATO and European Union countries as well as Russia. [As one example] Helisota Limited has overhauled Latvian military helicopters.'⁴⁰³

According to Rudzite-Stejskala (2012): 'There have been no specific studies in the Baltic states on the effect of defence expenditure in creating domestic demand for goods or boosting income and thus indirectly affecting labour/capital productivity, but it certainly had, and still has, only a very limited effect on the import/export ratio and on domestic technological improvement.'⁴⁰⁴

Limited data are available on the exact scope of Lithuanian defence exports, with LGSPA figures suggesting a total figure of €32 million in defence exports for 2014. The association hopes to increase this figure by around a third in 2015.⁴⁰⁵ In addition to the homegrown capabilities of Lithuanian defence firms, a number of foreign enterprises operate facilities or subsidiaries in the country. This includes the US company Safariland, which produces bulletproof vests in Kaunas,⁴⁰⁶ and the Swedish prime contractor Saab AB, which operates a small facility near Siauliai that produces plastic containers for the Carl Gustav anti-tank system ammunition.⁴⁰⁷ The Swedish firm is the first foreign member of the Lithuanian NDIA.⁴⁰⁸ These multinational firms also contribute to the presence of Lithuanian products on global markets.

⁴⁰⁰ Gotkowska & Osica (2012, 53).

⁴⁰¹ Grizibauskienė (2015).

⁴⁰² Grizibauskienė (2015).

⁴⁰³ IHS Jane's (2014l).

⁴⁰⁴ Rudzite-Stejskala (2012, 177).

⁴⁰⁵ ELTA (2015a).

⁴⁰⁶ Grizibauskienė (2015).

⁴⁰⁷ Grizibauskienė (2015).

⁴⁰⁸ LDSIA (n.d.).

8.2.2. Major industries

Key actors in the small Lithuanian defence and security sector include:⁴⁰⁹

- **Elsis Group:** ICT company designing and developing a range of ICT hardware and software, as well as development of small UAVs.
- **Helisota Ltd:** Provider of MRO services for Mil Mi-8 and Mil Mi-17 helicopters, as well as a range of aviation equipment and spare parts. Also involved in the fixed-wing market, mostly through MRO but also including production of light two-seat trainer aircraft.
- **GGG Giraite Armament Factory:** Small arms ammunition manufacturer, producing bullets to NATO and ISO standards, as well as components for cartridges, with around 90 per cent of production exported for both military and civilian markets.

8.2.3. Niche areas

Lithuanian SMEs and research institutes operate across a range of niche areas, primarily in relation to the air and land domain. The Lithuanian MOD and LGSPA suggest that the country's defence sector is a leader in a number of technical niches, including laser research, specialist laser production, software programming and MRO of certain platforms (e.g. Antonov aircraft, Mi-type and Kamov helicopters), with a strong science and research base relative to the country's small size.⁴¹⁰ Reflecting the country's inability to produce entire platforms or major systems, these niche areas are focused on components and subsystems, with Lithuanian firms typically acting as a supplier or subcontractor for foreign markets.⁴¹¹

Since 2013, Lithuania has also been home to the NATO Energy Security COE, based in Vilnius, which builds upon the country's own domestic investment in the Lithuanian Energy Institute.⁴¹²

8.3. Barriers and obstacles

8.3.1. Internal

Although there is not an extensive academic or grey literature addressing the Lithuanian defence industry, a number of studies have identified potential internal barriers to greater competitiveness and collaboration on the international market.

An overriding issue facing the Lithuanian defence sector is the highly limited availability of capital, with the country's defence spending falling to less than 0.8 per cent of GDP in 2011 and plans to raise this gradually to two per cent by 2020 yet to be fully implemented.⁴¹³ Importantly, the defence budget has been overwhelmingly focused on personnel costs and current activities since the country's independence in

⁴⁰⁹ IHS Jane's (2014l).

⁴¹⁰ RAND Europe interviews, August 2015.

⁴¹¹ RAND Europe interviews, August 2015.

⁴¹² NATO (2013).

⁴¹³ RAND Europe interviews, August 2015.

1990. This issue has been compounded by the availability of cheap stocks of Soviet-era materiel, as well as by donations of second-hand military equipment from Nordic and Western European states.

The small size of domestic demand for defence materiel poses obvious financial challenges for the Lithuanian defence industry, as well as impacting its capacity to export; firms cannot rely on the Lithuanian Armed Forces to acquire products, deploy them in the field and act as a reference for subsequent overseas sales or international partnerships. As a potential customer, the Lithuanian MOD is absent from some areas of defence entirely. For instance, the country operates no fixed-wing combat aircraft, relying instead on NATO allies for air policing. Similarly, Lithuanian defence firms lack competitive products in many areas and are limited in terms of their production capabilities, hindering their potential for involvement in large-scale international defence programmes.⁴¹⁴

On the government side, the budgetary constraints of the MOD limit Lithuania's purchasing power and diplomatic influence as a buyer for foreign-made equipment. Legal considerations also limit the Lithuanian MOD's ability to direct defence spending towards domestic suppliers or collaborative international programmes, given the requirement for open competition, although the potential utility of offsets to counter this remains a subject of public debate, despite EU regulations limiting their use. The LGSPA is reported to be exploring the possibility of an exception to EU regulations (citing the example of the Netherlands) to allow an offset of 30 per cent for the procurement of infantry fighting vehicles.⁴¹⁵ However, Defence Minister Juozas Olekas has acknowledged that this 'discourages Western manufacturers, who like competition to be very fair',⁴¹⁶ and the proposal has also received criticism from the Lithuanian parliament's National Security and Defence Committee.⁴¹⁷

Other key issues concern the structure of the Lithuanian defence industry, as well as its wider networks and connections. A major challenge for those looking to export has been a lack of visibility or marketing presence for Lithuania's defence SMEs outside the country itself. This reflects the small size and immaturity of the sector.⁴¹⁸ There is a perception within the sector that as a newcomer to the EU market, it is difficult to penetrate the 'old club' that dominates the EDTIB, with western primes and SMEs having pre-existing relationships with both Western and Eastern European MODs.⁴¹⁹ Until as recently as 2014, the sector lacked an NDIA to promote common initiatives at home and greater awareness abroad, making Lithuania the last EU member state to establish such a body.⁴²⁰ Despite the recent creation of this forum, the literature suggests that in many defence enterprises there is a limited understanding of how to navigate the procurement processes of major export markets, such as the UK or US.⁴²¹ Similarly, the LGSPA reports a lack of cooperation or coordination between governmental institutions, contracting authorities

⁴¹⁴ RAND Europe interviews, August 2015.

⁴¹⁵ Alfa (2014).

⁴¹⁶ Alfa (2014).

⁴¹⁷ Alfa (2014).

⁴¹⁸ RAND Europe interview, August 2015.

⁴¹⁹ RAND Europe interview, August 2015.

⁴²⁰ Grizibauskienė (2015).

⁴²¹ RAND Europe interview, August 2015.

and local industry, as well as an absence of market research studies to provide information on market opportunities and capabilities.⁴²²

Furthermore, talent and culture issues compound these difficulties in collaborating with foreign partners, with language skills identified as one concern.⁴²³ Similarly, divergent internal cultures and a limited understanding within civilian industry or research institutions of defence organisations, and how to work with them, can pose challenges to those seeking to promote interdisciplinary working or development of dual-use goods. At the same time, a perceived lack of technical knowledge and administrative capacity within the Lithuanian defence ministry limits its competence as an ‘intelligent customer’, as well as the organisation’s ability to act as a ‘knowledge-brokering’ hub to bring together defence industry, civilian industry and military needs (or domestic firms with foreign opportunities).⁴²⁴ Similarly, the financial challenges facing both industry and government may be exacerbated by the perceived instability of Lithuanian MOD forward planning, with defence priorities having been subject to political and economic change in recent years,⁴²⁵ and a perceived lack of holistic thinking on the links between military needs, industrial policy and S&T investment.⁴²⁶

Infrastructure is another area affecting defence industrial cooperation. Although Lithuania has established five integrated science, business and technology ‘valleys’ to promote innovation, exports and investment in the country’s productivity, research base and workforce, Lithuania lacks dedicated open infrastructure for the defence sector to cluster around. Furthermore, only a limited number of foreign defence firms (e.g. Saab AB) operate industrial sites in the country.

8.3.2. External

The Lithuanian MOD and LGSPA report a number of perceived external barriers to collaboration, including:

- Divergent strategic priorities across CEE and EU countries.
- Different planning, budgetary and electoral cycles.
- Favourable conditions for large prime contractors and preferences in many countries for using national industry rather than international partners or SMEs.
- Asymmetry of scale of Armed Forces, defence budgets, local industry and industrial ambitions.
- Need to acquire new military capabilities in a short timeframe (given the security situation in Eastern Europe), whereas collaborative programmes can take time to set up.
- Lack of institutional frameworks or funds to promote collaboration, which is primarily driven on a more case-by-case basis.⁴²⁷

⁴²² RAND Europe interview, August 2015.

⁴²³ RAND Europe interview, August 2015.

⁴²⁴ Jermalavicius (2012, 10).

⁴²⁵ RAND Europe interviews, August 2015.

⁴²⁶ Jermalavicius (2012, 10).

⁴²⁷ RAND Europe interviews, August 2015.

8.4. Opportunities and programmes

Despite the barriers and obstacles identified above, Lithuania has a number of extant collaborative arrangements and ongoing procurement plans, both of which may provide a basis on which to build international defence industrial cooperation in future.

Collaboration of this kind is perceived by the Lithuanian MOD as an opportunity to ensure security of supply, promote economic benefits through use of the labour force and support innovation.⁴²⁸ For its part, the LGSPA recognises that increased cooperation may promote the exchange of new design ideas and project management methods, as well as potentially reducing costs through avoidance of duplication of expensive facilities. Business-to-business cooperative arrangements will also allow firms to circumvent the bureaucratic obstacles perceived to affect government dealings.⁴²⁹ Potential incentives and benefits for western prime contractors engaging in collaboration with Lithuanian firms are thought to include cheap labour costs, greater understanding of Lithuanian MOD requirements and access to high-quality Lithuanian products.⁴³⁰

The Lithuanian defence sector's existing collaborative mechanisms include:

- **Bilateral partnerships:** In 2014, Lithuania pledged to increase cooperation with Ukraine, including possible joint military-technological development and select shipments of arms to the Ukrainian Armed Forces.⁴³¹ In 2015, the UK defence association ADS signed an MOU with the LGSPA to promote greater future industrial cooperation.⁴³² The country has also recently concluded a cooperation agreement with the US that addresses a range of defence topics, including the promotion of joint projects for the development of Lithuania's defence capabilities.⁴³³
- **Joint regional programmes:** Lithuania is involved with a range of collaborative defence initiatives with its Baltic neighbours. This includes the joint Baltic Battalion (BALTBAT), Baltic Naval Squadron (BALTRON) and Baltic Air Surveillance Network (BALTNET), as well as a number of educational centres, such as the Baltic Defence College. Cooperation has also been established with regard to HNS exercises, with the three states having declared that they would be willing to extend this cooperation to include more effective use of firing ranges and training centres and, possibly, to pursue some specialisation in this field.⁴³⁴ In the area of acquisition, Lithuania has also partnered with Estonia and Latvia on a joint €50 million procurement of the Carl Gustav anti-tank system⁴³⁵. Furthermore, the Baltic states also partnered with Nordic neighbours through

⁴²⁸ RAND Europe interview, August 2015.

⁴²⁹ RAND Europe interview, August 2015.

⁴³⁰ RAND Europe interviews, August 2015.

⁴³¹ BBC News (2014).

⁴³² Machinery Market (2015).

⁴³³ Lithuanian Ministry of National Defence (2015).

⁴³⁴ Gotkowska & Osica (2012, 14)

⁴³⁵ Gotkowska & Osica (2012, 13)

NORDEFECO, with plans for enhanced cooperation on armaments, training and exercises, and capacity-building.⁴³⁶

- **Involvement in wider European mechanisms:** In the field of R&D, Lithuanian research institutes participate in a number of international frameworks, such as the NATO Science for Peace Programme, EU FP7 and EUREKA, as well as hosting the NATO Energy Security COE. In October 2015, Lithuania also joined Croatia, Italy, Germany, Greece and the Netherlands in the NATO Support and Procurement Agency's PzH2000 user project, following acquisition of 12 self-propelled howitzers from Germany the previous month.⁴³⁷

8.4.1. Defence planning and future procurement programmes

As outlined above, the instability and limited time horizon of the Lithuanian MOD's forward planning may act as a barrier to greater investment in the Lithuanian DTIB. However, despite these challenges and the small size of the Lithuanian defence budget, a number of future procurement priorities have been outlined, which could potentially form opportunities for international industrial collaboration and/or joint procurement.

In the land domain, most notable is the launch in 2014 of a long-term project to mechanise, strengthen and upgrade the Lithuanian Land Force, focused around the Iron Wolf Brigade.⁴³⁸ It is anticipated that approximately two battalions of the Iron Wolf unit, which currently uses 224 ageing M113 APCs and a small number of 105 mm howitzers and 120 mm mortars, will receive 88 advanced wheeled IFVs between 2017 and 2019, under the first phase of a wider national defence system development programme running from 2014 to 2023. In December 2015, the Lithuanian MOD announced it had opened talks with German manufacturers over a reported €400 million purchase of Boxer IFVs to be conducted through the international Organisation for Joint Armaments Cooperation (OCCAR) – a major commitment of funds, given Lithuania's total defence budget stood at €425 million in 2015. Defence minister Juozas Olekas also indicated that local industrial participation in MRO would be a major part of negotiations for the Boxer vehicle.⁴³⁹ Vaidotas Malinionis, then-president of the LGSPA, previously indicated that he hoped that up to one-third of the value of this programme could be captured by Lithuanian firms through contracts to provide maintenance, repair and spare parts, although this proposal remains controversial.⁴⁴⁰

Alongside this procurement of IFVs, the Lithuanian MOD is also reported to be seeking to procure anti-tank weaponry (including the Javelin missile system⁴⁴¹), anti-aircraft systems (including a US\$40 million contract for the Polish GROM missile), C2 systems, communications equipment, training simulators and

⁴³⁶ O'Dwyer (2015).

⁴³⁷ The Baltic Course (2015).

⁴³⁸ Turnbull (2014).

⁴³⁹ ELTA (2015b).

⁴⁴⁰ Grizibauskienė (2015).

⁴⁴¹ Agence France-Press (2014).

a range of personal equipment for infantry troops.⁴⁴² Investment in cyber and physical infrastructure is also reported to be a priority, as defence spending increases from its low of 0.8 per cent of GDP towards two per cent by 2020.⁴⁴³

In the air domain, modernisation plans for the small Lithuanian Air Force are focused on acquiring new helicopters and possible upgrades of the country's radar station, as part of wider Baltic efforts to boost air surveillance and defence capabilities.⁴⁴⁴ In July 2015, the Lithuanian President Dalia Grybauskaitė joined her Latvian counterpart, Raimonds Vējonis, in announcing plans to promote joint acquisition with Poland and Estonia so as to establish a common air surveillance network and decrease costs.⁴⁴⁵ Lithuania has also been cited as a potential buyer for the Czech-produced L-159 ALCA training and light combat aircraft,⁴⁴⁶ and Baltic leaders are understood to have discussed joint acquisition of fighter aircraft, although all three countries in the region currently rely on NATO Air Policing missions in the absence of any combat aircraft of their own.⁴⁴⁷

In the maritime domain, Lithuania lacks military capabilities beyond limited patrolling and mine countermeasures (MCM) activity. Plans for the future include adaptation to enable full compatibility with NATO standards.⁴⁴⁸

8.5. Capacity-building needs

A literature review identifies a number of potential capacity-building needs for the Lithuanian MOD and industry, corresponding to the various barriers and obstacles to greater competitiveness outlined above. These include measures to:

- Boost the technical knowledge and administrative capacity of the Lithuanian MOD.
- Provide guidance to SMEs on procurement processes (both domestic and international).
- Promote greater exchange of information and contacts between civilian and defence institutions, in the light of a perceived lack of mutual understanding of each side's culture, needs and processes.
- Assist SMEs and NDIA with marketing skills to promote the visibility of the Lithuanian defence sector, as well as information on foreign export markets (e.g. key actors, relevant procedures, upcoming opportunities).
- Facilitate the creation of a regional cluster with other CEE countries to increase production rates and minimise delivery times, backed by common or aligned industrial strategies.⁴⁴⁹

⁴⁴² Palowski (2015).

⁴⁴³ Palowski (2015).

⁴⁴⁴ Gotkowska & Osica (2012, 53).

⁴⁴⁵ Adamowski (2015b).

⁴⁴⁶ Gotkowska & Osica (2012, 15).

⁴⁴⁷ O'Dwyer (2015).

⁴⁴⁸ Gotkowska & Osica (2012, 53).

⁴⁴⁹ RAND Europe interviews, August 2015.

In addition to these specific opportunities for Lithuania, the literature review also identified studies that have focused on recommendations applicable at the wider, Baltic level. This is particularly the case for the analysis of defence-related R&D in the three countries, with a view to using cooperation in this field as both a proof-of-concept and springboard for subsequent potential collaboration on procurement. Jermalavicius (2012) suggests that advances in defence understanding of R&D (and collaboration on R&D) will have knock-on effects for the technical and programme management competences of Baltic defence organisations, identifying these as the prerequisites for intelligent acquisition, maintenance and use of military capabilities.⁴⁵⁰ His recommendations include:⁴⁵¹

- Advancing trilateral R&D collaboration by means of a BALTDEFCOL-led research consortium of national defence academies, mentored by a non-Baltic NATO or EU nation with significant experience in R&D.
- Tying research themes to existing trilateral collaboration projects and organisations to generate some common ‘pull’ for R&D efforts to support their development and functioning (e.g. research in maritime MCMs to support further evolution of BALTRON).
- Synchronising the setting of national capability requirements and strategy with R&D investments.
- Aligning defence-related industrial policy with defence-related innovation strategy (or develop one if it does not exist, as in Latvia). In turn, aligning defence innovation strategy with wider national innovation strategy or priorities.
- Focusing also on carefully chosen interdisciplinary themes that branch out into civilian (‘dual-use’) S&T, with human factors and medicine, organisational management and modelling and simulation being potential contenders, followed by areas such as C4ISR, information assurance, autonomous vehicle technology and electromagnetic spectrum technologies.
- Relaunching the Baltic Defence Research and Technology Conference as a biennial event, preceded by a series of workshops and seminars run by thematic research groups.

⁴⁵⁰ Jermalavicius (2012, 3).

⁴⁵¹ Jermalavicius (2012, 3).

9. Country profile: Poland

9.1. Country at a glance

Poland is the largest of the CEE countries, in terms of population, economic output and defence spending. As such, the Polish defence sector faces a number of unique opportunities and challenges, as well as sharing in many of the developments affecting the wider region. Although its defence industry is smaller than those of the top six EU arms producers, the Letter of Intent (LOI) countries, (France, Germany, Italy, Spain, Sweden and the UK) Poland nonetheless outstrips smaller European players such as Finland, Austria and the Netherlands, as well as the DTIB of other EDA CEE MS.

Following a period of partial consolidation and privatisation, the Polish defence industry's main design and manufacturing capabilities are concentrated in the state-owned PGZ holding group, which produces a range of platforms and systems across the SALW, armoured vehicle and electronics sectors. Notable products include self-propelled howitzers, the GROM anti-air missile system and the Rosomak armoured wheeled vehicle, originally designed by the Finnish firm Patria but now manufactured and updated by Polish enterprises. In the aerospace market, Poland is home to a number of successful aviation companies with ties to major US and European developers (e.g. Sikorsky, Airbus and AgustaWestland), with activity focused around the Aviation Valley cluster in the south-east of the country. Polish industry is also involved in naval shipbuilding and MRO services, and has also built a number of partnerships with foreign missile specialists in connection with the country's upcoming military modernisation programme.

This procurement and reform initiative, which is thought to be worth US\$40 billion between 2013 and 2022, has attracted significant interest from international defence companies in the potential for collaboration with Polish industry.

9.1.1. Context of industrial and economic restructuring

As in other CEE countries, for much of the 20th century Poland's defence industry was shaped by the country's integration into the regional WTO, alignment with pro-Soviet export markets and experience of command economy. In this period, maximising output to meet the needs of militaries in Poland and allied nations was prioritised over efficiency or profitability, with the defence industry benefiting from strong governmental support, high levels of procurement spending and other economic privileges. By the mid-1980s, the sector comprised around 120 companies and research units, employing approximately 250,000 workers and generating two per cent of Poland's total industrial output. The total value of exports placed Polish industry seventh or eighth in the world, with the Soviet bloc and the Middle East acting as the country's largest markets.

