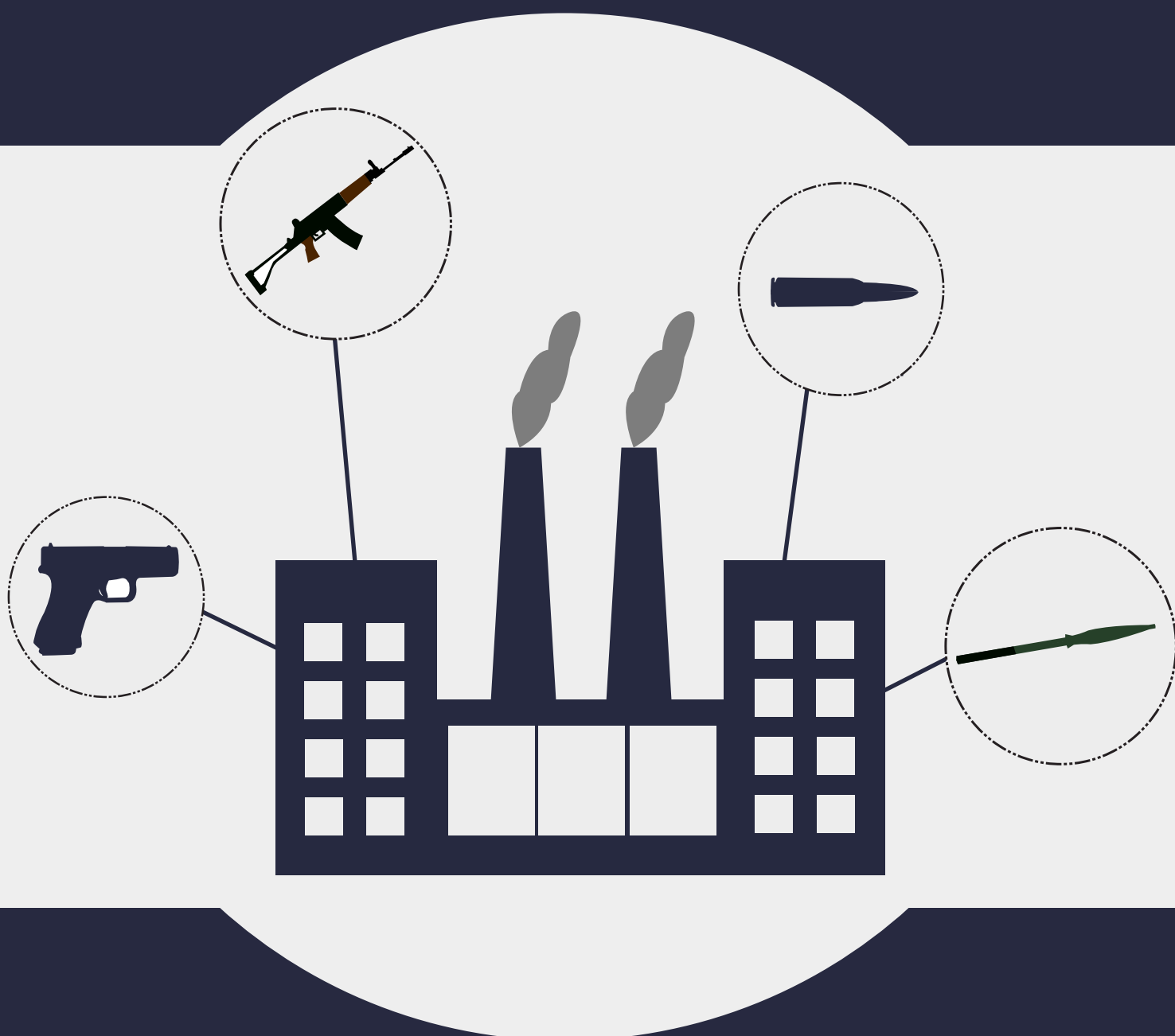


Fatal Business: Supplying the Myanmar Military's Weapon Production

16 January, 2023



Special Advisory Council for
Myanmar

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Glossary and Abbreviations

Arms – conventional arms (excluding weapons of mass destruction). In this report, the terms “arms” and “weapons” (and associated terms such as “arms industry” or “weapons industry,” “arms manufacturing” or “weapon manufacturing”) are used interchangeably as collective terms that encompass a wide range of equipment, including battle tanks, armoured combat vehicles, large-calibre artillery systems, combat aircraft and unmanned aerial vehicles, attack helicopters, warships, missiles and missile launchers, landmines, cluster munitions, small arms, light weapons and ammunition.

CNC machines – Computer Numerical Control machines.

DDI – the Myanmar military’s Directorate of Defence Industries.

DSTA – Defence Services Training Academy.

Dual use items – goods and technologies that may have both civilian and military end-purposes. They are regulated under various international agreements and subject to dual-use goods export controls.

End-use risk – the risk of human rights harm occurring either to an end-user or because of the end-use of a product. In the context of companies supplying – either directly or indirectly – products used in weapon manufacturing factories in Myanmar, end-use risk refers to the human rights risks associated with the end-use of that product (the manufacturing of weapons and use of those weapons).

EU – European Union.

EU Dual-Use Goods Regulation – Regulation (EU) 2021/821 of the European Parliament and the Council of 20 May 2021 setting up a Union-wide regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (recast). The 2021 recast replaced Regulation (EU) No 428/2009 as the key legislative instrument governing EU exports of dual-use items.

