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BY
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Foreword

All indexes and figures on current global defence spending highlight that a power shift is occurring: expenditure on armaments is both growing worldwide and becoming more visible in countries and regions that were previously less significant in this domain. This rebalancing is mostly happening to the detriment of the West and, in particular, of EU and European NATO members. Moreover, some of the new big spenders on defence worldwide are ever less reliant on buying equipment off the shelf – mostly from Western suppliers – and keener on developing some sort of 'home-grown' armaments industry, often starting from niche capabilities but with the clear intent of reducing their foreign dependency.

The Arab states started becoming major buyers of armaments and serious defence spenders already some time ago – but the trend has been reinforced by the turmoil of the past few years in the region. What is new and distinctive about the current phase is their apparent determination, to different degrees and in different forms, also to become more self-reliant in this domain – operationally as well as technologically. This *Chaillot Paper* by Florence Gaub and Zoe Stanley-Lockman explores and analyses in depth the various ways in which this is happening, its strategic and domestic drivers, the identifiable national variations, their strategic repercussions and foreseeable prospects. By doing so, it contributes to a clearer and nuanced appreciation of both the regional theatre (and its players) and the global context. It is also part of a broader EUISS project that aims at highlighting – at a time when the EU is starting to move towards a more collaborative approach to capability development and common defence spending – the way in which 'others' are dealing with their own defence industrial and technological bases, and the resulting challenges for Europe and the West.

This study constitutes a strong start – more on the same theme will follow over the next months.

Antonio Missiroli

Paris, March 2017

Executive summary

Between skyrocketing defence budgets, increased arms imports, more emphasis on military training and exercises – as well as involvement in ongoing conflicts across the region – there is no doubt that Arab states are militarising. Relatively less attention is paid to another important feature of militarisation in Arab states: new and renewed efforts to develop national defence technological and industrial bases (DTIBs). The past five years alone have seen the Arab-state defence industries (ASDIs) undergo enormous changes: while Egypt relocated and reorganised its factories, Saudi Arabia reoriented its governance and ambitions, and the United Arab Emirates (UAE) restructured its industry. These changes entail new relationships with defence suppliers – whereby Arab states that were formerly customers are evolving into arms manufacturers in their own right – and also mark a shifting strategic balance in the Middle East and North Africa (MENA) region.

Ever since undertaking ASDI development, there has been one constant in the MENA region: the occurrence of conflict. During the Cold War years, this hampered any serious efforts at arms production. But the Gulf War of 1991, characterised particularly by the effectiveness of precision-guided munitions (PGMs), made Arab states revisit their motivations to become arms producers. Along with the globalisation of supply chains, with benefits for emerging DTIBs and costs for countries ensuring security of supply, military industrialisation took precedence on a new scale.

The results of this are finally being seen today. In the early 1990s, Egypt scaled up production of US main battle tanks (MBTs); Saudi Arabia began producing aviation components; and the UAE acquired South African unmanned aerial systems (UAS) to jump-start technology transfers. In the past eighteen months alone, Saudi Arabia unveiled its first large-scale co-produced aircraft and the UAE exported UAS to Russia. Furthermore, the fact that this increase in arms production coincides with the Saudi-led intervention in Yemen is no accident.

Between strategic, economic and symbolic motivations to become arms producers, Arab states are interested in using local industry to be able to operationalise the masses of weapons they import. This is seen not only as a way to diversify their economies away from rents, but also as a way to become more independent from the countries from which they typically import armaments – paradoxically attempting to strengthen their autarky by entering into long-term partnerships. It is virtually impossible that Arab states will achieve their stated goals of achieving independence in arms production, but they are beginning to recalibrate and achieve more realistic goals of enhancing their military capabilities – and potentially even strengthening regional cooperation in the Gulf Cooperation Council (GCC).

The cases of Egypt, Saudi Arabia and the UAE are distinct from one another. While Egypt is motivated by economic interests and sustained by foreign financing, the proliferation of Egyptian arms is an unintentional strategic consequence that is likely to continue, especially if the beginnings of Sino-Egyptian defence industrial relations ramp up. For Saudi Arabia, having overzealous ambitions unmatched by the capacities to attain them is a chronic problem – one that has already caused them to reach out to other non-Western suppliers to diversify their DTIB. The UAE, on the other hand, has similar ambitions to Saudi Arabia and – despite its smaller size – far greater chances of realising them. In contrast to the other Arab DTIBs, Emirati acquisitions of foreign firms and the regional footprint of Emirati platforms demonstrate that the UAE has already made advanced strides towards achieving its goals.

After separately reviewing these three cases, the smaller, more recent forays into building ASDIs from other GCC countries, as well as Jordan and Algeria, are examined. With minimal information available about the state of play in Oman and Bahrain, it is Jordan, Kuwait and Qatar that may act as multipliers for the speed with which Arab states have begun seriously taking up the defence industry business.

Elaborating on these trends, this *Chaillot Paper* explains the reasons why ASDIs have failed in the past, where they presently stand and why they may succeed in the future.

Introduction

Conflicts in the Arab world share many features: they occur repeatedly, they take place within the region – and they are fought with weapons purchased elsewhere.

Not only have Arab states traditionally relied on imports to meet their military needs, they generally spent high amounts. In the 1970s and 1980s, nearly half of the global arms trade (worth $165.4 billion) went to the region; whereas the world arms trade doubled in the 1970s, it quadrupled in the Middle East. In 1982, the countries with the highest military spending per capita were all Arab.[1] Three decades on, this trend has not changed significantly: even though Syria and Libya are no longer big arms spenders, Arab states still import most of their equipment, and they still feature prominently among the world's top ten importers: Saudi Arabia ranking second behind India (accounting for 7% or $46 billion of global imports) and the United Arab Emirates (UAE) ranking fourth (accounting for 4.6%). Moreover, the region is an expanding market: since 2010, Arab imports have increased by 9% in North Africa and by 130% in the Middle East. Unsurprisingly, imports have risen particularly in those countries recently involved in a conflict: according to the Stockholm International Peace Research Institute (SIPRI), Qatari imports multiplied twentyfold, Saudi Arabia's increased by 195%, Iraq's by 168%, the UAE's by 113%, while Egyptian import increased by 115% between 2010-2015. The region has consequently been thought of as a market for imports rather than one for exports.

Saudi Arabia's announcement that it was going to change this as part of its 'Vision 2030' therefore came as a surprise. A government-owned holding company for military industries, to be launched by the end of 2017, will have as its objective to raise the proportion of military equipment from Saudi producers from 2% to up to 30-50%. Just eighteen months earlier, the UAE announced the merger of 11 (ultimately 16) state-owned defence companies under the umbrella of the Emirates Defence Industries Company (EDIC); Egypt meanwhile launched the construction of the Mubarak Complex for the Defence Industry in 2011 on the outskirts of Cairo, regrouping more than 28 factories and 18 munitions factories. ASDIs seemed suddenly revitalised after decades of inefficiency.

This impression is, however, somewhat misleading: Arab states have tried repeatedly since the 1960s to build up their own defence industries and close the apparent production gap between military equipment needs and local manufacturing. The results have been mixed rather than utter failures. Although they have so far struggled to achieve even low levels of self-sufficiency, they have learned from their previous mistakes. Perhaps more importantly, their motivations, their needs as well as the strategic context have changed, making current attempts more likely to succeed.

1. Joe Stork, 'Arms Sales and the Militarization of the Middle East', Middle East Research and Information Project, MERIP Report no. 112, January/February 1983.

Tracking defence industrial development remains difficult because of the lack of data. Other indicators to measure effectiveness include: manpower-to-equipment ratios, employment-to-output ratios and sortie rates – as well as retrieval rates of damaged equipment and turn-around times. Furthermore, given the general lack of transparency on the performance of defence firms, lack of information on the accounting basics makes it difficult to assess the economic effectiveness of developing a DTIB. But for indigenously produced weapons, sophistication and economic effectiveness are far from the best indicators of impact on international security. A key regional security concern explored below is how second-tier arms production enhances the usability of 'glamour weapons'.

There are many reasons why the development of an indigenous defence industry is an attractive goal. Countries can create high-skilled jobs and simultaneously support their armed forces – all the while gaining prestige because of the immense difficulties inherent to building a defence industrial base.

In the region, however, military autarky and foreign policy independence have trumped other, more economic and industrial motivations. The prospect of regional cooperation also feeds into the same logic: for Egypt, developing robust industries was historically seen as a way to ensure a leadership role in regional cooperation efforts, and today the UAE has revived this strategic goal as a motivating factor to restructure its own defence industrial base. Possessing a strong, indigenous DTIB is seen as a means to fulfil the national security objective of having a secure source of military materiel. On top of this, techno-nationalist motivations include 'securing and advancing a nation's geopolitical status in a regional or global system.'[2] Techno-nationalism, including national prestige founded upon technological advancement and gaining status geopolitically, has also inspired countries such as Saudi Arabia or the UAE to try to become members of the exclusive 'club' of advanced arms-producing states. The symbolic case remains strong today, as is regularly reiterated by high-level officials. But techno-nationalist arguments also tend to be the most rhetorical and least productive. Consequently, these efforts are doomed to fail in comparison to the far simpler, less risky path of diversifying arms imports sources.

Gulf States are now just beginning to give precedence to the economic arguments for developing their own defence industries. The creation of high-skilled jobs, the diversification of national economies as well as the development of an industrial base now play into Arab states' reasons to become defence producers. While this task remains a challenging one, it will ultimately depend on whether the right lessons from the past have been drawn, whether their investments are sustained over the long term without gaps, and whether the current strategic environment lends itself to such efforts. Otherwise, these attempts, like previous ones, will fail.

Recent efforts by Arab states to invest in and scale up arms production have been written off in some quarters as unlikely to pose a threat to Western technologi-

2. See Richard Bitzinger, 'Defense Industries in Asia and the Technonationalist Impulse', *Contemporary Security Policy*, vol. 36, no. 3, January 2016.

cal superiority or have just been dismissed as inconsequential. But as traditional customer countries become more demanding, localisation requirements are changing international defence trade, and the lower end of high-tech – the 'good-enough' realm – can still have high impact. Today, as technology proliferates and arms imports to the Middle East rise, Arab arms industries merit a closer look. The reality is that the industrial capabilities and ambitions of these countries affect alliance structures and international security dynamics in a more uncertain world.

Chapter 1

Doing badly better? Why previous attempts failed

The first signs of ambition in the Arab world with regard to national defence production stared to appear in the 1950s: recovering from the defeat against Israel and the crucial tactical insights gleaned from the war (e.g. gaps in vital arms, such as rifles, and ammunition as well as dependence on foreign suppliers) spurred the creation of a first series of military factories in Egypt and even a dedicated ministry. But within only a decade, three quarters of these factories faced over-capacity, and the ministry of defence production was closed down. This was only the first in a series of attempts which would struggle to achieve their objective – three decades later, weapons exports from third world countries (including Arab countries) still stood at barely 1.5-3% of the global trade in spite of these attempts.[3] Why did previous ASDIs not take off?

Lacking the basics

One of the main reasons ASDIs struggled in the decades after World War II was that they lacked two main ingredients: a civilian industrial base as well as resources.

The industrial base, i.e. the industrial assets of an economy necessary for the production, repair and maintenance of such equipment, needs to be large enough, skilled enough and have a certain level of Research and Development (R&D). Six industries in particular matter to the defence industry: iron and steel, non-ferrous metals, metal products, non-electrical machinery, electrical machinery, and transportation equipment. Equally important are the individuals employed in these industries, especially scientists, engineers and technicians. But in 1988, Arab states interested in a national arms industry still had low rates of scientists and technicians: 1% of the population in Jordan or 8% in Egypt, for instance. The UAE laid down the building blocks in these industries, but attempts at building a maritime industry, for example, had little military relevance.

Arab states lacked this base in the early decades of independence for a number of reasons.

3. Yezid Sayigh, *Arab Military Industry: Capability, Performance and Input* (London: Brassey, 1992), p.1.

Their industrial latecomer status – the region saw the very beginning of industrialisation only in the 1930s – had in part to do with low educational levels, poor infrastructure, and later on with reliance on aid as well as rents from oil and gas. It was, however, reinforced by the fact that neighbouring Europe had already achieved much higher levels of industrialisation at the beginning of the twentieth century; this translated into European demand for Arab agricultural products, and European exports of industrial goods to the region. In the 1970s, Arab industrial output hovered around 0.4-0.5% of the global output, while Arab populations constituted 3.5% of the world's population. In most Arab states at the time, the share of industrial manufacture was low with e.g. 2-3% in Libya, 8-10% in Saudi Arabia, Iraq, Algeria and 14-21% in Egypt or Syria – compared to 60% in Israel or 87% in Germany.

These numbers have shifted, but not equally so: whereas Germany's share in manufactured exports is 83%, it still stands at only 2.2% in Libya (2010), 3% in Algeria, 7% in the UAE, and 24% in Syria before the war. Only Egypt has recently increased this number to 51% (up from 18% in 2007). Similarly, employment in Arab industrial sectors remains modest: 30.9% in Algeria, 25% in Egypt or 23% in the UAE, for example. The region's industrial base has consequently not grown significantly over the last few decades.[4]

TABLE 1: ARAB ARMS PRODUCTION IN THE EARLY 1980s

Country	Ammunition	Small arms	Aircraft	Armoured vehicles	Missiles	Ships
Algeria	X					X
Egypt	X	X	X	X	X	X
Iran	X	X	(X)			
Iraq	X	X				
Israel	X	X	X	X	X	X
Jordan	(X)					
Saudi Arabia	X	X				
Sudan	X					
Syria	X					
Tunisia	(X)					

Note: brackets indicate unconfirmed reports

Source: Michael Brzoska and Thomas Ohlson, '*Arms production in the Third World*' (Stockholm: Stockholm International Peace Research Institute, 1986), pp.16-17.

The lack of an industrial base has particularly hampered Saudi efforts to establish an arms industry. In contrast to some of its Arab neighbours, Saudi Arabia had the requisite funds and enjoyed relative stability, giving it the necessary leeway for this endeavour. But Saudi Arabia's small and at the time unskilled population translated into reliance on foreign personnel: in the mid-1980s the modest Saudi military force of 45,000 was flanked by 30,000 American, 3-4,000 French and 2-3,000 British advisors and trainers.

4. Roberto Aliboni, *Arab Industrialisation and Economic Integration* (London: Routledge, 1979), p.24.

Box 1: The rise and fall of Iraq's civilian industrial base

Iraq's ambition in the defence sector dates back to the mid-1970s, when it not only opened its first military factories but also focused on the creation of a scientific elite. Over the course of a decade, it managed to increase the share of students in technical fields by 300% to 120,000, mostly stimulated by the employment of over 4,000 Palestinian teachers. The war with Iran galvanised this development: by 1984, Iraq was using its own chemical weapons against Iranian troops, and launched some 300 surface-to-surface missiles in 1988, equally manufactured in Iraq. It also produced a variety of infantry weapons, artillery systems, ammunition, air-to-ground munitions and electronic components. In the late 1980s, nearly half of Iraq's industrial workforce or 100,000 people were employed in the defence sector, supervised by the Ministry of Industry and Military Industrialisation. And this sector was projected to grow further: Shortly before the invasion of Kuwait, Iraq announced investments worth $20 billion in local military industrialisation.

The wars of 1991 and 2003, as well as the intermittent sanction years, put an end to this development. Industrial infrastructure was destroyed during combat or suffered from lack of maintenance and investment, whereas the sanctions programme reduced Iraq's financial resources significantly. Iraq was no longer able to fund and import any new warfare technology and was left with old and obsolete equipment. Lack of funds and spare parts also diminished Iraq's arms production capability. The invasion of 2003 dismantled all state-owned civilian industries, whereas ongoing violence has led to the emigration or death of Iraq's scientists.[5] In terms of its industrial base, Iraq is currently not in a promising position.

In addition, several of the Arab arms producers faced severe funding constraints early on. In 1980, Egypt's Gross Domestic Product (GDP) per capita stood at $552, Algeria's at $2,269, and Syria's at $1,422. The rapid increase in oil sales after 1974 changed the dynamics for oil-producing states, of course: Saudi Arabia's GDP that year was $17,655, the UAE's stood at $40,015 and Libya's at $13,032, but within a few years, these numbers were halved or even reduced by two thirds. In 1990, Saudi Arabia's and Libya's GDP constituted with around $7,000 each. nearly a third of German GDP, whereas Algeria's and Egypt's (between $1,700 and 2,100) stood at a tenth. On average, Arab per capita income shrunk in the 1990s – making it the second-worst region in the world after the Sub-Saharan African countries. Although Arab economies had grown, they still struggled in absolute terms.

5. Timothy D. Hoyt, *Military Industry and Regional Defense Policy: India, Iraq and Israel* (London: Routledge, 2007), p.123.

Box 2: Military industrialisation levels

(1) Maintenance and repair of imported weapons systems

(2) Overhaul and refurbishment of imported weapons systems

(3) Local assembly of imported sub-assemblies

(4) Limited licensed production of some locally-made components, possible re-export to licenser

(5) Local assembly and licensed production of less sophisticated components

(6) Limited modifications to license-produced arms from independent, local R&D

(7) Production of sophisticated arms from independent, local R&D with foreign components

(8) Complete independence in R&D and production.[6]

This reality also puts the proportionally high military spending in the region in perspective; while Egypt was spending 31.4% of its GDP on military expenditure in 1973, this translated into a 'mere' $3 billion.[7] The same applies to Syria, where spending exploded upon Hafez al-Assad's arrival in power in 1970. Military expenditure stood at 13.7% of GDP that decade, equalling $2 billion. While Syria continued to spend large amounts in the 1980s ($29.09 billion) and 1990s ($39.46 billion) this was not only modest compared to states with developed defence industries, it was also beyond its means. When the Soviet Union collapsed in 1989, Syria still owed $15 billion in military debt.

This lack of funding was (and to some extent still is) a serious obstacle to the development of a national arms industry. Towards the end of the 1980s, Egypt was estimated to need $4-6 billion in order to develop an arms industry – funds that were simply not available to it due to its high level of debt and poor credit rating. The development of the *Sakr-80* missile for instance cost $100 million in R&D.

As a result of these resource constraints, Egypt was not able to provide seed money or investment capital for new ventures; it also had to limit its projects of production under licence, thereby hindering its acquisition of skills and know-how; lastly, lack of funds stood not only in the way of the development of a national arms industry, it also affected existing projects as they were either cancelled (such as the *Lynx* helicopter programme) or delayed.

6. Keith Krause, *Arms and the State: Patterns of Military Production and Trade* (Cambridge: Cambridge University Press, 1992); Richard Bitzinger, *Towards a Brave New Arms Industry?* (London: International Institute for Strategic Studies, 2003), pp.16-17.

7. Latif Wahid, *Military Expenditure and Economic Growth in the Middle East* (New York: Palgrave, 2009), pp. 112-31.

The impact of war and instability

Both the absence of an industrial base as well as the lack of funds were, of course, aggravated by the fact that most Arab states underwent highly costly conflict at some point in their recent history. Regular conflicts not only drain resources but also lead to arms races and hinder synergies between countries.

Since the end of World War II, the region has witnessed eleven inter-state wars, at least 23 types of intra-state conflicts including civil wars, terrorism, secession attempts and insurgencies as well as over 73 coup attempts. 12 of these conflict episodes lasted longer than 8 years, and the peace which followed around half of these conflicts lasted less than 10 years. Since 1946, the region has accounted for 40% of the estimated global total of battle-related deaths. Statistically, conflicts in the region are associated with a reduction in GDP growth of between 6 and 15 percentage points. In terms of cost, the region has lost over $12 trillion since 1990 alone – including military expenditure and lost opportunities of economic development.

Iraq's GDP for instance shrank by 8.1% in the first half of the 1980s due to the war with Iran. Lost oil exports, disruption of agricultural and industrial production, infrastructure damage as well as losses in foreign exchange reserves amounted in total to $452.6 billion. After the war, Baghdad owed $90 billion ($40 billion to the Gulf States and $35 billion to Western European countries, and $11 billion to the Soviet Union). More recently, Syria and Iraq's per capita income has been reduced by 23% and 28% respectively due to the incurred violence.[8]

But not just full-blown war has an economic price: coups, too, reduce national income in the year in which they occur by 3.5%, and also in the year after. A coup therefore costs the economy 7% of a year's income – and even 5 years later, it is still worse off than before the coup. Coups also hinder investment into a potential defence sector as leaders might refrain from strengthening a potentially threatening military force with a home-grown arms industry.[9] The politically volatile environment of the region has thus affected arms industries, as well.

The constraints of dependency

The prevalence of conflict, the lack of funds as well as the small industrial base meant in practice that, militarily, the best option for Arab states to build up their arsenal was reliance on foreign suppliers. Imports simply became significantly cheaper than production – not only because prices were more competitive (Soviet military hardware was one third the price of equivalent items on the world market), Moscow also gave competitive discounts. Egypt for instance received a 33% discount prior to 1967 and 50% thereafter.

8. Strategic Foresight Group, *Cost of Conflict in the Middle East* (Mumbai: Strategic Foresight Group, 2009); International Monetary Fund, 'The Economic Impact of Conflicts and the Refugee Crisis in the Middle East and North Africa', September 2016

9. Paul Collier, *Wars, Guns and Votes: Democracy in Dangerous Places* (New York: Harper Collins, 2009), p. 143.

Box 3: A costly conflict: the impact of the six-day war on Egypt

Although the war of 1967 was arguably short, lasting only six days, its economic, financial and military impact on Egypt was considerable. In addition to the territorial loss of the Sinai, rich in oil and mineral resources as well as tourism opportunities, Egypt lost revenues from the Suez Canal amounting to $219.2 million (or 4% of GDP) and incurred infrastructure damage to canal facilities amounting to $2.3 billion. As tourism declined, $84 million were lost in economic opportunity; the destruction of 17 major industrial facilities cost not only $389.4 million, it also hurt the emerging industrial base. In addition, the Egyptian military had lost 80% of its equipment which needed to be replaced.