With the overwhelming victory of the Solidarity movement in the parliamentary elections of June 1989, Poland underwent a period of rapid political and economic reform. The early 1990s saw the introduction of a number of major structural reforms aimed at converting the country to a functioning and stable market economy. For much of Polish heavy industry, this entailed privatisation or liquidation, the removal of state subsidies, improved budgetary oversight and wage freezes, resulting in a period of sharp decline in total output and employment.⁴⁵² While Poland had 11,000 state-owned enterprises in 1990, by 2005 this number had fallen to 1,000 as a result of Industrial Development Agency (ARP) reforms.⁴⁵³ After this painful transition, however, the country returned to economic growth in 1994 and despite political and electoral instability, successive governments targeted NATO and EU membership as confirmation of Poland's transformation, acceding to these bodies in 1999 and 2004 respectively.

Against this backdrop of wider economic restructuring, the Polish defence industry underwent its own transition. Unlike many civilian industries, key Polish defence firms were exempt from the initial waves of privatisation in the early 1990s. The government's strategy was to restructure and rationalise the various state enterprises in anticipation of eventual privatisation at some future date. Again, unlike a number of other CEE countries, a high degree of institutional continuity was maintained on the government side, with the ministries and agencies responsible for the defence sector retaining much of their pre-1990 structure, personnel and experience. Political support for the industry remained comparatively high, with the pursuit of NATO accession (and interoperability) a key strategic concern.

Although many subsidies remained in place and a number of company debts were written off, the sector nonetheless experienced a sharp decline in output, exports and employment, down from an estimated 250,000 people in the mid-1980s to fewer than 60,000 by the late 1990s, stabilising at around 35,000 since 2004.⁴⁵⁴ In 1999, the Polish government announced a wave of privatisation to assist local industry. In the following three years, foreign defence and aerospace companies made a number of acquisitions: EADS CASA and Avia System Group joining to buy 51 per cent of PZL Warszawa-Okecie, while US-based Pratt & Whitney purchased an 85 per cent stake in WSK PZL-Rzeszow. Other takeovers would occur throughout the decade, involving firms like Boeing, Sikorsky and Finmeccanica. In 2002, a further wave of restructuring saw most of the remaining core state-owned enterprises consolidated into two holding groups. The *Strategy of Consolidation and Supporting the Development of Polish Defence Industry in 2007–2012* updated this strategy five years later by merging all major defence manufacturers into the Bumar Group.

In addition to the consolidation initiatives outlined above, the promotion of offsets, technology transfer and exports formed important components of this government strategy. For much of the 1990s and 2000s, the Polish defence industry was primarily concerned with acquiring European and US technologies that might extend the capabilities or lifetime of extant stocks of post-Soviet land platforms and aircraft. Most of these bottom-up cooperative projects focused on components or small systems, rather than full

⁴⁵² Kiss (2014, 38).

⁴⁵³ Kiss (2014, 104).

⁴⁵⁴ Kiss (2014, 41).

platforms or cutting-edge technology.⁴⁵⁵ To encourage foreign support for local industry, the Polish government initiated a system of offsets in 1999, with subsequent amendments in 2002 and 2004 introducing ‘offset multipliers’, incentivising foreign firms to target their investment or assistance at certain key companies. Under this new policy, all deals above €5 million over three years were made eligible for offset agreements.

The most notable example of such agreements in action came with US prime Lockheed Martin’s provision of F-16 combat aircraft to the Polish military in 2003, a procurement that came with over US\$6 billion of offsets attached. The same year, Finland’s Patria and Italy’s Oto Melara signed deals for US\$544 million and US\$387 million respectively, following the purchase of Rosomak armoured vehicles. Other major offset accords include US\$440 million from Rafael in 2004, US\$160 million from Saab Bofors in 2006 and US\$143 million from Kongsberg in 2008 as part of a series of anti-tank and anti-ship missile procurements. With high multipliers applied to offset projects involving technology transfer, R&D investments, job creation and export promotion, Polish governments targeted such deals as an opportunity to boost the capabilities and long-term prospects of local industry.

However, as Kiss notes, ‘it is still too early to truly evaluate the overall performance of the offset programmes, [though] the results seem to be mixed’.⁴⁵⁶ In part, this reflects inconsistency in the implementation of different offset obligations. In 2012, for instance, the Polish Supreme Audit Office outlined a range of problems with the fulfilment of offset deals with Patria, Oto Melara and Honeywell in the follow up to Poland’s 2003 purchase of the Rosomak.⁴⁵⁷ Similarly, EADS CASA received criticism for the perceived slow pace of implementation of investments in the 2000s following the purchase of ten C-295 transport aircraft by Poland at the start of the decade. Problems also occurred on the side of local Polish firms acting as recipients for foreign assistance, with Kleiber noting that a major barrier to local participation in Lockheed Martin’s F-16 offset programme was ‘posed by the Polish industry’s limited capability of adopting investments and adopting new technology’.⁴⁵⁸ According to Krystowski, by contrast, the most successful offset deals were those between Nammo and MESKO, Thales and ZR Radmor, and others involving the Bumar Group.⁴⁵⁹

⁴⁵⁵ Pochylska & Terlikowski (2015, 2).

⁴⁵⁶ Kiss (2014, 87).

⁴⁵⁷ NIK (2012).

⁴⁵⁸ Szymczak (2003).

⁴⁵⁹ Krystowski (2007, 25).

9.1.2. Recent policy and defence spending

The introduction of 2009 EU regulations mandating greater competition in defence equipment procurement, along with a corresponding Polish law in 2013, have limited Poland's ability to show a preference for indigenous weapons systems or direct offsets.

Despite mixed success with implementation, industrial offsets, technology transfer and licence production have therefore become important tenets of the Polish policy towards the defence sector. There is a strong emphasis on using international arrangements of this kind to rebuild sovereign defence industrial capabilities and provide a basis for future transition to a more high-technology, export-oriented and competitive Polish DTIB. Over the past two decades, and according to varying criteria, defence industrial policy has defined a core cluster of key state-owned defence firms that the Polish government seeks to protect, reform and boost during this period of state-guided adjustment towards potential eventual privatisation.⁴⁶⁰ Following the restructuring strategies of a number of western countries, the Polish state-owned defence industry has been consolidated and reshaped to anchor this cluster around a designated 'national champion' (initially the Bumar Group, now PGZ).⁴⁶¹

With Poland embarking on an ambitious *Armed Forces Technical Modernisation Plan* (TMP), projected to involve US\$40 billion of spending in the years 2013–2022, the government has exhibited a strong resolve to ensure that national defence companies benefit from this investment long-term through integration into the global supply chains of major western primes. It is also robustly promoting the transfer of knowledge, facilities, export licences and IPR into Polish control, particularly to involve Polish firms in MRO roles, so as to ensure security of supply across the whole life-cycle of the Polish Armed Forces' incoming modern equipment. It is hoped that this basis will also enable Polish defence companies to export systems initially produced for the Polish MOD, as in the case of the Rosomak armoured personnel carrier, originally designed by Finland's Patria, but now licensed for Poland to produce, maintain, upgrade and export as it sees fit. It should also allow civilian businesses and universities to benefit from spillovers from the military domain.

To support the TMP, Poland sharply increased defence spending from US\$9.1 billion in 2013 to over US\$10.3 billion in 2014, of which US\$2.6 billion was allocated for procurement, making its budget several orders of magnitude larger than that of the smallest CEE country. The Polish Minister of National Defence, Tomasz Siemoniak, has indicated that defence budgets would exceed two per cent of GDP in 2015, if taken to include the final payment to Lockheed Martin for Poland's F-16 fighter fleet, and would then see stable increases from 2016 onwards.⁴⁶²

⁴⁶⁰ Kiss, (2014, 44-45).

⁴⁶¹ Terlikowski (2013a, 2).

⁴⁶² IHS Jane's (2014f). Note that this procurement expenditure excludes funds for F-16 payments from outside the regular budget.

Table 9.1 Defence spending in Poland, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	9.476	8.972	10.133	12.186	12.352	12.658	12.991	13.352
Constant 2015 PLN billion	29.85	28.26	31.92	38.39	38.91	39.87	40.92	42.06
% GDP	1.84%	1.71%	1.87%	2.18%	2.13%	2.09%	2.07%	2.05%

Source: IHS Jane's (2015)

9.2. Defence industrial capabilities

9.2.1. General assessment by sector (land, air, naval, C4I)

By European standards, Poland has an active, medium-sized defence industry, possessing a breadth of industrial capability and levels of unemployment not seen in other CEE defence sectors. Poland is assessed as self-sufficient in MRO, as well as in the manufacture of key land-based systems such as wheeled armoured vehicles (e.g. Rosomak), air defence radars and short-range missiles (e.g. GROM), as well as small and medium helicopters. In addition, Polish industry offers some more limited capabilities in the maritime domain, including local design and production of logistical support ships, tankers, minehunters, small surface vessels and related naval systems. As well as supporting the Polish Armed Forces, various indigenous platforms, systems and munitions are also exported to smaller countries in Europe, South America and the Middle East. In 2013, nearly two-thirds of Polish defence exports (US\$235 million) reportedly went to the US, reflecting the close ties between the two industries, given the role of firms like Sikorsky, Raytheon and Lockheed Martin in the country.⁴⁶³

As Terlikowski (2013) notes, the Polish defence sector lags behind LOI countries by most metrics, 'sales, profits, portfolio of offered products, capital and organizational structure, market position, etc.'⁴⁶⁴ Competitiveness, however, varies between different industry actors and especially between the aerospace, land and maritime domains. Around 130 companies are registered with the Polish Chamber of National Defence Producers, with direct employment in defence (excluding related dual-use activities such as commercial aviation) thought to involve 18–20,000 people.⁴⁶⁵

In the land sector, Poland's substantial industrial capabilities are dominated by the broad portfolio of products offered by its capital holding group, with local competences and designs supplemented by agreements with foreign firms for license production, for instance of Patria's Rosomak. In a recent drive

⁴⁶³ Pochylska & Terlikowski (2015).

⁴⁶⁴ Terlikowski (2013b,8).

⁴⁶⁵ Majer (2015).

towards consolidation, in 2013 the Polish government announced the creation of the Poland Armaments Group (PGZ) holding company to include the former Bumar Group, Stawola Wola and 11 national manufacture and MRO enterprises, and in 2014 state shares in 17 state-owned enterprises were formally transferred to PGZ control. PGZ operates three main units: land, ammunition and electronics, producing a range of full platforms, including artillery systems, self-propelled howitzers, armoured personnel carriers and command vehicles, as well as SALW and various subsystems, parts and munitions. Specialist R&D centres also support the development of new products by Polish enterprises. For example, the Military Academy of Technology (WAT) in Warsaw cooperates with FB Radom, a division of PGZ, on the design of the modular small arms system (MSBS) that is being offered as a future service rifle family for the Polish Army.⁴⁶⁶

The aerospace sector has seen extensive privatisation in contrast to much of the Polish DTIB, with a number of Polish companies having become successfully integrated into the global supply chains of leading European and transatlantic firms. A major role is played by Poland's Aviation Valley, a regional cluster of around 115 aviation companies employing over 23,000 workers in the towns and cities around Rzeszow, constituting over 80 per cent of the country's aerospace industry.⁴⁶⁷ This area is supported by tax rebates, ties to local education centres (e.g. Rzeszow University of Technology), the Aeropolis Podkarpackie Science & Technology Park and the Special Economic Zone EURO-PARK MIELEC. Foreign firms involved in either commercial or military activity in the area include MTU Aero Engines (Germany), the SAFRAN Group (France-Spain), Sikorsky (USA) and UTC Aerospace Systems (USA). UK engine specialist Rolls-Royce is also constructing a new gearbox production plant following the creation of a joint venture with Hispano-Suiza, part of SAFRAN.

This reflects a decade of significant growth in the scale and sophistication of Poland's aviation industry capabilities, with the Aviation Valley having been home to only 40 companies and around 11,000 workers as recently as 2006.⁴⁶⁸ Today, Polish defence aerospace firms provide MRO services for the Polish Air Force and foreign customers (e.g. Bulgarian MiG-29s), as well as producing a range of platforms and systems, including the W-3A Sokol, SW-4 and S-70 Black Hawk helicopters, with the Airbus H225M Caracal to be produced from 2017.⁴⁶⁹

The country is also home to a number of major shipyards, such as Shipbuilding Repair Shipyard Gdansk or Naval Shipyard Gdynia, involved in shipbuilding and repair across both the civilian and military markets. This includes production of (predominantly small) surface vessels for the Polish Navy, such as logistical support ships or three upcoming Kormoran II minehunters being built by a Polish consortium headed in Gdansk.⁴⁷⁰ Although the degree of international collaboration is not as pronounced as in the aerospace sector, Poland's shipbuilding industry also has ties to major European multinationals; the

⁴⁶⁶ Wilk (2015).

⁴⁶⁷ Morrison (2010).

⁴⁶⁸ Morrison (2006).

⁴⁶⁹ Osborne (2015c, 2).

⁴⁷⁰ Cielma (2014).

Damen Group has a design and engineering subsidiary in Gdansk, as well as a small private shipyard at Gdynia that produces small specialist craft (e.g. hydrographic survey vessels). In the absence of local competences for submarine design and manufacture, however, the country has been reliant on overseas suppliers to produce its submarine fleet, including Russia (*Kilo-class*) and Germany (*Kobben-class*).

9.2.2. Major industries

In addition to the PGZ's dominance of the land, ammunition and electronics sectors, with the holding group comprising over 30 companies and subunits, major Polish defence enterprises include:

- **FB Radom (part of PGZ):** Polish SALW specialist, producing and exporting both indigenous designs (e.g. MSBS rifle family, Beryl assault rifle, various pistols and civilian rifle variants) and licensed weaponry (e.g. Walther pistols).
- **Huta Stalowa Wola (part of PGZ):** Manufacturer of artillery systems and military vehicles such as the 155 mm AHS Krab, 120 mm self-propelled tracked howitzers, the Langusta multiple launch rocket system and command vehicles.
- **MESKO (part of PGZ):** Producer of SALW ammunition, explosives and both anti-aircraft and anti-tank technologies.
- **Naval Shipyard Gdynia:** Polish shipyard, involved in Kormoran II minehunter consortium.
- **PZL-Mielec (with Sikorsky):** The company produces cabin sections and structural elements (tail cone and pylon) for the Sikorsky UH-60M helicopter. It also manufactures the PZL M28 turboprop cargo/patrol aircraft, and its military variant, the PZL M28B/PT Bryza.
- **PZL-Okecie (with Airbus):** Design, development and supply of systems, parts and services for aeronautical engines.
- **PZL-Swidnik (with AgustaWestland):** Helicopter design, research and development (R&D), system integration, manufacturing, support, training and upgrades. It produces the PZL SW-4, PZL W-3A Sokół, PZL W-3PL Gluszec, PZLSW-4 Solo (RUAS/OPH) and AgustaWestland AW149.
- **Shipbuilding Repair Shipyard Gdansk:** Historic major Polish shipyard, acting as lead on Komoran II minehunter construction; previously designed and built logistical support ship *ORP Kontradmiral Xawery Czernicki*, the largest ship produced in Poland for the Polish Navy. Also involved in civilian markets.
- **TELDAT:** Polish firm specialising in telecommunications and other ICT solutions for defence and security users, producing both hardware (e.g. tactical communication terminals) and software.
- **Ultratech:** Polish company producing aerospace parts and subassemblies for both commercial and military prime contractors, including Airbus and BAE Systems.
- **WB Electronics:** The company designs and manufactures digital communications devices, artillery systems and UAVs with Thales.
- **Wojskowe Przedsiębiorstwa Remontowo-Produkcyjne:** State-owned MRO specialists.
- **Wojskowe Zakłady Lotnicze 1 (WZL 1):** Plant involved in helicopter design, manufacture and MRO, with major European prime contractor Airbus.
- **Wojskowe Zakłady Lotnicze 2 (WZL 2):** Provides MRO services to the Polish Air Force for fixed-wing aircraft, including the Su-22, MiG-29 and C-130, as well as having previously conducted life extension and overhaul work for the Mi-8 helicopter.

- **Wojskowe Zakłady Lotnicze 3 (WZL 3):** Provides MRO services to the Polish Air Force on various aircraft, including the TS-11 jet trainer and M-28 and C-295 transports.
- **Wojskowe Zakłady Lotnicze 4 (WZL 4):** Plant involved in aeronautical jet engine manufacture, in conjunction with Avio Aero.

9.2.3. Niche areas

Poland's extensive defence industrial capabilities mean that it is unique among CEE countries in the breadth and sophistication of its portfolio of products at the platform and major systems levels, with successful production of armoured vehicles, helicopters and so on (see above).

In addition, smaller Polish defence industrial companies operate in a wide range of niches, including production of land vehicles, self-propelled artillery, small arms and light weapons, MRO services, military electronics, lasers and robotics. Polish firms have also developed optionally manned helicopters (PZL-Swidnik), mini-UAVs and plans for a Polish version of the Thales Watchkeeper (WB Electronics). The country is also responsible for the design, manufacture and export of ultra-light trainer aircraft (Aero AT), building on its wide involvement with commercial aeronautical production and military rotary wing aircraft.

In the maritime domain, Polish firms also produce sonar, counter-mine and torpedo systems, in addition to the construction of full naval and commercial vessels. Poland's ICT industry also supports development of military communications, simulators, C4ISTAR systems, radar and optoelectronics, as well as a variety of dual-use products in both hardware and software form.

9.3. Barriers and obstacles

9.3.1. Internal

Unlike in many CEE countries, the barriers to greater competitiveness and international cooperation are not thought to focus primarily on shortage of capital or limited domestic demand, although there is criticism of the limited availability of bank and venture capital. Instead, there are key concerns over what is perceived to be a heavily bureaucratic domestic business environment (for state-owned enterprises more than the privatised aerospace sector); the high degree of state intervention in favour of Polish 'national champions' such as PGZ or formerly the Bumar Group; and a perceived preference for pursuing major partnerships with US and Western European prime contractors (backed by offsets and technology transfer) over smaller CEE countries or firms.

Indeed the large size of the domestic market relative to the budgets offered by other CEE MODs is seen to incentivise major Polish firms to view regional cooperation as a threat to their existing market share and privileged relations with Polish contracting authorities, with many especially reluctant to accept other CEE (e.g. Czech) companies as prime on a joint project. Similarly, the breadth of industrial capabilities represented in Polish industry reduce the requirement for partnering, with a historic preference for

acquiring licenses to produce foreign designs (e.g. the Finnish Rosomak) where necessary.⁴⁷¹ With a major military modernisation programme underway, the Polish defence industry has a number of significant opportunities for partnering with large prime contractors in Western Europe and the US, but this may diminish the political or commercial incentive to invest in relationships with other CEE countries as well.

Skills requiring further development are thought to include marketing, strategy building and knowledge of foreign markets, as well as competences in emerging technologies and a greater managerial focus on innovation and engaging openly with academia or non-traditional partners.⁴⁷² Interviewees also alluded to issues with a more traditional, risk-averse organisational culture and the competitive rather than collaborative outlook of many managers, especially in the state-owned sector.⁴⁷³

Varying levels of investment in modern infrastructure and technology across the defence sector are also perceived as creating a 'technology gap' that may limit the capacity of Polish firms to act as international partners or recipients of foreign assistance (e.g. offsets).⁴⁷⁴ At the same time, clusters such as Poland's Aviation Valley, with its science parks, business incubators, research centres and modern production facilities, offer a potential model for the ongoing modernisation of the country's wider DTIB. The Valley has also invested in skills programmes to address shortages in workforce skills, with US\$80 million devoted to the Aeronet training scheme at six local technical universities.⁴⁷⁵

9.3.2. External

A number of Polish commentators have suggested that the country remains 'skeptical about its chances to benefit from joining trans-European supply chains, as it has been involved in neither any of the collaborative weapons investment programmes run in the EU over the last decade, nor in the subsequent waves of transnational mergers and acquisitions in the defence sector [outside of aviation]'.⁴⁷⁶ Issues include a perception of these supply chains as closed off by the preferences of governments and major primes for their own national network of SMEs, as well as Poland's assertive stance on the use of offsets and limited understanding in certain industry segments of the key actors, procedures and market opportunities in foreign countries.⁴⁷⁷

Other concerns relate to the limited planning horizon of MODs in other CEE countries, which are perceived as a barrier to harmonising requirements and aligning this with Poland's 2013–2022 TMP.⁴⁷⁸ With Poland's own procurement budget outstripping those of its Visegrád and CEE neighbours by a

⁴⁷¹ RAND Europe interviews, July-August 2015; Majer (2015).

⁴⁷² RAND Europe interview, August 2015.

⁴⁷³ RAND Europe interview, August 2015.

⁴⁷⁴ RAND Europe interview, August 2015.

⁴⁷⁵ Morrison (2010).