Extraterritorial jurisdiction – the ability of a State, through various legal, regulatory and/or judicial mechanisms, to prescribe and enforce laws with respect to companies and business activities outside its own territory. The UN Guiding Principles recognise that there can be strong policy reasons for extraterritorial jurisdiction. For example, the Guiding Principles note that the risk of gross human rights abuses is greatest in conflict-affected areas. In such areas, the “host” State may not be able or willing to protect human rights, and there may be no State control or authority over the area. In those situations, “home” States have a particular role to play in providing advice, assistance and guidance, and in requiring companies operating in those areas to ensure that they are not involved in human rights abuses.

Front company – a fully functioning company with the characteristics of a legitimate business, serving to disguise and obscure illicit financial activity. Myanmar's military uses front companies, sometimes involving multiple layers of such companies, to evade sanctions.

Home State – the country in which a company is legally domiciled.

Host State – any State other than the home State in which a company, or a group of companies, operates or invests, or which is a significant source of goods or services for the group or its constituent companies.

KaPaSa – weapon production factories operated by the DDI in Myanmar.

Joint venture – is an undertaking of two or more parties that seek the development of a single enterprise or project for profit. The parties to the joint venture must be at least two natural persons or entities. The joint venture agreement sets out the rights and responsibilities of each party, including where the risks of the undertaking lie.

MEHL – Myanma Economic Holdings Public Company Limited, a military holding company in Myanmar. All shares in MEHL are held and managed by current or former Myanmar military officers, regiments, and units, and organisations led by former service members.

MOD – Ministry of Defence.

MOEE – Ministry of Electricity and Energy.

OECD Guidelines – The Organisation for Economic Co-operation and Development Guidelines for Multinational Enterprises.

SAC-M – Special Advisory Council for Myanmar.

SLORC – State Law and Order Restoration Council.

UN – United Nations.

UN Guiding Principles – United Nations Guiding Principles on Business and Human Rights.

Value chain – the range of activities and processes needed to create a product, bring it to market and ultimately to end users.

Wassenaar Arrangement – the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies.

Weapons – see arms, above.

Executive Summary and Key Recommendations

Following the attempted coup in February 2021, Myanmar's military¹ has relied on an arsenal of weapons² to carry out summary executions, massacres and other human rights atrocities in response to peaceful protests and growing anti-coup armed resistance in Myanmar. Analysis of witness statements and of video and photographic evidence in relation to such human rights violations shows security forces armed with a variety of locally produced firearms, including sniper rifles,³ MA-1 semi-automatic rifles,⁴ and Uzi-replica BA-93 and BA-94 sub-machine guns.⁵ In addition, analysis of images of weapons used by soldiers and the military-controlled Myanmar police force shows that much of the small arms ammunition used against peaceful protestors in 2021 carries the headstamp marking of the Myanmar military's Directorate of Defence Industries (DDI), confirming local manufacture.⁶

Since the late 1950s, and in particular with the coming to power of the so-called State Law and Order Restoration Council (SLORC) military junta in 1988, Myanmar's military has invested significantly in strengthening its domestic capacity to produce weapons as a necessary means for releasing the military from a dependence on external supplies. This ambition is illustrated by:

- the initial establishment of weapon production factories in Yangon and in the central, Bamar-majority parts of the country and the continuous establishment of new factories, including some that have yet to become fully operational;
- the progressive increase in stockpiles of strategic raw materials to ensure adequate and uninterrupted supply for continuous in-country production of weapons;

¹ This report uses the terms Myanmar's armed forces and Myanmar's military interchangeably to refer to the army, the navy and the air-force, all of which contribute to the KaPaSa factories' production lines and receive weapons for use from these factories.

² In this report, the terms "arms" and "weapons" (and associated terms such as "arms industry" or "weapon industry" as well as "arms manufacturing" or "weapon manufacturing") are used interchangeably as a collective term to refer to any weapons other than weapons of mass destruction. This term encompasses a wide range of equipment, including battle tanks, armoured combat vehicles, large-calibre artillery systems, combat aircraft and unmanned aerial vehicles, attack helicopters, warships, missiles and missiles launchers, landmines, cluster munitions, small arms and lights weapons, and ammunition.

³ Fortify Rights, March 2022. 'Nowhere is Safe – The Myanmar Junta's Crimes Against Humanity Following the Coup d'Etat,' pg. 45.

⁴ Amnesty International, Press Release of 11 March 2021. 'Myanmar: Vast arsenal and notorious troops deployed during nationwide 'killing spree' protest crackdown – new research.'

⁵ Amnesty International, Press Release of 11 March 2021. 'Myanmar: Vast arsenal and notorious troops deployed during nationwide 'killing spree' protest crackdown – new research.' Note that BA-93 and BA-94 small arms are no longer in production in Myanmar and have been largely replaced by the MA-series of small arms. Some BA-93 and BA-94 weapons remain in use, in particular by the police and border guard force as these often receive weapons that are no longer used by the armed forces.

⁶ International Peace Information Service, Arms Trade Bulletin March-April 2021. 'Arms transfers to Myanmar.'

- the modernisation of auxiliary industries – such as iron and steel plants – to provide necessary materials for production;⁷
- the continuous upgrading of existing weapons and diversification of production lines; and
- the strategic diversification of sourcing bases (countries and companies) to limit the impacts of current and potential future sanctions and embargoes.

As a result, Myanmar's military has gradually become largely self-sufficient in manufacturing a range of weapons. By way of illustration, the DDI currently has an extremely robust production capacity for small arms⁸ to meet its operational needs,⁹ which are focussed almost exclusively on the brutal internal suppression of the Myanmar population.