Egypt's defence industry, already somewhat struggling, was majorly affected by all of these developments. In addition to the resource constraints, the sector had to absorb the departure of most Western (especially West German) technicians, as well as the suspended delivery of missing parts and technology provision. The failure to absorb technology transfers, meaning they were not accompanied by a transfer of knowledge and skills, had a major structural impact. The virtual boycott of Western states also closed off potential export markets. Two years after the war, several programmes had to be shut down and three quarters of military industrial capacity diverted to civilian production, and the Ministry of Defence Production was abolished.[10]

Political reasons soon led to dependence on a single supplier: in the 1970s, North and South Yemen, Syria, Algeria, Libya and Iraq relied on the Soviet Union for between 65% and 99% of their arms supplies. This dependence created, in addition to political constraints, negative ripple effects for the defence industry.

The Soviet Union was not only hesitant to grant licensed production, but also to transfer technology. Even at the height of Egyptian-Soviet military cooperation in the late 1960s, Soviet-designed fighter jets and other items had to be returned to the USSR for maintenance and repair – hindering the development of Egyptian skill and aviation facilities. Similarly, Saudi Arabia's sophisticated equipment purchased from the US required training and logistic support, as the Saudi workforce could not maintain it alone. In contrast to Egypt, however, Saudi Arabia's motivations to develop local industry reached far beyond local assembly and licensed production. Most contracts in the Arab countries were based on turnkey agreements – at least in part because Western states were reluctant to share combat technology with potential enemies of Israel. Despite being more ambitious than Egypt, the restructuring of military factories established by King Abdulaziz Al Saud in 1949 into the General Organisation for Military Industries in 1986 did little to move Saudi Arabia up the military industrialisation ladder.

10. 'Egypt's economic battle from June 1967 to October 1973', *Al-Ahram*, 11 October 2014.

But the high pace of technological development, as well as the rising costs of both R&D and production, meant that it was generally quicker and cheaper to rely on foreign supplies for sophisticated weaponry, and to zero local production on low-technology 'combat consumer' products, such as infantry and medium weapons, ammunition, mines and air bombs (any type of explosive used in the air). On the downside, arms imports reduced industrial output and productivity – and made no use of the potential advantages of the Arab defence industry, namely cheap labour.

Strategic overreach

Related to the point of dependency is the high level of ambition which ultimately slowed down the development of ASDIs.

Egypt, for instance, sought to establish all aspects of defence production simultaneously, rather than focus on certain technologies, precisely in order to reduce foreign dependency – it felt it could neither rely on European supplies nor Arab cooperation, but still had to face up to the possibility of war. This point had been driven home particularly during the 1948 war with Israel, when the Egyptian armed forces had been sent to the frontline without the necessary equipment – or indeed the possibility to procure it quickly. As Nasser noted in his *Philosophy of the Revolution*, 'I used often to say to myself: Here we are in these foxholes, surrounded, and thrust treacherously into a battle for which we were not ready, our lives the playthings of greed, conspiracy and lust, which have left us here weaponless under fire.'[11] The main rationale for an Egyptian arms industry was therefore self-sufficiency: Cairo sought to develop indigenous aircraft, aircraft engines, surface-to-surface and long-range missiles, making it one of the most ambitious arms producers in the non-Western world at the time. In 1962, it launched the Al-Kahir, a missile with a projected range of 640km.

But Nasser's push for an arms industry capable of providing for all military needs had several downsides. Firstly, he ruled out specialisation as there was no time for innovation; this however meant that Egypt forewent an opportunity to develop niche products that was perhaps in its reach. Secondly, he opposed co-production with foreign manufacturers in order to retain full control over the product. But given these as well as the time constraints, Egypt had to rely on Western scientists in order to fill the gaps in technological skills from which it suffered – scientists who left after the war of 1967. At that time, planned 'Egyptianisation' of particularly the aircraft and missiles industries had not yet taken place, bringing these projects to a near-total halt.

Egypt did not give up on its arms industry, however, but reviewed its ambition. In particular, the war of 1973 led to the insight that modern combat involves high rates of consumption of arms and ammunition; it therefore instead focused on the production of ammunition, small arms and mortars. The Egyptians also aborted

11. Gamal Abdul Nasser, *Egypt's Liberation: The Philosophy of the Revolution* (Washington: Public Affairs Press, 1955), p.23.

attempts at more ambitious projects, such as long-range surface-to-surface missiles with West Germany or aircraft engines designed by Soviet expatriate engineers. By the mid-1980s, 60% of the military's needs were produced locally by a labour force of 75,000 to 100,000, spread out over 30 factories.[12] This was made possible because of agreements to produce French aircraft, as well as weapons from the UK and Spain, under license.

The narrative of military self-sufficiency also opened the door to the Egyptian armed forces' venture into economic activities – although since then, they have expanded their production far beyond military supplies. 40% of military production is in fact civilian in nature (see Figure 3 on page 33). Iraq and Syria's armed forces equally became more involved in non-military production as a side effect of their attempts to develop an arms industry.

No pooling, no sharing: the issue of cooperation

ASDIs have also suffered from the political disintegration of the region at large. Since World War II, the Middle East and North Africa has experienced not only actual wars, but also numerous diplomatic fallouts and suspended relations. One casualty from such diplomatic 'cold wars' was the possibility of regional cooperation on arms production endeavours.

A first idea for such cooperation was floated in 1972, when the Federation of Arab Republics (including Egypt, Libya and Syria) decided to launch a joint arms production scheme assisted by Western military industries. This plan was shelved when the Chiefs of Staff of 18 Arab countries recommended the allocation of 2% of the gross national product (GNP) annually to a similar scheme in 1974 – with the goal to surpass Israeli production within five years. By 1975, the number of states willing to participate in such a joint venture was down to four: Egypt, Qatar, Saudi Arabia and UAE. Together, they created the Arab Organisation for Industrialisation (AOI). Whereas Egypt was to field personnel of 15,000 and infrastructure (notably four arms factories), Saudi Arabia, Qatar and the UAE would provide the capital of $1.04 billion (each contributing $260 million). The organisation was to make up for Egypt's resource constraints and the Gulf States' manpower shortcomings.

The AOI's stated goals were the supervision and development of self-sufficient ASDIs, with three strategic goals in mind: reduce the cost of arms supplies, export surplus to other Arab countries, and establish Egypt as a major arms producer and exporter. But whereas Cairo focused particularly on the latter part, its Gulf partners felt side-lined throughout. This aspect also deterred other Arab League member states from joining. When Egypt signed a peace treaty with Israel in 1979, this led not only to its isolation in the region, but also to the withdrawal of first Saudi and later Qatari and Emirati funds. Disputes over the invested funds dragged on for over a decade, with $690 million still frozen in bank accounts in 1988. The return

12. Robert Bailey, 'Armed Forces Modernization Spurs Growth of Arms Industry', *International Herald Tribune*, 14 June 1984.

of Egypt to the Arab League that year gave impetus to another attempt at reviving the joint project, but failed. In 1993, Cairo became the sole owner of the organisation.[13]

In spite of its regional isolation, Egypt still managed to export weapons during the 1980s; in 1982 alone, it claimed to have exported arms worth $1 billion – particularly to Iraq, Somalia, Oman, Sudan and North Yemen. Egyptian weapons were also supplied to the Mujahideen in Afghanistan and to the forces of Hissène Habré during the civil war in Chad. (The quality of these weapons was, however, disappointing. More than 30,000 mortar bombs turned out to be unusable as the cartridges had swollen in the damp).[14] Egypt also acquired substantial levels of know-how in reverse-engineering and manufacturing of Soviet weapons and their maintenance, repair and overhaul (MRO). In the early 1980s, employment in the arms industry accounted for 8% of total manufacturing employment. The average annual growth in the whole industry and manufacturing increased from 5% in the 1960s to 9% in the 1970s, partly thanks to the establishment of local arms production facilities.

Libya's originally similarly ambitious attempts at developing an arms industry never reached Egyptian levels; instead, the projects launched in the 1970s failed to manufacture ammunition and spare parts for Soviet weapons without foreign assistance. Plans to assemble some *SF-260* training planes acquired from Italy equally fell through. Instead, Libya's manufacturing capacity remained well below its ambitions with the production of basic quartermaster items, uniforms, and some small arms and ammunition.

Size matters: big armies, big cost

Another impediment to the development of Arab arms industries was the fact that, although military expenditure in the region was exceptionally high, most of the military budget allocation was spent on salaries.

Especially Iraq, Syria and Egypt maintained large military institutions in manpower terms and generally paid rather handsome salaries. There were three reasons for this policy. In part, because the armed forces constituted a major source of employment amidst underperforming economies. But the Soviet doctrine followed by these countries at the time was also manpower-intensive, making the employment of large amounts of troops necessary. For Egypt and Syria, the size of their armed forces were also a way to make up for the strategic imbalance *vis-à-vis* a much better equipped, but much smaller Israel. Lastly, the payment of decent salaries, pensions and benefits was one way to ensure the loyalty of officer corps notoriously involved in politics in all three countries.

And the trend towards large military forces was a regional one: Iraq's armed forces have more than quadrupled between 1978 and 1987, from less than 200,000 to

13. Yezid Sayigh, op. cit. in note 3, p.53.

14. Aqab Malik, 'Darra Adam Khel: "Home Grown' Weapons"', *Air & Space Power Journal*, vol. 7, no.1, ASPJ Africa & Francophonie, 2016, p.79.

850,000 troops – making up 5.6% of the country's population. Syria's armed forces grew from 50,000 troops in 1967 to 130,000 in 1973 and 400,000 in 1985, by then making up 14.5% of the population.[15] Syrian soldiers and officers earned between four to ten times more than their civilian counterparts. The Algerian military, too, nearly doubled between 1978 and 1992 to 120,000; likewise, the Egyptian military more than doubled between 1966 and 1984, from 180,000 to 460,000 although the population grew only by 10%. The force's size having not changed significantly since then, 60% of the official defence budget (not counting the non-disclosed economic activities of the military) is still dedicated to salaries today. In comparison, Israel spends 47% of its defence budget on salaries, the US approximately 25%, and many in Europe well over 50%.

But the manpower of an armed force determines not only the share of salaries in the defence budget – it pushes up other costs as well, as troops increases mean more soldiers needing to be equipped, maintained and trained. Moreover, a high number of military personnel per capita increases the pressure to use simpler technologies across the armed forces – and thereby slows down innovation. A large standing force consequently drastically reduces the budget available for R&D and other projects.

Pitfalls of bureaucracy

Arab bureaucracies have equally not facilitated the emergence of national arms industries. The large amounts of paperwork in Egypt for instance, in addition to bribes paid to middlemen, not only made the industries less efficient but also less competitive. But patronage (*wasta)* and corruption are features of most Arab defence sectors, with negative effects for allocation of funds.

In Saudi Arabia, foreign or private investors were deterred by the apparently arbitrary decision-making process with regard to ownership, taxation and terms of agreements. In addition, the Saudi leadership was unable to provide the clear policy direction necessary to create incentives for investment. Many foreign partners complained about the predominance of personal connections over performance in evaluating defence industrial ventures.

Saudi Arabia, for instance, has enacted a law making the use of intermediaries in defence procurement illegal, but it does not appear enforced. The Al-Yamamah agreement from the 1980s included, among other things, the purchase of military aircraft along with training and support, e.g. the Al-Salam Aircraft Company which repairs, overhauls and modifies commercial as well as military aircraft. As recently as 2007, four years before the most recent set of governance reforms, its offset deal with the UK appeared to have been facilitated by a £1billion payment to Prince Bandar, then Saudi Arabia's ambassador to the US.

15. David Commins & David W. Lesch, *Historical Dictionary of Syria* (Lanham: Scarecrow Press, 2014) p.42.

Box 4: DIY weapons: a shadow industry

Non-state actors have been part of the region's military landscape since the end of World War II. Their weapons have been largely imported – but they have also ventured into defence production.

This has particularly been the case in the Palestinian territories; spurred by the impaired access to arms, several Palestinian groups started the manufacturing of weapons from the early 2000s onwards. The military wing of Hamas for instance has developed three types of rockets since then, largely modelled on Russian ones. The first one, *Qassam*-1, had a maximum range of 3 to 4.5 kilometres, whereas its successors *Qassam*-2 and *Qassam*-3 had ranges of 12 and 16km respectively, capable of reaching deep into Israeli territory. Simple in terms of engineering, these rockets are unguided and have hence been deployed indiscriminately against civilian (as well as military) targets. Cheap to produce (around €500 each), they have in turn spurred the development of Israel's Iron Dome missile defence system.

The *al-Quds* rocket, developed by Islamic Jihad and deployed five years later, has a range of 18-30km and has been fired repeatedly at Israeli cities, most notably Ashkelon. This rocket was developed along with a multiple-rocket launcher system capable of firing 10 rockets simultaneously.

But Hamas and Islamic Jihad field only half of Palestinian rockets launched at Israel; other groups, such as the Popular Resistance Committees, have equally developed rockets such as the *al-Nasser* or *Saria*-2. And the production does not end with rockets: Hamas has also developed anti-tank missiles such as *Yasin*, the RPG *al-Bana* and its successor *al-Batar*, mortars and more recently drones. These are modelled on the Iranian *Ababil*-1 and can be used, according to Hamas, for both reconnaissance and armed attacks. In late 2016, Israel's air force confirmed having shot down such a drone over its territory. The assassination of a Tunisian drone expert, linked to Hamas in late 2016, was interpreted by the Arab press as proof that Palestinian drones are indeed a strategic threat to Israel.

Daesh has equally launched some defence production initiatives – but with higher ambitions than its Palestinian counterparts. Indeed, its levels of production, particularly in Iraq, were so sophisticated that it can be described as a regular industrial production system. A dedicated political body, the Committee for Military Development and Production, oversaw not only the production of improvised weapons and coordinated the manufacturing workshops, it also sought to develop an R&D programme. Evidence suggests that the production chain was rather sophisticated; the manufacturing of improvised rocket-assisted munitions, for instance, involved machining warheads, rocket motor nozzles, coupling screws and welding machined cones to warheads. Advancing Iraqi

forces also uncovered chemical weapons material. Daesh has also used commercial drones (and even model airplanes) for military purposes by fitting them with hand grenades, and to fly reconnaissance sorties on Iraqi troops. It has also begun the development of drone workshops in its territory in Iraq.[16]

Other militias active in Syria's civil war have equally used self-made drones against the regime.

In Libya, too, Islamist militias have begun to alter the equipment they came into possession of following the fall of Gaddafi. They have customised American *Stinger* missile-launchers to make them compatible with Russian anti-tank missiles.

16. Conflict Armament Research, 'Standardisation and quality control in Islamic State's military production', December 2016.

Chapter 2

Post-Cold War proliferation

Arab states' attitude to defence spending changed significantly at the end of the Cold War. While the early 1990s spelt *détente* for the rest of the world (and even for Israel, which signed the Oslo Accords in 1992 and a peace treaty with Jordan two years later) leading to disarmament and low defence spending, this was not the case for the rest of the MENA region. In constant 2014 prices, SIPRI data shows that, while Western Europe decreased military expenditures by 5% and the US by 15%, North African and Middle Eastern states compensated for this by increasing their outlays respectively by 27% and 15%.

The reasons for this were strategic: the invasion of Kuwait by neighbouring Iraq triggered an important strategic change in Gulf States capitals, particularly the UAE. The dependence on international allies to free Kuwait highlighted the need for more self-sufficiency, whereas the invasion itself underlined the need for military power projection. In return, the international coalition against Iraq led to concerns in Damascus and Tripoli that they, too, might become the target of a large-scale military intervention. Meanwhile, just recently united Yemen faced a violent war of secession in 1994.

At the same time, terrorism began to emerge on a wholly new scale. Although the region had struggled with the phenomenon on and off, it now reached new dimensions. In Algeria, the annulment of free elections by the military, fearing an Islamist victory, triggered a decade-long conflict against various terrorist organisations. In the meantime, Soviet withdrawal from Afghanistan after 10 years of conflict freed up an important cohort of Arab fighters from 1989 onwards. It was around this nucleus that al-Qaeda was created, launching its first attack in Yemen in 1992. In the same spirit, the Islamist militant group al-Jama'a al-Islamiyya gained strength in Egypt and launched a violent campaign throughout the 1990s, killing more than 760 policemen and 60 tourists.

The 1990s were consequently not a peaceful period for states in the region.

Proliferation changes

As Western countries cashed in on the peace dividend at the end of the Cold War, defence industries were forced to find new customers to compensate for tightening Western defence budgets. Arms producers whose home governments bought less hardware became more export-oriented in order to survive and avoid excess capacity issues. The net levels of global arms exports fell dramatically between the 1980s and 1990s, largely due to the global economic crisis, but over the same time period, the share of Western European and US arms exports exploded from half of the global share in the 1980s to three-quarters of global arms exports in the 1990s.

Post-Cold War demilitarisation procedures not only included the destruction of military equipment, but also transfers of excess defence articles to relatively under-equipped countries. For countries bolstering their indigenous defence industrial capabilities, the omnipresence of retired or surplus equipment gave them opportunities to learn lessons in maintenance, and more crucially, in refreshing the equipment to catalyse their own arms production. Some of the most successful 'second-tier' arms producers[17] started here with 'add-on, add-up' modifications to second-hand equipment.

Whereas earlier attempts to produce equipment focused primarily on ammunition, ships and aircraft, the excess of land vehicles enabled newer defence technological and industrial bases (DTIBs) to use technology transfers and partnerships refreshing second-hand main battle tanks (MBTs), armoured personnel carriers (APCs) and armoured fighting vehicles. During the Cold War, advances in the sophistication of MBTs made for limited technology transfers, but significant deals such as delivering French *Leclerc* tanks to the UAE created opportunities to focus on components in the interim. Whereas war theatres from the Cold War did not favour land vehicles, proliferation of lighter land vehicles corresponded to high demand on Middle Eastern territory.

All of this meant that, even with effective export control regimes in place, military equipment was easier to come by. To the dismay of emerging arms producers, first-tier arms producers still refused to grant technology transfers for crown-jewel technologies. But conventional weaponry proliferated, inadvertently turning customer countries into partner countries.

Technological changes

At the same time, the nature of technological innovation underwent paradigmatic shifts. Whereas military technology previously 'spun off' into civilian sectors, cutting-edge technologies – such as information communication technology (ICT) or unmanned systems – now increasingly find their homes in commercial-tech communities. Today the countries at the forefront of defence innovation are seeking ways to capitalise on commercial technologies ('spin in'), partially because Western defence research and development (R&D) expenditures have significantly diminished. With both civilian and military applications, 'dual-use' items – the same ones that often benefit from private R&D funding in lieu of government funding – are subject to a far more globalised means of production.

Developing countries have championed localisation policies to glean experience from more advanced, transnational companies. Although the protectionist policies do not always bear fruit, they have a preferred development tool to increase science, technology, engineering and mathematics (STEM) careers for their own populations. Globalised supply chains also opened up more opportunities for training and

17. Krause, op. cit. in note 6.

educational partnership, although the extent to which developing countries have been able to absorb the technologies and use them to create more self-sustainable industries certainly differs.

Military technologies are not exempt. Originally introduced as part of the Marshall Plan, Washington incentivised Western European arms production by 'offsetting' the costs of buying US arms with local factories to produce components and maintain systems. And it worked: these incentives helped sustain European industry – the very competitors to US defence firms today. However, the unintended consequence was that developing nations growing their own defence industries would internalise this lesson and turn these extra-economic deals, called offsets, into requirements in defence trade. Frowned upon in the US and illegal within the EU today, various developing countries are increasingly adopting defence offset policies, meaning that foreign defence firms have to foster relationships with local partners as a prerequisite to closing major arms deals.

Indeed the first offset deal, the Peace Shield programme, resulted from the acquisition by Saudi Arabia of the Airborne Warning and Control System (AWACS) from Boeing (until 1992) and three other US contractors. Indeed some of the main actors of the Saudi DTIB today grew out of Peace Shield, including the Saudi Advanced Industries Company (SAIC), which has holding interests in Al-Salam Aircraft Company and Aircraft Accessories and Components Company (AACC). Additionally the International Systems Engineering, Middle East Propulsion Company and the civilian-oriented Advanced Electronics Company are among the more established companies that work with foreign partners in the Kingdom at present.

Through Peace Shield, US firms invested $600-700 million – 30-35% of the cost of the hardware in the contract – into local industry.[18] Since then, for better or for worse, they have become a mainstay of international defence trade. Offset deals are notoriously difficult to track, oftentimes because they are branded with nondescript names like 'industrial partnerships'. Moreover, even when countries are transparent about offset arrangements in announcing arms sales, sometimes offsets are agreed upon after arms deals are announced, meaning there is not a particular clause to report at the time of sale. Either direct or indirect, offsets come in various forms, including purchasing, subcontracting, technology transfer, co-production, training, investment and credit assistance.

18. Sayigh, op. cit. in note 3, p. 136; Abdulla M. Al-Ghrair and Nick Hooper, 'Saudi Arabia and Offsets' in Stephen Martin (ed.), *The Economics of Offsets: Defence Procurement and Countertrade* (Overseas Publishers Association, 1996), p.232.