⁴⁷⁶ Terlikowski (2013b, 8).

⁴⁷⁷ RAND Europe interview, August 2015.

⁴⁷⁸ RAND Europe interview, August 2015.

significant margin, the country is investigating potential measures to boost funding to regional allies (see Regional Security Assistance Programme in Section 9.4).

9.4. Opportunities and programmes

At the same time, there is a range of opportunities for future collaboration. Poland has a wide range of extant governmental partnerships with foreign defence sectors, many related to upcoming procurement opportunities in the country's modernisation programme, including:

- **Hispano-Suiza and Turbomeca:** French helicopter engine supplier Turbomeca is planning to transfer some production for the Makila turboshafts that power the Airbus Helicopters H225M Caracal to a new site in Sedziszow Malopolski, where partner company Hispano-Suiza already has an existing facility.⁴⁷⁹
- **MESKO and Lockheed Martin/Nammo:** In September 2013, Lockheed Martin signed an agreement with Polish company MESKO jointly to develop long-range surface-to-surface missiles for the future WR-300 multiple rocket launcher system. The Polish firm, which is part of PHO (formerly Bumar Group), was previously involved with Lockheed Martin as a beneficiary of the offset arrangements for Poland's F-16 fighter procurement. The US prime provided funding for MESKO and Nordic armaments producer Nammo to cooperate on a number of ammunition projects for the Polish military.⁴⁸⁰
- **PHO and BAE Systems Hägglunds:** In May 2013, BAE Systems Hägglunds announced a partnership with PHO in which BAES would provide access to its armoured tracked vehicle technology and facilitate production in Poland as part of collaboration on Poland's anticipated Universal Tracked Platform programme.⁴⁸¹
- **PIT-RADWAR and Thales/MBDA/Raytheon:** As part of Poland's Wisla medium-range air and missile defence programme, Polish firm PIT-RADWAR signed LOIs for industrial cooperation in the fields of development, production and maintenance with European firms Thales and MBDA, as well as US supplier Raytheon.⁴⁸² These plans also included technology transfer and assistance in efforts to integrate the Wisla weapon system into NATO structures.⁴⁸³
- **PZL-Swidnik and AgustaWestland:** PZL-Swidnik has also worked with AgustaWestland on an unmanned and optionally piloted SW-4 Solo demonstrator for Italy's National Military Research Plan.⁴⁸⁴
- **PZL-Mielec and Sikorsky:** In summer 2015, Sikorsky announced the loss of 500 jobs at PZL-Mielec, following the Polish MOD's decision to procure the Airbus H225M Caracal ahead of Sikorsky's

⁴⁷⁹ Perry (2015).

⁴⁸⁰ IHS Jane's (2014k).

⁴⁸¹ IHS Jane's (2014k).

⁴⁸² Anderson (2014).

⁴⁸³ Svitak (2014, 3).

⁴⁸⁴ Osborne (2014b, 4).

Black Hawk. The future shape and size of Sikorsky's involvement in Poland is also subject to potential future change in the light of Lockheed Martin's acquisition of the firm in July 2015.⁴⁸⁵

- **PZL-Okecie and EADS/Airbus:** Having been acquired by EADS (now Airbus) in 2001, PZL-Okecie has provided components for a number of Western European defence projects, including acting as a supplier for the C-295 and A400M transport aircraft produced in Spain.⁴⁸⁶
- **TELDAT and Raytheon:** Raytheon's cooperation with Polish firms on the Wisla programme also involves a number of companies besides PIT-RADWAR, with the US company disclosing that it is looking to partner with local organisations in areas such as 'an open architecture common command-and-control system, introduction of a 360° multifunction radar, and potential integration of a new low cost interceptor'. In July 2014, for instance, Raytheon signed an LOI with Polish electronics company TELDAT to cooperate on C2 software, military communications and systems integration and testing.⁴⁸⁷ By November 2014, Raytheon had signed 27 LOIs and six subcontracts with Polish industry.⁴⁸⁸
- **Thales Alenia Space Polska and Thales/Finmeccanica:** On 8 June 2015, Thales Alenia Space, a joint venture between Finmeccanica and Thales, announced the creation of a new Polish subsidiary to build on existing industrial and academic partnerships developed since Poland's admission to the ESA in 2012. This includes a deal signed in March 2015 for joint research with the Technological University of Warsaw.⁴⁸⁹
- **WB Electronics and Thales:** On 8 July 2015, Polish firm WB Electronics and the Anglo-French company Thales signed a cooperation agreement to produce the Gryf tactical UAV for the Polish MOD, with construction of the Gryf in Polish factories and key technologies such as datalinks, mission computers and some electro-optical sensors to be developed by Polish engineers.⁴⁹⁰
- **WZL 1 and Airbus Helicopters:** Unlike AgustaWestland and Sikorsky, Airbus Helicopters has not had a significant ongoing role within Poland's helicopter industry, despite owning PZL-Okecie since 2001. However, following a successful bid to the Polish MOD in April 2015, Airbus now plans to assemble 70 H225M Caracals at Airbus's production line in Lodz (50 for the Polish MOD, 20 for export) in conjunction with Polish Military Aviation Works (WZL) 1.⁴⁹¹ Airbus also recently opened a new helicopter design office at the site, employing 100 engineers, with a focus on 'future breakthrough technologies' in rotorcraft drive systems and equipment.⁴⁹² This builds on previous partnerships with the Lodz University of Technology to work on elements of the X3 high-speed helicopter programme.⁴⁹³

⁴⁸⁵ Clevenger (2015).

⁴⁸⁶ PISM (2013).

⁴⁸⁷ IHS Jane's (2014k).

⁴⁸⁸ IHS Jane's (2014k).

⁴⁸⁹ Fryer-Biggs (2015).

⁴⁹⁰ Glowacki (2015).

⁴⁹¹ Osborne (2015c, 2).

⁴⁹² Osborne (2015e, 30).

⁴⁹³ Osborne (2015a, 2).

- **WZL 2 and Saab:** In 2015, Saab announced it had signed a teaming agreement with WZL 2 to promote a joint offer to the Polish Air Force for modernisation of the country's MiG-29 fleet, integrating electronic warfare equipment from the Swedish manufacturer of the JAS-39 Gripen,⁴⁹⁴
- **WZL 4 and Avio Aero:** Italian jet engine transmission, gearbox and turbine specialist Avio Aero, which was acquired by General Electric in 2013, is currently working on joint development of a new Cold Flow Turbine Test Facility with the PoloniAero Laboratory at Zielonka, near Warsaw, a project undertaken in conjunction with Warsaw's University of Technology, Poland's Military University of Technology and Military Aviation Works (WZL) 4.⁴⁹⁵

In addition, the Polish government has been active in promoting a range of bilateral government-to-government defence cooperation agreements, including on the issue of industrial collaboration. Recent examples include:

- **Poland and Bulgaria:** In July 2015, Bulgarian Defence Minister Nikolay Nenchev confirmed that the Bulgarian Armed Forces would be awarding a contract for maintenance and repair of the country's 12 MiG-29 fighter jets to Polish industry, in the light of growing concerns that the aircraft's Russian manufacturer RKS-MiG could not guarantee security of supply.⁴⁹⁶
- **Polish and Ukrainian defence industries:** Poland's defence industry has also established a number of partnerships and agreements with counterparts in Ukraine, especially in the wake of growing common concern over the strategic threat posed to both countries by Russia. On 4 June 2015, for instance, the Ukrainian aircraft manufacturer Antonov Bureau announced a consortium with Polish companies to develop Antonov's range of military, maritime and regional civil aircraft up to western design standards.⁴⁹⁷
- **Poland and Southeast Asian states (Indonesia, the Philippines, Vietnam and Brunei):** In 2013, Poland concluded a number of MOUs with countries in Southeast Asia, with a view to promoting Polish defence exports to the region. This included accords with the Philippines in July, Vietnam (a recent purchaser of Polish-made helicopters) in August and Brunei in December. In September 2013, Poland also signed a deal with Indonesia to expand industrial collaboration in a number of sectors, including an offer to sell Indonesia naval vessels, military aircraft, helicopters and combat vehicles that would be produced under license in Indonesia by state-owned companies.⁴⁹⁸
- **Poland and South Korea:** In October 2013, Poland signed a defence industrial cooperation agreement with the Republic of Korea,⁴⁹⁹ reportedly with a particular focus on technology transfer, military aerospace and initiatives to facilitate future Polish purchases of materiel made in South Korea.⁵⁰⁰

⁴⁹⁴ Defense Aerospace (2015).

⁴⁹⁵ Osborne (2015d, 9).

⁴⁹⁶ Adamowski (2015a).

⁴⁹⁷ IHS Jane's (2015s).

⁴⁹⁸ IHS Jane's (2014k).

⁴⁹⁹ Grevatt (2014a).

⁵⁰⁰ Grevatt (2013).

- **Poland and Saudi Arabia:** In December 2013, Poland and Saudi Arabia signed a defence cooperation agreement aimed at promoting joint training, increased trade between the two countries and greater collaboration between their respective defence industries, although it is unclear whether this initiative has translated into concrete projects.⁵⁰¹

In addition to this range of bilateral activity, Poland is also an active member of multilateral frameworks with European and transatlantic partners. Notably, the country is the only CEE member state involved in OCCAR, as a ‘participating’ rather than ‘member state’, with Poland part of the European Secure Software-defined Radio (ESSOR) programme.⁵⁰² Poland is also home to the NATO Military Police COE, which opened in Bydgoszcz in 2014, with the new Counter Intelligence COE in Krakow, which also received accreditation in September 2015.⁵⁰³ The country has also entered into cooperation through the NATO Support and Procurement Agency, is an active member of the Visegrád Group and has partnered successfully with other CEE member states on an EDA procurement for Carl Gustav anti-tank ammunition. In addition, in April 2015 the Polish government indicated that it has plans to set up a special defence fund to strengthen regional defence cooperation, unveiling the Regional Security Assistance Programme to support procurement in small neighbouring countries through use of government, bank and export loans.⁵⁰⁴

9.4.1. Defence planning and future procurement programmes

Poland’s ambitious *Armed Forces Technical Modernisation Plan* is projected to involve US\$40 billion of spending in the years 2013–2022. Key procurement priorities include:⁵⁰⁵

- **Land:** The Polish Armed Forces are seeking a universal modular tracked platform to replace its fleet of T-72 tanks and BWP-1 infantry fighting vehicles, with a contract up to US\$2.8 billion. In April 2015, the Polish MOD also announced a tender for 118 light armoured long-range reconnaissance vehicles (LRRVs) under the ‘Zmija’ (Viper) programme. The MOD is also pursuing a range of Titan ‘Future Soldier’ initiatives, with 14,000 equipment sets to be delivered in 2018–2022 at a total cost of US\$1.6 billion.
- **Air:** Poland recently awarded Airbus Helicopters a US\$3 billion contract to supply the H225M Caracal to replace the country’s ageing Soviet-era medium utility helicopters, although this decision is now the subject of a lawsuit from Polish competitors. Poland is also seeking to replace its Mi-24 attack helicopters, as well as examining options for acquiring new VIP transport and tanker aircraft, perhaps joint procurement of the A330 with Norway and the Netherlands. In 2014, Poland also announced plans to acquire 64 fifth-generation fighter aircraft from 2021, as well as intentions to spend around US\$560 million on Medium Altitude/Long Endurance (MALE) drones and tactical UAVs by 2022.

⁵⁰¹ IHS Jane’s (2014k).

⁵⁰² OCCAR (n.d.).

⁵⁰³ NATO (2015a).

⁵⁰⁴ Adamowski (2015b).

⁵⁰⁵ IHS Jane’s (2014f).

- **Naval:** A major US\$5.8 billion recapitalisation programme is underway for 2017–2022, including plans for new submarines, MCM vessels and offshore patrol vessels. In the same timeframe, the Polish Air Force is expected to acquire maritime patrol aircraft, ASW helicopters and enhanced SAR capabilities to support naval and littoral operations.
- **C4ISTAR:** Poland is also focusing on acquisition of C4ISTAR assets, including a requirement for air surveillance radar formerly planned for possible joint V4 acquisition.
- **Ballistic missile defence:** In addition to the above categories, Poland has been cooperating with US and European firms on a missile shield programme, with offers including the Patriot system.

9.5. Capacity-building needs

Interviewees identified a number of potential capacity-building needs, including:⁵⁰⁶

- A requirement for promoting greater awareness of key actors, procedures and market opportunities in foreign countries, e.g. through information-sharing portals, events or market research (at either government or industry level).
- Support for the development of marketing, strategic planning and language skills to boost the visibility of Polish firms and products abroad, as well as to support local industry and the MOD in undertaking cooperative partnerships with other nations.
- Development of skills and competences in emerging technology areas, e.g. UAVs, expanding on the Polish DTIB's current base of experience and infrastructure for 'traditional' defence technologies, such as the production of armoured vehicles.
- Assistance (e.g. from the EDA) in brokering international cooperation agreements with European partners, including dissemination of 'lessons learned' on the specific project management and IPR challenges of conducting such programmes.

⁵⁰⁶ RAND Europe interview, August 2015.

10. Country profile: Romania

10.1. Country at a glance

The Romanian defence sector represents a medium-sized CEE industrial player, with competences focused in areas such as armoured vehicles, artillery, SALW, electronics and military aviation. While the aerospace sector was privatised after the collapse of the Warsaw Pact, the remainder of the defence sector continues to be owned and controlled by the state through the Ministry for Economy, Commerce and Tourism (MECT). Romanian aerospace firms have had most success in integrating with international supply chains, with many other heavy armaments companies (e.g. RomArm) having struggled to overcome burgeoning debts, overcapacity and a lack of investment in new technology or products.

10.1.1. Context of industrial and economic restructuring

Prior to the collapse of the Soviet Union, Romania's arms exports were worth US\$1 billion a year, ranking it fifth among the world's arms exporters.⁵⁰⁷ With the gradual westernisation of the Armed Forces in the post-Soviet era, the Romanian defence industry had to transform and adapt accordingly. From 200,000 people working in the state-owned defence industry in the early 1990s, there are reportedly only around 20,000 employees left today. Several major companies have been privatised (e.g. Aerostar); however, the need for the defence industry to diversify and move beyond the production of solely military products still remains strong. RomArm is the state-owned national company for military technology. It is heavily involved in nearly all aspects of defence acquisition and development, including armoured vehicles, artillery and small arms.⁵⁰⁸ RomArm oversees most Romanian defence companies, while the state-owned company itself is under the direct authority of the MECT. While RomArm is producing the greatest part of 'traditional' land systems for Romania (e.g. armoured vehicles, guns and ammunition), for IT and communications systems the Ministry of National Defence (MND) usually opts for the private sector.⁵⁰⁹ The largest Romanian export markets are Asia, the Middle East, Africa and the US, with only six per cent of production going to the EU because of the inability to meet EU standards.⁵¹⁰

⁵⁰⁷ Jane's Defence Weekly (2002).

⁵⁰⁸ IHS Janes' (2015i).

⁵⁰⁹ Felstead (2014).

⁵¹⁰ RAND Europe interview, July 2015.

10.1.2. Recent policy and defence spending

The Romanian Armed Forces have large quantities of armament and military equipment but mostly of older types. Romania's capabilities in land systems include heavy tanks, military trucks, armoured personnel carriers and communication equipment.⁵¹¹ The technological levels of the Land Forces' equipment vary, with most of the items representing the technological standards of the mid-1980s. The Piranha III armoured personnel carriers are the only state-of-the-art items held by the Land Forces. Except for the acquisition of these, which are mainly for the purposes of the mission in Afghanistan, the Land Forces' upgrade plans are reliant on the products of the domestic arms industry.⁵¹²

The core of the Air Force comprises of five combat squadrons and an SAM brigade. The equipment held by the Air Force is largely obsolete. Some upgrades have been undertaken in recent years despite the financial constraints: the airlift units and helicopter fleet are being upgraded as a priority (mainly for the purposes of ensuring support for the contingent in Afghanistan). The greatest challenge for the Air Force is to choose the successors for the obsolete MiG-21 Lancer fighter aircraft, which have not been approved for operations with NATO joint forces.⁵¹³

Currently Romania's defence budget is 1.3 per cent of GDP.⁵¹⁴ In early 2015, Romania announced its plans to increase defence budget by two per cent of GDP in response to the Ukraine conflict, with a 25 per cent increase in defence acquisition anticipated.⁵¹⁵ As a result, Romania's defence budget is expected to increase by an average of 14.81 per cent in real terms between 2015 and 2018.⁵¹⁶ Should these plans be put into effect, the Romanian defence industry may stand to benefit, as this would entail increased production of ammunition and spare parts for weapons and equipment.⁵¹⁷ Romania plans to use this increase of the defence budget to upgrade and further modernise existing defence capabilities by investing in the domestic defence industrial base. As Tudor (2014) mentions, Avioane Craiova, Uzina Automecanica Moreni and Aerostar Bacau are among the companies that will receive funds from the MOD to modernise and make fully operational certain components from the Land Forces and Air Forces.⁵¹⁸ Apart from enabling greater technological cooperation between Romanian companies, this could also be an opportunity for the domestic defence industry to establish collaborations with other countries and defence manufacturers abroad.

⁵¹¹ Grevatt (2014b).

⁵¹² Gotkowska & Osica (2012).

⁵¹³ Gotkowska & Osica (2012).

⁵¹⁴ RAND Europe interview, July 2015.

⁵¹⁵ RAND Europe interview, July 2015.

⁵¹⁶ Kanavakis (2015).

⁵¹⁷ IHS Jane's (2015i).

⁵¹⁸ Tudor (2014).

Table 10.1 Defence spending in Romania, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	2.376	2.586	2.737	2.845	3.180	3.674	4.131	4.434
Constant 2015 RON billion	7.94	8.65	9.15	9.51	10.63	12.28	13.81	14.82
% GDP	1.21%	1.28%	1.32%	1.33%	1.44%	1.62%	1.76%	1.83%

Source: IHS Jane's (2015)

According to the *Defence Roadmap Until 2050*, Romania plans to increase its focus on asymmetric and cyber threats, forming digital forces and finalising the modernisation of the Armed Forces mentioned above in the period 2013–2021, while the transition period for the defence industry and the Romanian Armed Forces to meet the NATO targets is set for 2021–2030.⁵¹⁹

A draft bill of 2014 unveiled Romania's plans to secure minority private investors for the country's state-run defence industry in order to modernise its defence industrial sector further. The government aims to maintain a share of at least 50 per cent in the manufacturers and secure investors who will provide the necessary technology and know-how to upgrade the industry's production capabilities. According to the draft bill, the Romanian companies will maintain their main fields of activity, production capacity and range of services for at least five years following the potential transactions.⁵²⁰ In addition, as part of the measures to be taken in order to help the domestic defence industry revive, in 2014 Romania announced its plan to erase some fiscal debts amassed by the companies operating in the sector, with approximately 15 companies to be benefited from this measure.⁵²¹

10.2. Defence industrial capabilities

10.2.1. General assessment by sector (land, air, naval, C4I)

Romania has a relatively developed arms industry with 25 core companies employing 10,000 people,⁵²² although the Romanian Business Association of Military Technique Manufacturers (PATROMIL) represents a wider pool of over 200 Romanian producers and research institutes, many of which are active in 'dual-use' markets.⁵²³

⁵¹⁹ RAND Europe interview, July 2015.

⁵²⁰ Defence News (2014).

⁵²¹ KG/Xinhua (2014).

⁵²² RAND Europe interview, July 2015.

⁵²³ PATROMIL (n.d.).

Its main disadvantage, though, is that it lags behind technologically despite some improvements having been achieved by the acquisition of western licences. The largest manufacturers of tanks, artillery, small arms and ammunition all operate under the umbrella of the state-controlled RomArm company (Arsenal Resita, Electromecanica, Moreni, MFA SA Mizil). The Romanian arms industry also has the capacity to upgrade aircraft, including combat aircraft, and manufacture aircraft components (Avioane, Aerostar, which also produces armament for the Land Forces, Romaero); helicopters (IAR); aircraft engines (Turbomecanica, working under a Rolls-Royce licence); guided missiles (Aerofina); radio electronics for fighting vehicles, command and communication systems (Elektromagnetica, working under a German licence); communication systems (Elprof, working under a British licence); radar stations (UTI Systems in cooperation with Lockheed Martin); and optoelectronics (Pro Optica). The shipbuilding industry has experience in building all the vessel types currently in service in Romania's Navy (the Mangalia shipyard), but has not invested significantly in modern technology in recent years.⁵²⁴

Eurocopter Romania was founded in 2002 and has grown into one of the most advanced of Eurocopter's subsidiaries, delivering overhauled Puma and Super Puma helicopters. Airbus Helicopter Romania has become the main global centre for the production and maintenance of the Puma/Super Puma helicopter family. Current industrial capacity allows the simultaneous overhaul of eight medium-sized Puma and Super Puma helicopters annually. Most work comes from military contracts in Africa, Europe, the Middle East, South America and Asia. Locally, Airbus Helicopters Romania supports the H135 and Dauphin helicopters used by the Romanian state authorities, alongside the marketing and maintenance-repair activities of new generation helicopters for civilian customers from Romania and neighbouring countries.⁵²⁵

10.2.2. Major industries

Key subunits of the state-owned RomArm group, which dominates the domestic land market, include:

- **Arsenal Resita:** Produces artillery (up to 152 mm calibre) and anti-air guns.
- **Electromecanica:** Produces rockets and missile systems.
- **Moreni Mechanical Plant:** Produces armoured personnel carriers.
- **MFA SA Mizil:** Offers MRO services for armoured vehicles, as well as producing turrets and overhead weapons stations.
- **Tohan:** Produces artillery munitions (up to 130 mm calibre), explosives and short-range surface-to-surface and air-to-surface missiles.
- **Uzina Mecanica Cugir:** Produces a variety of SALW (e.g. pistols, machine guns) and ammunition (including to NATO standards).