As its atrocities mount, the military's need to further insulate itself from economic and external diplomatic pressure will likely lead to increased efforts aimed at the modernisation of existing weapon factories, the construction of additional factories and the development of auxiliary domestic industries for supplying the factories with necessary raw materials.

Despite robust production capabilities, however, the DDI is still reliant on international supplies, including for a variety of raw materials, parts and components and end-items, as well as machinery and technology, for the sustained production – both licensed and un-licensed¹⁰ – of the weapons in its arsenal.

This report maps out the Myanmar military's in-country weapon production which takes place at factories commonly referred to as KaPaSa (after the Burmese name for the Directorate of Defence Industries, Karkweye Pyitsee Setyone) or, in the military's own terms, as "Defence Industry" factories (DI). The report provides an overview of some of the critical supplies that appear to enable this production, and it identifies companies whose products are currently used by the DDI to successfully sustain its weapon manufacturing at scale.¹¹ The report also identifies companies that enable the DDI to purchase products by brokering deals or otherwise acting as intermediaries for the DDI.¹² In doing so, these companies also enable Myanmar's military to continue to commit gross human rights violations, amounting to crimes against humanity, war crimes and genocide.

⁷ Since the 2021 attempted coup in particular, the Myanmar military has increasingly prioritised import-substitution and self-sufficiency by imposing new import substitution policies and through renewed efforts to re-open and operationalise state-owned factories that had previously been suspended by the National League for Democracy government due to concerns over economic viability. See, for example, Myanmar Now, 26 August 2021, '*Junta attempts to reopen steel mill once dismissed as dept trap.*'

⁸ Small arms refer broadly to weapons designed to be used by one individual. Small arms typically include self-loading pistols and revolvers, rifles and carbines, sub-machine guns, assault rifles and light machine guns.

⁹ Vining, M., 2019. State SALW production and Transfers in Myanmar. Unpublished background paper. Geneva: Small Arms Survey. Quoted in Picard, M., Holtom, P., Mangan F., 2019. Trade update 2019: Transfers, Transparency South-East Asia Spotlight, pg. 51.

¹⁰ Both licensed production and unlicensed production involve the acquisition of technology by an actor that did not previously possess it for the production of a specific weapon (or component of a weapon). In a licensed production agreement, the licensee – in this case the Myanmar military's DDI – is manufacturing a product for which it is granted production rights under certain conditions, while the licensor retains the ownership of the intellectual property necessary for production. Unlicensed production, on the other hand, involves the acquisition and use of manufacturing technology without the consent of the original owner. See Small Arms Survey, 2007. Guns and the City: Chapter 1. Multiplying the Sources: Licensed and Unlicensed Military Production.

¹¹ Listed in the Annex to the present report.

¹² Listed in the Annex to the present report.

This report by the Special Advisory Council for Myanmar (SAC-M) finds that:

- Some of the DDI's production appears to be taking place under license (including expired licenses). However, the licensing situation for many of the weapons currently produced at the KaPaSa factories remains unclear. Whether licensed or unlicensed production, the DDI appears to have obtained the technology and know-how to produce a variety of its weapons through various types of transfer of technology (ToT) deals. Over the years, the types of ToT deals that the DDI has entered into with companies – including State-owned companies – from Italy and (then) West Germany, Singapore, Israel, South Korea, North Korea, China and Ukraine have included the receipt of entire weapon production plants (turn-key projects), receipt of direct support from engineers associated with the owner of the technology, joint venture agreements, and KaPaSa factory staff being trained by original license-holders. Some companies that have provided ToTs to the DDI appear to have received commercial contracts, including in Myanmar's oil and gas sector, in exchange.
- While the DDI is able to partially produce and domestically source some of the critical raw materials used for its arms production, it still imports important quantities of such materials, including from China through the China State-owned company China North Industries Group Corporation Limited (NORINCO). China has also played an important role in supporting the establishment and operation of auxiliary industries, such as iron and steel plants and copper mines, that are either directly connected with weapon production factories in Myanmar or whose outputs feed the factories' production. The DDI is currently also seeking to invest in iron and steel plants in the country, including in Pyin Oo Lwin, Mandalay Region. Consequently, foreign companies involved in the extraction and/or processing of certain raw materials in Myanmar may find themselves contributing to, or being directly linked to, sustaining the Myanmar armed forces' arms production capabilities.
- The DDI also depends on imports of parts and components ready to be used in weapons made in the KaPaSa factories, including fuses, cast boosters, detonating caps, igniters and electric detonators. Available data indicates that many of these parts and components come from companies domiciled in India and China. Information obtained by SAC-M suggests that the poor quality of many of the Chinese products upon which the DDI depends has prompted the DDI to progressively turn to other countries, including India, for critical supplies, and that the DDI is planning for other countries, including India, to play an increasingly important role for the weapon production industry in Myanmar. Several companies domiciled in India have also been identified as supplying the DDI with end-items such as optical sights to be fitted to made-in-Myanmar small arms such as sniper rifles. The military's need to import optical sights is likely to continue as the military is moving towards the increased use of optical sights in its small arms and light weapons design and manufacture.
- Automated machining is a critical step for weapon manufacturing at scale and modern Computer Numerical Control (CNC) machines with turning, milling and grinding functions, as well as electro-discharge machines, play a critical role. SAC-M has identified machines manufactured by companies legally domiciled in Austria, Germany, Japan, Taiwan and the United States (US) that are currently used by the Myanmar military at its weapon production factories. SAC-M has also

identified various software programmes made by companies legally domiciled in France, Israel and Germany currently being used at KaPaSa factories for operating some of the CNC machines.