TABLE 2: COMPARING OFFSET OBLIGATIONS IN SAUDI ARABIA AND THE UAE

	Saudi Arabia	United Arab Emirates
Agency handling	Economic Offset Committee	UAE Offsets Group (UOG)
Part of Procurement Decision	Yes	Yes
Offset Sector	Civilian and military	Military
Minimum Value of Contract	Not specified	$10 million
Minimum Offset Required	35%	60%
Term	Within 10 years	7 years
Multipliers	Subject to approval of offset authority	Yes but unpublished
Penalties	Best efforts but reconsidering policy	8.5% of offset obligation or 4.5% of total contract
Focus	Jobs, training, technology transfer and investment	Sustainable wealth creation
Direct vs. indirect	Mix with original focus on direct	No distinction
Eligible Offset Activities	Investments in joint ventures with local parties	Profits of joint ventures with local parties

Source: Bilal Y. Saab, *The Gulf Rising: Defence Industrialization in Saudi Arabia and the UAE,* Atlantic Council, May 2014.

Strategic alliances with foreign firms allow younger defence industries to glean expertise and skills, gain access to sensitive technologies and intellectual property rights (IPR), and enter new markets. The form of strategic alliance chosen – ranging from marketing agents, to local assembly, to licensed production, and up to co-development and joint production – determines how dependent firms are on their Western partners and helps to answer how indigenous ASDIs truly are today. The relationships between defence firms are intimately tied to the development of human capital and a knowledge-based economy. Strategic alliances are important in this light so that countries not only access technologies, but also develop the expertise to operate, maintain and repair them.

Beyond Western partners, another opportunity opened up for emerging arms industries given the rising number of second- and third-tier producers by the 1990s. By the end of the Cold War, other countries – including Argentina, Brazil, India, Israel, Taiwan, South Korea (as well as Japan and Sweden) emerged as up-and-coming arms producers.[19] Arab countries began also to look to other countries, from Ukraine to Serbia to South Africa, to gain access to sensitive technologies.

19. See Richard Bitzinger, *Towards a Brave New Arms Industry?* (London: International Institute for Strategic Studies, 2003) and Michael Brzoska, 'Arms Production in the Third World', Stockholm International Peace Research Institute, 1986.

Box 5: Other industries in the region: Iran, Israel and Turkey

The Middle East region already houses a few 'second-tier' arms industries. Most successful is Israel, which – as the world's ninth-largest arms exporter in 2015 – boasts a consistent record of exporting missiles, world-class unmanned aerial systems (UAS) and other military equipment. With advanced systems such as the *Iron Dome*, Israeli defence production is also vital to its self-defence. Indeed, its strength has contributed to an Arab arms race and the growth of indigenous arms industries.

Benefiting from strong relationships with Western defence firms, the Turkish defence industry is also recognised as an up-and-coming producer with technological capabilities across a wide spectrum of segments – mostly based in components, but increasingly developing its own systems in collaboration with fellow NATO allies and beginning to dabble in cooperative schemes with Arab actors. In contrast to Israel, Turkey and its military might is generally not seen as a direct threat to Arab states: indeed Turkish firms have begun partnering with ASDIs in the past few years.

In contrast, Iranian arms production is based on what it perceives to be existential threats, but has followed a different trajectory due to its isolation from international defence industrial collaboration. It is however fair to say that Iran's belligerent rhetoric has contributed to the Gulf States' threat perception – and their desire to bolster their air force and naval capabilities in particular. Iranian military parades today regularly boast 'new' equipment and hardware which are, in fact, modified versions of pre-existing equipment, often derived from Soviet models.

These younger defence industries may not develop sophisticated capabilities to compete with more technologically advanced weaponry in all international arms markets, but renewed focus on indigenous defence industrial capabilities – as related to both equipment and services – goes hand-in-hand with these countries striving to diversify their economies and gain prestige in the international arena. Most importantly, they seek to become more powerful geo-strategic actors with the short-term goal of operationalising military equipment and the long-term goal of increasing their independence from Western countries in using – and exporting – their own arms. To varying extents, Egypt, Saudi Arabia and the UAE have already exhibited preliminary signs of achieving these goals. That this coincides with geopolitical and military shifts in the region is not just happenstance; the industrial perspective is indeed expressive of strategic aspirations (and realities) in and around the Gulf.

Chapter 3

Egypt: the assembler

Much of the momentum that Egypt built up in the second half of the twentieth century in its drive towards military self-sufficiency has since been lost. Despite its status as the longest-standing arms manufacturer of the Arab states, Egypt maintains low rates of indigenous manufacturing and has plateaued as a 'third-tier' arms producer. With low-tech production capabilities and limited demands for technology transfers, Egypt's economic motivations to maintain its industrial base outweigh its strategic ambitions. Egypt fulfils its strategic needs primarily through diversifying its sources of arms imports. Its factories therefore exist to support its arms imports rather than to ensure independence from foreign suppliers.

Egyptian military factories produce equipment under licence, assemble equipment based on imported kits, or produce equipment with little or no military relevance. This has been well known throughout the course of Egyptian military production: in the late 1990s, the US considered that only 24% of the end items produced in Ministry of Military Production factories were actually military. Indeed only two of the 16 Ministry factories exclusively produced military items, and civilian items such as beauty products or copper tables (see Table 3 on pages 33-34). Especially since the Arab Spring, the production of extra-military equipment has generated significant criticism and led to the nickname 'Military Inc.' for the Egyptian armed forces. Oftentimes military aid is funnelled into dual-use ventures that are speculated to be more commercial than they are military, such as the acquisition of Gulfstream business jets or local assembly of Jeep Wrangler kits.

Bankrolling 'Military Inc.'

Financing this production would not be possible without the support of the US. Egypt is able to generously supplement its defence spending through its status as the second-largest recipient of US foreign military financing (FMF). In addition to the $62 million worth of excess defence article grants sent from the US to Egypt between 2003-2013, the amounts of FMF that have been channelled into 'Military Inc.' are far from transparent.

From 2002-2007, the Egyptian Ministry of Military Production focused primarily on electronics and chemical industries, which likely were the outcome of capabilities developed in the 1980s-1990s (see Table 3 on pages 33-34). But today, little is confirmed about what actually fills the factories and which of the items have maintained active production lines. However, with the main purposes of assembling and maintaining equipment, it is probable that the massive factory complexes are underutilised.

In part, this has to do with the fact that Egypt's economy is still not adapted to the needs of a fully developed arms industry. Egypt has, in theory, a large and young population to tap into, but it has so far failed to transform this potential pool of labour into an innovation and science powerhouse. While the numbers look encouraging – gross enrolment ratio at the tertiary level was 32% in 2010 – this glosses over the problem of quality due to severe resource constraints and mismanagement. In 2012, the World Bank ranked Egypt 97 out of 140 countries in the Knowledge Economy Index. According to the Global Competitiveness Index, Egypt struggles particularly with educational levels, labour market efficiency as well as its financial market's sophistication. It is hence still in the transition stage from a factor-driven economy to an efficiency-driven economy.[20]

That said, the country is still known for continued licensed production and local assembly, rather than indigenous manufacturing. One of the most long-standing licensed production cases in Egypt is seen in the case of the M1A1 *Abrams* main battle tank (MBT). As part of a FMF deal, Egypt has a long track record of locally assembling M1A1 *Abrams* tanks. In 2007, the Department of Defense (DoD) sent Egypt 125 *Abrams* kits for $890 million. Despite temporary suspension of co-production, General Dynamics and AOI signed further agreements worth an estimated $1.329 billion in 2011.

In the region, Iraq also operates the M1A1, and Kuwait and Saudi Arabia also operate variants of the *Abrams* tank that may share similar spare parts. Many Iraqi MBTs have required significant refurbishment in consequence of the war and instability, and the Saudi-US joint venture Advanced Electronics Company (AEC) has also worked on electronic components. In 2015 Morocco placed an order for refurbished M1A1 *Abrams*. In these cases, even if they are US deals, it is probable that Egyptian production facilities benefit indirectly, for example through the supply of spares needed to repair the tanks.

The reorganisation of the Egyptian DTIB re-commenced in 2011 with the Mubarak Complex for the Defence Industry, respectively housing military production factories and munitions factories outside of Cairo. Instead of restructuring the DTIB through M&A processes (as the UAE has recently done), this reorganisation was intended to bring most of the government's largest factories together – at least 28 of the total 32 – into a single industrial park (with munitions factories separately housed in the Mubarak Complex II) space along with 34 new manufacturing sites, a laboratory and a technical education complex.[21]

20. Salma El-Tanany, 'Moving towards a knowledge-based economy: what is needed to enable science, technology and innovation in post-revolutionary Egypt', PhD thesis, American University of Cairo, May 2013.

21. Shana Marshall, 'Egypt's Other Revolution: Modernizing the Military-Industrial Complex', *Jadaliyya*, 10 February 2012.

TABLE 3: PRODUCTION IN MINISTRY OF MILITARY PRODUCTION FACTORIES IN THE LATE 1990s

Military items	Potentially dual-use items*	Non-military items
Components for ammunition and casting	Adhesives	Aerosol containers
Falcon 50 components**	Axle boxes	Agricultural machinery and equipment
Fuses	Ball bearings and bearing shells	Air conditioners
H14 engines (for Gazelle aircraft)**	Binoculars and periscopes	Aluminium containers and teapots
Helicopter engine overhaul**	Blasting services	Aluminium foil
Larzac 04 turbofan engine**	Bolts and nuts	Automatic and semi-automatic bakery lines
Laser range-finders	Brass, copper and aluminium brass	Automatic balances
M1A1 main battle tanks and other armoured vehicles**	Casting of hematite iron, grey iron, and steel	Baby formula
Mirage 2000 components**	Commando knives and axes	Beauty products and cosmetics
Night observation devices	Computer numeric control machines	Copper tables
Propellants	Conductors	Cutlery
Radar equipment	Copper and aluminium cables	Electric and water meters
Radars and electronic equipment	Cylinders	Electric fans
Radars for electronic equipment	Degreasing solutions	Electric switches and sockets
Tucano components**	Diesel engines	Fire extinguishers
TV2 engines (for M1-8	Drilling machines	Food cans
Various SALW and ammunition (including anti-tank missiles, infrared-guided missiles, mines and metallic components for mines, hand grenades, mortars and mortar charges and machine guns)	Explosives, explosive powder and dynamite	Freezers
Weapon sights**	Fasteners	Gas ovens
	Formaldehyde and hexamine paints	Gasoline pumps
	Gas bottlers, regulators and rings	General cutting tools
	Grinders	Gulfstream business jets**
	Incinerators	House insecticides
	Insulated electric wires	Hydrogenated oils
	Lathes	Irrigation sprinklers
	Paints, inks and varnish	Jeep Wranglers**
	Phosphating solutions	Kitchen knives
	Pistons and piston rings	Meat mincers
	Precision casting	Medical and surgical instruments
	Rifles and pistols	Milling machines
	Safety and detonating fuses	Oil coolers
	Sections strips, plates, tubes, blocks, castings, sheets, wires and cables	Personal computers
	Shotgun cartridges and powder	Pressure cookers

Military items	Potentially dual-use items*	Non-military items
	Sodium toluene sulfonate, potassium chlorate	Radiators
	Various chemicals (including industrial nitro-cellulose, potassium chlorate and anaesthetic ether)	Radios
	Welding, pumping and compressed air sets	Refrigerators
		Rubber and plastic products
		Scissors
		Sewing machines
		Shapers
		Solar water heaters
		Stainless steel cooking pots
		Television receivers
		Tractor engines
		TV antennas
		Wood sawing machines
		Wooden furniture

* Lack of information about technical specifications makes it difficult to determine which items are dual-use
** Larger programmes carried out through known strategic alliances
Source: Hammam Nasr, *'International Market Insight: Military Factories: Egypt'*, US Foreign Commercial Service and US Department of State (1998). Available at website of Federation of American Scientists: http://fas.org/nuke/guide/egypt/facility/mark0033.htm

A move in June 2015 further reduced the transparency of Egyptian military production by exempting 574 military facilities from real-estate taxes, also making it difficult to corroborate the 2011 reorganisation of the factories and their contents. But it appears that more recent projects undertaken by the Ministry – including solar panel research with foreign firms, fish farming, distribution of subsidised bread, commercial shops and production of smart water meters, sewage plants and electrochemical equipment – show that Egypt is not abandoning its 'Military Inc.' model of using FMF and the national defence budget for extra-military production.

Partnerships with foreign defence firms do, however, continue to exist and expand Egypt's repertoire of licensed production and local assembly. Dual-use ventures proceed: Siemens-VAI, based in Austria, and DSD Ferrometalco, the Egyptian subsidiary of the German firm, have worked with the Ministry of Military Production's steel rolling mill. As recently as September 2015, French UAS producer Sagem and AOI extended industrial cooperation. With limited technology transfer and most of the demanding labour remaining in France, AOI will assemble and maintain the *Patroller* surveillance UAS, as well as train Egyptian personnel to operate the system, thereby bolstering Egyptian surveillance and counter-terrorism capabilities rather than giving them the opportunity to develop the industrial competences themselves. Between the extra-military, the dual-use, and the military deals, the Egyptian DTIB's main interest is maintaining its *status quo* of using military funds to expand its economic footprint.

Box 6: Egypt's Chinese connection

The Egyptian DTIB's ties to China are far more longstanding and developed than is the case for Gulf countries. One of the first post-Cold War ventures came about in 2006, when the Egyptian branch of the Kharafi Group (a Kuwaiti conglomerate described on page 66) acquired an 80% stake in the Chinese firm SitEX in 2006 in order to reap IT technology transfers for fire-fighting vessels and radio technology. These technology transfers are suspected to have been 'traded' for increased security of the facilities in Egypt.[22]

Sino-Egyptian defence industrial cooperation is otherwise concentrated in the air domain. Egypt began receiving kits from the Chinese firm Hongdu Aviation Industry Corporation to locally assemble 120 K-8E *Karakorum* jet trainers in 2008, nine years after signing initial export orders for the aircraft. In January 2011, the Aviation Industry Corporation of China (AVIC) partnered with AOI to co-develop military and civilian aviation components and engines, as well as establish an MRO R&D facility.

Given the scale of Chinese foreign investment, monitoring investment in infrastructure and industry abroad is an increasingly important indicator of Chinese foreign influence. Although Chinese arms exports to Egypt nearly completely diminished following the Arab Spring (from over $10 billion in 2006-2010 to $3 million in 2011-2015), monitoring the dual-use and defence agreements between the two nations – as part of the estimated $15 billion of Chinese investment in Egypt – could become a harbinger of Chinese influence in MENA, including in the military sphere.

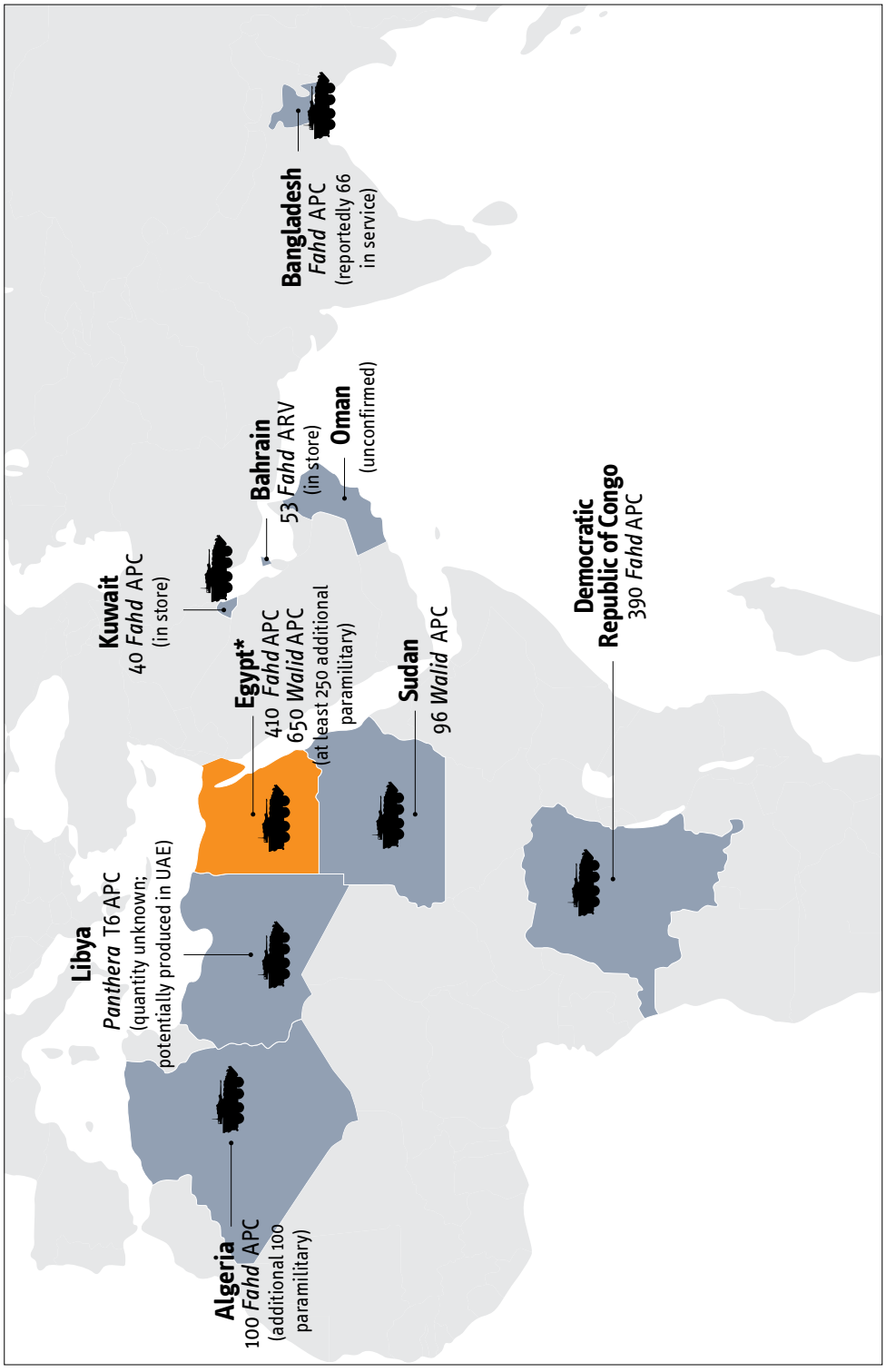
Despite entering into a 'comprehensive strategic partnership' in 2014, Sino-Egyptian military cooperation remains essentially rhetorical. Particularly as China becomes more involved in the region through the One-Belt-One-Road and complementary initiatives, Beijing could avail of the dual-use character of thse commercial activities and technologies to increase its influence – not only as an investor, but also as a military provider in less obvious ways than traditional exports.

As Egypt increases its arms imports from other sources other than the US and Russia, beneficiaries such as France – and perhaps China down the road – economic ties could indicate changes to the strategic landscape. In the case of China, this could also include selling second-hand Soviet-era equipment.

It is also worth noting that Chinese armed UAS are making a debut in the Gulf; however, this seems to be filling capability gaps rather than building industrial capabilities. That said, in early 2017, Saudi Arabia announced a new industrial plant to co-manufacture military UAS with foreign companies, potentially including the Chinese *Wing Loong* with Chengdu Aircraft Industry Group.

22. Ibid.

FIGURE 1: REGIONAL FOOTPRINT OF EGYPTIAN ARMS



Sources for data: IISS *Military Balance*; EUISS.

Foreign customers and proliferation risks

Also driven by economic concerns, Egypt is the longest-standing Arab arms exporter. Regional users of Egyptian-made equipment (see Figure 1) are equipped with legacy systems, and not necessarily new technologies. Many of these countries – Somalia, Oman, Sudan and Yemen – already received shipments from Egypt in the 1980s, although many of these were re-exports of second-hand Soviet, US and Chinese equipment. But today, Egyptian arms have proliferated. In March 2016, *Panthera* T6 armoured personnel carriers – most likely assembled by the Egyptian company Eagle Defence International Systems – were transferred to Libya, despite the UN arms embargo. (It is also possible, however, that Eagle Defence International Systems is the name of the Egyptian office of the Emirati firm Minerva Special Purpose Vehicles). This donation (along with Soviet-era jets that are suspected to also have been donated by Egypt since 2013) to the Libyan National Army (LNA) is purely strategic in nature: Cairo is a declared supporter of General Hafter, whose forces are in dire need of equipment.

In terms of indigenous manufacturing, Egyptian small arms and light weapons (SALW) can also make their way into conflict zones. Many Egyptian SALW are derived from Soviet equipment, for example the Egyptian self-propelled anti-aircraft guns (SPAAG) converted from Soviet howitzers and guns. AOI also produces 122mm *Saqr* multiple rocket launchers (MRL). SALW capabilities are not new to Egypt, as can be seen in Figure 1 opposite. The Institute for National Security Studies in Israel reports that Egypt is also capable of indigenously producing mines, magnetic mine-clearing systems, as well as artillery fire control systems. In a tumultuous region, these are the items that pose proliferation risks. Although it is difficult to confirm, AOI-produced MRLs and high-explosive anti-tank projectiles have reportedly been seen in Syria since 2013.[23]

Low aims rarely disappoint

Because Egyptian industry has longer-standing relationships with the US and because – unlike Saudi Arabia and the UAE – Egypt does not formally consider domestic arms production as a core tenet of its strategic ambitions, it is less demanding of offsets and sometimes a more natural partner. It is also the only one of the three states that does not have a formal diversification plan (and whose stability is more imminently threatened than that of Saudi Arabia or the UAE).

That said, the irony of the economic aims of 'Military Inc.' is that strategic alliances are organised in such a way that they keep current factories open, rather than spill over into other sectors of the economy. Contrary to neighbours such as Israel, the defence-growth nexus in Egypt shows that more defence spending actually decreas-

23. N.R. Jenzen-Jones, 'Sakr 122mm Cargo Rockets & Submunitions in Syria', *The Rogue Adventurer*, 15 January 2013. Available at: https://rogueadventurer.com/2013/01/15/sakr-122mm-cargo-rockets-submunitions-in-syria

es overall economic growth, This partially results from the curse of receiving foreign subsidies for military production: foreign funding has nearly imposed a ceiling on the development of the Egyptian DTIB. Perhaps relations with China – and indeed Russia, should the large influx of imports from 2015 and civil nuclear cooperation deal perpetuate – will raise this ceiling. But ultimately, the lack of autarky compounds itself in the Egyptian case due to chronic domestic under-investment in the industrial sector, namely in education and R&D.