Other top companies in the aerospace and maritime domains include:⁵²⁶

⁵²⁴ Gotkowska & Osica (2012).

⁵²⁵ IHS Jane's (2015i).

⁵²⁶ IHS Jane's (2015i).

- **Aerostar Bacau:** Aviation systems and ground defence systems supply for the Romanian MOD, previously produced around 1900 Yak-52 trainer aircraft in the Soviet era; also recently completed life extension and upgrade work for the Mozambique Air Force's MiG-21 fleet.
- **Avioane Craiova:** Aerospace component manufacturing, which previously produced the indigenous IAR-99 jet trainer/light strike aircraft, with a modernised version (IAR-99 TD) planned for 2016.
- **Daewoo Mangalia Heavy Industries:** Shipyard offering both new build and MRO services, primarily in commercial markets. The Mangalia naval yard has also worked on the disposal of old Romanian Navy vessels.
- **Damen Shipyards Galati:** Construction of both commercial and military vessels for the multinational Damen Group, including recently the hull of the Dutch Navy's largest ship, the logistical support vessel *HNLMS Karel Doorman*.
- **Eurocopter Romania:** Overhauling of Puma and Super Puma helicopters, EC135, Dauphin etc.
- **IAR S.A. Brasov:** Helicopter component manufacturing and overhaul.
- **Romaero S.A. Roma:** Manufacturing and overhauling of civil and military transport aircraft.
- **Romtehnica:** Trading company for defence imports and exports, under coordination of the MOD.
- **Santierul Naval Constanta Shipyard:** Largest shipyard in Romania, offering both shipbuilding and MRO, primarily for large commercial vessels (e.g. tankers) but also applicable to military.

10.2.3. *Niche areas*

Niche areas include: tanks, heavy armament vehicles, system integration, engineering, energy security, ICT, cybersecurity, border security, critical infrastructure protection, SALW and ammunition (anti-aircraft missiles, rifles, bombs), personal protective equipment, specialist textiles, aircraft (e.g. Puma helicopters).⁵²⁷

Romania also has a range of research institutes that focus specifically on the defence industry, which may lead to new areas of development.⁵²⁸ Examples include: the Military Technique Academy's munitions lab, or Agency for Research of Military Techniques and Technologies, as well as 'dual-use' R&D centres such as the Institute for Research and Design of Production Systems.

10.3. Barriers and obstacles

10.3.1. *Internal*

Reduced government orders and lack of international interest in Romanian-manufactured defence products, most of which are based on less competitive and obsolete communist-era designs, have posed difficulties to Romania's defence industry since the end of the Warsaw Pact.⁵²⁹ Profitable companies, such as Aerostar Bacau, Romania's most lucrative aviation company, are an exception, as the privatisation

⁵²⁷ RAND Europe interview, July 2015.

⁵²⁸ RAND Europe interview, July 2015.

⁵²⁹ IHS Jane's (2015i).

process and economic downturn pose difficulties to others, such as Avioane Craiova, IAR Brasov and Romaero.⁵³⁰

While the privatisation of defence companies is still high on RomArm's agenda, the failure of many industrial holdings to make a profit remains a formidable challenge. For example, Romania has sought to sell the aerospace operation Avioane Craiova multiple times but, despite the interest from the Czech Republic and Italy, the company's debt burden and continuing losses have reportedly obstructed possible deals.⁵³¹ Interviewees suggested that there is a perception within the industry that the government does not treat private and state-owned companies equally, while political instability and the lack of knowledge, skills and understanding within the government additionally influence the industry.⁵³² Reportedly the government exercises too much political involvement in the industry and sometimes even hampers exports, while national legislation on domestic procurements is perceived to favour international companies.⁵³³

Although plans to increase the defence budget have been announced, it is unclear how much of the defence budget will benefit the Romanian defence industry, as there is a perceived lack of long-term defence planning or consistent strategy for the development of the defence industry, as well as low marketing skills on the industry side.⁵³⁴ Ineffective state institutions, possible corruption and varying levels of project management competence are also some of the internal factors that affect Romania's defence sector and have reportedly impacted the pursuit of international collaboration.⁵³⁵ Talent and skills are similarly reported to be an issue. Although Romania has well specialised engineers, most of them are approaching retirement age and there is therefore a need to train new qualified personnel; yet Romania is losing qualified personnel to emigration as salaries are low.⁵³⁶

Set against these challenges, favourable labour rates and production prices are perceived as incentives for western companies to seek cooperation with Romanian companies. The example of the governmental financial incentives for Airbus to invest in the sector, to the extent of €38 million, could also serve as a motivation for western companies to invest or open business in Romania.⁵³⁷

10.3.2. *External*

In the case of Romania, the most visible cooperation has been with the Black Sea region. However, it has been hindered by the heterogeneity and divergent interests of individual countries in the area, as well as financial constraints, the slow pace of overcoming historical resentments and the lack of a culture of

⁵³⁰ IHS Jane's (2015i).

⁵³¹ IHS Jane's (2015i).

⁵³² RAND Europe interview, July 2015.

⁵³³ RAND Europe interview, July 2015.

⁵³⁴ RAND Europe interview, July 2015.

⁵³⁵ Gotkowska & Osica (2012).

⁵³⁶ RAND Europe interview, July 2015.

⁵³⁷ RAND Europe interview, July 2015.

cooperation. Romania, which has the largest potential and biggest ambitions, has also been striving to develop closer cooperation with Central Europe, Poland in particular.⁵³⁸

NATO compatibility requirements and global arms trade restrictions on exports have also limited sales prospects⁵³⁹ and only six per cent of defence exports go to the EU market.⁵⁴⁰ There are some issues regarding licensing (e.g. receiving licences for engine repairs from western companies).⁵⁴¹ There is also a perceived opinion within the industry that the western market regards Romanian companies as competitors and are therefore reluctant to cooperate or invest.⁵⁴² However, western investments may be hampered by Romanian legislation, which does not allow joint ventures to be established with Romanian companies,⁵⁴³ while Romanian companies are reportedly not allowed the same VAT exemptions as western companies.⁵⁴⁴

10.4. Opportunities and programmes

Over the last few years, Romania has signed several multinational agreements to bolster its arms exports and defence collaboration with various countries and manufacturers:

- **Bilateral B2B agreements:** In September 2014, Romania and Airbus Helicopters signed an MOU to pave the way for Airbus Helicopters to extend its presence and further develop production capabilities for Super Puma helicopters at Brasov Aerospace Technological Park.⁵⁴⁵ Airbus Helicopters has a longstanding partnership with Romania that dates from 2002, when the company first established its presence in the country through a joint venture, known as Airbus Helicopters Romania. Since then, more than 300 Pumas and Alouettes helicopters have been produced under license at Brasov for national and export markets.⁵⁴⁶ In October 2008, Alenia Aeronautica and Aerostar Bacau, Romania's most profitable aviation company, signed an agreement collaboration covering various aerospace activities.
- **Bilateral G2G agreements (non-EU):** In April 2011, Romania signed a defence cooperation agreement with Vietnam without further details being disclosed. However, given Romania's large inventories of Soviet-era designs, it is likely the agreement focused on the supply of military technologies, materials and spare parts to Hanoi that could be used for upgrades or maintenance.⁵⁴⁷ In 2013, Pakistan and Romania signed a cooperation agreement that covers military training, exports and imports of defence equipment, industrial collaboration and military exchange visits. No further

⁵³⁸ Gotkowska & Osica (2012).

⁵³⁹ IHS Jane's (2015i).

⁵⁴⁰ RAND Europe interview, July 2015.

⁵⁴¹ RAND Europe interview, July 2015.

⁵⁴² RAND Europe interview, July 2015.

⁵⁴³ RAND Europe interview, July 2015.

⁵⁴⁴ RAND Europe interview, July 2015.

⁵⁴⁵ IHS Jane's (2015i).

⁵⁴⁶ IHS Jane's (2015i).

⁵⁴⁷ IHS Jane's (2015i).

details of this agreement are known; however, it is likely that it builds on previous defence accords signed by the two countries in 2001 and 2011, which relate to the production of ammunition for tanks and artillery systems.⁵⁴⁸ In April 2014, further to this bilateral defence trade agreement, Pakistan and Romania pledged to explore areas of possible joint defence production.⁵⁴⁹

- **Bilateral G2G agreements (EU):** Having high military potential and political aspirations, Romania has also been seeking to develop closer cooperation with Central Europe, and Poland in particular, due to their geographic proximity, similar security interests (perceived threats, close relations with the US) and the need to strengthen Romania's position in NATO and the EU.⁵⁵⁰ Romania has signed an MOU with the Polish Chamber of Commerce and with the Bulgarian Industry Association, to boost cooperation.⁵⁵¹ However, Romania's inability to correspond to NATO technical specifications may be an impediment to exporting within the EU in the future.⁵⁵²

Reflecting the country's wider involvement in regional defence frameworks, Romania is also home to the NATO Human Intelligence COE, which opened in Oradea in 2010.⁵⁵³

10.4.1. Defence planning and procurement programmes

In response to the Ukrainian-Russian conflict, Romania's defence budget is expected to increase by an average of 14.8 per cent in the period 2015–2018,⁵⁵⁴ with a planned 25 per cent increase for defence acquisition.⁵⁵⁵ Should these plans be put into effect, this may entail increased production of ammunition, spare parts for weapons and equipment⁵⁵⁶ and demand for components for the Land and Air Forces.⁵⁵⁷

According to the Defence Roadmap to 2050, Romania also plans to increase its focus on asymmetric and cyber threats, forming digital forces and finalising the modernisation of the Armed Forces mentioned above between 2013–2021, while the transition period for the defence industry and the Romanian Armed Forces to meet the NATO targets is set for 2021–2030.⁵⁵⁸ Except for the acquisition of armoured personnel carriers, mainly for the purposes of the mission in Afghanistan, the Land Forces' upgrade plans are reliant on the products of the domestic arms industry.⁵⁵⁹

⁵⁴⁸ IHS Jane's (2015i).

⁵⁴⁹ Grevatt (2014b).

⁵⁵⁰ Gotkowska & Osica (2012).

⁵⁵¹ RAND Europe interview, July 2015.

⁵⁵² RAND Europe interview, July 2015.

⁵⁵³ NATO (2015a).

⁵⁵⁴ Kanavakis (2015).

⁵⁵⁵ RAND Europe interview, July 2015.

⁵⁵⁶ IHS Jane's (2015i).

⁵⁵⁷ Tudor (2014).

⁵⁵⁸ RAND Europe interview, July 2015.

⁵⁵⁹ Gotkowska & Osica (2012).

10.5. Capacity-building needs

Romania aspires to develop a significant R&D base, which could promote future international cooperation, and hopes to transform the country into a large aircraft hub (e.g. Aerostar, YAK-52, Spartan and Antonov-30), develop UAVs and continue its IAR-99 TD jet trainer modernisation programme. However, significant investment is likely to be required in new technology, facilities and skills programmes to implement this vision of a transition to a knowledge-based, high-tech defence economy.⁵⁶⁰

Other capacity-building needs identified by a literature review and interviews include:

- Support or guidance to enhance MOD understanding of EU defence regulations (including on use of offsets) and IPR.
- Measures to promote the visibility of defence opportunities in other European markets to Romanian SMEs and defence enterprises.
- Skills programmes to boost both technical and 'soft' skills, e.g. marketing, project management.
- Guidance in brokering international cooperation agreements with European partners, including dissemination of 'lessons learned' on the specific project management challenges of such collaborative programmes.

⁵⁶⁰ RAND Europe interviews, July 2015.

11. Country profile: Slovakia

11.1. Country at a glance

The small Slovakian defence sector draws on the longstanding heritage of Czechoslovakia in defence production, although it has experienced significant decline and disruption since independence in 1993. Today, the Slovak Defence and Security Industry Group (ZBOP) comprises around 40 members, active mostly in the market for MRO services, with a small group of manufacturers dominating the country's production capabilities in aerospace C2 systems, military communications, optoelectronics, armoured vehicles, self-propelled artillery, missiles and munitions.

11.1.1. Context of industrial and economic restructuring

Before 1990, traditional heavy weapons production was a key economic pillar of a united Czechoslovakia, with the country playing a significant role in the integrated Soviet-era defence industrial base of the WTO.⁵⁶¹ Like the Czech Republic, Slovakia has a strong legacy of modern armaments production, stretching back to the early 20th century; for example, Czechoslovakia was the sixth-largest defence exporter in the 1980s, as well as the world leader in terms of jet trainer aircraft production. At its peak in 1988–1989, this output was valued at US\$623 million, representing approximately 24 per cent of the country's machinery and electronics production, almost 11 per cent of all industrial production and over three per cent of GDP. Small arms, aircraft, armoured vehicles and electronics were produced to local designs, while tanks, artillery, combat aircraft and missiles were built under Soviet licence.⁵⁶² The Czechoslovakian defence sector employed approximately 80,000 people directly and a similar number indirectly, with around half of the total figure based in Slovakia, centred around the 'military triangle' of Martin, Dubnica and Detva, where defence dominated the regional economy.⁵⁶³

A period of modernisation and transformation followed the end of the Cold War and the foundation of an independent Slovak Republic.⁵⁶⁴ The loss of traditional export markets, a collapse in domestic defence spending and a policy of converting 'tanks into ploughshares' under Czechoslovakia's President Václav Havel presented the local defence industry with significant economic challenges on the declaration of

⁵⁶¹ Kiss (1999, 1).

⁵⁶² Kiss (1993, 1045-1047).

⁵⁶³ Kiss, (2014, 243).

⁵⁶⁴ Smith (1994, 410).

Slovak independence in 1993. The Slovak aviation industry was hit especially strongly by the division of the country, as more than 90 per cent of production had been situated in the Czech Republic,⁵⁶⁵ while many armaments factories suffered significant losses due to unsold stocks and capital assets, falling demand and bad debts.⁵⁶⁶

In the mid-1990s, the Meciar government pursued an interventionist policy of subsidies, export promotion and consolidation in an attempt to reverse this decline, with the DMD Group established and major defence companies taken into state ownership in 1997.

From 1998, however, the Dzurinda government rejected this policy of attempting to retain a full spectrum of defence industrial capabilities in favour of emphasising free market competition and niche specialisms, a position endorsed by the local NDIA,⁵⁶⁷ with the bulk of firms having been privatised by 2002. According to the Ministry of Economy, by 2005 the defence sector produced approximately one-tenth of its 1988 peak output, employing only 776 people, although these exact figures have been disputed.⁵⁶⁸ Major defence firms such as ZTS TEES Martin were closed down and a number of others split into smaller successors or faced near bankruptcy.⁵⁶⁹ At the same time, the wider economy underwent a period of rapid restructuring, labour code liberalisation and a large-scale inflow of foreign capital known as the 'Slovak miracle'.⁵⁷⁰ Although conversion⁵⁷¹ was no longer government policy, Kiss (2014) suggests that these wider economic factors led to 'an organic conversion process', with many individuals and companies formerly involved in the defence industry moving into more profitable civil sectors, such as the automotive business, which was a major beneficiary of foreign investment, or relocating to the Czech Republic, where salaries were higher.⁵⁷²

11.1.2. Recent policy and defence spending

Since joining the EU and NATO in 2004, Slovakia has pursued an active multilateral security and foreign policy, with Slovak military personnel participating in EUFOR ALTHEA in Bosnia and Herzegovina, EUFOR RD Congo and the UN peacekeeping mission to Cyprus, as well as US-led operations in Afghanistan and Iraq. Slovakia has also played an active role in the promotion of regional Visegrád cooperation with Poland, the Czech Republic and Hungary.

At the same time, however, Slovak defence spending has seen a period of significant decline, which has only recently begun to reverse in the light of growing concern over the security situation facing Central and Eastern Europe. In 2015, the defence budget amounts to €797 million, representing slightly over one per cent of GDP, a significant decline from over two per cent in 1999 and 1.7 per cent in 2004 (when

⁵⁶⁵ Kiss, (2014, 243).

⁵⁶⁶ Kiss (1993, 1049).

⁵⁶⁷ RAND Europe interview, August 2015.

⁵⁶⁸ Kiss, (2014, 245).

⁵⁶⁹ Kiss, (2014, 245).

⁵⁷⁰ Kiss, (2014, 240).

⁵⁷¹ Kiss (1993, 1050-1052).

⁵⁷² Kiss, (2014, 245).

Slovakia joined NATO). Approximately 33.6 per cent of the budget is designated for salaries and 12.9 per cent for capital expenditures, with 18.8 per cent (€150.2 million) earmarked for spending on force and infrastructure modernisation.⁵⁷³ IHS Jane's estimates that total regular forces will maintain their strength of approximately 16,000 while the proportion of GDP spent on defence will stay at around 1.1 per cent in the next four years.⁵⁷⁴ This has been confirmed by the Fico government, despite speculation that there might be larger increases in the light of the crisis in Ukraine, although President Kisko has argued for increasing military spending to 1.6 per cent of GDP by 2020.⁵⁷⁵ While previous Slovak governments sought to direct procurement spending towards local industry through offset arrangements, with the 2008 Slovak offset regulations requiring at least 100 per cent offsets for deals over €6 million, 20 per cent of which must be direct offset, this policy was effectively abandoned in 2011 in the light of opposition from EU institutions.⁵⁷⁶

Table 11.1 Defence spending in Slovakia, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	1.061	0.969	1.002	1.057	1.105	1.173	1.243	1.298
Constant 2015 EUR billion	0.80	0.73	0.76	0.80	0.83	0.88	0.94	0.98
% GDP	1.09%	0.98%	0.99%	1.02%	1.03%	1.05%	1.07%	1.07%

Source: IHS Jane's (2015)

In the light of these resource constraints, Slovakia has relatively conservative defence policy goals. There have even been discussions on a possible merger of the Ministries of the Interior and Defence, including the integration of two military intelligence units into the civilian Slovak Information Service (SIS). In 2013, the total strength of the Slovak Armed Forces was about 16,307 (including 4,023 civilian personnel),⁵⁷⁷ representing a significant decline from 57,626 in 1993 or the 22,912 that were available when Slovakia joined NATO in 2004.⁵⁷⁸ Since 1 January 2006, the Slovak military has been fully professionalised and formally consists of the operational component (Land Forces and Air Force), and the support component (Support and Training Forces).⁵⁷⁹ The Land Force core consists of two mechanised brigades that use mostly Slovak- or Soviet-made equipment, with around 30 MBTs. Similarly, the Air Force is relatively lightly equipped, operating 12 modernised MiG-29 jets and 8 L-39 trainer jets, as well

⁵⁷³ Wolters Kluwer (2014).

⁵⁷⁴ IHS Jane's (2015t).

⁵⁷⁵ IHS Jane's (2015t).

⁵⁷⁶ IHS Jane's (2015l); Kiss, (2014, 258).

⁵⁷⁷ Personalny urad ozbrojenych sil sr (2013).

⁵⁷⁸ Personalny urad ozbrojenych sil sr (2013).