- Singapore functions as a strategic transit point for potentially significant volumes of items – including certain raw materials – that feed the Myanmar military's weapon production. Companies domiciled in Singapore have been identified as brokering deals and exporting items to the DDI or to associated civilian front companies for the military in Myanmar. In addition, according to credible information received by SAC-M, Taiwan functions as an important transit point for the DDI's purchase of high precision CNC machines, including from European manufacturers, for KaPaSa arms manufacturing. In addition, individuals formerly associated with Myanmar's armed forces suggest that, with the assistance of Mottama Holdings Limited – a Myanmar-based conglomerate and reportedly the current intermediary between the DDI and Chinese arms industry company NORINCO – the DDI also regularly sends CNC machines from KaPaSa factories to Taiwan where they are serviced by technicians associated with the European manufacturers of the machines, after which they are shipped back to Myanmar and to the DDI. It appears as though the absence of Taiwanese sanctions on Myanmar facilitates these types of transactions and shipments to and from Myanmar for the performance of critical maintenance.

The leader of the Myanmar military, Senior General Min Aung Hlaing, and his top military leaders must be held accountable for the human rights violations that they have perpetrated. However, this report emphasises that concrete action must also be taken to address the corporate responsibility to respect human rights in Myanmar. **This requires action both by the companies that have been identified in this report and by their home governments.**

Under international human rights law, all States have a duty to protect against human rights abuses by third parties, including business enterprises, through appropriate policies, regulation and adjudication. In relation to the manufacturing and export of weapons and associated items and machinery specifically, this expectation is reflected in several multilateral agreements of relevance to the arms industry, including the Arms Trade Treaty¹³ and dual-use goods regimes, such as the Wassenaar Arrangement,¹⁴ the European Union (EU) Dual-Use Goods Regulation¹⁵ and current sanctions regimes that apply to Myanmar.¹⁶ For the home States of the companies that have been identified, adhering to these legal provisions requires them to apply export controls on a number of items – including sub-components, end-items and machinery and technology – that could be used for arms production.

At present, it is unclear to what extent the home States of companies have upheld this responsibility in relation to the products that have been identified in use at the Myanmar military's weapon production factories and auxiliary industries. **SAC-M recommends that the home States identified in this report investigate and, as relevant, initiate administrative and/or legal proceedings**

¹³ The Arms Trade Treaty entered into force in December 2014.

¹⁴ The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (1996).

¹⁵ Regulation (EU) 2021/821 entered into force on 9 September 2021. It replaces the previous Dual-Use Regulation, Regulation (EC) No. 428/2009.

¹⁶ For example, currently, the Directorate of Defence Industries in Myanmar – overseeing the in-country production of arms – is subject to sanctions by the European Union (and in consequence by all EU member states), the US, Canada, the UK and Japan.

against the companies whose parts and components, end-items and machinery and technology are relied upon by the Myanmar military's Directorate of Defence Industries. States should also adopt targeted sanctions against the KaPaSa, its leadership and its network of brokers that have been identified in this report.

Companies have a responsibility to respect human rights. This means that they should act with due diligence to avoid infringing on the human rights of others and to address adverse human rights impacts with which they are involved.¹⁷ The responsibility to respect is independent of States' abilities and/or willingness to fulfil their human rights obligations. In practical terms, and in relation to the Myanmar military's weapon production, meeting this responsibility means that companies are expected to apply their own due diligence in relation to the risks of potential harmful end-use of their products,¹⁸ and to put in place measures to prevent or mitigate such risks. For products that are covered by export controls, companies are not absolved of the responsibility to respect human rights by the mere fact that their home State has granted the necessary export permits. **Companies identified in the report should immediately stop doing business with the Myanmar military's Directorate of Defence Industries and associated military entities and civilian front companies for the Myanmar military, and they should investigate how their products have ended up being used for the manufacturing of arms by the military in Myanmar. Beyond this, companies should also take steps to prevent future harmful end-use of their products through robust due diligence to identify, prevent, and mitigate the risk of harm associated with the sale/licensing and deployment of their products. In relation to harms that have already been suffered by civilians in Myanmar, companies should provide for, or cooperate in, the remediation of such harms, including by collaborating with any future legal or administrative proceedings.**

Lastly, it should be noted that this report does not undertake the immense task of mapping out the Myanmar military's arms production and associated value chains¹⁹ in their entirety. Undertaking such an endeavour is a key recommendation of this report. Put differently, additional, longer-term research is needed to identify additional critical supplies with a view to disrupting the Myanmar military's weapon production. This undertaking would fill an important gap in the current research on Myanmar's armed forces, which tends to focus on the military's acquisition of weapons from elsewhere, rather than weapons that are made in the country. **To this end, SAC-M encourages interested parties to follow-up on the present research where it has left off. To sustain such future work, SAC-M invites the submission of information, on a continuous basis, that could lead to the identification of additional companies that supply or support the Myanmar military in its manufacturing of weapons.**²⁰

¹⁷ This responsibility is anchored in the United Nations Guiding Principles on Business and Human Rights, the global standard for preventing and addressing the risk of adverse impacts on human rights linked to business activity, and they provide the internationally accepted framework for enhancing standards and practices with regards to business and human rights. The Human Rights Council unanimously endorsed the Guiding Principles in its resolution 17/4 of 16 June 2011.

¹⁸ In this report the term end-use risks refers to situations in which products have been misused in some way, repurposed for some unauthorised use, or incorporated into some other product that is then used in a way that harms human rights.