Chapter 4

Saudi Arabia: the box-ticker

The main driver of Saudi defence industrialisation has been the deepening of ties with and concomitant frustration with the US. In the early 1980s, Saudi programmes sought to become more independent from suppliers with strong connections to Israel. The US has previously reassured Israel that it will be the only operator of the F-35 fifth generation fighter jet in the Gulf, regardless of interest from GCC countries. The Obama administration in particular irked the Kingdom, notably including the refusal in 2013 to export armed *Predator* UAS. This has translated into a renewed determination to bolster the domestic DTIB. As recently as February 2016, the spokesperson for the first-ever Armed Forces Exhibition for Diversification (AFED) of Local Manufacturing, Brigadier General Attiya bin Saleh Al-Malki, explained the motivation of the exhibition as a desire 'to break [away from] the monopoly of international companies.

Ticking boxes

To date, Saudi attempts at arms production fall into one of two categories: either risk aversion or pipedreams. The Kingdom has historically ticked boxes of offset agreements, and there is a sizeable difference between offset requirements and their enforcement and added-value. According to one law firm, from 1988-2006, the 36 offset-established companies were only valued at $4.5 billion and created 120-150 jobs for $1 billion of military contracts, whereas offset obligations would have totalled at $45-55 billion of capitalisation and the equivalent in foreign direct investment (FDI) would have created 750-2,600 jobs per $1 billion of contracts.[24] Furthermore, of this $4.5 billion from offsets, only 13% of investments went into aircraft and electronics industries, with other sectors such as food, medicine and health management as beneficiaries of indirect offset agreements with limited relevance to military production.[25]

24. 'GCC Defense Offset Programs: The Trillion-Dollar Opportunity', *AT Kearney,* 2015, p. 3. See: https://www.atkearney.be/documents/10192/3278959/GCC+Defense+Offset+Programs+-+The+Trillion-Dollar+Opportunity+v2.pdf/4a92196a-fb52-4bb8-835c-cc4f04cf30ce.

25. Anuradha Mitra, 'A Survey of Successful Offset Experiences Worldwide', *Journal of Defence Studies*, Institute for Defence Studies and Analyses, 2009. Available at: http://www.idsa.in/jds/3_1_2009_ASurveyofSuccessfulOffsetExperiencesWorldwide_AMitra

Either pipedreams or rhetoric

When the Saudis are not playing it safe, their ambitions appear to be somewhat unaligned with reality. Following talks about opening an assembly plant in 2013, the Saudi company TAQNIA Space signed an agreement with the Ukrainian firm Antonov to jointly produce modified An-132 light cargo aircraft with only Saudi and Ukrainian nationals as employees. This marks the first time that Saudi Arabia has embarked upon large-scale aircraft assembly. Their choice of partner, however, does not inspire confidence that the venture will succeed. Antonov has become dependent on re-sales of Soviet-era aircraft and barely maintains production today, meaning it is improbable that the firm has maintained industrial capabilities. The first prototype of the An-132 was seen in December 2016, and in the future the two firms are expected to build 8-12 aircraft per year. This short turn-around time suggests that Antonov – desperate for financing, especially in light of severed ties with Russia – would be the partner holding the reins on modifying payload, range and take-off capabilities.

Vision 2030 unveiled the Kingdom's desire to raise local defence manufacturing from 2% to 30-50% by 2030. This is widely recognised as unrealistic, particularly because 10-15 years is a short amount of time in inherently long defence life cycles, and it is possible that recent efforts to revive the Saudi DTIB are more knee-jerk reactions to low oil prices and a rocky relationship with the US. Even if major gains are made, they could be from 'ghost-workers', or those brought in to fill quotas, for example having Saudi firms tick boxes by marketing what foreigners engineer, rather than enhance productivity. Whether the Saudis meet this target by 2030 should not be the main point of concern. Rather the intention is more important, and the question is from whom they will be drawing lessons.

One answer is bringing in many foreign consultants. Bin-Salman is not the only young voice orchestrating Saudi diversification efforts; consultancies including Booz Allen Hamilton, Boston Consulting Group, and McKinsey are all working closely with the Saudi Ministry of Defence to increase the effectiveness – including mitigating corruption – of weapons procurement procedures and interagency coordination.

Another answer lies in a broader focus on using foreigners' expertise to create more sustainable jobs in Saudi Arabia. Firms such as BAE Systems have employed offset arrangements to enhance education partnerships with industrial parks, and top universities such as Stanford and the Massachusetts Institute of Technology are also investing in the Saudi manufacturing sector. General Electric, seeking to double its presence in the Kingdom, is investing in the region's first forging and casting factory for supply materials for maritime and energy industries.

Stronger governance for stronger industry

The incursion of militants based in Yemen and Saudi Arabia in 2009 was a wake-up call for the Kingdom to modernise its military capabilities. In addition to one of the largest procurement initiatives ever undertaken, the armed forces were professionalised by replacing heads of services with non-royals.[26] Concurrently, changes to the Saudi governance system for defence industrialisation began in earnest in 2010 with the creation of the Central Committee for Local Industrialisation. The Committee acts as a forum for industry and government leaders to collaborate on local capability development and enhancing performance.

The year 2010 also marks the first time that local firms were able to bid on supply contracts for basic materials. In 2013, the Ministry of Defence passed a new law regulating the General Organisation for Military Industries, designed to give priority to domestic producers over foreign firms. In the same year, the Kingdom established of the Saudi-British Economic Offset Programme (EOP), key not only to arms production deals, but also to training and educational partnerships.

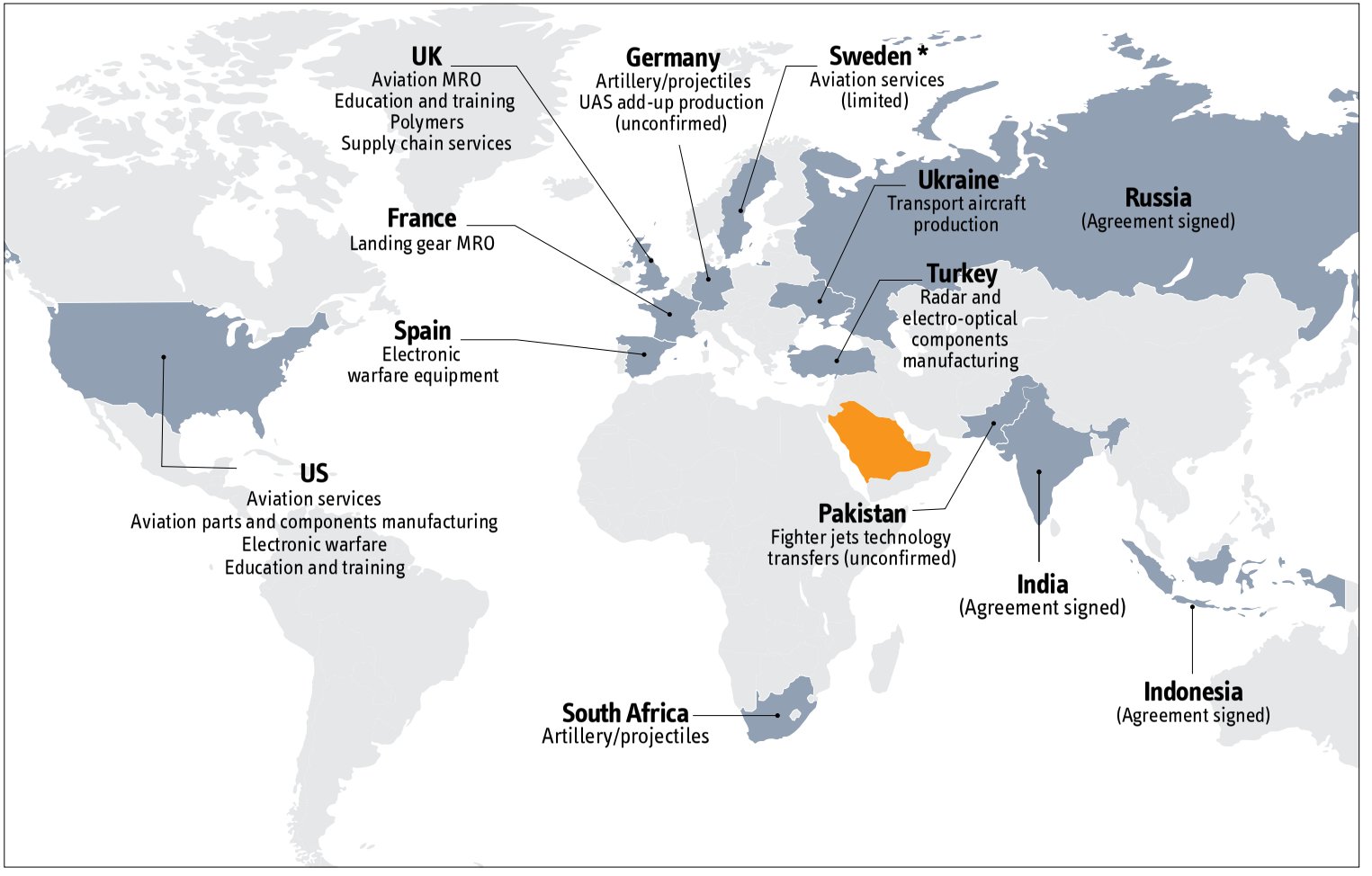
Actions speak louder than words

Deputy Crown Prince Mohammed bin Salman has cited military production as a cure for Saudi Arabia's oil addiction, but today Saudi industrialisation remains largely rhetorical. In February 2016, AFED officials suggested that Saudi Arabia would localise 10% of production; by April 2016, the *Vision for the Kingdom of Saudi Arabia* raised local production stakes to 30-50% by 2030, starting with the foundation of a military holding company. Looking towards 2030 and even further down the road, the health of the Saudi DTIB will depend on sustained motivation and investment. This means that a hike in oil prices could perhaps draw attention away from diversification efforts – or perhaps divert funds more towards petrochemical industries rather than arms manufacturing.

The Deputy Crown Prince has already begun to implement some strategic changes leading up to the announcement of the National Transformation Plan (NTP). The largest defence firm in the Kingdom – the Saudi Military Industries Corporation (MIC) – has a new chairman, Mohammed al-Mady, who is known for the 'Saudisation' of the petrochemical industry and close industrial ties with the US. Personal relationships remain paramount: the Deputy Crown Prince is the chairman of MIC, and Al-Mady will also report to his chief of staff, demonstrating the close ties between the government and defence industry.

26. Emile Hokayem and David B. Roberts, 'The War in Yemen', *Survival,* vol. 58, no. 6, International Institute for Strategic Studies,21 November 2016.

FIGURE 2: FOREIGN PARTNERS HELPING DEVELOP THE SAUDI DTIB



Source for data: EUISS.

New partnerships

Since beginning reform of its defence industrial sector, Saudi Arabia has also taken steps to diversify its DTIB strategic alliances. In 2014 alone, the Kingdom signed defence cooperation agreements with three countries – Indonesia, India and Pakistan – that contain clauses on industrial cooperation. Regardless of how realistic a prospect defence industrial collaboration is with these countries, the interest demonstrates two trends. Firstly, Saudi Arabia is taking DTIB development seriously, and it is becoming more of a mainstay in more general military and defence agreements. This can be seen in the recently formed joint venture, from February 2016, between the Turkish firm Aselsan and TAQNIA. The two are expected to jointly develop defence electronics, but it remains too early to see in which direction Saudi-Turkish defence industrial relations will head. Secondly, Saudi Arabia is testing the waters of working with less traditional partners, namely due to frustration with lack of technology transfers from the West.

Apart from the rudimentary relationships with countries like Indonesia or India, some other trading relationships, namely those with Ukraine and South Africa, have already acquired more concrete form.

One unique feature of the agreement between Ukraine and Saudi Arabia to produce cargo aircraft, described above, is that Saudi Arabia will own the IPR, even if the Saudi nationals play a minimal role in the prototypes and initial production. This effectively buys time for TAQNIA – as well as the other partner, the King Abdulaziz City for Science and Technology (KACST) – to try to play catch up. Furthermore, export prospects may be limited by the fact that the aircraft, which uses US navigation systems, will still remain subject to the US International Traffic in Arms Regulations (ITAR) export controls.

Apart from Ukraine, South Africa is also increasing its footprint in Saudi Arabia. When the US denied Saudis access to armed UAS in 2013, the Saudi response was to pivot to another partner willing to help them develop the capability. The South African firm Denel Dynamics quickly agreed to help the Saudis with the development of an armed version of the *Seeker* 400 UAS, initially used for surveillance purposes. The Chinese are also likely to capitalise on this 'lost opportunity'. In March 2017, a large export order for Chinese *Wing-Loong* II UAS, largely copied from the US *Reaper*, was signed for an undisclosed customer in the Gulf, with some speculation that they will be delivered to the Kingdom. Denel has reportedly signed an agreement with Prince Sultan Advanced Technologies Research Institute (PSATRI), although PSATRI's role in the supposed collaboration is not confirmed. Armed *Seekers* have not yet been rolled out, but the collaboration between Denel and Saudi Arabia has already become more robust in the past three years. In 2016, the joint venture between Denel and Rheinmetall opened a projectiles factory in Al-Kharj with Saudi's arms giant MIC. In the same year, Denel also began co-producing ATGMs with ITEAC Group, another Saudi defence firm.

Even though these developments focus primarily on the land domain, the increased emphasis on ammunition and artillery could potentially be an indicator that, down the road, South Africa would also co-develop the *Mokopa* and *Impi* missiles to be equipped on the *Seeker* 400. Indeed the former is already found on manned systems in Algeria, suggesting that the South Africans are more open to proliferating the technologies than others are.

Treading water

The Kingdom's efforts to foster a domestic defence industrial base have focused on training for select platforms and systems, rather than capabilities. This preoccupation with platforms has continued with recent deals such as co-production of the An-132. As a result, even technology transfers and opportunities created through offsets do not spill over into new capability development areas. With low multiplier effects, Saudi Arabia goes through the motions of diversifying its economy, but efforts are doomed to fail if the Kingdom does not begin to prioritise markers of a knowledge-based economy such as R&D investment, education and retention of skilled labourers.

Although Saudi Arabia ranks above most of its regional neighbours (with the exception of the UAE and Bahrain) when it comes to the Knowledge Economy Index, and has made significant progress over the last decade, it still lags far behind highly performing economies able to deliver the necessary framework for national defence industries. In 2012, it ranked 52 out of 140 countries. In large part, this has to do with Saudi Arabia's failure to leverage its own population. Although progress in the educational field has been extensive, enrolment levels in secondary and tertiary levels are still low, and public spending on education continues to remain inadequate. Consequently, there still are considerable recruitment shortages when it comes to qualified nationals in science, technology and engineering. Students in those fields are still fewer than 1.0 per 1,000 people aged 20 to 34, a low number compared to the ratio in the average developed country; the quality of education is equally below standard. Brain drain is a major problem for this already small pool, too, as 25% of these graduates emigrate. R&D activities and expenditures remain a mystery in Saudi Arabia as they are not being monitored – in part because they are too few to matter. Most universities are focused on their educational rather than research task.

Despite the oil boom and financial liquidity, Saudi Arabia offers limited specialised loan and risk capital to innovation-oriented companies. Saudi investors tend to be risk averse and less favourable towards extending funds to young technology-driven companies, which almost always have a high-risk profile. Banks and investors are currently geared to extending funds to companies in established sectors such as trade and consumer-goods, wholesaling and retailing.

But with renewed political will from Deputy Crown Prince Bin Salman, Saudi Arabia is certain to focus more on its DTIB in the coming years. The question will then be the extent to which strategic alliances will continue to come overwhelmingly

from the West, or whether these examples of untraditional partners will increase their market share in the Kingdom. Fostering defence industrial relationships with non-traditional partners is likely to continue as a mainstay in defence cooperation agreements. The extent to which Saudi Arabia *depends* on other partners, however, will depend largely on the post-Obama Saudi-US relationship.

For the US, this will depend on whether the shifts in the Saudi-US relationship were specific to the Obama years, or whether they are more permanent. In terms of defence cooperation – on operational as well as industrial levels – between the two countries, it is not yet clear whether the two are more systematically moving away from one another (which would be much more clear if Saudi partnered with, for example, Russia and China, rather than strategic partners like South Africa) or whether the bilateral relationship was only put under strain in the Obama years. The report on the ties between the Saudi government and certain 9/11 plotters, released in the summer of 2016, has already led Congress to consider measures against Riyadh.

For Europe, this could very well depend on the political appetite to continue arming Saudi Arabia in light of human rights concerns. In 2015 alone, 882 out of 893 arms exports licences from EU member states to Saudi Arabia were granted, and only one of the remaining 11 refusals was tied to 'risk of diversion' instead of human rights concerns. Voices advocating for stronger military capabilities and economic diversification *vis-à-vis* indigenous arms production come at a sensitive time. Ranging from domestic executions to high numbers of civilian fatalities in the Saudi-led coalition in Yemen, human rights concerns have generated an impetus for arms embargoes against Saudi Arabia. A proposal to embargo Saudi Arabia was brought to the UK parliament, but did not culminate in a vote. The Netherlands became the first EU member state to halt arms sales to Saudi Arabia and the European parliament voted in favour of a non-binding EU-wide arms embargo last year, and in a political debacle in 2015, Sweden also chose to not renegotiate a defence memorandum of understanding (MoU) due to a diplomatic row involving women's rights concerns. Paradoxically, this could lead Saudi Arabia to take indigenous production more seriously. Historically, the rise of second-tier arms producers – including Iran and South Africa – has grown out of a sudden need to increase autarky.

Saudi defence industrial capabilities are still overwhelmingly reliant on the West, but the diversification of strategic alliances suggests preliminary steps aimed at enabling the Kingdom diversifying away from the US and Europe, although not necessarily following through on the stated desire to become more autarkic.

Chapter 5

United Arab Emirates: the up-and-comer

The Emirati DTIB is significantly younger than its Egyptian and Saudi counterparts. State-owned firms in the UAE only began dabbling in defence services and industry related to maritime security 20 years ago. Yet today, the UAE appears the most promising of the Arab candidates seeking to gain emerging arms producer status. Indeed the UAE has also been more explicit about becoming a net arms exporter, already differentiating its motivations from the other regional players.

In part, this has to do with the fact that the Emirati economy is in a better position to provide the necessary ingredients for a knowledge-based economy: in 2012, it ranked 45 out of 140 on the Knowledge-economy Index (compared to Egypt, which ranked 97). Its Vision 2021 made the transition to a knowledge-based economy a stated goal; within 11 years, the Emirati government aims at ranking among the top ten countries with regard to innovation, triple its R&D spending to 1.5% and nearly double the share of 'Knowledge Workers' in the labour force.[27] That does not imply that the UAE does not have its fair share of challenges relating to its economic conditions: the quantity and quality of its educated labour force is still a concern, as is low investment in education as well as in R&D.

The most important signal that the UAE is serious about its DTIB came in December 2014, when it was announced that it would consolidate the majority of its productive, existing companies into a new firm: the Emirates Defence Industries Company (EDIC). The thinking behind creating EDIC extends to the entire *raison d'être* of the Emirati DTIB: (i) to diversify the economy, and (ii) to align the national defence industry to better serve the UAE armed forces and become a more dominant regional exporter.

Pragmatism over pipedreams

Even as the youngest industry, the UAE takes a more pragmatic approach to bolstering its defence industrial capabilities. In 2015, 10% of the UAE's GDP came from the manufacturing sector. With the aim of entering the Global Innovation Index by 2021 (as expressed in Vision 2021), the UAE is targeting to grow this figure to 20-

27. Allam Ahmed & Ibrahim Abdalla Alfaki, 'Transforming the United Arab Emirates into a knowledge-based economy: The role of science, technology and innovation', *World Journal of Entrepreneurship, Management and Sustainable Development*, vol.9, no.1, 2013, pp.4 -13.

30% by 2020.[28] This is already far more realistic than the Saudi goal of increasing local military production from 2% to 50% in fewer than 15 years, particularly because the target does not distinguish between military and civilian production.

Emirati pragmatism is also reflected in recent governance reforms, which underpin the success of any DTIB. In 2010, the Offset Program Bureau (now the Tawazun Economic Council) identified certain segments within the defence sector as priority investment areas and enforced penalties for underperforming programmes *vis-à-vis* offset obligations. In February 2013 – in a position similar to Saudi Arabia with limited technology transfers from the US – the UAE announced increasing focus on fostering joint ventures in the defence and security sector. Eight years after attempting to create a Joint Logistics Model (JLM), the UAE finally rolled out its JLM in December 2013. Focusing on public-private partnerships with both domestic and foreign partners, the JLM created centres of excellence that refocus partnerships on performance (output and outcome) instead of relationships.

With over 80 companies reportedly registered in Abu Dhabi, Dubai and Ras al-Khaimah, the UAE has the highest concentration of companies in the shipbuilding, aviation, unmanned systems, and land systems segments in the GCC. Most of these 80 firms are subsidiaries stemming from a variety of state-owned investment funds. The consolidation of the Emirati supplier base will also help the defence industry reach economies of scale. Because investment is spread across a greater number of firms that achieve lower output levels, the defence industry is currently not optimised. By merging services-based defence firms together, the UAE will enable more effective R&D expenditures and delivery of parts, components, and services at a lower, more competitive cost. Diversification of the non-oil economy relies heavily upon the development of knowledge and expertise for the UAE labour base. In addition to the economic benefits offered by restructuring, the perception of modernisation also serves to attract foreign investment. To this end, the formation of EDIC may be understood as an *Emiratisation* initiative.