⁵⁷⁹ Gotkowska & Osica (2012, 71).

as 12 military helicopters.⁵⁸⁰ Having failed to procure or modernise on a large scale for two decades, obsolescence and equipment fatigue are thought to be significant concerns for the Slovak Armed Forces, with many platforms operating at or beyond their technical limits.⁵⁸¹ An estimated 70 per cent of equipment and armaments has reached end of service and is in storage pending disposal.⁵⁸²

Between 1993 and 2010, the Slovak military also procured discounted Russian equipment and spare parts for its own stocks of Soviet-era materiel through ‘arms-for-debt swaps’ agreements.⁵⁸³ Without major plans for modernisation and only limited overall defence spending, defence imports have varied significantly year-on-year; as a result, in 2011 Slovakia imported only €2.8 million of military equipment.⁵⁸⁴

11.2. Defence industrial capabilities

11.2.1. General assessment by sector (land, air, naval, C4I)

As a result of economic restructuring and limited domestic demand, the profile of the Slovak defence industry in 2015 represents a significant departure from its former pre-1990 standing. ZBOP currently has around 40 members, traditionally active mostly in MRO activities, with a small group of manufacturers dominating the country’s production capabilities in aerospace C2 systems, military communications, optoelectronics, armoured vehicles, self-propelled artillery, missiles and ammunition. Slovak industry produces a number of full platforms in the land domain, including the Zuzana 2 155-mm self-propelled artillery system (Konštrukta Defence) or Tatravan 6x6 armoured vehicle (PPS Group and Vývoj Martin), as well as subsystems and components such as high-precision gearboxes (Spinea, Prešov). In aerospace, the sector has proven ‘robust’ despite international competition, conducting MRO for a range of military craft and helicopters,⁵⁸⁵ as well as developing products such as training simulators (Virtual Reality Media), air traffic management and control systems, as well as radars and consoles for both military and civil applications (ALES, Trenčín). As Slovakia is a landlocked country, industrial capabilities in the maritime domain are highly limited.

Seven key areas are highlighted as especially important for the Slovak defence industry:⁵⁸⁶

- Air defence and aviation technology
- Ammunition and explosives
- Armoured vehicles and artillery
- Individual protection
- Logistic and medical support
- Small arms

⁵⁸⁰ Gotkowska & Osica (2012, 71).

⁵⁸¹ RAND Europe interview, August 2015.

⁵⁸² IHS Jane’s (2015l).

⁵⁸³ IHS Jane’s (2015m).

⁵⁸⁴ IHS Jane’s (2015l).

⁵⁸⁵ Kogan (2008, 104).

⁵⁸⁶ IHS Jane’s (2015l).

- Simulators and synthetic environments.

Together with other small European countries, the Slovak Republic has a medium-sized arms industry largely dependent on exports in the light of the limited scale of domestic demand.⁵⁸⁷ The industry provides supplies to the land forces (mainly weapons and munitions) but most are relatively outdated and some even based on 1980-technology.⁵⁸⁸ Niche firms have had more success in focusing on export markets in Europe and the US, although two joint-stock trading companies – Hermes (weapons and ammunition) and Kerametal Company Ltd (heavy weaponry products) – dominate Slovakia's arms trading activities.⁵⁸⁹ Relations with NATO Western European Armaments Group members have been sought out and have helped connect the industry with several international primes.⁵⁹⁰

In the late 1980s, Czechoslovakia was the sixth-largest defence exporter in the world, with Slovakia estimated to be responsible for producing around 65 per cent of that materiel.⁵⁹¹ The collapse of the Warsaw Pact, however, and subsequent industrial restructuring brought about the loss of many traditional export markets for both civil and defence goods. Today, Slovakia is a relatively small exporter of military equipment with €64 million worth of exports in 2011.⁵⁹² The main exports in the period 2008–2012 included three MI-8MT/Mi-17/Hip-H helicopters to Afghanistan, eight BMP-1 IFVs to Cambodia and three OT-90 APCs to the Central African Republic. As well as a large proportion of foreign sales flowing to the neighbouring Czech Republic,⁵⁹³ new markets have been developed, particularly in Asia. In 2011, for instance, a deal was reached with Vietnam, focusing on the supply of military technologies to Hanoi, military exchanges, training and exercises.⁵⁹⁴ This commitment is expected to increase bilateral trade between Vietnam and Slovakia, which in 2012 reached US\$300 million, more than twice.⁵⁹⁵ Another agreement was signed with Romania.⁵⁹⁶ In both cases, knowledge in upgrading Soviet-era equipment has helped Slovak arms manufacturers gain competitive advantage. Slovakia has also exported aircraft avionics, engines, parts and other components to Egypt, France, Germany, Italy, Poland and the US.⁵⁹⁷ IHS Jane's argues these deals are 'indicative of Slovakia's requirement to expand its defence export base in developing countries given the small size of the domestic market'.⁵⁹⁸

⁵⁸⁷ Gotkowska & Osica (2012, 72).

⁵⁸⁸ Gotkowska & Osica (2012, 72).

⁵⁸⁹ IHS Jane's (2015l).

⁵⁹⁰ IHS Jane's (2015l).

⁵⁹¹ Kiss, (2014, 258).

⁵⁹² IHS Jane's (2015l).

⁵⁹³ IHS Jane's (2015l).

⁵⁹⁴ IHS Jane's (2015l).

⁵⁹⁵ IHS Jane's (2015l).

⁵⁹⁶ IHS Jane's (2015l).

⁵⁹⁷ IHS Jane's (2015l).

⁵⁹⁸ IHS Jane's (2015l).

11.2.2. Major industries

Of the ZOBP's approximately 40 members, major defence firms include:⁵⁹⁹

- **Ales:** Developer of aviation C2 systems and mobile command posts.
- **Aliter Technologies:** Provider of defence communication technologies.
- **Delta Defence:** MRO for tanks and other armoured vehicles, as well as communication systems and rocket launchers (in conjunction with Diehl DE).
- **DMD Group:** State-controlled holding company, with units specialising in the design, testing and production of defence equipment, as well as producing parts for the automotive, electronic and energy industries.
- **EVPU Defence:** Specialist in optoelectronics, remote controlled weapons stations, turret management systems and training simulators.
- **Hermes:** Trading company for weapons and ammunition.
- **Kerametal:** Supplies light armoured vehicles.
- **Konstrukta Defence:** Manufactures artillery systems, including the autonomous turret used on the joint Slovak-Polish 155 mm Diana self-propelled howitzer, which mounts the turret on a chassis provided by Polish group PGZ.
- **LOTN (Letecké opravne Trenčin):** Aircraft MRO service provider.
- **Považské strojárne Letecké Motory (PSLM):** Jet engine component manufacturer.
- **PPS Vehicles:** Armoured tracked and wheeled vehicles.
- **Tanax Trucks:** Manufacturer of transport vehicles.
- **Tatra Trucks:** Produces chassis and armour plate for Zuzana 155 mm self-propelled howitzer.
- **VOP Novaky:** Privatised firm specialising in military repairs. MSM Martin (owned by Czech-based Excalibur Army) leased the firm for 20 years effective from October 2012.
- **VOP Trenčín a Banská Bystrica:** Company focused on MRO services for wheeled and tracked military vehicles. Also leased to MSM Martin until 2034.
- **Virtual Reality Media:** Successful exporter of synthetic training systems and simulators.
- **ZVS Holding:** Specialist in large- and medium-calibre ammunition.

11.2.3. Niche areas

In addition to its broader industrial capabilities, especially for aerospace MRO and armoured vehicle production, the Slovak defence sector has developed a number of emerging niche specialisms. These include:

- **CBRN and EOD:** In 2005, Slovakia set itself the goal of achieving leading nation status for EOD as part of its contribution to the US-led 'war on terror', reportedly modelling its activities on the success of the Czech CBRN defence battalion.⁶⁰⁰ The following year, a CBR training and testing centre was opened in Zemianske Kostolany, supplemented in 2007 by the opening of the NATO

⁵⁹⁹ IHS Jane's (2015l).

⁶⁰⁰ Kiss (2014, 242).

EOD COE in Trenčín and Nováky. Slovak firm Way Industry (acquired by Sitno Holding in 2009) also produces the Bozena mine-clearance system, while Metrodat has had success with the CO2 DIAL system for remote detection of chemical warfare agents and other electronic devices.⁶⁰¹

- **Aviation research and design:** Slovak universities have a relatively strong presence in the aerospace industry. The Faculty of Mechanical Engineering at the University of Zilina specialises in the construction of aircraft engines, while the Faculty of Aeronautics at the Technical University in Kosice focuses on aviation mechanical engineering as well as aviation electronics.⁶⁰²
- **Training simulators and synthetic environments:** The Slovak firm Virtual Reality Media (VRM) produces full mission simulators for training crews of Mi-17 aircraft up to the squadron level and supplies them worldwide. In March 2011, the US Army took delivery of an ‘anti-terrorist’ version of the simulator coproduced by VRM, Fidelity Technologies Incorporated and Aeronautical Systems Engineering. This was VRM’s eighth simulator and is designed to facilitate training for the Iraqi military.⁶⁰³
- **Robotics and remote-controlled weapons stations:** Slovak defence firms are also seeking to expand upon their traditional focus on heavy land armaments with an emerging interest in robotic systems and remote-controlled weapons stations.⁶⁰⁴ In May 2012, PPS Vehicles teamed with South Africa-based BAES Land Systems to offer a tactical remote turret to military forces in the region.⁶⁰⁵

11.3. Barriers and obstacles

11.3.1. *Internal*

Although there is not an extensive academic or grey literature addressing the Slovak defence industry, a literature review and interviews identify a number of potential internal barriers to greater competitiveness and collaboration on the international market.

A significant concern of industry pertains to the limited availability of procurement programmes or capital. Interviewees and the literature report a limited domestic political appetite for defence spending, despite the end of recession and the recent onset of the crisis in Ukraine,⁶⁰⁶ with a need for defence projects to demonstrate wider benefits to Slovak voters in terms of jobs or spillovers into civil sectors, e.g. healthcare or education.⁶⁰⁷ Related to this issue, as well as to the ready availability of Soviet-era equipment through arms-for-debt swaps with Russia,⁶⁰⁸ there have been no major modernisation or procurement

⁶⁰¹ Kiss (2014, 255).

⁶⁰² IHS Jane’s (2015l).

⁶⁰³ IHS Jane’s (2015l).

⁶⁰⁴ RAND Europe interviews, August 2015.

⁶⁰⁵ Kiss, (2014, 252).

⁶⁰⁶ Suplata (2014).

⁶⁰⁷ RAND Europe interviews, August 2015.

⁶⁰⁸ IHS Jane’s (2015m).

programmes from the Slovak MOD in the past 20 years, significantly limiting the domestic market for Slovak industry, as well as the potential for investment in new modern products for the export market.⁶⁰⁹

In addition, Slovakia provides little or no MOD funding to support defence industrial development, or the commercialisation of basic research into final products for domestic use or export.⁶¹⁰ However, the state-owned EXIMBANKA (export-import bank) does provide finance in support of Slovak exporters and accepts slightly higher risk than commercial banks would do. Funding can also be made available through commercial banks or venture capital, although many are reported to prefer to proceed in conjunction with EXIMBANKA to mitigate risk.⁶¹¹ Given the limited levels of defence spending, these alternative sources of capital have been central to the involvement of firms such as VRM in international tenders.⁶¹²

Inefficiency of budget planning has also historically been an issue, exacerbating the issues posed by scarce financial resources and creating uncertainty over future investments. In 2007, an MOD document noted that ‘defence planning... has been reduced to one-year procurement cycles... armaments and modernisation suffer most from budget cuts and transfers’.⁶¹³ According to IHS Jane’s, the country lacks ‘clarity and stability of resourcing’ and faces inefficient utilisation of allocated funding. Long delays in procurement (such as the ongoing negotiations over Gripen fighter aircraft, or the delayed acquisition of the C-27J transport), as well as missed targets for meeting NATO standards are partly a result of limited resources but also of political processes that do not follow a clear direction in defence procurement.⁶¹⁴ The Slovak MOD lacks a new, clearly defined Security Strategy or Defence Concept, as well as stated policies for the defence industry or for international cooperation, with limited coordination between different MOD departments and other parts of government.⁶¹⁵ As Suplata (2014) notes, the ‘insufficient transparency in defence policy objectives as well as the divergent views and stances of government ministers and less predictable government’s position on defence and security matters has eroded the confidence of allies and partners’, damaging the credibility of Slovakia’s commitments to regional cooperation projects.⁶¹⁶

Also related to the efficient management and coordination of resources is the question of corruption, with a recent economic survey showing that almost a third of Slovak companies identified corruption and bribery as prevailing economic crimes in the country.⁶¹⁷

Wider perceived barriers and obstacles include issues with talent and culture, in both the defence industry itself and within the Slovak MOD. There are varying levels of diplomatic, managerial and technical skills

⁶⁰⁹ RAND Europe interviews, August 2015.

⁶¹⁰ RAND Europe interviews, August 2015.

⁶¹¹ RAND Europe interviews, August 2015.

⁶¹² RAND Europe interviews, August 2015.

⁶¹³ Cit. in Kiss (2014, 256).

⁶¹⁴ IHS Jane’s (2015m).

⁶¹⁵ Suplata (2014).

⁶¹⁶ Suplata (2014).

⁶¹⁷ IHS Jane’s (2015l).

across companies, with particular concern over language and marketing skills.⁶¹⁸ Furthermore, high turnover rates for key personnel within the MOD frustrate the development of long-term plans or close institutional and personal networks and connections.⁶¹⁹ Although STEM skills are thought to be a strength of the Slovak labour force, many young workers are reported to prefer employment in the automotive and other civil sectors over the defence industry, with emigration also an issue.⁶²⁰ An internal study by ZVS Holding in 2005 saw management predict a future shortage of qualified workers, with managers noting an average age in the company of 48 and a reliance on local recruitment, with challenges posed by factors such as lack of housing or adequate apprenticeship schemes.⁶²¹ At the same time, there has been a perceived loss of the organisational culture of cooperation that defined CEE defence ministries and industries during the command economy structure of the Soviet era. The partial privatisation of industry in Slovakia (and elsewhere) is believed to have brought a 'zero-sum' competitive mentality to many CEE and EU defence firms, rather than an appreciation of the potential mutual benefits to be derived from cooperation.⁶²²

This problem is seen to be compounded by issues of structure, such as the lack of clear, well-communicated and well-supported defence industrial policy on the part of Slovak MOD.⁶²³

While there has been an MOU between the MOD and ZBOP since 2010, the small size of the defence sector in Slovakia means that many firms prefer to develop direct bilateral ties with the Slovak MOD rather than using the shared industry forum⁶²⁴; a number of important companies, such as Metrodat, a successor producer and exporter of CBR detection devices, do not belong to the national association.⁶²⁵ The result of this fracturing is perceived to be less mutual understanding, communication and support between the Slovak government and the defence industry than is apparent in other (especially Western European) EDA member states.⁶²⁶ This has potentially led to a limited capability to navigate the relevant processes or perform lobbying at the EU, EC, NATO and EDA levels, with some other CEE member states perceived to have achieved more success in this regard, e.g. Poland and the Czech Republic.⁶²⁷ Indeed, there is a reported lack of widespread experience of international collaborations, given that the MOD reported no foreign investments or joint ventures in the defence sector as recently as 2005.⁶²⁸

⁶¹⁸ RAND Europe interviews, August 2015.

⁶¹⁹ Suplata (2014).

⁶²⁰ RAND Europe interviews, August 2015.

⁶²¹ Kiss (2014, 268).

⁶²² RAND Europe interviews, August 2015.

⁶²³ RAND Europe interviews, August 2015.

⁶²⁴ RAND Europe interviews, August 2015.

⁶²⁵ Kiss (2014, 255).

⁶²⁶ RAND Europe interviews, August 2015.

⁶²⁷ RAND Europe interviews, August 2015.

⁶²⁸ Kiss (2014, 254).

11.3.2. External

Wider external barriers to competitiveness and collaboration are thought to include:⁶²⁹

- Lack of harmonisation of procurement requirements and defence industrial policies across the CEE and other EDA member states.
- Limited defence budgets across Europe, including the proportion spent on procurement.
- Successful lobbying by Western European and some CEE defence industries to influence domestic government procurement spending in favour of ‘national champions’.

11.4. Opportunities and programmes

Despite the barriers and obstacles identified above, Slovakia has a number of recent collaborative arrangements and ongoing procurement plans, both of which may provide a basis on which to build international defence industrial cooperation in future.

Collaboration of this kind is perceived by the Slovak MOD and ZBOP as an opportunity to improve the Armed Forces’ ageing military capabilities at affordable cost, as well as to involve Slovak industry in partnerships that might bring new skills, technology and opportunities for accessing third markets.⁶³⁰ Potential incentives and benefits for other EDA member states looking to establish cooperative partnerships are thought to include:⁶³¹

- Affordable labour rates relative to many Western European economies.
- High levels of technical expertise and other industrial skills, especially in niche areas.
- A successful technical education system.
- Joint Czechoslovakian legacy as a past defence industry ‘superpower’, with historic brands and long-standing relations with certain foreign markets.

The successful example of car manufacturing in Slovakia is cited as one example of the country’s reputation for high-quality, affordable production and a skilled labour force.⁶³²

In contrast to its Polish neighbour or certain other CEE EDA member states, foreign participation in the Slovak defence industry has historically been ‘minimal’ since the country’s independence in 1993, with the MOD reporting no foreign investment or joint ventures in the sector as recently as 2005.⁶³³ However, in recent years a number of collaborative arrangements have been established that might form the basis for further cooperation in the future:

- **Bilateral business partnerships:** Slovak firms have pursued a number of international partnerships in recent years in niche areas of expertise. In May 2012, for example, PPS Vehicles teamed with

⁶²⁹ RAND Europe interviews, August 2015.

⁶³⁰ RAND Europe interviews, August 2015.

⁶³¹ RAND Europe interviews, August 2015.

⁶³² RAND Europe interviews, August 2015.

⁶³³ Kiss (2014, 254).

South Africa-based BAE Systems Land Systems to offer a tactical remote turret to military forces in the region.⁶³⁴ Many Slovak firms also work closely with their Czech counterparts following the division of 1993. In June 2012, for instance, Czech firm CZUB and Sitno Holding announced plans to open a new firearms production site in Kremnické Bane in Slovakia to supply the Slovak Armed Forces.⁶³⁵ Czechoslovakian cooperation also includes an annual arms exhibition that alternates between the two successor countries: IDEB in Slovakia and IDET in the Czech Republic.⁶³⁶ British prime contractor BAE Systems is also a member of the ZBOP Slovak national defence association.⁶³⁷

- **Bilateral G2G partnerships:** The Slovak government has also pursued bilateral governmental agreements with local neighbours (e.g. Poland), as well as further afield, especially in Southeast Asia.⁶³⁸ This includes a ‘joint action plan’ signed with the Philippines in February 2015 to promote industrial collaboration centred on licensed production and technology transfer tied to purchases of Slovak defence equipment.⁶³⁹ The country also outlined a similar partnership with Vietnam in June 2015, with Vietnam having previously expressed interest in Slovak expertise in mine-clearance and flight simulation systems, as well as Slovak supplies of spare parts for Soviet-era land equipment.⁶⁴⁰ The Central European country also hopes to finalise an agreement with Indonesia in 2015, having previously offered the Indonesian Armed Forces the Tatravan armoured platform and Aligator light reconnaissance vehicle, as well as exporting 122 mm rockets.⁶⁴¹
- **Joint regional (e.g. Visegrád) programmes:** Slovakia is an active member of the Visegrád Four (with the Czech Republic, Hungary and Poland), participating in a joint Battlegroup and other regional initiatives. Although this regional collaboration has not successfully generated joint procurement programmes as of yet, in the light of disagreements over workshare and technical requirements, high-level political commitments have been made to promote such projects in future.
- **Involvement in wider European mechanisms:** In addition to EU funding frameworks (e.g. FP7 or Horizon 2020 research), Slovakia has also been involved in a number of NATO ‘smart defence’ initiatives, with NATO Secretary General, Anders Fogh Rasmussen, citing Slovakia’s role in the Allied Ground Surveillance initiative, the Multinational Logistics Coordination Centre in Prague and the NATO EOD COE as successful examples in this regard.⁶⁴²

⁶³⁴ Kiss (2014, 252).

⁶³⁵ Kiss (2014, 252).

⁶³⁶ Kiss (2014, 243).

⁶³⁷ ZBOP (n.d.).

⁶³⁸ Anderson (2015).

⁶³⁹ Grevatt (2015c).

⁶⁴⁰ Grevatt (2015d).

⁶⁴¹ Grevatt (2014c).

⁶⁴² NATO (2011).