¹⁹ A value chain is the range of activities and processes needed to create a product and get it to market and, ultimately to an end user (in the case of KaPaSa production, the end-user being the DDI or associated military-controlled entity).

²⁰ Information can be communicated to the following email address: exposekapasa@proton.me. Other secure methods of communication are available on request.

Purpose and Methodology

Since the military's crackdown on the 1988 pro-democracy uprising, arms embargoes and sanctions have been imposed on Myanmar by foreign governments. So far as arms are concerned, these types of measures have principally sought to prohibit the trade of military or dual-use goods that may be used by the Myanmar military for internal suppression. Important as they may be, these measures have not been fully effective in preventing the military from committing atrocities against the civilian population. On the one hand, this failure stems from the fact that several UN member states continue to sell weapons to the military.²¹ An equally important factor, however, is the fact that Myanmar's military can produce a large variety of weapons in-country.

Weapons made in the country's so-called KaPaSa factories have been, and continue to be, used by Myanmar's military for widespread, systematic and indiscriminate attacks on civilians, as evidenced in publicly available reports and video/photographic evidence, and corroborated by information received by SAC-M from individuals formerly associated with the Myanmar armed forces or experts on made-in-Myanmar weapons. For example:

- Post-coup military offensives in Karenni / Kayah State have involved the systematic and massive use of landmines – including locally produced M14 anti-personnel landmines – in and around villages in south-eastern Karenni / Kayah State, acts that may amount to war crimes.²² Photographs reviewed by the Land Mine and Cluster Munition Monitor indicate that antipersonnel landmines manufactured by Myanmar were captured from the Myanmar Armed Forces by non-state armed groups every month from January to September 2022 and in virtually every part of the country.²³ In August 2022, antipersonnel mines manufactured by and in the possession of the Myanmar military were captured in both the northwest and southwest of the country, indicating extensive mine use by the armed forces.²⁴
- Following the 2021 attempted coup, the military and police responded to peaceful protests with in-country made weapons – including a variety of rifles²⁵ and grenades²⁶ – to assassinate protestors.
- In March 2019, during armed conflict between the military and the Arakan Army (AA), at least five people were killed when the army opened fire on Say Taung village in northern Rakhine, using

²¹ See, for example, A/HRC/49/CRP.1. Conference Room Paper of the Special Rapporteur on the situation of human rights in Myanmar: 'Enabling Atrocities: UN Member States' Arms Transfers to the Myanmar Military,' February 2022; A/HRC/42/CRP.3. Report of the Independent International Fact-Finding Mission on Myanmar. 'The economic interests of the Myanmar military,' August 2019.

²² Amnesty International, 20 July 2022, 'Myanmar: Military's use of banned landmines in Kayah State amounts to war crimes.'

²³ Land Mine and Cluster Munition Monitor, Country Profile: Myanmar/Burma, last updated 17 November 2022.

²⁴ Land Mine and Cluster Munition Monitor, Country Profile: Myanmar/Burma, last updated 17 November 2022.

²⁵ See, for example, Fortify Rights, March 2022, 'Nowhere is Safe – The Myanmar Junta's Crimes Against Humanity Following the Coup d'Etat,' pg. 45; Amnesty International, Press Release of 11 March 2021, 'Myanmar: Vast arsenal and notorious troops deployed during nationwide 'killing spree' protest crackdown – new research.'

²⁶ In Bago, in April 2021, junta security forces attacked civilian protestors, killing at least 82 people, including through the use of MG-2 rifle grenades made by the DDI. See Myanmar Witness, 11 April 2022, 'Violence against protestors in Bago.'

rounds and artillery produced at a KaPaSa factory.²⁷ Throughout the two-year period of conflict with the AA, the military regularly fired into villages in Rakhine State with locally produced small arms and ammunition, injuring or killing civilians, damaging civilian houses and other structures, and causing mass displacement. Investigation into military attacks in Rakhine in 2019 also indicates that the military systematically fired explosive weapons with wide area effects, including locally produced mortars and associated projectiles, into civilian areas.²⁸

- The military's genocidal atrocities inflicted on Rohingya in Rakhine State in 2016 and 2017 involved the killing of Rohingya civilians by the military and Border Guard Police using a variety of DDI-made small arms, including the MA-3 MK I and G3 rifles used during the Inn Din massacre.²⁹

In short: weapons produced by the Myanmar military in-country at its KaPaSa factories have been used in the military's widespread and systematic attacks against civilian targets, prior to, during and after the 2021 attempted military coup, and continue to be so.

G3 rifle

MA-3 MK 1 assault rifle



Picture of the Inn Din massacre. This photo was taken on the day the ten Rohingya men were killed during the so-called Inn Din massacre in September 2017. The picture, obtained from a Buddhist village elder and authenticated by witnesses before being published by Reuters,³⁰ shows, to the left, a soldier carrying a G3 rifle, and to the right, a soldier carrying a MA-3 MK I assault rifle, both locally manufactured and likely used for the executions.

²⁷ The Irrawaddy, 22 September 2019. '5 Civilians Killed as Tatmadaw Troops Open Fire on Village in N-Rakhine: Witnesses.'

²⁸ Amnesty International, May 2019. "'No one can protect us': War crimes and abuses in Myanmar's Rakhine State.' In relation to attacks on the Ywar Haung Taw village, an Amnesty International military expert confirmed the tail-booms of 120mm and 60mm mortars, noting that the matching colour and stencilling suggested they were likely made in Myanmar.