Since the signing of a MoU between three state-owned investment firms to explore 'the synergy opportunities that could be created by the unification of their defense services businesses' in April 2014, the UAE has made significant strides to become the leader of indigenous Arab defence industry development. The new conglomerate, EDIC, resulted from a massive merger between Mubadala Development Company (which maintains a 60% stake), Tawazun Holding LLC, and the Emirates Advanced Investments Group (EAIG). At present, the 16 subsidiaries that compose EDIC provide defence services, namely MRO, and also manufacturing of firearms, munitions and aviation components. According to one account from November 2015, the 16 EDIC subsidiaries employ 10,000 individuals.[29]

28. 'UAE defence industry set to grow', *Gulf News*, 19 February 2015; 'First-ever Abu Dhabi Aviation and Aerospace Week starts', *The National*, 5 March 2016.

29. Alexander Cornwall, 'Edic merger to be complete "very soon"', *Gulf News*, 8 March 2016.

TABLE 4: EDIC COMPOSITION AND PARENT ORGANISATION

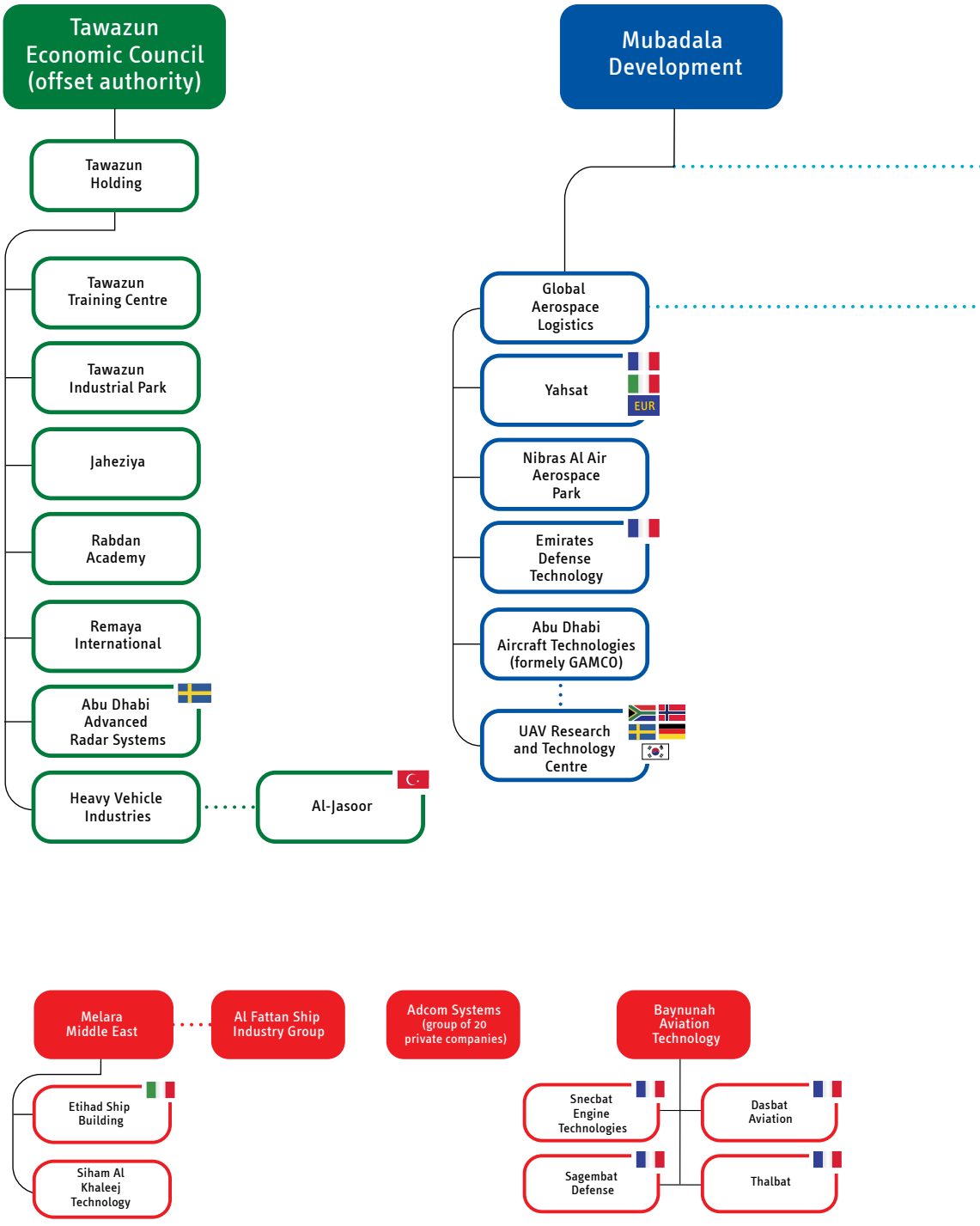
Parent organisation	EDIC (spun-off subsidiaries)		Remaining subsidiaries	
	EDIC subsidiaries	**EDIC Segments**	**Defence and security segments**	**Other investment areas**
Mubadala Development Company	Advanced Military Maintenance Repair Overhaul Centre* Al Taif Technical Services** Bayanat for Mapping and Surveying Services Horizon International Flight Academy	MRO Training	Aviation manufacturing and training Aviation MRO Aircraft engines Data centre facilities Information communications technology Port management	Commercial aviation Financial services Healthcare Metals & mining Oil & gas Real estate Renewables Semi-conductors Telecommunications Utilities
Tawazun Holding LLC	Abu Dhabi Autonomous Systems Investment (ADASI) Burkan Munitions Systems* Caracal International Caracal Light Ammunition NIMR Automotive* Tawazun Dynamics* Tawazun Precision Industries*	Firearms Aviation components	(Tawazun Offset Council) Training facilities	Commercial firearms
Emirates Advanced Investments Group	C4 Advanced Solutions* Global Aerospace Logistics, LLC Naval Advanced Solutions Secure Communications Thales Advanced Solutions*	Weapon system maintenance Aircraft maintenance Information technology	Aviation MRO Computer simulation R&D for land systems and naval technologies	Food and agriculture Firefighting Healthcare Leadership training and consulting Real estate Travel

**Involved in strategic alliance with foreign partner*

***Involved in strategic alliance with domestic partner*

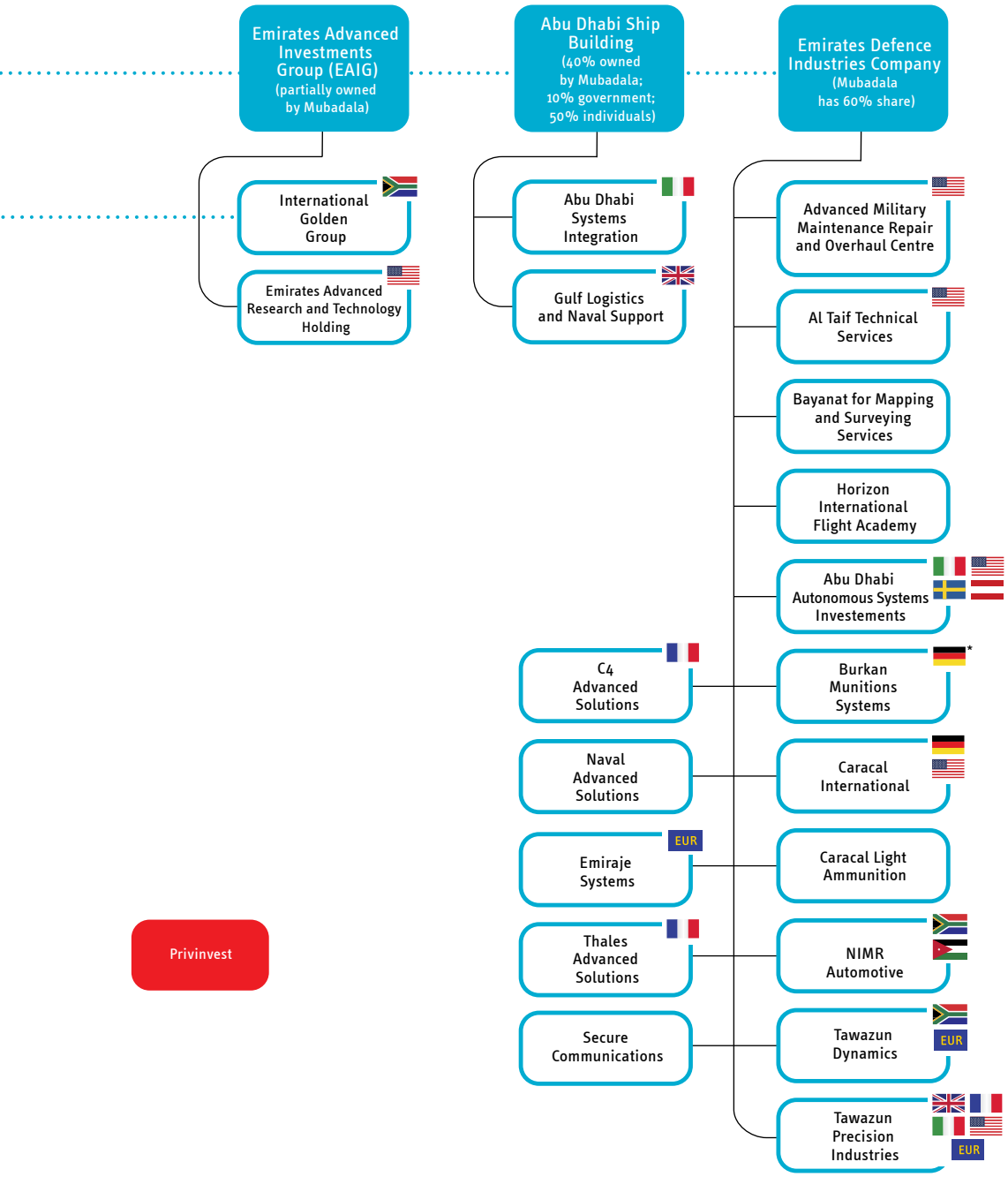
Source for data: EUISS

FIGURE 3: STRUCTURE OF EMIRATI DTIB



* Burkan Munitions Systems was 40% owned by the German firm Rheinmetall until 2012, when it sold its remaining shares to Tawazun.

Source for data: EUISS


Emirates Advanced Investments Group (EAIG)
(partially owned by Mubadala)
Abu Dhabi Ship Building
(40% owned by Mubadala; 10% government; 50% individuals)
Emirates Defence Industries Company
(Mubadala has 60% share)
International Golden Group
Emirates Advanced Research and Technology Holding
Abu Dhabi Systems Integration
Gulf Logistics and Naval Support
Advanced Military Maintenance Repair and Overhaul Centre
Al Taif Technical Services
Bayanat for Mapping and Surveying Services
Horizon International Flight Academy
Abu Dhabi Autonomous Systems Investements
Burkan Munitions Systems
Caracal International
Caracal Light Ammunition
NIMR Automotive
Tawazun Dynamics
Tawazun Precision Industries
C4 Advanced Solutions
Naval Advanced Solutions
Emiraje Systems
Thales Advanced Solutions
Secure Communications
EUR
Privinvest

Mubadala continues manufacturing, training, and MRO for aviation and also owns dual-use subsidiaries related to ICT, data centres, and port management. EAIG also remains a player in aviation MRO in addition to computer simulation and R&D for land systems and naval technologies. While Tawazun's stake in production is minimal, it owns six training facilities and the Tawazun Economic Council remains the arbitrator of Emirati offset agreements.

Serious about services

The creation of EDIC should be also understood as a strategic move to become the regional focal point for MRO. The UAE emphasis on defence services represents a desire to ensure the capability of operationalising the large quantities of arms that it imports. As GCC countries become increasingly militarised, the existence of a service-oriented firm that enjoys well-established relationships with US and European defence firms is intended to situate the UAE at the forefront of military action. Especially as a regional MRO hub, the UAE may be attempting to assure a leadership role in regional defence cooperation in the future. Should military cooperation take place between GCC countries, EDIC could become a crucial centrepiece of MRO in the region.

The JLM has also been key in having a central logistics hub to operationalise the myriad platforms owned by the Union Defence Forces. The UAE has used this as an opportunity to provide experience to EDIC subsidiaries. Al Taif has a 20-year contract to provide MRO, technical and virtual training, supply chain management, R&D and IT support for all Emirati land systems. The Advanced Military Maintenance Repair and Overhaul Centre (AMMROC), a joint venture with Lockheed Martin, has also been selected for MRO for the 32 fixed- and rotary-wing platforms operated by the Union Defence Forces.

Interoperability is also a major consideration; EDIC is positioned to service other militaries' equipment. A high degree of trust and competency is ensured by the fact that Western firms – including Boeing, Lockheed Martin, Raytheon, Rheinmetall, and Thales – are already engaged in joint ventures with EDIC subsidiaries. The UAE is an attractive option for U.S. and European defence firms that do not want to return armaments home for lengthy, expensive repairs. For the lower-skilled jobs in the arms industry, the inexpensive foreign labour base in the UAE also increases the profit margin.

Hubs and spokes

The globalisation of the defence industry led to a division of labour between first-tier arms producers taking the lead and the lower tiers acting as junior partners. With junior partners, including the UAE, engaging in joint ventures and subcontracting relationships, a 'hub and spoke model' has emerged with monopolistic first-tier arms producers as the hub, and lower tiers as dependent spokes.[30] This means that

30. Richard Bitzinger, *Towards a Brave New Arms Industry?* (London: International Institute for Strategic Studies, 2003), p.74.

Emiratis are producing components for the platforms they import. The question for Western arms producers and governments to consider is whether these spokes will eventually replace – rather than duplicate – capabilities mastered by more advanced defence industries.

As well as having trained personnel to service the mass amounts of military equipment that the UAE imports, EDIC also represents an effort to localise the lower end of the supply chain. The EDIC subsidiary Tawazun Precision Industries has produced parts for a variety of metallic components for aviation platforms, including for Boeing tactical aircraft, Dassault *Falcon* 7X aircraft and Airbus, as well as Selex infrared seekers and the MBDA *Marte* missile programme. Through its joint venture C4 Advanced Solutions, Thales also uses its EDIC subsidiary for sub-contracted defence electronics produced in country.

ADSB also established a joint venture in 2005 with Selex (part of Leonardo/Finmeccanica) to produce integrated electronic systems, then mounted on both of the largest co-produced vessels in the UAE: the *Ghannatha* and the *Baynunah*. The latter, managed by Baynunah Aviation Technology and subsidiaries as displayed in Figure 3, is perhaps the most important deal in developing Emirati military shipbuilding capabilities.

Such examples are important for the sustenance of the Emirati DTIB because they are not merely platform-specific. Cyber-security is the realm with the highest demand for offset arrangements, of which 60% of the contract value for defence sales over $10 million are expected to be local (either through production or re-investment). Recognising that it cannot realistically develop sophisticated platforms, the UAE instead leverages its strategic alliances to be the 'spokes' for cybersecurity, as well as the command, control, communications, computers, intelligence, surveillance, target acquisition and reconnaissance (C4ISTAR) capabilities to reinforce the operationalisation of the 'glamour weapons', or equipment that is selected based on its prestige rather than utility, they import.

Spokes and spokes

Not all Emirati defence industrial activities can be characterised as spokes for foreign hubs. Recently the UAE has also engaged in other strategic alliances to co-develop munitions to mount on Emirati platforms.

The Serbian firm Yugoimport curiously signed a €200 million agreement to jointly develop Advanced Light Attack System (ALAS) cruise missiles with an EAIG subsidiary in 2013. The UAE initially transferred €24 million to secure the co-development venture, ALAS is not as accurate as alternatives such as the Israeli *Spike* non-line of sight missile, but evades Western export control restrictions, and is simple and cheap to manufacture.

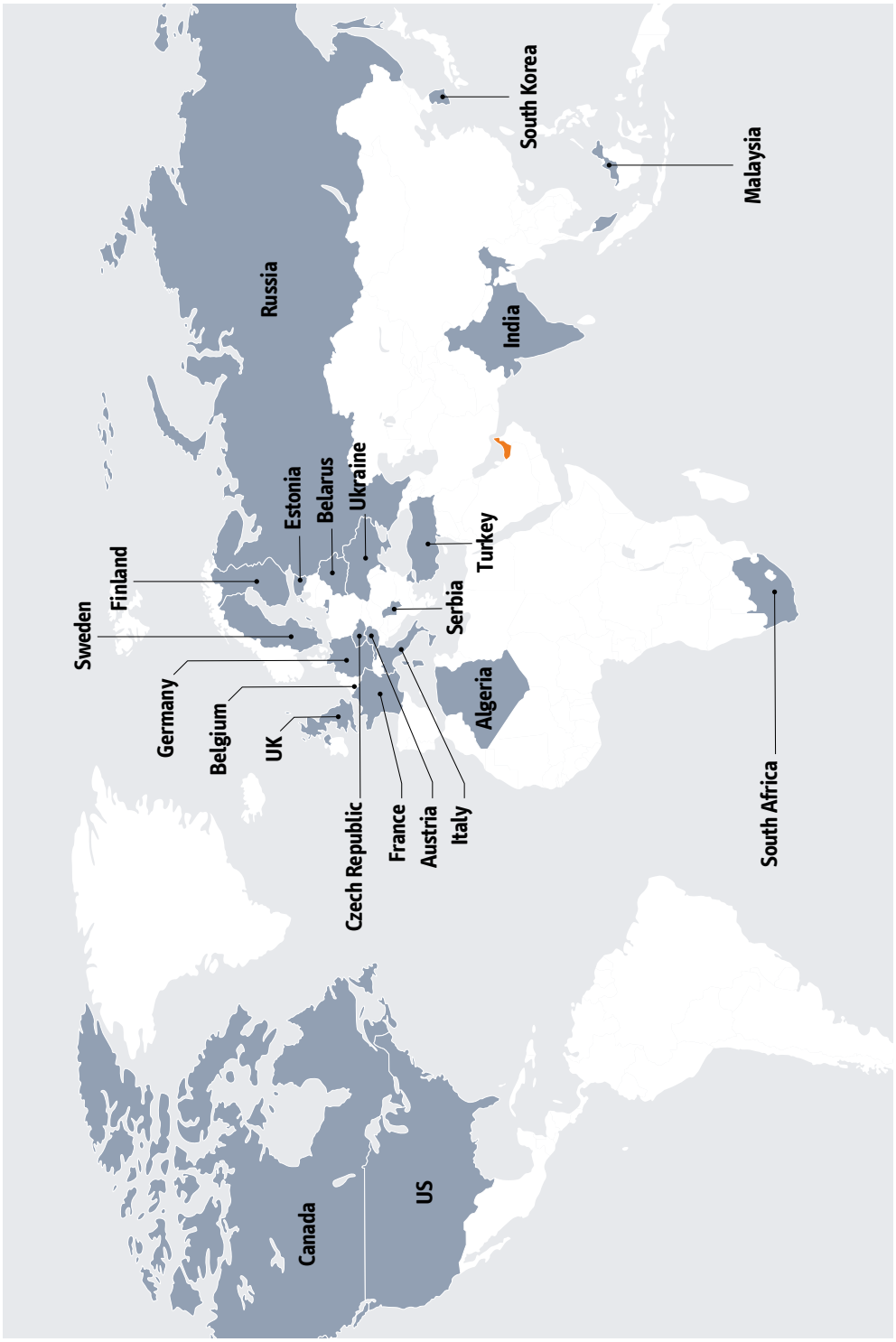


FIGURE 4: FOREIGN PARTNERS HELPING DEVELOP THE EMIRATI DTIB

Foreign partner	Description
Algeria	Land vehicle manufacturing
Austria	UAS technology transfers
Belgium	Land vehicles modernisation
Belarus	(Agreement signed)
Canada	Aviation services; training
Czech Republic	Land vehicle cooperation (marketing, potential future production)
Estonia	Unmanned ground vehicle co-production (agreement signed)
Finland	Ownership of firm(s)
France	Aviation parts and components; defence electronics manufacturing (satellites, ICT, radios); night vision goggle research; ownership of firm(s); satellite manufacturing and services
Germany	Ownership of firms; UAS technology transfers
India	(Agreement signed)
Italy	Aviation component manufacturing; helicopter MRO; ownership of firm(s); patrol boats electronics; supply chain services
Malaysia	UAS production
Russia	UAS production; fifth generation fighter jet co-production (forthcoming)
Serbia	Missile production
South Africa	Extensive land vehicle manufacturing*; PGM and howitzer manufacturing; UAS production
South Korea	UAS technology transfers
Sweden	Radar manufacturing; patrol boats technology transfers
Turkey	Naval vessel production; land vehicle co-production; rocket system manufacturing; unmanned systems cooperation
UK	Aviation parts and components (metallic components, engine components); naval vessel defence electronics; patrol boats electronics
Ukraine	Land vehicle production
US	Aviation MRO; education and training; PGM manufacturing; space and cybersecurity cooperation; UAS training and support; UUS technology development (potential)

*Some South African systems originally from UK (namely BAE Systems)

Source for data: EUISS

Furthermore, although the ALAS missiles were initially designed to be mounted on helicopters or vessels for coastal defence systems, they may be of interest to the UAE chiefly because they can be mounted on 4x4 or 6x6 vehicles. Little information is available about the success of ALAS missiles, but moving toward partnerships with countries like Serbia could decrease dependence on Western munitions – be they imported or co-produced, such as the *Talon*. (That said, the Emiratis would need to find other engines for their land vehicles to truly reduce dependence on the West.)