11.4.1. Defence planning and future procurement programmes

The Slovak defence industry perceives the recent increase in procurement spending and reorientation away from reliance on Russian imports as an opportunity for local firms to win a larger share of an expanding domestic market, to participate in international collaborations and to leverage the finance, references and visibility generated by these domestic deals to establish better a presence in third markets.⁶⁴³

Opportunities for future collaboration are thought by Slovak industry to include:⁶⁴⁴

- Harmonisation of procurement requirements.
- Common skies initiatives.
- Government-to-government cooperative programmes, such as an ongoing project between Slovakia and Poland, whereby Slovakia intends to procure items of military equipment for the Land Force from its Polish neighbour, which in turn commits to procure certain products from Slovakia in return to ensure both nations' DTIB is supported.⁶⁴⁵

Given the recent commitment to increase defence spending and the proportion allocated towards modernisation of the Slovak Armed Forces, a number of future programmes are anticipated that might provide opportunities for Slovak (and other CEE) defence firms to collaborate, either with each other or with Western European prime contractors. These plans include:

- **Infantry fighting vehicles:** The Slovak Land Forces will need to 'reequip [their] two core mechanised brigades from 2016'.⁶⁴⁶ Some of the equipment considered includes wheeled IFVs, such as Polish-built Rosomak 8x8s, replacements for Soviet-era BMP inventory and new tactical command, control, communications, computers and intelligence systems.⁶⁴⁷
- **Medium-range 3D radar:** In addition, new 3D medium-range radio-locators worth up to €60 million are being procured. The principal requirements include a 350 km minimum range, the ability to detect a 1 m² radar cross-section-equivalent object at least 250 km away and compliance with NATO standards. Two are expected to be delivered by the end of 2016 and one by 2020 (a possibility of an additional option is also included). This contract would help replace Soviet-era legacy P-37 (1RL139) 'Bar Lock' 2D systems that have been in service since the 1980s.⁶⁴⁸ This may build on an announcement in October 2012 that the Czech Republic and Slovakia would seek to pursue joint acquisition of military surveillance radar systems.⁶⁴⁹
- **Fixed-wing combat aircraft:** In August 2014, the Czech Republic, Slovakia and Sweden signed an LOI to cooperate on mutual operation and support of Saab Gripen fighters.⁶⁵⁰ As of July 2015, the leasing of about eight Saab JAS-39 Gripen multirole fighters, to replace the existing Mikoyan

⁶⁴³ RAND Europe interviews, August 2015.

⁶⁴⁴ RAND Europe interviews, August 2015.

⁶⁴⁵ Anderson (2015).

⁶⁴⁶ IHS Jane's (2015l).

⁶⁴⁷ IHS Jane's (2015l).

⁶⁴⁸ IHS Jane's (2015v).

⁶⁴⁹ Kominek (2012).

⁶⁵⁰ Osborne (2014a).

MiG-29 fleet, is under negotiation. This would expand the number of Central European countries using or expecting to use Gripens alongside the Czechs, Hungarians and Croats, offering the potential for cooperation in maintenance and repair and/or training activities. The decision is expected to be made before 2016 when the contract for spare parts for MigG-29 jets from Russia expires.

- **Trainer aircraft:** In a related development, the Czech Republic and Slovakia plan collectively to procure new Lead-in Fighter Trainer (LIFT) aircraft that would replace the Aero L-39 Albatross trainers, which are scheduled to end service in 2019. The most likely replacement is the new L-39NG with improved aerodynamics, redesigned wet wings with integral fuel tanks, night vision goggles, open-architecture digital avionics, embedded virtual training systems and power-assisted ailerons.⁶⁵¹ The joint Slovak and Czech requirements are for 24 such aircraft, with a potentially larger order if Hungary and Croatia join the training scheme.⁶⁵²

11.5. Capacity-building needs

Interviewees and a literature review identify a number of potential capacity-building needs for the Slovak MOD and industry, corresponding to the various barriers and obstacles to greater competitiveness outlined above:

- Assistance with strategic forward planning and long-term defence budgeting.⁶⁵³
- Development of a clear defence industrial policy with high-level political support, industry involvement and clear metrics and timelines for future progress updates.⁶⁵⁴
- Promotion of 'soft skills' for both industry and the MOD, e.g. project management, languages and marketing.⁶⁵⁵
- Improved awareness (e.g. through training courses) of international procurement procedures and market opportunities (e.g. key industrial players, upcoming requirements of foreign MODs, specificities of managing multilateral defence programmes with different partner countries).⁶⁵⁶
- Counter-corruption and transparency reforms.⁶⁵⁷
- More regular attendance at EU and NATO negotiations, perhaps coordinating positions ahead of time with other CEE (e.g. Visegrád) nations to improve influence.⁶⁵⁸
- Assistance from the NSPA and EDA in helping review or manage defence procurement processes to improve 'time and financial efficiency, transparency, interoperability and possibility to get contracts for the domestic defence industry'.⁶⁵⁹

⁶⁵¹ IHS Jane's (2015v).

⁶⁵² IHS Jane's (2015v).

⁶⁵³ Suplata (2014); RAND Europe interviews, August 2015.

⁶⁵⁴ Suplata (2014).

⁶⁵⁵ RAND Europe interviews, August 2015.

⁶⁵⁶ RAND Europe interviews, August 2015.

⁶⁵⁷ RAND Europe interviews, August 2015.

⁶⁵⁸ Suplata (2014).

- Review of the possible reinstatement of the powers of the Slovak Chief of Defence Staff and National Armaments Director, ‘notably the substantive scope of... financial responsibility and budget disposal powers to bring it into line with the standards applicable in other NATO member countries’.⁶⁶⁰
- Review of the possible centralisation of budgetary and semi-budgetary authorities within the MOD portfolio to centralise and streamline oversight, reducing financial and time costs for procurement.⁶⁶¹
- Use of funding through the NATO Security Investment Programme (NSIP) and EU Structural Funds to modernise Slovakia’s physical defence infrastructure, which may also need to be consolidated, in line with NATO recommendations, to bring cost savings and free up capital for investment in procurement programmes,⁶⁶²
- Examination of the potential application of ICT to improve efficiency in MOD administration and processes, as well as the opportunities for greater outsourcing, coordination with industry or other avenues to reduce the bureaucratic burden on the DTIB.⁶⁶³

⁶⁵⁹ Suplata (2014).

⁶⁶⁰ Suplata (2014).

⁶⁶¹ Suplata (2014).

⁶⁶² Suplata (2014).

⁶⁶³ Suplata (2014).

12. Country profile: Slovenia

12.1. Country at a glance

Despite its small size, Slovenia's privately owned defence industry has achieved relative success within its key industrial niches (e.g. land vehicles, SALW, optics), having pursued a policy of adaptation to compliance with NATO standards.⁶⁶⁴ The partial revival of the defence industry and cooperation between producers and research institutes has been boosted by Slovenia's accession to NATO and benefits from cooperation with the Codification and Quality Assurance department of the Slovenian MOD, which also manages product quality assurance during their life cycle.⁶⁶⁵ The country's main export markets are the EU, south-east Europe and the Middle East.⁶⁶⁶

12.1.1. *Context of industrial and economic restructuring*

As in neighbouring Croatia, Slovenia's defence industry has been shaped by its historical development within the federal structures of the former Yugoslavia, as well as by the challenges of transitioning to independence after 1991. During the 1980s, Slovenia's defence industry produced approximately 17 per cent of the region's export revenues, with its portfolio of products dictated by Yugoslavia's military needs and those of its traditional export customers in developing countries.

Slovenia's independence in 1991 prompted a period of decline, disruption and reorganisation for the local defence sector. In contrast to defence industrial firms in Croatia, which saw a significant surge in domestic demand during the Croatian War of Independence 1991–1995, open hostilities as a result of Slovenia's own independence were limited to the Ten-Day War, ensuring that Slovenian industry endured a sharp fall in sales and investment similar to that experienced by most CEE countries during the 1990s. Where the Croatian defence sector benefited from domestic government spending worth around 7.6 per cent of GDP in 1992, investment in Slovenia was significantly more limited, with Slovenian MOD spending accounting for only around 2.2 per cent of GDP. By 1995 this had fallen sharply to 1.6 per cent, before reaching a low of around 1.1 per cent at the end of the decade.⁶⁶⁷

⁶⁶⁴ Chamber of Commerce and Industry of Slovenia (2015).

⁶⁶⁵ Chamber of Commerce and Industry of Slovenia (2015).

⁶⁶⁶ IHS Jane's (2014h).

⁶⁶⁷ Bojnec (2013, 880).

At the same time, the Slovenian government introduced a range of wider reforms, aimed at liberalising and restructuring Slovenia as a market economy, including the consolidation and privatisation of many state-owned enterprises. With the loss of access to traditional markets in Yugoslavia and non-European countries, the Slovenian DTIB 'entered into economic difficulties, resulting from uncompetitiveness [sic] to sell on other, more competitive and demanding markets'.⁶⁶⁸ As a result, many of the defence sector's major enterprises underwent either collapse or reorganisation, replaced by more modest (if often more efficient) new SMEs. With exports stagnant and the Slovenian defence industry unable to produce many of the larger or more modern systems needed by the Slovenian military, especially with the transition towards a professional, voluntary force, by 2000 the country was importing around 60 times as much materiel from EU countries as it was exporting to them, generating a large defence trade deficit.⁶⁶⁹

In 2004, however, the country completed its accession to both EU and NATO membership, bringing new opportunities for potential international collaboration, industrial modernisation and export. Where Slovenian arms and ammunition exports to EU nations were worth less than €12,000 in 1999, these had risen to a reported €359,000 in 2002, with a sharp increase to €1.7 million in 2007.⁶⁷⁰ The sector similarly benefited from a revival of Slovenian defence spending, with the MOD announcing a ten-year programme of procurements worth DM1 billion in 1999, with total defence expenditure growing from 1.1 per cent of GDP in 2000 to around 1.4 per cent by 2005.⁶⁷¹

Connected to these acquisitions, a policy of offset obligations and buy-back agreements was also used by the Slovenian government in an attempt to incentivise foreign prime contractors to transfer technology and production to local industry, as well as opening up supply chains for Slovenian SMEs.⁶⁷² In 2012, Slovenia was criticised by the European Commission for the slow pace of implementation of the European Directive on defence procurement and offsets.

12.1.2. Recent policy and defence spending

Since joining NATO in 2004, the guiding principle of the development of new defence production programmes in Slovenia has been the pursuit of interoperability and compliance with NATO standards.⁶⁷³ The cooperation of enterprises with research institutes and Slovenian universities has also expanded significantly. The production of armaments and military equipment is kept aligned with NATO standards due to the close collaboration between the companies and the Standardisation, Codification and Quality Assurance department of the Slovenian MOD, which also manages product quality assurance during their life cycle.⁶⁷⁴

⁶⁶⁸ Bojnec (2012, 314).

⁶⁶⁹ Bojnec (2013, 881).

⁶⁷⁰ Bojnec (2013, 881).

⁶⁷¹ Bojnec (2013, 880).

⁶⁷² Saferworld (2002).

⁶⁷³ Chamber of Commerce and Industry of Slovenia (2015).

⁶⁷⁴ Chamber of Commerce and Industry of Slovenia (2015).

During this timeframe, accession to NATO necessitated a transformation of the small Slovenian Armed Forces (SAF), which was fully professionalised from 2003 and benefited from increases in defence expenditure. The SAF has a total combined strength of around 9,000 personnel, including over 1,000 reservists, ranking it among Europe's smallest military forces. Investment and personnel are primarily focused in the Ground Force, which has been involved in a number of international deployments in recent years, including detachments to NATO's Kosovo Force, UN peacekeeping missions in Lebanon and International Security Assistance Force (ISAF) operations in Afghanistan. The SAF's few naval capabilities are limited to coastal patrol, port defence and some minor demining activity, with a fleet of only two patrol vessels. The Slovenian Air Force operates a small number of fixed- and rotary-wing transports, as well as trainer aircraft, relying on allied nations for armed air policing.

Despite the transition to NATO membership, the country's *Strategic Defence Review 2009–2010* concluded that Slovenian society had become increasingly critical of the defence sector, in part due to the fiscal challenges posed by the economic crisis but also because existing legislation and planning approaches were found to be outdated. A €278 million procurement of Patria AMVs, initially on an order of 135 units, subsequently reduced to 30, caused widespread political controversy in 2008 when allegations of corruption and mismanagement emerged, centring on business and government officials in Finland, Austria, Croatia and Slovenia. In 2013–2014, former Slovenian Prime Minister Janez Janša, a special forces commander and the owner of local firm Rotis were each sentenced to around two years in prison for their involvement in bribery as part of the Patria deal.⁶⁷⁵

Against this backdrop of controversy and reform, in 2010 the Slovenian MOD unveiled a long-term procurement strategy, *Resolution on General Long-Term Development and Equipping Programme of the Slovenian Armed Forces up to 2025*, with modernisation to NATO standards and achievement of interoperability with allied forces as key priorities. The limited industrial capabilities of the Slovenian DTIB, which is focused on the subsystems and components level, has restricted its ability to provide many of the major platforms envisaged in this programme. Domestic investment in the local defence industry has been further hampered by revisions to defence budgets in the wake of the onset of the global financial crisis. Although the MOD budget increased by an average annual rate of 9.2 per cent during the period 2001–2008, the onset of recession and austerity forced a sharp reduction in the ambitions of the *Mid-Term Defence Programme 2007–2012*, with the original plan to boost defence spending from €510 million to €835 million instead giving way to cuts of 41 per cent between 2011 and 2014. As a result, total defence spending is down to around 0.9 per cent of GDP (-€325 million) in 2015. This makes the country one of Europe's smallest defence spenders, with Defence Minister Andreja Katič having indicated that even nominal increases are unlikely within the coming two years.⁶⁷⁶

⁶⁷⁵ Zgaga (2014).

⁶⁷⁶ IHS Jane's (2015w).

Table 12.1 Defence spending in Slovenia, 2012–2019

Total Defence Budget	2012	2013	2014	2015	2016	2017	2018	2019
Constant 2015 US\$ billion	0.491	0.480	0.463	0.441	0.430	0.428	0.437	0.452
Constant 2015 € billion	0.491	0.480	0.463	0.441	0.324	0.323	0.329	0.341
% GDP	1.00%	0.99%	0.93%	0.87%	0.84%	0.81%	0.81%	0.81%

Source: IHS Jane's (2015)

12.2. Defence industrial capabilities

12.2.1. General assessment by sector (land, air, naval, C4I)

Today, survey data suggest that the Slovenian defence sector is dominated by SMEs, with 61 per cent of firms involved primarily in service activities, compared to 15 per cent in development and production and 14 per cent in manufacturing.⁶⁷⁷ Although the Slovenian MOD has suggested that around 100 local enterprises are involved in defence or security to some degree, the literature suggests that most firms are oriented primarily towards civilian markets, with Bojnec assessing that only one quarter of the companies' combined workforce are dedicated to defence, generating only around 10 per cent of corporate profits.⁶⁷⁸

The country's main export markets are the EU, south-east Europe and the Middle East.⁶⁷⁹ Export is regarded as an opportunity to develop economies of scale, while globalisation, liberalisation of trade and the EU market are considered by some Slovenian companies as providing greater export and business opportunities.⁶⁸⁰ Research has found that around 60 per cent of the 100 Slovenian companies surveyed sold more than 50 per cent of their primary production to the outside market. Only a few enterprises focus on subcontracting and supply-in-return activities. Additionally, more than 40 per cent of the companies are more than 50 per cent involved in defence supply chains as traders in the domestic market.⁶⁸¹

In 2015, the Slovenian Defence Industry Cluster represents around 20 core companies employing only 3,500 workers.⁶⁸² These firms are predominantly privately owned SMEs producing systems, subsystems and spare parts or components. Given the small size of the SAF, the country has focused on SALW, land

⁶⁷⁷ Bojnec (2013, 880).

⁶⁷⁸ Bojnec (2013, 882).

⁶⁷⁹ IHS Jane's (2014h).

⁶⁸⁰ Bojnec (2013).

⁶⁸¹ Bojnec (2012).

⁶⁸² IHS Jane's (2014h).

armoured and utility vehicles, as well as related systems.⁶⁸³ Industrial capabilities in other areas are considerably more limited. Products manufactured include optoelectronic equipment, light armoured vehicles, telecommunications equipment, SALW, ammunition, artillery systems and demining equipment. In addition, the production of military trucks was recently reestablished at TVM in Maribor. A prototype of a new military truck, manufactured in compliance with the NATO standards, has already successfully passed the Slovenian Army tests, and the first orders have been placed.⁶⁸⁴ Local firms have also been involved in some development of local variants of licensed platforms, such as the Krpan APC, a modified Slovenian version of the Pandur II built on license from Steyr-Daimler-Puch using 55 per cent local components.⁶⁸⁵

Industrial skills and capabilities are more restricted in the air and maritime domains. Around 18 aeronautical SMEs are reported to be active in the country but are focused on the civil market, with Pipstrel, the largest local aviation firm, recording sales of €11 million in 2013 in connection to its ultra-light trainer aircraft. Another Slovenian company, C-Astral, has also developed and tested its Bramor family of UAVs in a range of hostile environmental conditions (e.g. the Arctic, desert), primarily aimed at mapping and surveying.⁶⁸⁶ The very small Slovenian Navy (in fact the 430th Naval Division, an integrated part of the SAF rather than a separate service) only operates two vessels, both procured from overseas, with limited shipbuilding or MRO capability in the country compared to the major shipyards found in neighbouring Italy or Croatia.

Slovenia is also home to a number of ICT firms active in the C4ISTAR market, either through production or services (e.g. Iskratel, Mil Sistemika, S-TMM Sistemi). As in other parts of the defence sector, many such businesses are also or predominantly active in civilian and dual-use markets.

12.2.2. Major industries

Within the small Slovenian defence sector, key companies include:⁶⁸⁷

- **Alpina:** Supplier of personal infantry equipment.
- **Apex:** SALW and ammunition, personal kit.
- **Bijol:** Light armoured vehicles and military trucks, artillery systems.
- **C-Astral:** Producer of small UAVs.
- **Dat-Con:** Border surveillance systems specialist.
- **Em.ronic:** CBRN protection and test equipment, including production of a specialist CBRN reconnaissance vehicle.
- **Fotona:** Specialist optoelectronics, including thermal-imaging gunners' sights, laser rangefinders and laser threat warning systems for land and naval use. A majority of business is conducted in civil markets, with the firm bought by a US investment group in 2014.

⁶⁸³ IHS Jane's (2015j).

⁶⁸⁴ UKTI DSO (2013a).

⁶⁸⁵ Military Today (n.d.).

⁶⁸⁶ Invest Slovenia (2014).

⁶⁸⁷ Chamber of Commerce and Industry of Slovenia (2015).

- **Guardias Defence Simulations:** Military simulation software (e.g. Armoured Warfare Training System for SAF's M-84 tank).
- **Iskratel:** Military ICT systems.
- **IZOP-K:** SALW and ammunition production and demilitarisation.
- **KIK Kamnik:** Supplier of specialist demining equipment.
- **Seantech:** SALW and ammunition production.
- **Mil Sistemika:** C2 systems.
- **S&T Slovenija:** Dual-use ICT solutions.
- **Sistemika Tehnika:** Production of light armoured vehicles and military trucks, artillery systems, marketing its Krpan 8x8 wheeled IFV (on licence from Steyr-Daimler-Puch), the 6x6 Pandur (on licence from Patria) and an upgrade package for T-55 MBTs. In September 2015 the firm was acquired by Russian-owned steel producer SIJ.
- **S-TMM Sistemi:** Military ICT systems.
- **Trival Antene:** Military ICT systems and antennae.
- **Veplas:** Composite materials and ballistic protection.
- **Vilpo:** Development of SAMSON mine-clearance vehicles.

12.2.3. *Niche areas*

Other relevant industrial niches are reported to include fire control systems, individual equipment, simulation and training equipment, information technologies, logistics equipment, heavy weapons and machine parts, and specialist steel manufacture.⁶⁸⁸

Slovenia is also home to the NATO Mountain Warfare COE in Poljce, where the centre formally accredited and opened in March 2015.⁶⁸⁹

12.3. Barriers and obstacles

12.3.1. *Internal*

As with many other CEE countries, the limited financial and human resources of Slovenian defence sector institutions, on both the government and industry side, pose a number of challenges to any attempt to develop successful defence industrial cooperation. These have been compounded by the disruption of attempts at long-term planning, which creates difficulties for local industry in drawing up long-term strategies, developing relations with the relevant international partners and creating the internal business case for investment in new R&D, infrastructure or products. In 2010, for instance, Slovenia adopted a *Resolution on General Long-Term Development and Equipping Programme of the Slovenian Armed Forces up to 2025*, but the economic crisis has led to significant reductions in the defence procurement budget and has delayed its implementation, creating uncertainty and risk.⁶⁹⁰ In the wake of reforms brought about by

⁶⁸⁸ Chamber of Commerce and Industry of Slovenia (2015).

⁶⁸⁹ NATO (2015b).