²⁹ Lone, W., Soe Oo K., Lewis S., and Slodowski, A., for Reuters, 8 February 2018. 'Massacre in Myanmar – a special report.'

³⁰ Lone, W., Soe Oo K., Lewis S., and Slodowski, A., for Reuters, 8 February 2018. 'Massacre in Myanmar – a special report.'

Over a period of one year, SAC-M has mapped out the Myanmar armed forces' in-country weapon production and the value chains that enable this production. The research has entailed open-source investigation, including review of user-generated content in Burmese and English posted on a wide variety of social media forums and discussion groups (open and closed). SAC-M has also reviewed leaked budget-related documents (2016-2021) from the Myanmar military-controlled Ministry of Defence (MOD) and the DDI as well as shipment records from subscription-based import/export databases. In addition, SAC-M has interviewed approximately 30 individuals, including former soldiers of the Myanmar armed forces as well as weapon experts and experts on the weapon manufacturing industry in Southeast Asia broadly and Myanmar specifically.^{31,32}

SAC-M hopes that this report will contribute to a greater understanding of the Myanmar military's weapon production and the global value chains that feed this production to ensure that more effective international action can be taken to protect the rights of the Myanmar people, including through targeted sanctions, engagement with identified companies to prevent future supplies reaching the DDI and the network of KaPaSa factories and, as necessary, targeted accountability-oriented proceedings.

The DDI currently has an extremely robust production capacity for small arms to meet its operational needs, which are focussed almost exclusively on the brutal internal suppression of the Myanmar population.

³¹ It should be noted that information about the DDI in general, and the KaPaSa factories in particular is limited and only paints, at best, a very partial picture. In addition, publicly available information tends to be circular often leading back to the same sources, making it challenging to independently verify. In light of this, the report has sought to triangulate and verify, through multiple sources and, in particular, through individuals with first-hand experience of KaPaSa weapon production, the information that has contributed to this report.

³² Due to the sensitive nature of the subject matter and high risk of reprisals against those interviewed, the identities of SAC-M's interlocutors will not be disclosed.

“Made in Myanmar”: Mapping the Military’s In-Country Weapon Production

Contrary to common practice in other countries, including in Southeast Asia, there are no private arms manufacturing companies in Myanmar: in its entirety, Myanmar’s weapon industry is a military-run affair.³³ As a fully State-owned enterprise, the DDI³⁴ is the principal organisation overseeing the domestic manufacture and assembly of weapons in Myanmar. The DDI has always remained under the firm control of the military, including during the years of coalition government with the National League for Democracy (NLD). As a part of the military’s structure, the DDI operates under the Myanmar Ministry of Defence and reports to the Office of the Commander in Chief.³⁵ The current Chief of Defence Equipment Production at the DDI – responsible for weapon manufacturing at KaPaSa factories – is Lieutenant-General Kan Myint Than.³⁶ Prior to assuming his function at the DDI, Kan Myint Than served as the Commander of Defence Services Science and Technological Research Centre (DSSTRC) in Pyin Oo Lwin, Mandalay Region.

According to the Stockholm International Peace Research Institute (SIPRI), Myanmar’s total defence spending budget amounted to 3.3% of the country’s gross domestic product in 2021.³⁷ This figure is indicative only as it does not take into account the many ways in which the military supplements its income through off-budget sources.³⁸ While SIPRI’s data does not indicate the share of the budget earmarked for in-country production of weapons, proposed defence spending budgets leaked from the MOD suggest that, in 2020, the military requested over 29.68 million USD for military vehicles manufacturing and 65.22 million USD to purchase machinery for “Defence materials factories.”³⁹

³³ The State-owned Economic Enterprises Law (the State Law and Order Restoration Council Law No.9/89) defines 12 economic activities in which private investment is restricted and reserved to be carried out solely by the government. These activities include the “manufacture of products relating to security and defence which the Government has, from time to time, prescribed by notification” (Section 3, 1). In 2017, the Myanmar Investment Commission also issued a list of restricted investment activities including the “manufacturing of products for security and defence...” and the “manufacturing and related services of arms and ammunition for the national defence.” See Myanmar Investment Commission Notification No. 15 /2017: List of Restricted Investment Activities.

³⁴ The DDI is also commonly referred to as the Ministry of Defence Directorate of Defence Industries, the Myanma Defence Product Industry, or simply the Defence Product Industries and is located in Nay Pyi Taw.

³⁵ There is some level of disagreement between informants about who oversees the DDI. As regards the organisation and control of the KaPaSa weapon manufacturing complex, there is most likely a formal, conventional structure (with the DDI being part of the Ministry of Defence), but at the same time with the Director of Procurement reporting directly to the Commander in Chief of the Armed Forces. The higher levels of Myanmar’s armed forces often reach down into the wider defence organisation to oversee or manage key issues, including the acquisition of new weapons and the development of new capabilities. There also seems to be considerable overlap between the responsibilities of the Ministry of Defence and Myanmar’s military itself.

³⁶ Interview with #J2, 8 April 2022, and confirmed also by the publicly available list of participants in the Myanmar delegation to the 2019 Defence and Security exposition in Thailand at which the DDI showcased, for the first time, its Myanmar-made weapons.

³⁷ Stockholm International Peace Research Institute (SIPRI), 2022, Military Expenditure Database: 2021.

³⁸ See Selth, A., 2016, “Strong, Fully Efficient and Modern”: Myanmar’s new look armed forces’ (Griffith’s Asia Institute Regional Outlook Paper No. 49) pg. 6.