Box 7: South African munitions

One source of interest in the South African DTIB is that it sustained itself despite the voluntary arms embargo starting in 1963 and UN arms embargo from 1977. Prior to the arms embargoes, South African military capabilities were largely dependent on the UK, and also included some production under license of German and French platforms. South Africa evaded the arms embargo in various ways, including by (1) lobbying internationally against it throughout the 1960s, and (2) vigorously planning for a UN embargo for fifteen years before it was officially agreed upon.[35] Although it did not produce many arms throughout the 1960s, the combination of buying time and strategically and materially preparing themselves enabled the South Africans to become more autarkic.

This relative autarky meant that South African platforms and industrial capabilities came with fewer strings attached by the time the embargo was lifted. Companies like Rheinmetall and BAE Systems can still generate revenues by using joint ventures and other partnerships with South African firms to expand into other markets. Further, in the Middle Eastern context, South African land vehicles have the operational advantage of having always been produced to resist mines and improvised explosive devices (IEDs). While Western suppliers had to adapt to re-focus on platforms capable of rolling over IEDs, South African mine-protected vehicles (MPVs) operated better against roadside bombs.

'Emirati' platforms

For its UAS, the Emiratis prefer to use their own commercial-off-the-shelf (COTS) items in combination with more sophisticated technologies from partners. From the 1990s onwards, the Emiratis have depended on South African (Denel *Seeker*) and later on Austrian (Schiebel *Camcopter*) UAS capabilities. The emphasis on COTS means that the less ambitious programmes meet greater success; a year after opening the UAV Research and Technology (R&T) Centre in 2004, heavily hyped programmes such as the *Yabhon Excellency* and *Yabhon* VTOL fell off the radar. Instead of developing target drones, the UAE's main UAS producer, Adcom Systems, de-

31. See Michael Brzoska, 'South Africa: evading the embargo' in *Arms Production in the Third World*, Stockholm International Peace Research Institute, 1986, pp.193-214

cided to re-focus on simpler reconnaissance systems, such as the *Yabhon*-H.[32] Today COTS options remain supreme and Adcom has gradually built a variety of medium-altitude, long-endurance (MALE) platforms, including the *Yabhon* R, United 40 and Smart Eye.

In many cases, the UAE simply acquires platform designs and rebrands them to be 'indigenous'. Between Denel and the UAE-based military vehicle manufacturer NIMR Automotive alone, €101.9 million worth of contracts for industrial cooperation, were signed as of November 2015. The UAE has systematically re-branded Denel designs, including *Umbani* PGMs (now the *Al Tariq*). Denel's RG-31 armoured vehicle became the Emirati *Agrab* mobile mortar system with an order of 72 vehicles: after 10 were manufactured in South Africa, International Golden Group (IGG) produced the remaining 62 (under Denel supervision) in the UAE. (The Emirati version was initially mounted with Russian systems, but is now fitted with howitzers from BAE Systems and additional munitions from German Rheinmetall and Singaporean ST Kinetics). Most recently, in December 2016, NIMR unveiled its N35 mine-protected vehicle (MPV) – which is a makeover of the RG-35 developed by Denel Vehicle Systems (originally part of BAE Systems), of which NIMR now holds full ownership.

Buying up industrial capabilities

Sometimes the UAE goes a step further than buying up designs: it acquires foreign firms. This is seen more with European firms rather than US firms, partially because the Committee on Foreign Investment in the US (CFIUS), of which no European equivalent exists, has the authority to prevent foreign acquisitions for reasons related to national security. Preventing foreign acquisitions in strategic sectors ensures that foreign firms – especially when they have ties to their host governments – do not strip the original companies of IPR and industrial capabilities. The UAE has dabbled in foreign acquisitions in strategic sectors more as an entry point to build up their own industrial capabilities, although not necessarily at the expense of European capabilities.

In 2013, the state-owned SWF Mubadala increased its ownership of Piaggio Aerospace, an Italian UAS manufacturer, from 33% to 41%. Given this investment, it did not come as a surprise when, in March 2016, the UAE signed a €316 million contract to become the first export destination of the P1.HH *Hammerhead* UAS. According to the terms of the agreement, the UAE will acquire eight *Hammerhead* UAS from Italy (notwithstanding the recent *Hammerhead* crash that has slowed development).

To many the *Hammerhead* acquisition did not come as a surprise, given that the UAE had also established ties with Piaggio when ADASI (a Tawazun subsidiary at the time) financed the development of two maritime patrol aircraft (MPA) prototypes in 2012 with Piaggio and Saab. Such investments do not necessarily transfer skills

32. Jon Lake, 'In the Drone Zone', *Arabian Aerospace*, 29 October 2010.

to help develop Emirati industrial capabilities, but they do bolster Emirati military capabilities (with the combination of manned-unmanned aircraft) and also create market entry points that companies such as ADASI may leverage down the line. Indeed marketing for the MPA has already actively begun not only in the Middle East and Africa, but also as far away as Asia and Australia.

Another key player is Privinvest, an Emirati holding company that specialises in maritime investments. Similar to the Piaggio case, the Emirati shipyard Abu Dhabi MAR (through the Al Ain International Group and shipyard investment arm, Privinvest) owns the French shipyard Constructions Mécaniques de Normandie (CMN). The Emiratis have owned CMN since 1991. Little over a decade letter, in 2004, the Emirati firm ADSB secured a deal to produce six *Baynunah*-class corvettes with CMN, with the first constructed in France (delivered in 2011) and the rest in Abu Dhabi. As a Privinvest company, it is possible that not only skills, but also IPR, have been transferred from CMN to the UAE. Indeed the UAE expressed interest in selling the *Baynunah* to the Saudi and Kuwaiti navies, showing that the ownership of CMN is a move potentially targeting increased exports in the Gulf.

In addition to CMN, Abu Dhabi MAR has also heavily invested in other European shipyards. In a deal with ThyssenKrupp, Abu Dhabi MAR acquired a controlling interest in Nobiskrug yard, as well as another German shipyard which it renamed Abu Dhabi MAR Kiel. Emirati interest in European maritime industries is not purely military; these shipyards also produce and service yachts and commercial vessels. The Emirates are also interested in the refitting capabilities offered by European shipyards. The initial deal was supposed to have a more military character, but today contracts tend to be more for super-yachts rather than naval vessels. Another Privinvest company is Isherwoods, the British maritime services provider, which services military and commercial vessels alike (including the Emirati navy as a client).

That said, Nobiskrug does have designs for the *Nobis* FAC60, a fast attack craft, of which the UAE may take advantage down the road. (Some reports indicate that the *Nobis* can also store *Camcopter* UAS, the basis for Emirati UAS designs, suggesting that future Emirati acquisition of the fast attack craft could also be a platform on which indigenous Emirati equipment could be mounted.) The Nobiskrug naval division also states that it offers corvettes, offshore patrol vessels, rescue vessels and research vessels. Furthermore, Abu Dhabi MAR also acquired Hellenic Shipyards, one of the pillars of the Greek maritime industry, from ThyssenKrupp, and indeed Abu Dhabi MAR-owned Hellenic Shipyards has a contract to build German HDW U214 submarines in Greece.

IGG has recently taken on similar activities. The UAE has three unmanned surface vessels (USVs) – called *Sea Serpent*, *Oscar* and *Bravo* – which are nearing end of production. IGG acquired the Finnish firm Boomeranger Boats Ltd, which is involved in the USV market as well. Another common denominator between the IGG acquisition and the commercial strategy of Privinvest companies is to acquire yachting businesses that can also deliver military solutions. The three Emirati USVs are intended to patrol yacht harbours, but will also foray into offshore border patrol and

other maritime missions. It is not clear what the relationship is to Al Seer Marine, another Emirati firm attempting to design a mid-size USV.

Other investments and acquisitions are used more as market entry points and have limited connections with Emirati industry. This includes Mubadala's ownership of Sanad and SR Technics, two Swiss aviation firms, as well EDIC ownership of Merkel, a German small arms manufacturer. Some Mubadala subsidiaries in the US are potentially dual-use, but appear to be run entirely separately from the parent conglomerate.

Most European countries have moved towards privatisation of their DTIBs in the past two decades. Some countries maintain 'golden shares' through partial ownership, which gives them significant influence over strategic decision-making in the boardroom (rather than day-to-day management). But what happens when private companies are subject to the 'golden shares' of foreign governments? Thus far the Emiratis have not interfered in existing management structures, nor do they treat their investments as licence to micromanage firms abroad. But, nonetheless, deals with the likes of CMN and Piaggio – potentially with Nobiskrug as the next in line – are not coincidental. These investments represent ways in which the UAE strategically bolsters its military capabilities in innovative ways that extend beyond having an enormous defence budget and merely importing.

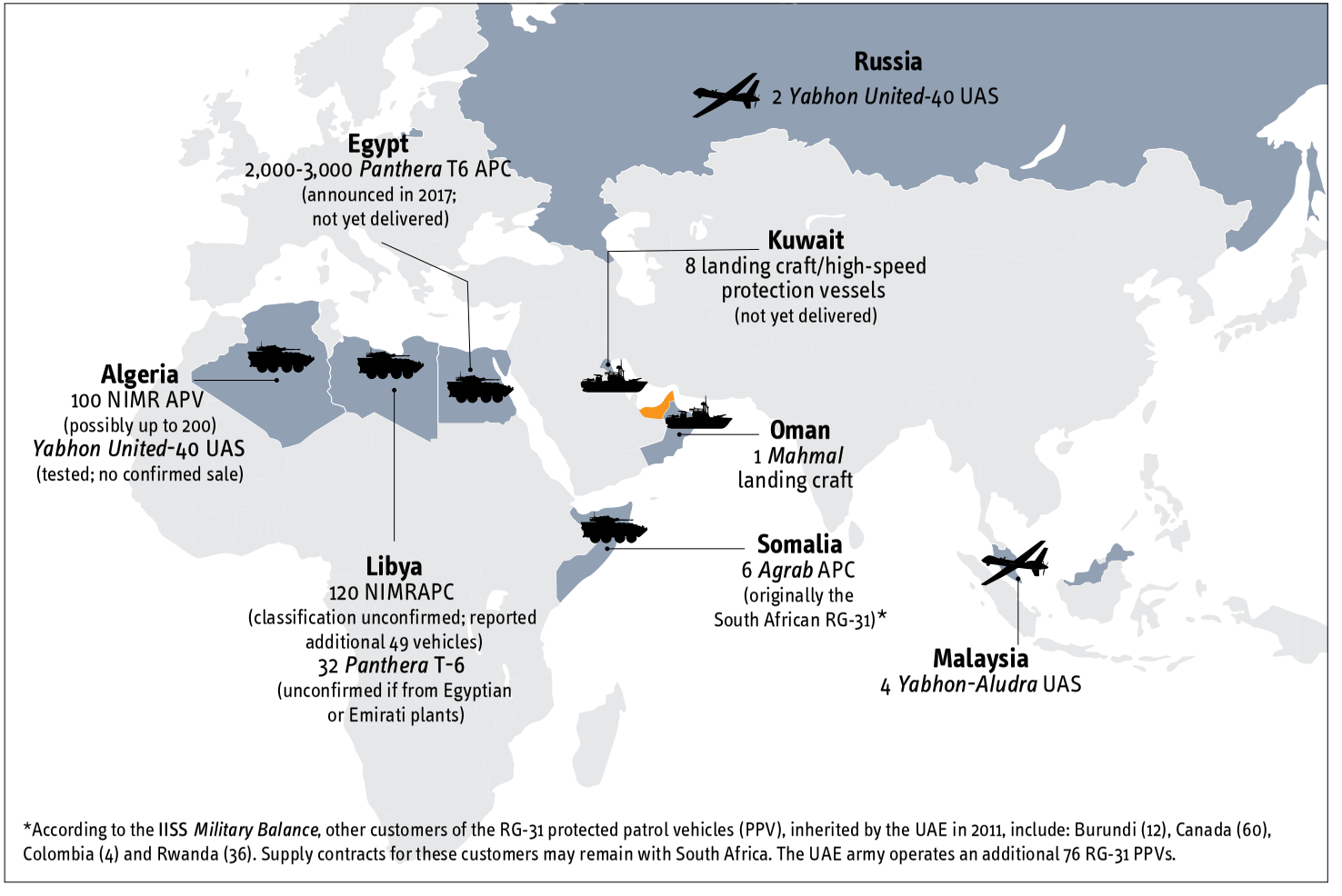
Proliferation and Emirati export ambitions

Another way that the UAE differentiates itself from Egypt and Saudi Arabia is in its ambition to become a net exporter in the next ten years,[33] The UAE already exports land vehicles, landing craft and UAS to many of its neighbours, bringing it one step closer to becoming a regional powerhouse. As seen in Figure 6 on page 64, Emirati firms also have more international export ambitions. NIMR stated its 2016 goal to expand to Southeast Asia (Indonesia, Malaysia, the Philippines and Thailand) as well as eastern Europe. Recent agreements with Belarus, the Czech Republic, Estonia, Serbia and Ukraine show that the UAE is following through on these intentions – and is indeed partnering more with Russia and Eurasia. In February 2017 the Russian defence giant Rostec and the UAE Ministry of Defence announced that next year the two will begin co-development of a fifth-generation fighter jet based on the MiG-29 (compatible with many of the Soviet-era legacy aircraft operated in the region).

The UAE is also actively partnering with others in the MENA region. In 2012 NIMR also signed an agreement to co-produce APCs with Algeria. The decision to locally produce 2,500 NIMR vehicles in Algeria also suggests that the UAE is seeking an entry point into African markets – a purely economic move, as Abu Dhabi and Algiers do not see eye-to-eye on a number of issues, ranging from the Syrian civil war to the conflicts in Yemen and Libya.

33. Sandra Erwin, 'Defense Industry Eyes Growth in the Middle East', *National Defense Magazine*, 2 May 2014.

FIGURE 5: FOREIGN CUSTOMERS OF EMIRATI MILITARY EQUIPMENT



*According to the IISS *Military Balance*, other customers of the RG-31 protected patrol vehicles (PPV), inherited by the UAE in 2011, include: Burundi (12), Canada (60), Colombia (4) and Rwanda (36). Supply contracts for these customers may remain with South Africa. The UAE army operates an additional 76 RG-31 PPVs.

Source for data: EUISS.

Also in 2012, the UAE explored opportunities with the Turkish-US joint venture DNSS Defense Systems to market – and potentially produce – Emirati armoured vehicles in Turkey. In early 2017 Turkey and the UAE ramped up their bilateral industrial cooperation with the announcement that Otokar would be building more mobile, wheeled AIFVs in Tawazun Industrial Park, most likely to replace the tracked BMP-3 vehicles currently operated by the UAE Army.

The fact that Jordan and Algeria have partnerships with NIMR, and are not pure customers, points to the fact that the UAE is engaged in arms production for strategic and not just economic reasons. If the only goal were economic diversification, then the Emiratis would be wiser to stick to their strategic alliances with, for example, the South African firm Denel Dynamics. And if the sole goal were job creation, then the UAE would not have opened a factory in Algeria employing 400-500 Algerian workers. Instead this approach demonstrates the UAE's ambition to increase exports. NIMR has already produced over 1,000 (reportedly almost reaching 2,000) vehicles, keeping the factories busy.

Aware that they cannot realistically innovate next-generation technologies, amateur defence industries often focus their industrial capabilities on force-multipliers that can be integrated into systems. Recognising that the production of major weapons systems, such as aircraft, is near impossible because the R&D costs are prohibitively expensive and shortened technology systems render equipment obsolete at a faster pace, the UAE instead has a different strategy. Developing items (or 'refining production processes'), such as PGMs, therefore, allows them to lower costs.[34] In 2012, South African firm Denel established a joint venture with Tawazun, trading as Tawazun Precision Industries(now part of EDIC), and announced the plan to build a new facility in al Ajban to convert more basic air armaments into precision-guided munitions.

In the past five years, transfers of military equipment to arms-embargoed destinations have increasingly included components produced in the UAE. In addition to deliveries to the LNA (see page 36), up to 49 NIMR vehicles were delivered to Libya via Jordan. The Stockholm International Peace Research Institute (SIPRI) estimates that Libya has been a recipient of second-hand Soviet APCs from Emirati production lines: 50 *Typhoon* APCs in 2012 and 38 *Typhoon* GSS-300 APCs from 2013-14 – and potentially an additional 750 *Spartan* APC/APVs in 2012-13. Emirati production facilities have also been busy producing a further 25 *Typhoon* APCs for South Sudan (potentially with the police as end-users) and 30 (Turkish) *Cobra* APVs to the Congo.

Battle-proven systems and operational needs

The UAE also distinguishes itself from other ASDIs as the only one with battle-proven systems. This is not only a useful asset when bidding on contracts, but once again demonstrates the strategic value of developing an Emirati DTIB. According to British

34. Sayigh, op. cit. in note 3, p.203.

officials, Emirati *Al Sabr* VTOL, managed by ADASI and based on the Austrian *Camcopter* platform, were deployed in Afghanistan as part of Emirati support to NATO.

The intervention in Yemen has also been a test battleground for Emirati munitions. In July 2015, the NIMR II *Ajban* 440A was seen in Yemen. The *Enigma* 8x8, produced by Emirates Defense Technology specifically for use by the Union Defence Force, was also reportedly deployed for the first time – just months after displaying the prototype at IDEX 2015. The newest NIMR vehicle, the N35, has already been seen in Yemen in 2017. On the maritime front, the Saudi-led coalition has approved *Baynunah*-class corvettes as one of the few vessels to enter embargoed ports.

The UAE has reportedly supplied land vehicles to the Kurdish Patriotic Union of Kurdistan (PUK) and Kurdistan Democratic Party (KDP) as well, showing an interest in conflicts in which it is not directly involved.

The UAE is serious about using its defence industry to enhance its operational capabilities, but at the same time has been forced to recognise that it is not mature enough to act independently. There are several cases where the UAE tried to develop industrial capabilities and was forced to acquire foreign equipment to fill operational needs. One is resorting to Chinese UAS, now used in Yemen, after being denied access to the US *Predator* and not having a sufficient domestic alternative. For the first time in 2017, significant Chinese attendance at the International Defence Exhibition and Conference in Abu Dhabi suggests that there may be a greater Chinese presence in the future, although this is so far not attached to defence industrial plans. A more curious case came about at IDEX 2013, when the UAE selected a Turkish system over a US-Emirati jointly developed missile system. EAIG has a long-standing strategic partnership with the US company Raytheon to develop the *Talon* laser-guided missile rocket (LGR) system, presumably intended for NIMR armoured vehicles. However, in 2013, the *Talon* surprisingly lost a key contract to the Turkish firm Roketsan, citing an 'urgent operational need.' (The *Talon* has since been selected for the Emirati *Hafeet* 620, each of which is outfitted with 16 *Talon* LGR missiles).

Efforts to 'Emiratise' manufacturing face a significant structural roadblock: the native population in the UAE is smaller than the population of Munich. Having a 'Made in the UAE' brand, therefore, will not equate to Emirati production. The reliance on foreign engineers and high-skilled workers does not guarantee sustainable industrial advances.

Chapter 6

Keeping it in the Arab family

Apart from Saudi Arabia and the UAE, smaller GCC economies have also expressed interest in developing their own DTIBs. Bahrain and Oman have offset bureaus that conduct military deals but are relatively inactive, while a more concerted effort in this direction may be observed in Kuwait and Qatar. Their prospects are limited, however their intentions are interesting in that they: (i) follow similar patterns seen in the countries above; (ii) could become export markets and more equal-footed partners with the UAE in the future; and (iii) would need to be considered if GCC defence cooperation (or at least stronger coordination) bears fruit in the future. Developments in Jordan and Algeria, considered below, also meet the first two of these criteria.

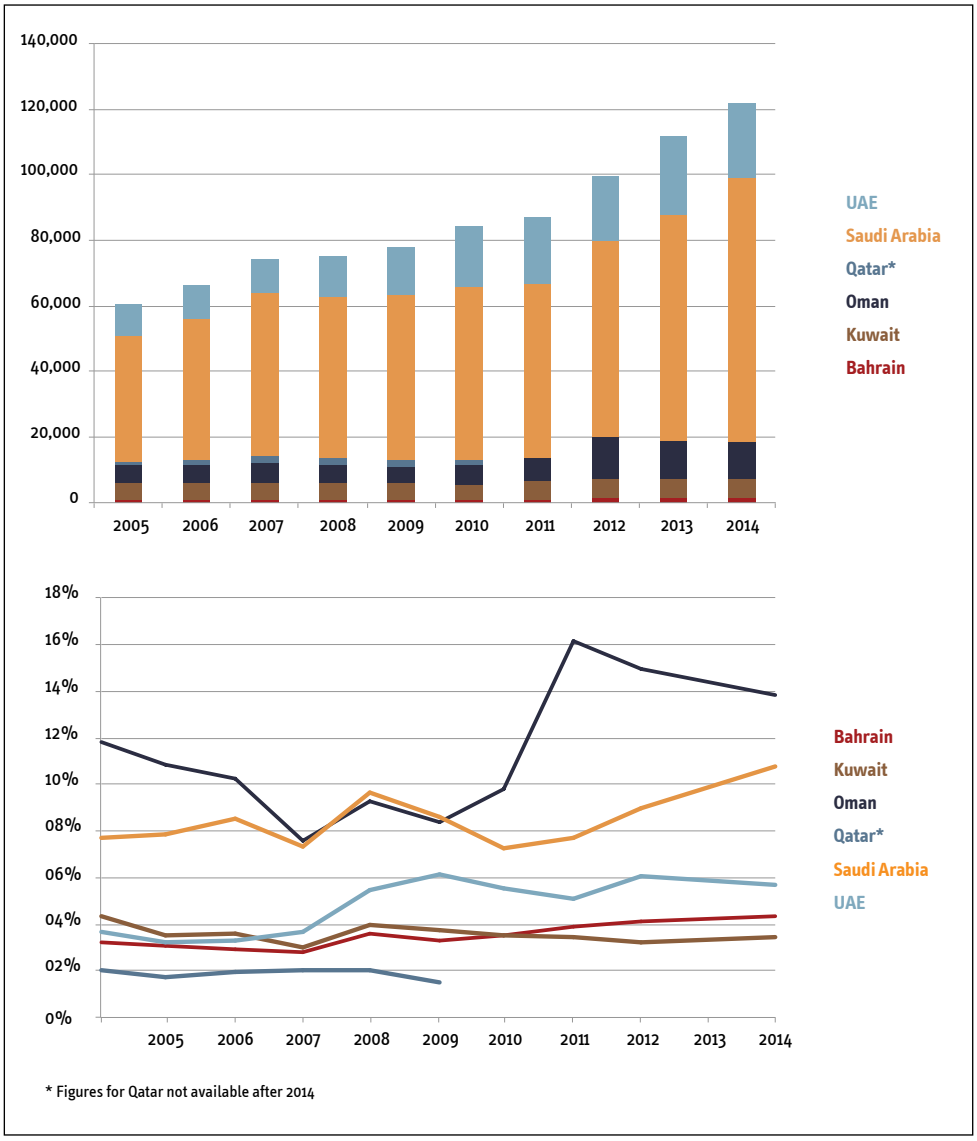
Jordan

The DTIB in Jordan is nearly entirely concentrated in the King Abdullah II Design and Development Bureau (KADDB), an independent government entity dating back to 1999 with 200 employees. The Bureau's investment and commercial arm, the KADDB Investment Group (KIG), invests in electronics and electro-optics, arms and ammunitions and automotive 'clusters', as well as troops products and supplementary items. KADDB is capable of some SALW manufacturing, including co-operation with Russia and Belarus to produce the Russian *Nashshab* RPG-32 under licence. However, despite reports of regional exports by 2006,[35] Jordanian production is far more limited in scope than its larger Gulf counterparts' DTIBs.