⁶⁹⁰ UKTI DSO (2013a).

the Patria controversy, however, IHS Jane's assesses the procurement processes themselves to be competitive and 'relatively transparent', including the use of parliamentary oversight.⁶⁹¹

In the light of many of these challenges, the Slovenian government has been reluctant to complete the privatisation of state-owned assets due to political concerns over potential losses of jobs and revenue. Foreign acquisition of critical Slovenian IPR is also a reported concern, disincentivising local SMEs from exposing themselves to a potentially vulnerable relationship with better-resourced foreign partners. However, the onset of the economic crisis in 2008–2009 forced the state to sell a number of assets to avoid international bailout, with plans unveiled in May 2013 to accelerate the sale of optoelectronics specialist Fotona and other state-owned enterprises in the sector.⁶⁹²

The lack of a large 'national champion' (i.e. a large national defence enterprise), with the Slovenian DTIB instead dominated by numerous SMEs, is also cited as a potential barrier to the local industry achieving more success and visibility on the international stage. Survey data suggest that Slovenian defence firms recognised the advantages that SMEs can have over larger competitors in terms of innovation and agility, but felt that larger enterprises and prime contractors were better able to promote exports, exert lobbying influence and secure alliances with foreign businesses or governments.⁶⁹³ As well as the lack of a 'national champion' within industry, Slovenian firms are also reported to be seeking more strategic and comprehensive support from government: requiring 'a Slovenian institution which would monitor the defence industry, coordinating and guiding its future development... [which] could also improve up-to-date information about development of new products and services'.⁶⁹⁴

Lack of infrastructure in certain areas is also a reported concern. For example, Slovenia is forced to demilitarise its surplus ammunition and explosives abroad in Bulgaria, the Czech Republic, Italy and Russia, due to a lack of domestic infrastructure.⁶⁹⁵ While Slovenia has an established scientific capability in the universities of Ljubljana and Maribor, the country does not have a significant defence R&D infrastructure, compared to some other CEE countries.⁶⁹⁶

12.3.2. External

Only a very small number of Slovenian companies have had any experience with substantive international cooperation, although others involved in export have reportedly encountered difficulties with perceived protectionism in other European markets. Related challenges pertain to the significant influence of 'national champions' in both western and CEE markets, which may exclude new Slovenian entrants.⁶⁹⁷ Survey data from Slovenian defence companies found that a majority of companies felt that larger European countries benefit from greater lobbying and diplomatic powers in defence procurements, which

⁶⁹¹ IHS Jane's (2014h).

⁶⁹² IHS Jane's (2014h).

⁶⁹³ Bojnec (2013, 883).

⁶⁹⁴ Bojnec (2013, 884).

⁶⁹⁵ Gobinet (2012).

⁶⁹⁶ IHS Jane's (2014h).

⁶⁹⁷ IHS Jane's (2014h).

they lobby in order to secure the best opportunities for collaboration with the most technologically sophisticated and commercially successful business partners. This includes cooperation with industrial actors from the civil markets, in contrast to the poor visibility and access of firms from smaller nations such as Slovenia.⁶⁹⁸

Furthermore, when foreign nations do seek to procure products in areas where Slovenian firms may compete, the size of orders and economies of scale required outstrip the production capacities of most members of the Slovenian DTIB.⁶⁹⁹

12.4. Opportunities and programmes

A number of existing international partnerships may provide some basis for future collaboration:

- **Bilateral B2B agreements:** Slovenian firms have preexisting ties to the Austrian company Steyr-Daimler-Puch, with its Pandur light armoured vehicle being manufactured under licence in Slovenia.⁷⁰⁰
- **Bilateral G2G agreements:** The Slovenian government is currently working with its US counterpart to reduce the barriers to entry into the US market for Slovenian defence exporters.⁷⁰¹

12.4.1. Defence planning and future procurement programmes

The recession that began in 2008 made Slovenia scale down ambitious plans for modernising the SAF with several major procurement programmes. Slovenia now aims gradually to acquire new equipment to satisfy the basic requirements set out in the 2010 procurement strategy, *Resolution on General Long-Term Development and Equipping Programme of the Slovenian Armed Forces Up To 2025*, with a revised level of ambition. This document recommitted Slovenia to pursuing modernisation in order to bring it in line with NATO and EU standards.⁷⁰²

Defence procurement is carried out by the Procurement Division of the Logistics Directorate of the Slovenian MOD ().⁷⁰³ According to the MORS review, the major planned defence procurement programmes are: 8x8 wheeled vehicles, various other armoured vehicles, anti-armour missile systems, C-IED equipment, self-propelled artillery, enhanced air surveillance and control, short-range air defence systems and unmanned aerial vehicles. However, the feasibility of this procurement plan largely depends on sufficient funding and the successful implementation of the long-term development and equipment review of the SAF.⁷⁰⁴

⁶⁹⁸ Bojnec (2013, 883).

⁶⁹⁹ Bojnec (2013, 883).

⁷⁰⁰ IHS Jane's (2015k).

⁷⁰¹ IHS Jane's. (2015j).

⁷⁰² IHS Jane's. (2015j).

⁷⁰³ UKTI DSO (2013a).

⁷⁰⁴ UKTI DSO (2013a).

Slovenia's long-term plans include the need for tactical airlift aircraft, new multirole helicopters, reconnaissance and electronic warfare systems, short- and medium-range air defence systems, and medium-range mobile radar systems.⁷⁰⁵

12.5. Capacity-building needs

In the light of the barriers identified above, Slovenia has a range of potential opportunities for capacity building on both the government and industry side of the local defence sector. These include:

- Information sharing on market opportunities and best practice for the management of international programmes, in the light of limited Slovenian experience in this area.
- Support and guidance on protection of IPR when local firms are participating in international programmes or foreign firms are entering the Slovenian market.
- Pooling and sharing of key physical infrastructure with national and international partners to promote opportunities for collaboration and innovation, in the light of limited financial resources and physical infrastructure of many Slovenian firms when working in isolation.

⁷⁰⁵ IHS Jane's (2015k).

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Appendix A – Interview protocol

RAND Europe Study (on behalf of the European Defence Agency):

‘Central and Eastern European countries: measures to enhance balanced defence industry in Europe and to address barriers to defence cooperation across Europe’

Part I - Introductory questions

- 1) In your opinion, what are the main barriers and obstacles to cooperation that CEE MS face? (e.g. within the region and with other EU MS)
- 2) What makes the barriers and obstacle CEE MS are experiencing different from those experienced by other small countries in western Europe?
- 3) What are the areas in which you see more opportunities for CEE MS to engage in internal and external cooperation?
- 4) Are there other specificities of this region that, in your opinion, would justify a tailored policy intervention at the EU level?
- 5) What capabilities do you believe that CEE MS would need to further develop to facilitate cooperation within and outside the region? (e.g. managerial, technical, diplomatic)

Part II - Specific questions

Drivers

Definition: drivers are the motivations that spur industrial cooperation to occur.

- 6) In your opinion, is there a real economic value in building or sustaining a national defence technology industrial base in CEE countries?
- 7) In your opinion, what are benefits that both governments and industries from CEE could derive from an increased cooperation within and outside the region?
 - a. Prompts for government:
 - i. National security,
 - ii. Domestic policies (e.g. more efficient use of limited budget, sustain labour market, promote high education);
 - iii. Foreign policy (e.g. what kind of international player does the country want to be, military demand).

- iv. Others
- b. Prompts for industry:
 - i. Access to new markets
 - ii. Innovation
 - iii. Others

- 8) Why should western defence industries or governments seek cooperation in CEE MS?
- a. Prompts:
 - i. Favourable labour rates for highly qualified workers?
 - ii. Others

Talent

Definition: Talent refers to both the technical and managerial expertise and skills necessary to support successful project delivery and cooperation both in the public and in the industry sectors.

- 9) In your opinion, what are the main strengths and weaknesses from a talent perspective, both in the public sector and in the industry?
- a. STEM areas (science, technology, engineering and mathematics) and specialised labour
 - b. business, marketing, policy, regulatory and social knowledge
- 10) What kind of niches of expertise emerge in this region?
- 11) Can you think of a specific example (a country or a project) in which talent (or lack of) had an impact on industrial cooperation?

Capital

Definition: While capital can mean equipment and physical assets held by firms to produce or manufacture their goods/services, for the purposes of this study capital refers only to the monetary or financial capital that organisations can access.

- 12) In your opinion, what is the influence of capital, intended exclusively as monetary or financial capital, in defence industrial cooperation?
- a. Prompts
 - i. Is current funding sufficient to promote/allow cooperation and innovation from development to commercialisation?
 - ii. What is the 'risk appetite' in using available capital?
 - iii. How can capital be better accessed and/or leveraged in the region to promote/allow cooperation?
- 13) Can you think of a specific example (a country or a project) in which capital (or lack of) had an impact on industrial cooperation?

Infrastructure

Definition: Infrastructure includes all available facilities (e.g. production plants, research hubs) in the national defence industrial base and may also include the wider business environment, such as 'support industries' (vendors and suppliers) that provide crucial support to the defence sector.

14) Given the available industrial infrastructure in CEE MS, what level of industrial cooperation would be reasonable and realistic?

For example:

- i. Platform development
- ii. System integration
- iii. Component development
- iv. Others

15) Can you think of a specific example (a country or a project) in which infrastructure (or lack of it) facilitated or hampered industrial cooperation?

Networks and connections

Definition: Networks and connections encourage/enable the exchange of knowledge, the connection of suppliers with recipients and the visibility of business opportunities that can lead to cooperation. The specific nature of these networks may be formal (e.g. structured partnerships, like the V4, EDA's CODABA, etc.) or informal (such as personal contacts and virtual networks).

16) In those countries with a privatised defence industrial base, is there a formal cooperation agreement between government and industry?

17) In your opinion, how efficiently are networks and connections between governments and industry managed within CEE MS?

18) In your opinion, how do subregional mechanisms (e.g. the V4) support cooperation?

a. Prompts:

- i. Can, and should, this kind of model be replicated?
- ii. What could the EDA/EU do to further support this culture of cooperation?

19) How could CEE MS benefit more from already established networks?

20) Can you think of a specific example (a country or a project) in which networks and connections (or lack of) facilitated or hampered industrial cooperation?

Culture

Definition: Culture can be described as patterns of organisational behaviour and ways of working.

21) In your opinion is the organisational culture both in the public and industry sector of CEE MS conducive to cooperation?

a. Prompts for governments:

- i. Transparency of requirements
- ii. Attitude towards risk
- iii. Coordination with national defence industry
- iv. Appetite for innovation
- v. Planning horizon

22) Can you think of a specific example (a country or a project) in which culture (or lack of it) has facilitated or hampered industrial cooperation?

Structure

Definition: The structure element refers to organisational structure as well as rules, regulations and procedures.

23) In your opinion, what are the bureaucratic hurdles to more effective industrial cooperation within the CEE region and between CEE MS and other EU MS?

24) In your opinion, are public institutions in CEE MS structured so as to facilitate and encourage cooperation within the CEE region and between CEE MS and other EU MS?

For example:

- i. Legal support
- ii. Protection of IPR
- iii. Others

25) Can you think of a specific example (a country or a project) in which structures (or lack of them) facilitated or hampered industrial cooperation?

Appendix B – Overview of country visits

B.1 Country visit: Czech Republic

Despite its relatively small size and the challenges posed by the dissolution of Czechoslovakia, the Czech Republic has a long legacy of defence industrial development, exporting a number of indigenous air platforms and military logistics vehicles, as well as various systems and subsystems from the country's niches in electronics, CBRN and simulation. The Czech Republic is an active member of the Visegrád Group, and has a range of bilateral G2G and B2B relationships, with the aerospace sector having achieved particular success in integrating with the global supply chains of European and US prime contractors such as Airbus or Boeing. Following the reform and restructuring of the country's military procurement processes in 2010–2014, the Czech MOD has recently embarked on the creation of new defence industrial and innovation policies (see Chapter 6).

Date: 27 July 2015

Location: Prague (offices of AOBP and Czech MOD)

During the RAND study visit to the Czech Republic, the research team met and interviewed a range of local defence sector stakeholders. They were:

- Head of Defence and Security Industry Association of the Czech Republic (AOBP).
- Assistant Deputy Minister, Director of International Cooperation, Defence Industry, Research and Development Department, Czech MOD.
- Deputy Chairman of the Board of Directors, Omnipol and Vice-President, AOBP.
- Head of Research and Development, ELDIS.

B.2 Country visit: Estonia

Like other Baltic states, Estonia has limited defence spending and a very small defence industrial sector, comprising SMEs with a range of niche products at the systems, subsystems and component level. This includes successful export or international collaboration on cyber, border surveillance and other military ICT applications. Estonia is involved in collaboration with Baltic states, EDA initiatives and NORDEFECO, and there is a comparatively large extant literature on Estonia's investment in innovation and ICT, reflecting Estonian hosting of a NATO Cyber COE and a number of successful technology SMEs. The country recently embarked on an ambitious modernisation plan for its small Armed Forces (see Chapter 7).

Date: 3 August 2015

Location: Tallinn (offices of EDIA, Cybernetica, Defendec and Estonian MOD)

During the RAND study visit to Estonia, the research team met and interviewed a range of local defence sector stakeholders. They were:

- Chief Executive, Estonian Defence Industry Association.
- Defence and Security Cluster Development Manager, Estonian Defence Industry Association.
- CEO, Cybernetica and Member of Advisory Board, Estonian Chamber of Commerce and Industry.
- CEO, Defendec, and Prototron Fund Committee Member, Tallinn Science Park Tehnopol.
- Adviser on Defence Innovation, Estonian MOD.
- Chief Expert for Defence Innovation, Estonian MOD.

B.3 Country visit: Romania

The Romanian arms industry has historically produced a range of products in the land, air and maritime domains, as well as having significant involvement in MRO activities. While the heavy armaments industry remains under state ownership, directed by MECT, the Romanian aviation sector underwent privatisation and has shifted towards production of both civil and military systems and parts for the global market. With greater success exporting defence products outside the EU, Romania has recently signed a number of cooperation agreements with third-market countries such as Pakistan and Vietnam (see Chapter 12).

Date: 28 July 2015

Location: Bucharest (offices of Romtehnica, ROMARM and MECT)

During the RAND study visit to Romania, the research team met and interviewed a range of local defence sector stakeholders. They were:

- Secretary of State, Ministry of Economy, Tourism and Trade.
- Deputy Chief of MOD Armaments Department.
- Representative, Industrial Cooperation Department, Romanian MOD.
- Manager, Offsets Operation Department, Romanian Government.
- Executive Director, PATROMIL.
- Chairman, Association of Romanian Aeronautical Companies (OPIAR), President and CEO, IAROM.
- MRO Business Development Manager, Aerostar SA.
- Representative, Import Department, Romtehnica SA.
- Area Manager, CSR.
- Director Commercial Marketing, ROMARM.
- Marketing Department, ROMARM.
- Marketing Department, ROMARM.

Appendix C – List of interviewees

Academics and external experts

Organisation	Name	Title
International Centre for Defence and Security (ICDS), Estonia	Tomas Jermalavicius	Research Fellow
International Centre for Defence and Security (ICDS), Estonia	Helga Kalm	Junior Research Fellow
University of York	Keith Hartley	Professor
Newcastle University	Jocelyn Mawdsley	Senior Lecturer, PhD
Central European Policy Institute	Milan Suplata	Senior Fellow, PhD
Central European Policy Institute	Marian Majer	Head of Defence and Security Programme, PhD
Vrije Universiteit Brussel	Daniel Fiott	Research Fellow, PhD
European Defence Agency	Carmen Parilla	Project Officer Operation Support

Government representatives

Country	Body	Title	Response	Notes
Bulgaria	MOD	Colonel	Written	
Bulgaria	MOE	Internationally Controlled Trade and Security Directorate	Written	
Croatia	MOD	Colonel, EDA POC	Written	
Czech Republic	MOD	Assistant Deputy Minister, Director of International Cooperation	Interview + written	
Estonia	MOD	Adviser on Defence Innovation	Interview	
Estonia	MOD	Chief Expert for Defence Innovation	Interview	
Hungary	MOD	Deputy Head of the HU MOD Armaments Development Department (and R&T Director)	Written	
Latvia	MFA	POC at MFA	Interview	
Lithuania	MOD	POC at MOD	Written	Joint submission with NDIA
Poland	MOD	Chief of Foreign Industry Cooperation Section	Written	
Romania	MECT	Secretary of State, Ministry of Economy, Tourism and Trade	Interview	
Romania	MOD	Deputy Chief of MOD Armaments Department	Interview	
Romania	MOD	Industrial Cooperation Department	Interview	
Romania	MOD	Manager, Offsets Operation Department	Interview	
Slovakia	MOD	n/a	Written	Joint submission with NDIA
Slovenia	MOD	Colonel, EDA POC	Interview	

Private sector representatives

Country	Body	Title	Response	Notes
Bulgaria	NDIA	Bulgarian Defence Industry Association	Written	
Czech Republic	NDIA	EDA POC at DSIA	Interview + written	
Czech Republic	NDIA	Deputy Chairman of the Board of Directors, Omnipol, and Vice-President, DSIA	Interview	
Czech Republic	ELDIS	Head of R&D, ELDIS	Interview	
Estonia	NDIA	Chief Executive	Interview	
Estonia	NDIA	Defence and Security Cluster Development Manager	Interview	
Estonia	Cybernetica	CEO, Cybernetica and Member of Advisory Board, Estonian Chamber of Commerce and Industry	Interview	
Estonia	Defendec	CEO, Defendec, and Prototron Fund Committee Member, Tallinn Science Park Tehnopol	Interview	
Hungary	NDIA	POC at HDIA	Interview + written	
Latvia	NDIA	President	Interview	
Latvia	UAV Factory	CEO	Interview	
Latvia	Other	LVA Researcher	Interview	
Lithuania	NDIA	Project Manager, LGSPA	Written	Joint submission with MOD
Romania	PATROMIL	Executive Director	Interview + written	
Romania	OPIAR	Chairman, Association of Romanian Aeronautical Companies (OPIAR), President and CEO, IAROM	Interview	
Romania	Aerostar	MRO Business Development Manager	Interview	
Romania	Romtehnica	Import Department	Interview	
Romania	CSR	Area Manager	Interview	
Romania	Romarm	Director Commercial Marketing	Interview	
Romania	Romarm	Marketing Department	Interview	
Romania	Romarm	Marketing Department	Interview	
Slovakia	NDIA	President	Written	Joint submission with MOD

EDA Study Management Committee

Name	Title	
Vilem Kolin	Policy Officer Strategic Foresight	ESI Directorate
Darius Savolskis	Policy Officer Industry Relations and Support	ESI Directorate
Marian Savu	Policy Officer Industry Relations and Support (SMEs)	ESI Directorate
Marek Kalbarczyk	Project Officer Land Systems Technologies	CAT Directorate

Appendix D – Overview of defence stakeholder workshop

Following a study kick-off workshop organised by the EDA on 20 May 2015 in Brno, and as part of the analysis and synthesis process, the RAND study team organised a defence industry workshop in London with the support of the EDA. This workshop involved participation of representatives from the MODs and defence industry of CEE EDA member states, as well as from Western European prime contractors.

Facilitated by the RAND team, this workshop used preliminary findings and analysis to support an open and frank discussion on barriers and obstacles to cooperation, as well as to identify potential routes to effective capability development. The study team then incorporated the feedback received from attendants in the final analysis.