³⁹ Justice for Myanmar, 8 December 2020, ‘Myanmar Military Files Show Systemic Corruption and Implicate International Businesses.’

KaPaSa Factories

The Myanmar military's arms production takes place at so-called "Defence industry" factories that are located in about a dozen different locations across the country. Commonly referred to as KaPaSa factories (after the Burmese name for the DDI, Karkweye Pyitsee Setyone), many of the factories were initially established in the 1950s with the technical support of West Germany and Italy. Since then, the factories have multiplied in number and their production lines have been diversified. While individual KaPaSa factories may initially each have run several different production lines simultaneously, they appear to have become increasingly specialised. In practical terms, this implies that, at present, some of the KaPaSa factories produce specific components for larger weapon systems that are assembled in other KaPaSa factories, or that KaPaSa factories produce a specific type of weapon in its entirety (typically a specific "generation" of a given weapon),⁴⁰ or focus on manufacturing tool holders⁴¹ for CNC machines in use at other KaPaSa factories.⁴² Put differently, the KaPaSa factories perform a wide variety of functions, from processing raw materials and manufacturing components, to making arms and equipment, reassembling components shipped into Myanmar from abroad, adapting dual-use technologies⁴³ – legally or illegally acquired from other countries – and performing major repair and maintenance functions. The result is a large, sprawling multi-layered and multi-faceted arms industrial complex that has evolved over the years and is still evolving.

The supervision of production in each factory is done by officers from the Defence Service Technology Academy (DSTA, Pyin Oo Lwin, Mandalay Region). DSTA officers supervise a work force ranging from 1000 in the smaller factories to 3000 in the larger establishments. Among the 25 factories, KaPaSa 4, located in Tat Kone Township in Nay Pyi Taw, has been singled out as being particularly important for its role as a research centre, its in-house professional expertise in installing CNC machines and producing tool holders for CNC machines in use at other KaPaSa factories, and its support for the design of weapon production lines broadly.

The effective functioning of the KaPaSa factories is supported by central storage units for imported materials, parts and components, end items and machinery (KaHtaPa, commonly also referred to as "the store," in Yangon), the Defence Materials Production School (KaHtaKa, located in Pyin Oo Lwin, Mandalay Region) and a Training School for KaPaSa factory workers (situated in Okeshitpin, Pandaung Township, Bago Region, in the vicinity of several KaPaSa factories). Three so-called "heavy industries" (TaKaSa) factories are also integral to the in-country manufacturing of products for military end-use: Heavy Industry Number 1 (manufacturing and assembling vehicles for the army), Heavy Industry Number 10 (producing components for aircrafts, drones and unmanned

⁴⁰ For example, different KaPaSa factories produce a specific generation of the MA-series of small arms (mark I, mark II, mark III).

⁴¹ Tool holders are one of the main parts of CNC machines, connecting the machine tool with the tooling. They play an imperative role in the correct and precise manufacturing of weapon systems.

⁴² Interview with #V4, 2 August 2022.

⁴³ Dual-use technologies refer to goods, software and technology that can be used for both civilian and military applications. These can be acquired by the Myanmar armed forces and adapted, at KaPaSa facilities, to suit their own purposes. There have been reports, for example, that Australian-manufactured radios were purchased and modified by the Myanmar armed forces before being operated in the field. See, for example, Des Ball, 'How the Tatmadaw Talks: The Burmese Army's Radio Systems.' Working Paper No. 388 (Canberra: Strategic and Defence Studies Centre, Australian National University, 2004)

aerial vehicles) and Heavy Industry Number 11 (making components for, and assembling, armoured cars and light tanks), all three situated near Meiktila, Mandalay Region.

Beyond the network of KaPaSa factories and supporting institutions, the Myanmar armed forces also run other major military manufacturing sites, such as shipyards in Yangon, where naval frigates and corvette naval vessels are built, and military research and development institutes. There have also been longstanding rumours that some of the KaPaSa factories may be involved in developing a long-range ballistic missile program with technical expertise from North Korea.⁴⁴ According to US national intelligence reporting, the Myanmar military also established a chemical weapons facility in Tonbo, Bago Region in the 1980s for the production of sulphur mustard;⁴⁵ geo-localisation⁴⁶ done in late 2020 suggests that this facility remains intact although it is not known whether this facility still holds any stocks.

The fact that the first KaPaSa factories were established in the late 1950s and that the military continues to refer to them as “Defence Industry” facilities is closely associated with the doctrine of the “people’s war” – developed in the 1960s by then military dictator General Ne Win – which emphasised the vital role of Myanmar’s armed forces to combat both domestic insurgents and to fend off the potential incursion of foreign armies. Under this doctrine, the military sees a central role for itself not only in the country’s earlier struggles for independence from the British, but also in “saving” the country from a wide range of external and internal threats.⁴⁷ The latter has included groups opposed to centralised, military rule but also the military’s civilian critics and democracy activists from a wide range of ethnic groups, often referred to as “anarchistic mobs,” “destructionists” and “terrorists” by the military and its supporters in their propaganda.⁴⁸ The ability to produce weapons in-country remains an important source of pride for Myanmar’s armed forces and is considered essential by its members and supporters in light of the perceived threats to the country’s unity and stability. The military has doubled down on this narrative after the 2021 attempted coup which has been met with widespread civilian resistance in the form of peaceful protests and the emergence of the civil disobedience movement (CDM). Local armed resistance groups, including People’s Defence Forces (PDFs), Local Defence Forces (LDFs) and People’s Defence Teams (PDTs), have also emerged in response to the military’s use of violence and lethal tactics against the population. The CDM and PDFs are now routinely referred to by the military as terrorist insurgents.