Until recently, both land and aviation systems focused primarily on upgrading platforms in order to lengthen the lifespan of equipment for the Jordanian Armed Forces (JAF). On the aviation side, KADDB partnerships focus more on refreshing aircraft, KADDB partnered with the US firm ATK (now Orbital ATK) and Airbus in 2014 to upgrade Royal Jordanian Air Force-operated transport aircraft. However it is unclear whether the modifications took place in Jordan and what was KADDB's level of involvement in converting the cargo planes into gunships. The 2014 agreement between South African Paramount and KADDB similarly focused on upgrading and refreshing Jordanian aircraft.

35. See Jomana Amara, 'Military Industrialization and Economic Development: Jordan's Defense Industry', Naval Postgraduate School: Defense Resources Management Institute, October 2006. Available at: http://calhoun.nps.edu/bitstream/handle/10945/32552/DRMI_Working_Paper_06-04.pdf?sequence=1.

FIGURE 6: DEFENCE SPENDING OF GCC COUNTRIES, 2005-2014 (CONSTANT 2014 $ MILLION AND % OF GDP)



Source for data: SIPRI *Military Expenditure* Database

Apart from limited development of the all-terrain vehicles *Al Washaq*, *Dawsar* and *Al Wahsh,* KIG's automotive and industrial 'cluster' relies on international partners to produce land vehicles. The *Desert Iris*, a light armoured vehicle, is a product of the joint venture that KIG and the British firm Jankel Group founded in 2003. The joint venture also offers a variety of internal security vehicles, which likely use COTS items to 'add-on' and 'add-up' to existing vehicles from the likes of Ford. Dating back to 2000, Raytheon has also provided upgrade kits for the Jordanian MBT fleet and has also

worked with KADDB to establish a maintenance depot. From the US, FMF funding has been a governmental mechanism enabling of strategic alliances, as seen for example with the involvement of the US defence contractor Raytheon in the Jordan Border Security Project, to improve security without necessarily developing DTIB capacities.

But beyond the UK and US, the UAE and South Africa have proved themselves key partners of Jordan in land vehicle manufacturing. Recently Jordan has been following in NIMR's footsteps by increasing ties with South Africa, most notably with the Paramount-KADDB deal to locally produce and assemble 50 *Mbombe* 6x6 armoured fighting vehicles for the JAF. Although KADDB will play an active role in the production phase of the *Mbombe* (which, if on schedule, already over half-way completed), the design and development have taken place in South Africa and Kazakhstan, with a more limited Jordanian role for the past seven years – and South Africa has since unveiled the *Mbombe* 8x8, in higher demand than the 6x6 for its manoeuvrability and lower maintenance costs.

With South Africa as a shared partner between Jordan and the UAE, an expanded South African footprint in the Gulf could increase competition – especially if Emirati land vehicles reduce their dependence on South African manufacturing. Further, recent cooperation with Turkey for night-vision goggles and other security equipment illustrate Jordan's regional stance on arms development cooperation.

Box 8: The Algerian DTIB

In the 1970s and 1980s, Algeria was capable of producing ammunition and ships. Its decade-long and extremely brutal fight against terrorism depleted it however not only tactically, but also politically and economically. In recent years, Algeria has tested the waters with a local DTIB through strategic alliances in the land domain and for SALW. Today, the two dominant defence industrial actors in Algeria are Groupement de la Promotion de l'Industrie Mécanique (GPIM) and Direction des Fabrications Militaires (DFM).

The most active domain for the Algerian DTIB is land vehicles: there are facilities to jointly produce Emirati *NIMR* II vehicles, local assembly of Rheinmetall's *Fuchs* II, as well as some civilian and military vehicles made by Mercedes (with financing from the Emirati investment arm Aabar).

In August 2016, the Italian firm Leonardo partnered with the Algerian Ministry of National Defence to establish a joint venture for production of helicopters for transport, evacuation and surveillance. In addition to the production of three light and medium types in Algeria, the agreement will also include MRO.

Kuwait

Internal stability has been a long-standing obstacle to long-term military planning in Kuwait, the side effect being limited options to foster an indigenous DTIB. The Fouad Alghanim & Sons subsidiary Gulf Technology Electronics & Systems Company is the main company in the military domain, but its role is essentially liaising between foreign suppliers and the Kuwait Military Forces. Foreign direct investment and fulfilments of the former offset obligations (in place from 1992-2015) have yielded a few ICT and cyber-security businesses, namely Future Technology Systems and Kuwait Computer Services. Revisions to the Kuwaiti offset programme, which began in 2015 and may be implemented in the near future, may mean that high-tech investments may not be as concentrated in these few companies, but it is likely that they will remain predominantly commercial.

A handful of Kuwaiti firms have responded to demand for security services in the region. In addition to serving Kuwaiti government clients, they also work with UK security services active in the Gulf. Al Mulla Group's joint venture with UK firm G4S provides a variety of security services, and United Networks, the satellite services provider part of the Kuwait Projects Company, serves Kuwaiti and British clients alike. Agility, which provides logistical support to governments, also conducted the handover of UK and US equipment from operations in the region.

Should Kuwait declare more concrete intentions to develop a DTIB, Egypt could develop into a partner. Egypt has facilitated technology transfers from Taiwan and Germany to the Kharafi Group, a primarily commercial conglomerate with an Egyptian operations hub in close proximity to the Mubarak Complex for the Defence Industry.

For the time being, though, Kuwait is more likely to be a customer for regionally produced equipment. With small defence outlays and no stated intention of championing a DTIB as a mode of diversification, Kuwait has not followed in Jordan's footsteps of intending to follow an Emirati model. Instead, its relevance to Arab defence industrial development is as a customer of regional producers. It has already placed orders with Emirati firms: in February 2013 Kuwait selected ADSB to fill future landing craft requirements and in January 2016, Abu Dhabi Ship Building signed a contract to build (€66.5 million) 8 vessels for the Kuwait MoD to secure maritime borders and enhance GCC coordination. This deal is significant not only for the UAE's ability to fill more export orders, but also in that, to date, Kuwait has almost exclusively procured military equipment from the West. If Kuwait remains interested in increased GCC coordination – in the naval domain as well as others – it may be a shock to Western suppliers: although Kuwait is not a large market, it has been a consistent one. As the UAE enhances its indigenous production capabilities (particularly for UAS), and if Emiratis can manage to keep costs down, then it could become a competitor to Western suppliers in Kuwait in particular.

Qatar

Although there is no mention of building indigenous arms in Qatar National Vision 2030 (QNV 2030), the Qataris have expressed interest in following the Emirati 'model'. At present Qatar explicitly prefers Western defence equipment and is undemanding of technology transfers (especially from the US). From a governance perspective, the emir's direct control over procurement processes translates to fewer performance-based standards and less oversight. Regardless of its intent, Qatar is yet to implement offset policies or more broadly create a governance structure to incentivise defence industrial development – therein relegating the country to the ranks of fourth-tier arms production (at least in the medium term).

Surveillance is a key capability development priority for Qatar, which also extends to its limited industrial ventures. QNV 2030 does call for diversification of investments from oil rents, which could include increasing shares in foreign defence firms. One such example arises from a 2016 memorandum of understanding with Poland, which allowed for 51% QAF ownership of the Polish firm WKK and which will make room for increased technology transfers for drone components. To this end, a more robust Qatari DTIB (several decades from now) could echo the UAE buying Italian firm Piaggio Aerospace and subsequently selecting their drones for domestic use.

In 2014, the German company Reiner Stemme Utility Air Systems partnered with the Qatar Armed Forces to jointly develop the *Q01* optionally piloted vehicle intended as a surveillance platform. Following the presentation of the prototype in March 2016, the QAF ordered the *Q01*s for QR 365.4 million (€96.4 million) to be built in Germany with key components coming from Thales. Notwithstanding the 'joint development' title, it remains unclear if this equates to a partnership to secure orders, or if it means calling upon Qatari expertise to help develop local capabilities.

In the long term, benefiting from relationships with Saudi Arabia and the UAE could impact Qatari defence capabilities. If Qatar does indeed become more serious about bolstering an indigenous DTIB, it may overcome its current complacency towards US export controls, therein creating opportunities for less strict producers, such as the UAE.

Conclusion

A 'domino effect' of defence industrial development in the Gulf is far from likely: a panoply of obstacles prevent Jordan, Kuwait and Qatar from gaining emerging arms-producer status in the foreseeable future. The UAE is already laying the groundwork to become a regional leader, as attested by the decision to consolidate state-owned defence companies under the EDIC umbrella from December 2014 onward. Under the auspices of Saudi Deputy Crown Prince Bin Salman, the Kingdom could also capitalise on GCC demand to fill future order books. This enhanced competition – particularly for land vehicles – is bound to become steeper, and is also likely to make the UAE not only a more capable partner, but also a more attractive one due to its regional connections.

Conclusion: those who can, will

The armaments industries of Arab states share one common aspect: they evolve within a very specific strategic landscape determined very much by war and conflict. Whereas European arms industries are less concerned with European conflict theatres, Arab arms industries are a reflection of how their respective decision-makers perceive challenges emanating from their immediate political, and ultimately military, environment. This applies particularly to the Gulf States but to a lesser extent also to Egypt.

In the Gulf, several developments have led to the insight that greater independence from outside security providers is paramount for national security: the American withdrawal from Iraq in 2010, its announcement of a 'pivot to Asia' the following year, defence spending cuts, Washington's reluctance to engage militarily against the Syrian regime in 2013 following the use of chemical weapons, are all signs interpreted by Gulf leaders that the US will in the future not be as present in the region as it used to be. American decision-makers themselves reinforced this perception, refusing to extend a NATO Article 5-type collective security guarantee to its Gulf partners, instead calling on them to do more in defence terms. The nuclear deal with Iran, signed in 2015 and viewed with disquiet by certain Gulf States, only increased the perception that not only could the US no longer be relied upon as a security guarantor, but that security would grow more fragile – not so much because they distrust the deal, but because they conclude that as a result, Iran will become engaged in an even bolder manner in the Arab region, whether in providing material support to Hezbollah in Lebanon or in reinforcing its ties with Shia communities across the peninsula.

In Egypt, the regime has experienced the suspension of parts of American military aid in response to the toppling of President Morsi in 2013 as a painful reminder of equipment dependence – although it was not a total suspension and ultimately lasted not even two years. Only parts of the $1.3 billion package were withheld (a $260 million cash transfer, 125 M1A1 *Abrams* MBT kits, twenty F-16 fighter jets, twenty *Harpoon* cruise missiles, ten Apache attack helicopters) – and not interminably so. Ten Apache attack helicopters were finally released after six months since they were considered a crucial element in Egypt's fight against Jihadist networks in the Sinai, and the whole programme resumed in 2015. Nevertheless, the desire for independence and diversification is one of the many factors playing into the resuscitation of the Egyptian arms industry. Like its Gulf neighbours, Egypt perceives itself to be abandoned in its fight against terrorism, which has claimed more civilian lives over the last five years than during any other period since World War II.

But both trends – American withdrawal as well as increased insecurity –have been preceded by more longer-term strategic shifts ongoing since the 1990s. The invasion of Kuwait drove home, in Gulf capitals, the insight that Gulf security was entirely dependent on outsiders; the implosion of Iraq after 2003 removed the 'Arab gate' which had acted as a bulwark against Iran. Since then, states in the region have moved increasingly into not only more assertive regional politics, but also the development of military capacity. This is particularly visible with regard to the air force: after three decades of inactivity, and Arab airspace having been controlled by outsiders, regional air forces are now in full swing. Egypt, whose air force continues to lead with 569 combat aircraft, has flown sorties in Libya; Saudi Arabia, which had a relatively small air force until the early 2000s, now operates 305 fighter jets and ranks second in the region; the UAE now ranks fourth with 201 aircraft.

The development of Arab arms industries hence has to be situated in this overall bolder, more militarised, and more engaged approach to conflict visible since at least the Arab Spring.

Money, money, money

Ultimately one of the largest determinants of building and sustaining a national DTIB is the amount of capital available. Despite decreasing oil and gas prices, the Kingdom and the Emirates both maintain substantial state-owned investment arms thirsty for diversified investments. Saudi Arabia continues to rank fourth in terms of foreign-exchange reserves; the United Arab Emirates, a state with the population-size of Barcelona, ranks higher than most European states. Saudi Arabia continues to harbour the second-largest oil reserves in the world, while the UAE ranks eighth. Financially, both states are therefore in a position to fund an arms industry.

This also means that defence industrial development in the region is intimately tied to the reserve funds. On top of exploding defence budgets in the region, Gulf countries are likely to continue flooding money into their industrial ventures. This also makes them more attractive partners: for firms struggling to make ends meet, trading technology transfers for desperately needed financing is the only way to survive. And for firms with declining home markets and increasing orientation towards exports, offering tailor-made solutions to countries with massive procurement projects is the only way to thrive.

Foreign funding also remains vital to defence industrial development in Arab states, albeit in different forms. Whereas Egypt continues to depend on foreign investment to bankroll its 'Military Inc.', the UAE leverages its rents to invest in foreign firms. The role of capital cannot be overstated: creating a DTIB is one of the most expensive projects a country can undertake. Invigorated with high-level political will, the costs of developing industry are likely to be secondary concerns to techno-nationalist and strategic ambitions.

The elephant in the room

Regardless of capital investments, governance reforms and new types of partnerships, however, no country will succeed in sustaining arms production without taking more fundamental steps aimed at educating and retaining high-skilled workers. So far, the educational revolution in the region is still in the making: although Arab states have made significant progress on literacy rates and school enrolment, they are still lagging behind in educational reform. Instead of being based on critical thinking, education is based on rote learning. Neither innovation nor independence of mind tend to be the outcome of this type of system.

At the same time, having a relatively clean slate can also be seen as an opportunity: these countries get to develop their civilian and military industries in tandem, as opposed to having an established defence industry that has difficulty adjusting to the benefits of commercial-tech innovation. In the Gulf, many training opportunities and educational partnerships with foreign firms are already helping develop these synergies from the outset. Increased foreign direct investment and indirect offsets, many of which target the commercial-tech base, are already the norm in Saudi Arabia. The same is true in the UAE, and the UAE may also have a greater chance for success given its initial investments in sectors such as yachting, which are also producing military spin-off capabilities. These efforts are not matched in Egypt, whose lack of strategic direction for its DTIB has paralysed any progress. For success in this domain, these countries will need to focus equally on absorbing technologies and skills and on retaining workers.

The blind leading the blind

One of the more curious developments has been the rise of eastern European countries and other unexpected partners entering into cooperation agreements with Saudi Arabia and the UAE. This, however, demonstrates recognition that dependence on the West is no longer guaranteed. Whereas arms imports trends show a tendency on the part of Gulf countries to go after the most sophisticated 'glamour weapons', the arms industry trends point more towards mastering the basics. With the exception of certain Saudi programmes, such as the recent foray into full aircraft production, emphasis on COTS solutions and partnerships with non-traditional partners with more middle-ground capabilities is perceived as a necessary interim step towards operability and, eventually, autarky.

Tracking new defence industrial partnerships in Gulf countries also indicates who future suppliers will be. As can already be seen with regard to arms imports in the Middle East, partnerships with second-tier, non-Western producers, namely South Africa, also demonstrate how the emergence of nascent defence industries may weaken Western dominance. If Arab DTIBs become more capable, this could have a ripple effect on other markets that may favour GCC cooperation and regionally sourced solutions. The implication for traditional suppliers from the US and Europe is a new trade-off of less foreign policy leverage relative to increasingly capable allies in the region.

Those who can, will

Present-day emphasis on defence industries assesses cutting-edge innovation. As China and Russia bolster their own capabilities, the US and Europe are focusing on defence innovation to overmatch potential adversaries. The US has unequivocally stated that the purpose is to maintain technological superiority as the cornerstone of conventional deterrence. Or, more simply put, to have sophisticated weapons and integrated battle networks so sophisticated that they prevent potential adversaries from entering into conflict. As a result, Arab equipment is often dismissed because it is not sophisticated enough to compete with Western equivalents. In terms of technological superiority, it is more likely that the defence industries of Russia and China threaten to match or over-match Western capabilities.

However, weapons in the region have perhaps an altogether different purpose than in Russia or Europe. Whereas technological superiority is meant to reinforce conventional deterrence, 'good-enough' weapons are indeed meant for conflict. This can range from very basic knife-attacks in Israel (leading to the deaths of 30 Israelis and 200 Palestinians) to self-built rockets; but even at the more operational level, say in Yemen, it is this 'good-enough' equipment which is available that will actually be deployed.

Countries that either seek less stringent export controls or that cannot afford expensive, sophisticated platforms may then choose the lower-end weapons. Having an effective DTIB helps bridge the gap between imports and operability. It is the expensive weapons that are the most precise; if equipment from countries that adhere to different standards proliferates, this could indeed multiply lethality rates, either through faulty equipment or less precise targets.

Between seeking out new partners and changing requirements for longstanding partners, Arab states are making moves to operationalise imported *and* locally produced equipment. In the regional context, this means preparing capabilities for actual conflict rather than theoretical readiness. As Arab states continue their defence industrialisation efforts, it remains to be seen whether they will reap the economic benefits that have driven them to develop national DTIBs. But it is certain that, intentionally or otherwise, the presence of local armaments and their connection to operationalising equipment will continue to change the geostrategic battlefields.