Date: 17 September 2015

Location: London (Novotel ExCeL, alongside DSEI Exhibition 2015)

Agenda: The conduct of the workshop was as follows:

- Opening remarks by Mr Jorge Domecq, Chief Executive of the EDA
- Introduction to the workshop
- Session one:
 - Conceptual framework for defence industrial cooperation
 - Analysis of barriers and obstacles (organisational, national and international)
 - Analysis of options for action
- Session two:
 - Working lunch on Western European industry perspectives
- Session three:
 - Analysis of matching defence needs with industrial capabilities
 - Wrap-up and summary

Workshop attendees – participating member states

Country	Organisation	Representative
Bulgaria	Industry	Mr Zhelyazko Gagov
Croatia	MOD	Colonel Anto Zelic
Czech Republic	MOD	Mr Jakub Hodinar
Czech Republic	Industry	Mr Libor Mikl
Estonia	MOD	Ms Eneli Saabas
Estonia	Industry	Ms Anu Eslas
Hungary	MOD	Lt. Colonel Gyorgy Miklosi
Hungary	Industry	Mr Attila Zsitnyanyi
Latvia	MOD	Mr Valdis Bucens
Latvia	Industry	Ms Elina Egle
Lithuania	Industry	Ms Roberta Burinskaite
Poland	MOD	Mr Maciej Lopatkiewicz
Poland	Industry	Ms Paulina Zamelek
Romania	MOD	Major General Catalin Moraru
Romania	Industry	Mr Viorel Manole
Slovenia	MOD	Mr Roland Zel
Slovenia	Industry	Mr Klemen Molek
Slovenia	Industry	Mr Marjan Molek

Workshop attendees – Western European industry

Country	Organisation	Representative
EU	ASD	Ms Isabelle Maelcamp
France	DCNS	Mr Jean-Charles Boulat
France/UK	Thales	Mr Paul Houot

Workshop attendees – EDA

Country	Organisation	Representative
-	EDA	Mr Jorge Domecq
-	EDA	Mr Peter Round
-	EDA	Mr Vassilis Tsiamis
-	EDA	Mr Vilem Kolin
-	EDA	Mr Darius Savolskis

Workshop attendees – RAND project team

Country	Organisation	Representative
-	RAND	Mr Dan Jenkins
-	RAND	Dr Giacomo Persi Paoli
-	RAND	Mr James Black
-	RAND	Ms Marta Kepe
-	RAND	Mr Alexandros Kokkoris

Appendix E – Recommendations

E.1 Recommendations for EDA to assist capability building

E.1.1 The EDA, CEE MS and NDIA/Industry should continue to develop the coordination of industrial capabilities and promotion of cooperative opportunities and strategies across the CEE group of member states

ISSUES ADDRESSED
Inadequate communication between MOD and CEE defence industries limits the ability to identify and exploit opportunities for both national projects and collaborative opportunities with other MS.
MEASURE
<p>The EDA, CEE MS and NDIA/Industry should continue to use and develop the unique, currently EDA led, MOD & Industry Forum to facilitate a better understanding of wider regional and European industrial capabilities, and closer dialogue between CEE stakeholders. The EDA should facilitate the development of terms of reference for this Forum in conjunction with both MOD and NDIA/industry suppliers to provide the basis for the establishment of the Forum as a permanent meeting.</p> <ul style="list-style-type: none"> • The terms of reference could be used, for example, to establish a rotating (non-EDA) chair for the Forum, outline the ground rules for discussion, and create any working groups or subcommittees desired by CEE MS (e.g. on specific issues such as exports or R&D). • In addition, the Forum participants could develop issue-specific codes of conduct, for example to address the ethical issues arising from the direct communication between industry and MOD, such as: a lack of transparent decision-making, monopoly suppliers, state support for industry, exclusive arrangements with selected industry, etc. The EDA should help to facilitate this process, with involvement from relevant external actors (e.g. Transparency International or other non-governmental organisations). • The Forum should be supported through the development and active use of a dashboard and set of metrics to measure the progress of the CEE MS in: developing national and regional implementation plans to overcome both the barriers: implementing additional capacity building activities and undertaking collaborative projects within the region and wider EU. • Through the Forum, CEE MS and Industry should also be encouraged to take more of a substantive role (potentially through multi-national CEE cooperation) in activities such as Capability Technology Groups to discuss opportunities for European-wide R&T projects (in particular focusing on the European critical defence technologies) and to forge greater links with other EDA MS and Industry (including prime-contractors) as well as other collaboratively focused bodies such as the Organisation for Joint Armament Cooperation (OCCAR), as well as with western prime-contractors. In addition, the forthcoming EDA SME Special Advisor could also assist in championing opportunities for CEE MS and in addressing shared problems such as increasing access to prime-contractor led supply chains. • As such, the EDA should consider doing more to promote data sharing and knowledge transfer

<p>across all member states, for example by improving the ease of use of the Collaborative Database (CODABA). This platform has the potential to deliver greater levels of information sharing needed to develop effective cooperative projects, in particular identifying those opportunities for collaboration across CEE and wider EDTIB, be it to cooperate to sell, procure or to develop. The forum would be an effective instrument to disseminate these opportunities more widely.</p>							
COSTS AND BENEFITS							
COSTS			BENEFITS				
<ul style="list-style-type: none"> • Cost assessment: LOW/MEDIUM • Cost estimate per year: up to €0.5m for EDA infrastructure. 			<ul style="list-style-type: none"> • Benefit assessment: HIGH 				
KEY ACTORS			TIMEFRAME				
<ul style="list-style-type: none"> • EDA • CEE member states • Defence industry and trade associations 			<ul style="list-style-type: none"> • Implementation: short/medium term (12–18 months) 				
IMPLEMENTATION							
TASKS		LEVEL 0 PROJECT PLAN					
		Cost	year 1	year 2	year 3	year 4	year 5
Task 1: Formalise the Forum as permanent meeting.		Task 1	€				
Task 2: Develop terms of reference and issue-specific codes of conduct (e.g. on ethics).		Task 2	€				
Task 3: Develop forum indicators and dashboard.		Task 3	€				
Task 4: Use and review the dashboard on an annual or bi-annual basis.		Task 4	€				
Task 5: Encourage CEE industry attendance and investment in Capability Technology Groups.		Task 5	€				
Task 6: Further develop and use the output of CODABA and other information to show case collaborative opportunities more widely.		Task 6					
		€:<0.5m, €€:0.5–5m, €€€:>5m					
TASK DESCRIPTION							
<p>The EDA should actively encourage the attendance of CEE MS and industry at the joint industry CEE MOD forum to ensure its continuation. The EDA should facilitate the development of terms of reference in conjunction with both MOD and NDIA/industry suppliers to be the basis of the establishment of the Forum as a permanent meeting – promoting the ownership of the Forum by the CEE MS, rather than relying on EDA coordination.</p> <p>In addition, the EDA and Forum should facilitate development of issue-specific codes of conduct – for example to deal with issues surrounding government-industry relations and related issues such as a lack of transparent decision-making, monopoly suppliers, state support for industry and exclusive arrangements with selected industry. External organisations (e.g. Transparency International) could provide relevant assistance and expertise in the development of these codes of conduct.</p> <p>The EDA in conjunction with CEE MOD/NDIA representatives should develop a set of forum indicators and a dashboard with which to measure the progress in developing national and regional implementation plans to overcome both the barriers: implementing additional capacity building activities and undertaking collaborative projects within the region and wider EU. The chair of the Forum should share, use and review the dashboard on an annual or bi-annual basis with the Forum to drive forward improvements across the region.</p> <p>Encourage CEE industry attendance and investment in Capability Technology Groups using the Forum</p>							

to showcase and develop opportunities for R&T and R&D investment, cooperation and collaboration involving CEE industry and MOD alike.

Further develop and use the output of CODABA and other information to showcase collaborative opportunities more widely. Again the Forum would be an effective instrument with which to disseminate to a much wider audience than perhaps has been exposed to this information to date.

RISKS

- Lack of engagement and involvement of stakeholders, in particular from the EDTIB and industrial institutions, including SME which make up the majority of the CEE industrial base.
- Availability of funding from EU instruments not being forthcoming.
- Lack of coordination between EU MS ministries (i.e. defence, trade and finance, etc.).

E.1.2 The EDA should provide support and advice to CEE MS on defence industrial policy

ISSUES ADDRESSED							
The lack of a defence industrial policy in many CEE MS precludes effective engagement between MOD and industry at the national level, and limits opportunities for regional and international cooperation.							
MEASURE							
<p>The EDA should consider taking a proactive lead in supporting CEE MS to develop robust and effective defence industrial policy which will enable more efficient and effective engagement in collaborative international projects. The EDA should develop an expertise-on-demand mechanism, which will be available, in country, to MS when requested. This mechanism could be based on EDA internal expertise, as well as external expertise, supported by, for example, a framework contract. This mechanism will:</p> <ul style="list-style-type: none"> • Facilitate and independently advise on the practical requirements of defence industrial policy generation, utilising best practice and a tool kit of policy instruments. • Provide guidance on defence industrial strategy and policy issues. • Provide practical support to address legal, commercial or procurement issues as they arise. • Provide support and training in the important differences between national projects and the establishment of cooperative projects. • Facilitate access to the wider EDTIB and industrial representatives across Europe, including prime-contractors. <p>The role could also facilitate greater awareness of the ways in which the EC Defence Directive can be used to facilitate cooperation across the EDTIB. This role could exist as a standalone function or equally fall within the remit of another workstream within the EDA, for example through advice and guidance provided to SME.</p>							
COSTS AND BENEFITS							
COSTS			BENEFITS				
<ul style="list-style-type: none"> • Cost assessment: LOW/MEDIUM (dependent on uptake from MS) • Cost estimate per year: up to €0.5m for EDA infrastructure 			<ul style="list-style-type: none"> • Benefit assessment: HIGH 				
KEY ACTORS			TIMEFRAME				
<ul style="list-style-type: none"> • EDA • CEE member states • Defence industry and trade associations • Policy academics and research institutes 			<ul style="list-style-type: none"> • Implementation: short/medium term (12–18 months) 				
IMPLEMENTATION							
TASKS		LEVEL 0 PROJECT PLAN					
Task 1: Define the scope of expertise that will be provided to MS and the mechanism of coordination with the EDA.		Cost	year 1	year 2	year 3	year 4	year 5
		Task 1 €					

<p>Task 2: Create, manage and coordinate the optimum response team to provide the 'expertise-on-demand' to CEE MS. This has the option to include both internal EDA experts and external contracted support depending on MS needs.</p> <p>Task 3: Collate and periodically update best practice examples and develop a tool kit for defence industrial policy generation including, for example, a strawman model of defence industrial policy based on a generic EU state and industrial relationship.</p> <p>Task 4: Advertise and deliver expertise to MS (prioritising CEE states initially).</p>	Task 2	€					
	Task 3	€					
	Task 4	€					
	€:<0.5m, €€:0.5–5m, €€€:>5m						
TASK DESCRIPTION							
<p>The EDA should begin by defining the scope of expertise that will be provided to MS and drawing up terms of reference for the experts involved, to include the degree to which they can actively draft legislation. The EDA should determine the best workstrand within which to coordinate activity, be it as a standalone function or within the remit of, for example, an SME advisory role. The next step would be to identify the key experts involved, both within the EDA and externally, for example in academia, defence thinktanks and potentially other MS. Identify a key owner for the process within the EDA, identify roles and responsibilities for the management and coordination of the function and set up a contracting mechanism, for example a call-off framework. Part of the delivery of the function will be through the effective use of best practice examples; this should be augmented by the development of a tool kit for defence industrial policy generation. This tool kit should include a strawman model of defence industrial policy based on a generic EU state and industrial relationship, which could be used to illustrate to CEE MS and industry what effective policy and processes should look like; it could also include guidance on commercial, legal and other policy issues. This would be periodically updated to stay in line with leading global policy. Finally, the EDA should make each MS aware of the service and deliver expertise to MS (prioritising CEE states initially) and, as required by MS, provide an optimum response team to deliver the 'expertise-on-demand'.</p>							
RISKS							
<ul style="list-style-type: none"> • Lack of engagement and involvement of stakeholders, in particular from the EDTIB and industrial institutions, including SME which make up the majority of the CEE industrial base. • Availability of funding from EU instruments not being forthcoming. • Lack of available experts to delivery at short notice. 							

E.1.3 The EDA should facilitate access to specific and tailored training to meet CEE MS needs; in addition, CEE MS and NDIA should develop joint national and potentially regional skills strategies that fully exploit EU funding opportunities

ISSUES ADDRESSED								
Both MOD and industries face the challenge of access to sufficient talent to pursue cooperation opportunities. Insufficient 'soft skills' such as project management, foreign languages, marketing and networking, market intelligence and business planning severely impact the ability to create and manage collaborative opportunities.								
MEASURE								
The EDA should develop the EDA/European Security and Defence College's, European Armaments Cooperation Course to include a number of modules tailored specifically to the needs of CEE countries or other MS, on policy generation, defence procurement, legal and commercial awareness including intellectual property issues and project management.								
CEE MS and NDIA should work to develop a common national and potentially regional defence skills programme, with appropriate stakeholder representation and engagement. The EDA could provide an effective forum to facilitate CEE MS in developing and implementing a coordinated defence procurement skills strategy at both the national and regional levels, perhaps expanding the remit of the CEE MOD/NDIA Forum. As part of these strategies the EDA, CEE MS and NDIA/Industry should all investigate the exploitation of available EU funding for skills development.								
COSTS AND BENEFITS								
COSTS			BENEFITS					
<ul style="list-style-type: none"> Cost assessment: LOW Cost estimate per year: up to €0.33m for EDA. Up to €0.33m for each CEE MS 			<ul style="list-style-type: none"> Benefit assessment: MEDIUM/HIGH 					
KEY ACTORS			TIMEFRAME					
<ul style="list-style-type: none"> EDA European Commission CEE member states Defence industry and trade associations Academic and other HR professionals 			<ul style="list-style-type: none"> Strategy development: short/medium term (12–18 months) Implementation (2–3years) Benefits measurement (4–5 years) 					
IMPLEMENTATION								
TASKS		LEVEL 0 PROJECT PLAN						
<p>Task 1: Identify specific CEE needs and requirements for training (three to six months); develop and integrate new content within the European Armaments Cooperation Course (six months) by adding new modules relevant to CEE MS</p> <p>Task 2: CEE MS and NDIA development of a joint national and regional defence industrial skills strategy.</p> <p>Task 3: Implement skills strategy with all actors involved, including effective benefits tracking.</p> <p>Task 4: Establishment of skills technical advisory group to provide technical and academic support</p>		Cost	year 1	year 2	year 3	year 4	year 5	
		Task 1	€					
		Task 2	€					
		Task 3	€					
		Task 4	€					
€:<0.5m, €€:0.5–5m, €€€:>5m								

to skills strategy development and implementation.	
TASK DESCRIPTION	
<p>The EDA and CEE MOD/NDIA should identify specific CEE needs and requirements for training through a robust training needs analysis involving all 11 CEE MS. The EDA should use this analysis to develop and integrate new content within the European Armaments Cooperation Course; likely areas of development might be policy generation, defence procurement, legal and commercial awareness including intellectual property issues and project management.</p> <p>Utilising the results of the training needs analysis, CEE MS and NDIA should develop a joint national and regional defence industrial skills strategy – addressing issues such as education and training, recruitment, retention, management of workforce demographics and the pipeline of STEM graduates. The skills addressed should not be limited to defence industry but also include delivery skills required by MOD officials. The strategy should explore the depth and breadth of the skills problem and outline the basis of the common skills strategy to alleviate some of the root causes of the decline in an effective defence skills base.</p> <p>The EDA should facilitate CEE MS in implementing this coordinated defence industrial skills strategy, leveraging the CEE MOD/NDIA Forum. As part of this process the EDA, CEE MS and NDIA/Industry should all investigate opportunities to exploit EU funding available for skills development. The EDA should similarly investigate ways of leveraging existing work on skills and EU funding instruments to adapt to the specifics of the CEE issues identified in the training needs analysis. The implementation phase will take a number of years, and require a number of specific change-related programmes to be developed and undertaken across the EDTIB and in particular the CEE MS. This process should therefore be accompanied by effective benefits tracking to evaluate the initiative’s impact over time.</p>	
RISKS	
<ul style="list-style-type: none"> • Lack of engagement and involvement of stakeholders, in particular from the EDTIB and industrial institutions, including SME which make up the majority of the CEE industrial base. • Availability of funding from EU/EC/national instruments not being forthcoming. • Lack of coordination between EU MS ministries (i.e. defence, trade and finance, etc.). • Difficulty in coordinating skills across a large and diverse geographical/cultural area. 	

E 1.4 A pilot collaboration project should be undertaken utilising the CEE MOD/NDIA Forum, and assistance from the EDA, to develop and procure equipment where identified synergies exist

ISSUES ADDRESSED
<p>The study found that opportunities exist to engage in joint development and procurement programmes across the CEE region. There are a number of cases where there exists both demand for the same equipment type across all or many CEE MS and a correspondingly high industrial capability across nearly all CEE MS, for example light armoured vehicles or CBRN equipment. This provides the opportunity to engage in a significant collaboration programme, either in regional clusters or, more ambitiously, potentially across the group of 11 MS.</p>
MEASURE
<p>Through the MOD & Industry Forum and in conjunction with EDA support, CEE MOD and NDIA should undertake to exploit these synergies in supply and demand to engage in a collaborative programme. This pilot project would not only provide a necessary capability, which could also be exported to wider EU customers or third markets, but importantly would also provide an opportunity for CEE MOD and Industry to:</p> <ul style="list-style-type: none"> • Take the lead in delivering a collaborative programme, out with the support provided by the EDA, a lead CEE nation or nations should act as the contracting authority, while learning the lessons of previous international collaborative programmes, e.g. JSF, Eurofighter, A400M. • Develop and refine processes, policies and ways of working to deliver effective capability in a collaborative environment. • Develop the experience, knowledge and skills to lead and collaborate as a group, including joint decision-making and project management, embedding an environment of cooperation between both MOD and industry. • Develop through other learning methods in relatively low technical complexity, low risk environment. At our London workshop many participants from both CEE MOD and industry expressed an aversion to training courses and a preference for 'learning by doing'. • Put into practice effective commercial and contractual structures to allow for effective industrial participation across the collaborating national framework, for example using incentivised contracts or special purpose instruments to encourage vertical integration of suppliers that could also provide the basis for further collaboration. • Share technology, development and manufacturing techniques and innovation to develop cutting-edge capability that is attractive to export markets. • Leverage economies of scale in procurement by maximising the number of participant MS. <p>Given the large number of potential participants (eight CEE MS) with a declared industrial capability in this area, there is a good opportunity to reduce technical risks through collaboration and a relatively low financial contribution to the development phases should all eight MS contribute. Financial, project management and other non-industrial support needed to deliver such a project successfully could be provided by the other three CEE MS who have no declared industrial capability in this area. Of course, this would be dependent on the systems and overall capability of the equipment, which could involve all CEE MS.</p>

COSTS AND BENEFITS								
COSTS			BENEFITS					
<ul style="list-style-type: none"> • Cost assessment: LOW/MEDIUM for EDA • Cost estimate per year: up to €0.5m for EDA support to process as a minimum, but would be largely determined by the size and scale of the support required by CEE MS • Cost for CEE MS would be determined by the size and scale of the project 			<ul style="list-style-type: none"> • Benefit assessment: MEDIUM/HIGH 					
KEY ACTORS			TIMEFRAME					
<ul style="list-style-type: none"> • EDA • CEE member states • Defence industry 			<ul style="list-style-type: none"> • Project initiation and development: short/medium term (1–2 years) • Implementation (2–3 years) • Production (2–4 years depending on numbers) • Benefits measurement (5–10 years) 					
IMPLEMENTATION								
TASKS			LEVEL 0 PROJECT PLAN					
Task 1: Project initiation and development. Task 2: Requirements definition. Task 3: Project design, development and financial assessment. Task 4: Creation of effective commercial contracting structures to deliver collaborative working. Task 5: Project implementation, manufacture and delivery. Task 6: Full benefits assessment and lessons learned activity.				year 1	year 2	year 3	year 4	year 5
			Task 1	■				
			Task 2	■	■			
			Task 3		■	■		
			Task 4	■	■	■		
			Task 5				■	■
			Task 6	■	■	■	■	■
TASK DESCRIPTION								
<p>Using the MOD & Industry Forum and EDA support to facilitate the project initiation and development phase, CEE MOD and Industry should: agree on the creation of a joint project office, under perhaps a lead nation construct; determine individual CEE MS' respective levels of participation and responsibilities; agree an outline governance structure; develop effective processes for information-sharing and decision-making within the project office; and create a project plan with key milestones and delivery targets.</p> <p>With support from the EDA, participating MODs should agree capability requirements at a systems and platform level to guide development. In addition, the project office and participating stakeholders should design a commercial strategy to deliver the initial development contract, for example a joint venture or special purpose instrument to ensure that there is an effective collaborative industrial organisation in place to deliver both the development project but also to manufacture the final agreed vehicle. To enable the optimum use of existing skills and resources within this workshare agreement, negotiation will potentially need to take place both between MOD and Industry, as well as on an Industry-to-Industry level across the CEE region.</p> <p>Leveraging the agreed commercial structures, the joint project office should identify and contract relevant Tier 1 and Tier 2 suppliers from CEE DTIBs, including identification of facilities for integrated</p>								

test, evaluation and acceptance as needed. Use of incentivised contracts or special purpose instruments to encourage vertical integration of suppliers could also provide the basis for further collaboration. Following the development phase, the project office should implement a manufacturing and delivery strategy, based on timeframes, funding and order sizes agreed with CEE MOD.

Throughout the project, the EDA should support CEE MOD and Industry in capturing 'lessons learned' through a rolling full benefits assessment. This should examine difficulties encountered at different stages of the development process on both the MOD and Industry sides; identify innovation and successful measures used to address barriers to cooperative working; and draw parallels with global best practice. In addition, this could include assessment of additional opportunities for collaboration arising from the new platform's lifecycle – including maintenance, repair and overhaul (MRO) as well as common training. To embed learning within CEE MOD and NDIA, the EDA should facilitate and promote the dissemination of these findings, including through the MOD & Industry Forum.

RISKS

- Lack of engagement and involvement of stakeholders, with difficulty aligning technical requirements, or agreeing project lead and workshare.
- Reticence of MOD or Industry to support regional development programme rather than national solution, off-the-shelf procurement or cooperation with non-CEE partners.
- Availability of development and procurement funding from MS not being forthcoming.
- Difficulty in coordinating collaboration (on both MOD and Industry side) across 11 CEE MS.
- Difficulty in delivering platform at required scale on the agreed delivery schedule.