Annexes

Selected industrial partnerships

Egypt

Egyptian company	Foreign partner	Date	Description
(Government)	Hongdu Aviation Industry Corporation (China)	1999; 2005	Agreement signed in 1999 for local assembly of 40 K-8E *Karakorum* jet trainers built from Chinese-supplied kits. Agreement to produce an additional 40 trainers under license from 2005.
Abu Zaabal Engineering Industries Co.	Patria (Finland)	1999	Local production of howitzers, including technology transfers. First system delivered in 2000.
	Ferrometalco (Germany) and VAIS (Austrian subsidiary of Siemens)	2006	Technical assistance to construction of steel rolling mill
Alexandria shipyards	Swiftships (US, subsidiary of Singapore-based Halter Marine)	2008; 2011	Original $13 million contract from 2008 for patrol craft, then modified in 2011 for Egyptian assembly of two patrol craft and co-production of the other two (with contract value increase)
Arab Organisation for Industrialisation (AOI)	Chrysler Group LLC	1978	Arab American Vehicle (AAV) working on co-production of military and civilian vehicles
	Safran (Sagem)	2015	Agreement signed to collaborate on *Patroller* long-endurance tactical surveillance UAS to meet needs of Egyptian armed forces and systems support, including dedicated training centre in Egypt for *Patroller* maintenance and operation
Egyptian Tank Factory	General Dynamics, Honeywell, Allison Transmission Motors (US)	1990s-2011, resumed in 2015	Licensed production of M1A1 *Abrams* tanks from US-supplied kits. Contract from 2011 for 125 *Abrams* suspended due to 'Arab Spring' and resumed in 2015 with updated terms for weapon and propulsion systems. Potentially also production of M88A2 armoured recovery vehicles
	Oshkosh, UTC (US)	2009	Co-production of medium tactical truck (MTT), depot-level maintenance of more than 40 new M1070 Heavy Equipment Transporters (HET) and co-production of 635NL trailers

Saudi Arabia

Saudi company	Foreign partner	Date	Description
(Government)	Russia	2008	Government-to government agreement for military and technological cooperation with little concrete follow-up and more relevance for attempts at selling Russian arms rather than helping develop local industry
	Indonesia	2014	Bilateral defence cooperation agreement signed, including clauses on defence industry cooperation
	India	2014	MoU on exchange of defence-related information, military training and education and cooperation on hydrography, security and logistics
	Pakistan	2014	Unconfirmed agreement related to procurement of Pakistani-Chinese fighter jets with some potential technology transfers from Pakistan Ordinance Factories POF
	UK	2007	Agreement "Project Salam" increasing cooperation in defence industry through Saudi-British Defence Co-operation Programme
Advanced Electronics Company*	BAE Systems (UK), Boeing (US)	Originally 1980s. 2014 for avionics.	Joint venture to establish Advanced Electronics Company (from offset arrangement dating back to 1980s), focusing on aircraft MRO and more recently avionics. AEC was the first non-European company approved to repair Typhoon avionics.
	DAS Photonics (Spain)	2015	MoU signed for joint design and development of electronic warfare equipment
	Lockheed Martin (US)	2015	Sustainment services contract for F-15 sensors, including *Sniper* advanced targeting pods, LANTIRN extended range navigation pods and Infrared Search and Track (IRST) systems.
	Thales (France)	2008	Joint venture to establish Advanced Arabian Simulation Company to design, develop and manufacture simulators and training solutions. Functional as of 2011.
	Raytheon, Northrop Grumman, Boeing, Smiths and Hughes, Lockheed Martin (US)	1994 onwards	M1A1 electronic components installation; maintenance of electronic jammers on F-15 aircraft; components on *Paveway* 2 laser-guided bombs

Aircraft Accessories and Components Company*	Boeing (US)	Originally 1985	Beoing industrial concept used to establish the electronic design company, working on development, manufacturing, repair and modification of defense equipment
	BAE Systems (UK)	1996, 2002	Collaboration on repair and overhaul of components for fighter aircrafts
	Honeywell (US)	2010	Licence for repair and overhaul of Royal Saudi Air Force equipment
	Messier Services (Safran Group) (France)	2008	Turnkey solution in support of the development of a military and civil landing gear MRO shop
Alsalam Aerospace Industries (formerly Alsalam Aircraft Company)*	Canard Aerospace Corporation (US)	2013	MoU signed for cockpit upgrades for Saudi TPT aircraft (C-130, L-100)
	Boeing (US)	Originally 1985. 2015 for rotorcraft.	Boeing created Alsalam in 1980s as part of offset arrangement for local MRO solutions. Joint venture to establish the Saudi Rotorcraft Support Centre in 2015 for Saudi rotorcraft fleet MRO – both civilian and military. Saudia Aerospace Engineering Industries (SAEI) also involved.
Dhahran Chemical Industries	Synthomer (UK)	1996	Joint venture to establish Synthomer Middle East for polymer dispersant production
International Systems Engineering*	BAE Systems (UK)	2006	Joint venture Saudi Maintenance and Supply Chain Management Company (SMSCMC) is an integrated supply chain services provider for technology intense industries
King Abdulaziz City for S&T (KACST)	Boeing (US)	2010	Partnership to create decision support centre for advanced modelling, simulation and analysis
	Lockheed Martin (US)	2012-2013	Training partnership agreement based on existing agreements between Lockheed Martin and Saudi educational sector. Other agreements between KACST and Lockheed Martin include manufacturing of A2100 communications satellites and research partnership for nanomaterials for aircraft fuselage design
King Abdullah Economic City (KAEC)	Lockheed Martin, Babson College (US)	2016	Educational agreement establishing College for Entrepreneurship
King Abdullah University of S&T (KAUST)	Boeing (US)	2014	Educational agreement for partnership furthered in September 2014 with new R&T office to facilitate collaboration
		2009	Advanced modelling, simulation and analysis work on behalf of aerospace companies in Saudi Arabia

Middle East Propulsion Company*	Pratt & Whitney (US), General Electrics (US), later MTU Aero Engines (Germany) and Rolls-Royce (UK)	1992, 2001, MTU joined in 2009	The company is a joint venture, including also Saudi Arabian Airlines (Saudia), National Industrial Company, Saudi Advanced Industries Company, Gulf Investment Corporation established to provide aircraft jet engine repair and overhaul
Mobily	IBM (US)	2013	Joint venture to establish Global Security Operations Centre for cybersecurity as part of Mobily's data centre. Not limited to defence – also works with Saudi Ministry of Education
Pannesma Company Limited (subsidiary of Atheeb Group)	Raytheon (US)	Jul-2014	Joint venture to establish Raytheon Atheeb Systems Limited (RASL) is a joint venture for C4I systems, with customers including Ministry of Defense and the Peace Shield Air Command and Control System for the Royal Saudi Air Force
Saudi Industrial Development Fund	Acer (Taiwan)	1988	Advanced Electronics Company Limited – offset programme company assembling computers and other civilian electronics.
TAQNIA	Antonov (Ukraine)	Talks began in 2013; signed in May-June 2015	Joint production of An-132 cargo aircraft (derivative of existing An-32 Cline) with first prototypes rolled out in December 2016. Saudis will own IPRs and expect to produce 8-12 aircraft per year from 2018 onward. Cockpit fitted with navigation devices from US.
	DigitalGlobe (US)	2016	Joint venture to develop imaging and reconnaissance satellites. KACST also involved in partnership.
	Aselsan (Turkey)	2016	Joint venture establishing defence electronics factory in Saudi Arabia – specifically for radars and electro-optical technologies – with intention of expanding regional exports
	Skyware Technologies (US/UK/Germany)	2016	Joint venture established (along with other Saudi partners Crescent and KACST) for satellite services. Unclear if more military or civilian.
	Lockheed Martin (US)	2016	Agreement signed to explore potential local assembly of Sikorsky S-70 *Blackhawk* helicopters
Saudi Military Industries Company	Denel, Rheinmetall (South Africa, Germany)	2016	Projectiles factory (munitions in Al-Kharj): $240 million to produce 300 artillery shells or 600 mortar projectiles per day - with 130 engineers and operators
Prince Sultan Advanced Technologies Research Institute	Denel Dynamics (South Africa)	2013	Unconfirmed collaboration to turn *Seeker* 400 surveillance UAS into armed UAS, armed with Mokopa or Impi missiles.

** Firms created from Peace Shield offset arrangements in the 1980s, with longstanding strategic alliances with US firms including Boeing, Lockheed Martin, General Dynamics, General Electric and United Technologies Corporation (Sikorsky – now part of Lockheed Martin)*

United Arab Emirates

Emirati Company	Foreign partner (country)	Date	Description
(Government)	Canard Aerospace Corporation (Canada)	2002	Joint venture Emirates-CAE Flight Training Centre (ECFT) established as military training centre
	Peleng JSC (Belarus) + government	2007	Military-industrial cooperation agreement as basis for components (Belarusian fire control systems) for BMP3 armoured personnel carriers – although Emirati role in production (of vehicles + components) unclear. 2014-15 Belarussian-Emirati military cooperation also included Emirati financing of Soviet-era combat helicopter deliveries to Libya
	Airbus (trans-European) and PAL Aerospace (Canada)	2016	Strategic partnership for the provision of in service support (ISS) for C295 aircraft operated by Gulf Cooperation Council (GCC) countries.
	Russian Aircraft Corporation (MiG) (Russia)	2017	Co-development of fifth-generation fighter jet based on MiG-29 to begin in 2018, expected to take 7-8 years thereafter
Abu Dhabi Ship Building	Constructions Mécaniques de Normandie (France, Emirati-owned)	1991 acquisition, then 2009 co-development	UAE 41% equity of CMN; then co-development deal where France built first Baynunah corvette, following five built in UAE afterward
	Selex (Italy, UK)	2005	Joint venture to establish Abu Dhabi Systems Integration to develop integrated electronic systems, particularly involved in Baynunah and Ghannatha naval projects
	Swede Ship Marine (Sweden)	2009-2015	Technology transfers: Swedes provide bases design and three Ghannatha class missile patrol boats
	VT Group (US) / BAE Systems (UK)	2008	Joint venture to establish Gulf Logistics and Naval Support to provide services to GCC countries
	Yonca-Onuk (Turkey)	2009	Cooperation related to delivery of Turkish MRTP-16 fast intervention craft to UAE: 12 boats manufactured in Turkey then remaining 22 in UAE
Adcom Systems	Berkut Aero (Russia)	2013	Adcom building Russia's first combat helicopter drone based on Russian Berkut vertical life helicopter as model
	Composite Technology Research Malaysia (Malaysia)	2010	Malaysian Unmanned Systems Technology (subsidiary of Composite Technology Research Malaysia) licensed production of Yabhon-R (called Yabhon Aludra in Malaysia)

Al Badie Group	Denel Land Systems l South Africa (South Africa - formerly BAE Systems)	2006-7 (not concluded)	[Al Badie was to manufacture the Iguana FV4-270 in Abu Dhabi and market to other GCC countries in 2006-7, but the deal fell through and BAE Systems acquired the Iguana designs in 2009]
Al Fattan Ship Industries	Fincantieri (Italy)	2010	Joint venture to establish Etihad Ship Building to co-produce maritime weaponry technologies. Have delivered variety of stealth vessels, but with Emirati role in production and development difficult to confirm.
Al Marakeb	Raytheon (US)	2016	Partnership exploring development of unmanned surface vehicle technology. The joint venture is being run through the UAE's Tawazun Holding.
Al Tuff International	Orbital ATK (US)	Subsidiary in 2010; agreement in 2015	Orbital ATK subsidiary in UAE opened in 2010 and announced agreement for PGMs, ammunition production, as well as special mission aircraft and cannons (but Emirati role in latter not specified)
Ares Security Vehicles	AutoKrAZ (Ukraine)	2013	Joint development of Panthera K10 MRAP vehicle, which claims to already have an order for 10 vehicles to be used in UN peacekeeping missions
Baynunah Aviation Technology	Thales (France)	2009	Establishment of Thalbat Advanced Technologies to serve Mirage 2000-9 (which are to receive Al Tariq munitions from EDIC's Tawazun Dynamics) and other platforms
	Snecma (Safran group) (France)	2009	Joint venture - Snecbat Engine Technologies established to develop high-tech aero-engine solutions
	Sagem (Safran group) (France)	2009	Joint venture Sagembat Defense established for defense technologies and solutions
	Dassault Aviation (France)	2009	Joint venture Dasbat Aviation established
Bin Jabr Group	Sabiex (Belgium)	2009	Contract reportedly for Belgian assistance modifying Italian OF-40 MBTs (acquired in early 1980s) into heavy infantry fighting vehicles and armoured recovery vehicles
EDIC (C4 Advanced Solutions)	Thales (France)	2009	Established joint venture to develop defence electronics and ICT technologies, including radio maintenance – Thales Advanced Solutions
	EADS Defence & Security (Airbus Group) (trans-European)	2009	Established joint venture – Emiraje Systems LCC to develop and market defence and security applications of high tech solutions.

EDIC (NIMR Automotive)	DNSS Defense Systems (Turkey, US)	2012	Exploration of marketing of NIMR vehicles in Turkey, with discussions of potential future production in Turkey
	VOP CZ (Czech Republic)	2017	Potential agreement to enter into Central and Eastern European markets, including technology transfers to Czech Republic. [Note: Czech firms Tatra, Russ Technology held discussions with the Emirati firm Vallo (formerly Hydra Trading) in 2010 to build a production plant for BMP3 armoured personnel carriers in Musaffah, but it appears this was not concluded.]
	GPIM, DFM (Algeria)	2012	Joint venture to establish NIMR-Algérie Joint Stock Company (reportedly worth €1.67 billion) to produce Emirati armoured vehicles under license in Algeria)
	Denel Land Systems l South Africa (South Africa - formerly BAE Systems)	2015	Several agreements, including driveline components for armoured vehicles. Rebranding of South African RG35 (originally from BAE Systems) to create N35 4x4 and 6x6 multi-role protected vehicles
EDIC (subsidiary not specified)	Reliance Defense Ltd (India)	2015	Signed MoU to explore manufacturing and MRO of defense vehicles, aviation, armament manufacturing, defence electronics, commercial and naval vessels
EDIC (Tawazun Dynamics)	Denel Dynamics (South Africa)	2012	$416 million contract for Denel to supply Umbani PGMs to Tawazun, which are rebranded and refreshed as the Al Tariq air-to-ground PGM in UAE. Potentially also includes some provision of howitzers to International Golden Group
EDIC (Tawazun Precision Industries)	BAE Systems (UK)	2013	Joint venture to establish Tawazun Precision Industries for variety of down-supply chain metallic component manufacturing
	Boeing, Finmeccanica/Leonardo, Dassault, MBDA (US, Italy, France, Europe)	2011/2013	Production of metallic components for BAE Systems airframes, Boeing aircraft, Selex components, Dassault aircraft and MBDA munitions
	Finmeccanica/ Leonardo Alenia Aermacchi (Italy)	2015	Commercial supply chain agreement for TPI to produce civilian aero-structural components and provide training to Emirati engineers

Emirates Advanced Research and Technology Holding (EARTH) (EAIG)	Oshkosh (US)	2015	Deal worth €210 million to develop Oshkosh defence systems and provide technical assistance and maintenance by providing spare parts
	Raytheon (US)	2013	Co-production of Talon LGR missile (to be fitted on NIMR Hafeet 6x6 vehicles as of 2015)
	Yugoimport (Serbia)	2013	Initial €20 million deal (with potential to reach €200 million) to co-produce ALAS cruise missiles
Gulf Aircraft Maintenance Company (Gamco)	Denel Dynamics (South Africa, Sweden, Norwat, South Korea, Germany)	2004	UAV Research and Technology Centre built (after having operated the South African Denel Seeker fixed-wing UAV since the early 1990s). The center cooperates with numerous international companies.
	UCONSYSTEM (South Korea)	2005	Signed MoU to develop integrated ground station to operate Camcopter UAS and other matters related to UAS
International Golden Group	Aselsan (Turkey)	2011	Joint venture to establish IGG Aselsan Integrated Systems to develop remote-controlled weapons systems, depending mostly on Aselsan expertise
	Milrem (Estonia) and Aselsan (Turkey)	2017	Trilateral MoU signed to co-develop unmanned ground vehicle
	Boomeranger (Finland, UAE-owned)	2015	Acquisition of Boomeranger to increase unmanned surface vessel development, including for the UAE vessels Sea Serpent, Oscar and Bravo
	Denel Land Systems l South Africa (South Africa - formerly BAE Systems)	2011	UAE ownership of RG31 armoured vehicles, renamed Agrab. First 12 vehicles delivered fully assembled from South Africa (based on BAE Systems design), then UAE final assembly of 60 vehicles based on semi knock-down kits manufactured in South Africa. Contract with Denel includes technical support for one year to facilitate transfer. Agrab also contains components from ST Kinetics (Singapore)
	Photonics (France)	2015	Establishment of centre of excellence to focus on night vision goggles and related technologies
	General Dynamics (US) and AM General (US)	2009	Agreement to increase share of the defence products manufactures by these two companies.
Jobaria Defense Systems	Roketsan (Turkey)	2013	Indigenous development of Multiple Cradle Launcher (rocket system) took three years – with aid from Turkish Roketsan – and in service with UAE army as of 2013

EDIC (Mubadala Development)	Boeing (US)	2016	Five-year R&D agreement, including educational partnerships with Khalifa University and Masdar Institute of Science and Technology, as well as deepening relationship with joint venture Strata Manufacturing PJSC (largely civilian)
	IBM (US)	2015	Joint venture to establish Cognit Technology Solutions LLC as an educational partnership and enhanced computing abilities in the Gulf
	Telekom Srbija (Serbia)	2013	Signed MoU for high-tech cooperation, including data-centre management and potentially semiconductor and microchip hardware manufacturing
	Sikorsky Aerospace Services and Lockheed Martin (US)	2010	Joint venture to establish Advanced Military Maintenance Repair and Overhaul Centre (AMMROC) providing services to the UAE Armed Forces and other military operators
	Lockheed Martin (US)	2016	Lockheed Martin, the UAE Space Agency and Mubadala launch a space-based workforce training program to develop UAE space industry
	DynCorp International (US)	2006	Joint venture to establish Al Taif Technical Services to provide maintenance, repair and overhaul (MRO) services of defence equipment and components
	Northrop Grumman Corporation (US)	2009	MoA to collaborate on various high technology aerospace and aviation educational and training. This includes agreement with Inzjizat Data Systems
	Airbus (trans-European)	2008, 2013	Supplier agreement, expanded in 2013 with a strategic agreement, including Airbus commitments to procure raw materials from Mubadala
	Finmeccanica (Italy)	2008	Agreement for a high-tech industrial partnership, including manufacturing of aerospace composite components (primarily for civil aircrafts)
	Rolls-Royce (UK)	2013, 2016	Creation of approved maintenance centre and agreement on establishment of manufacturing facility for aero-engine components
	EADS Astrium (trans-European) and Thales Alenia (France)	2008	Creation of consortium to build Yahsat (Al Yah Satellite Communications) satellites
	Telespazio (France, Italy)	2016	Contract for integrated satellite services with Yahsat
	Airbus (trans-European)	2015	Agreement of Global Aerospace Logistics (Mubadala company) on service of Airbus Helicopters

Tawazun	State Military-Industrial Committee (Belarus)	2017	(Agreement signed – if with offset authority then Emirati partner could be specified at later date)
	Rheinmetall (Germany)	2011, 2013	UAE supplying metallic components since 2011, then 2013 contract to cooperate for Skyshield air-defence system
		2007	Joint venture (including also Al Jaber Group) - Burkan Munition Systems producing munition
	Saab (Sweden)	2013	Establishment of joint venture Abu Dhabi Advanced Radar Systems, formed to produce new products (potentially AESA radar system) as well as Saab radars (already in UAE by time JV was formed)
	Northrop Grumman Corporation (US)	2009	MoU to explore the establishment of a collaborative business alliance on various defence programmes
	Otokar (Turkey)	2017	Joint venture to establish Rabdan to build 9x9 amphibious AIFVs for UAE Army (worth $661 million)
	AssetCo (UK, Ireland)	2009	Joint venture of Tawazun subsidiary – Rabdan Academy for the development and operation of new education and training facility – Rabdan Disaster City
Tawazun (Abu Dhabi Autonomous Systems Investments, ADASI)	Government (Austria)	2003	Government-to-government agreement to co-develop Al Sabr UAS based on Camcopter designs (Al Sabr final assembly of Camcopter)
	Boeing (US)	2013	Training, support and marketing for ScanEagle and Integrator UAS
	Piaggio Aerospace (Italy, UAE-owned) and Saab (Sweden)	2004 onwards, ramped up in 2012-13	Acquisition of P1.HH Hammerhead UAS and investment in P180 MPA
Injaz National	Lockheed Martin (US) and Exechon AB (Sweden)	2015	Joint venture to establish Exechon Enterprises L.L.C focused on advanced machining technology, including through creation of an Application and Technology Development Centre for supply of parallel kinematics machining
Bin Hilal Enterprises	General Dynamics (US, UK, Canada)	2015	Joint venture to establish General Dynamics Mission Systems International Middle East LLC focused on building C4ISR capability and related technologies
Abu Dhabi Aviation	AgustaWestland – Finmeccanica (Italy)	2011	Establishment of joint venture in the field of helicopter maintenance named AgustaWestland Aviation Services LLC
Emirates Defense Technology	Etienne Lacroix Group (France)	2015	Establishment of joint venture Emirates Defense Services (EDS) to maintain Lacroix's products and perform other defence-related services

Abbreviations

ADASI	Abu Dhabi Autonomous Systems Investment
ADSB	Abu Dhabi Ship Building
AFED	Armed Forces Exhibition for Diversification of Local Manufacturing
ALAS	Advanced Light Attack System
AOI	Arab Organization for Industrialisation
APC	Armoured personnel carrier
ASDI	Arab-state defence industry
AVIC	Aviation Industry Corporation of China
AWACS	Airborne Warning and Control System
C4ISTAR	Command, control, communications, computers, intelligence, surveillance, target acquisition and reconnaissance
CMN	Constructions Mécaniques de Normandie
COTS	commercial-off-the-shelf
DFM	Direction des Fabrications Militaires
DTIB	Defence technological and industrial base
EAIG	Emirates Advanced Investments Group
EDIC	Emirates Defence Industries Company
EDTIB	European Defence Technological and Industrial Base
EOP	Economic Offset Programme
DoD	US Department of Defense
FDI	Foreign direct investment
FMF	Foreign military financing

GCC	Gulf Cooperation Council
GDP	Gross domestic product
GNP	Gross national product
GPIM	Groupement de la Promotion de l'Industrie Mécanique
ICT	Information communication technology
IDEX	International Defence Exhibition and Conference
IPR	Intellectual property rights
ITAR	International Traffic in Arms Regulations
JAF	Jordanian Armed Forces
JLM	Joint Logistics Model
KACST	King Abdulaziz City for Science and Technology
KADDB	King Abdullah II Design and Development Bureau
KDP	Kurdistan Democratic Party
KAEC	King Abdullah Economic City
KIG	King Abdullah II Design and Development Bureau Investment Group
LGR	Laser-guided missile rocket
LNA	Libya National Army
MALE	Medium altitude, long endurance
MBT	Main battle tank
MENA	Middle East and North Africa
MIC	Saudi Military Industries Corporation
MoD	Ministry of Defence
MoU	Memorandum of understanding

MPV	Mine-protected vehicle
MRAP	Mine-resistant ambush protected
MRO	Maintenance, repair and overhaul
MRL	Multiple rocket launcher
NATO	North Atlantic Treaty Organisation
NTP	National Transformation Plan
PGM	Precision-guided munition
PSATRI	Prince Sultan Advanced Technologies Research Institute
PUK	Patriotic Union of Kurdistan
QNV 2030	Qatar National Vision 2030
R&D	Research and development
R&T	Research and technology
S&T	Science and technology
SALW	Small arms and light weapons
SIPRI	Stockholm International Peace Research Institute
SPAAG	Self-propelled anti-aircraft gun
STEM	Science, technology, engineering and mathematics
UAE	United Arab Emirates
UAS	Unmanned aerial systems
UAV	Unmanned aerial vehicle
USSR	Union of Soviet Socialist Republics
USV	Unmanned surface vessel
VTOL	Vertical take-off and landing

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