⁴⁴ Xu, T., November 2021, for the Open Nuclear Network. Institutions Relevant to Ballistic Missile Development in Myanmar. See also Lintner, B., 23 March 2022, Asia Times. ‘Myanmar-North Korea on a new missile making mission.’

⁴⁵ Koblenz, G., and Roty, M., March 11, 2020. ‘Myanmar should finally come clean about its chemical weapons past—with US help.’

⁴⁶ Geo-localisation refers to the process of identifying the exact location of one or several sites based on information derived from an analysis of data and/or images associated with a particular location.

⁴⁷ In terms of weapon production at KaPaSa factories, this dual role of defending the country against both external and internal threats is seen in some of the DDI’s choices for production lines: for example, the DDI can produce, in country, a 12.7 mm heavy machine gun which can be used against slow and low flying aircraft, such as helicopters, but in the Myanmar context this type of weapon is unlikely to be of use as none of the groups currently opposing the junta and fighting it have helicopters.

⁴⁸ Mathieson, D.S., ‘Glaring glimpse into Myanmar military’s self-delusion,’ Asia Times, 29 April 2021, as quoted by Selth, A., 2021: ‘Myanmar’s military mindset: An exploratory survey,’ Griffith University.

Numbers and Locations

The DDI does not disclose the precise number of KaPaSa factories. Non-official estimates, however, suggest that the number of factories has multiplied from less than six prior to 1988 to “more than 20” in 2011⁴⁹ and to as many as 25 in 2022. Indicative of the order in which they have been established, the factories are commonly referred to as Defence Industry (DI) or KaPaSa followed by a number ranging from 1 to 25 (for example, DI-1 or KaPaSa 1). Two of the KaPaSa factories (numbers 23 and 25) are reportedly still in their construction phase and are not yet fully operational.⁵⁰ According to information received by SAC-M, the production at these factories will potentially focus on strategic raw materials (KaPaSa 25) and chemicals (KaPaSa 23) to further reduce the military’s dependency on external supplies.

Historically, the early factories were located almost exclusively in and around the former capital Yangon on the western bank of the Irrawaddy River near the town of Pyay (formerly known as Prome) in the Bago Region, and in Magway Region further to the north.⁵¹ At present, the majority of the factories are located in Magway and, to a lesser extent, Bago, in the central part of the country. There are several reasons why the factories have been concentrated in these two regions:

- the central part of the country (Magway, Bago) has historically been under the military’s firm control and domination;
- Magway and Bago are remote and fairly sparsely populated and the population is predominantly Bamar Buddhist; this has, until recently, meant that the security of the facilities can be better guaranteed;
- many of the factories have specifically been built along the western bank of the Irrawaddy River as the river provides an important transportation route for the raw materials, parts and components, items and equipment needed for the production of weapons, and for the transport of ready-made products, such as ammunition, to various military units.

Wherever their location, the KaPaSa factories are well-connected to roads, ports, airports and rivers to facilitate the transport and inflow of necessary materials for sustained weapon production. By way of example, the Bassein-Monywa Highway is an important connecting point for, and supports the functioning of, several KaPaSa factories, while the Irrawaddy River has allowed the military to use barges⁵² to transport materials rather than having to rely on often inadequate roads.

⁴⁹ Lintner, B., Asia Times, 6 September 2011, ‘Toys for the boys in Myanmar.’

⁵⁰ Interview with #V4, #V20 and #V11, 30 July 2022.

⁵¹ Asia Times, 6 September 2011, ‘Toys for the boys in Myanmar.’

⁵² A barge is a type of marine vessel that is mainly used for cargo transportation. Barges are typically used in lakes, canals, and inland waterways, and often at seaports.

To some extent, information about the locations of some of the factories is readily available in the public domain.⁵³ While the military has not publicly disclosed the locations, the Ministry of Electricity and Energy (MOEE) listed, seemingly mistakenly, some of them in the context of its public disclosure of electricity stations in the Magway and Bago regions. The listed locations of KaPaSa factories in Magway were later removed in November 2021 from the military-run MOEE's website.⁵⁴ In addition, since the 2021 attempted military coup, more information about the factories has surfaced in both print⁵⁵ and social media, providing additional indications about their locations, production lines and the transportation routes used by the military for supply. This increase in public information stems, in part, from the fact that the presumed factory sites appear to have been subject to sustained fighting between local resistance groups, including local units of PDFs, and the military.⁵⁶ Such attacks, coupled with a reported increase in numbers of soldiers defecting from the KaPaSa factories,⁵⁷ appears to be cause for significant concern for the military⁵⁸ as illustrated by recent high-level visits from Nay Pyi Taw to KaPaSa facilities⁵⁹ and retaliatory attacks by the military on civilians in Magway Region where the junta seemingly fears losing its stronghold.

⁵³ For example, Viettel Construction inadvertently released information about [four KaPaSa factories in Magway in connection with the establishment of Mytel towers inside the factories](#). See also, Lintner, 2012, 'Burma's WMD Programme and Military Cooperation between Burma and the Democratic People's Republic of Korea,' (Asia Pacific Media Services), which lists, in an annex, the location, size, workforce and production lines of 20 KaPaSa factories. Based on more recent reporting on production lines at each KaPaSa factory this list now appears to be largely out of date.

⁵⁴ Specifically, prior to 17 November 2021, the MOEE's overview of the grid in Magway Region also listed ten factories; since then, under the now junta-controlled ministry, this information has been removed from the site.

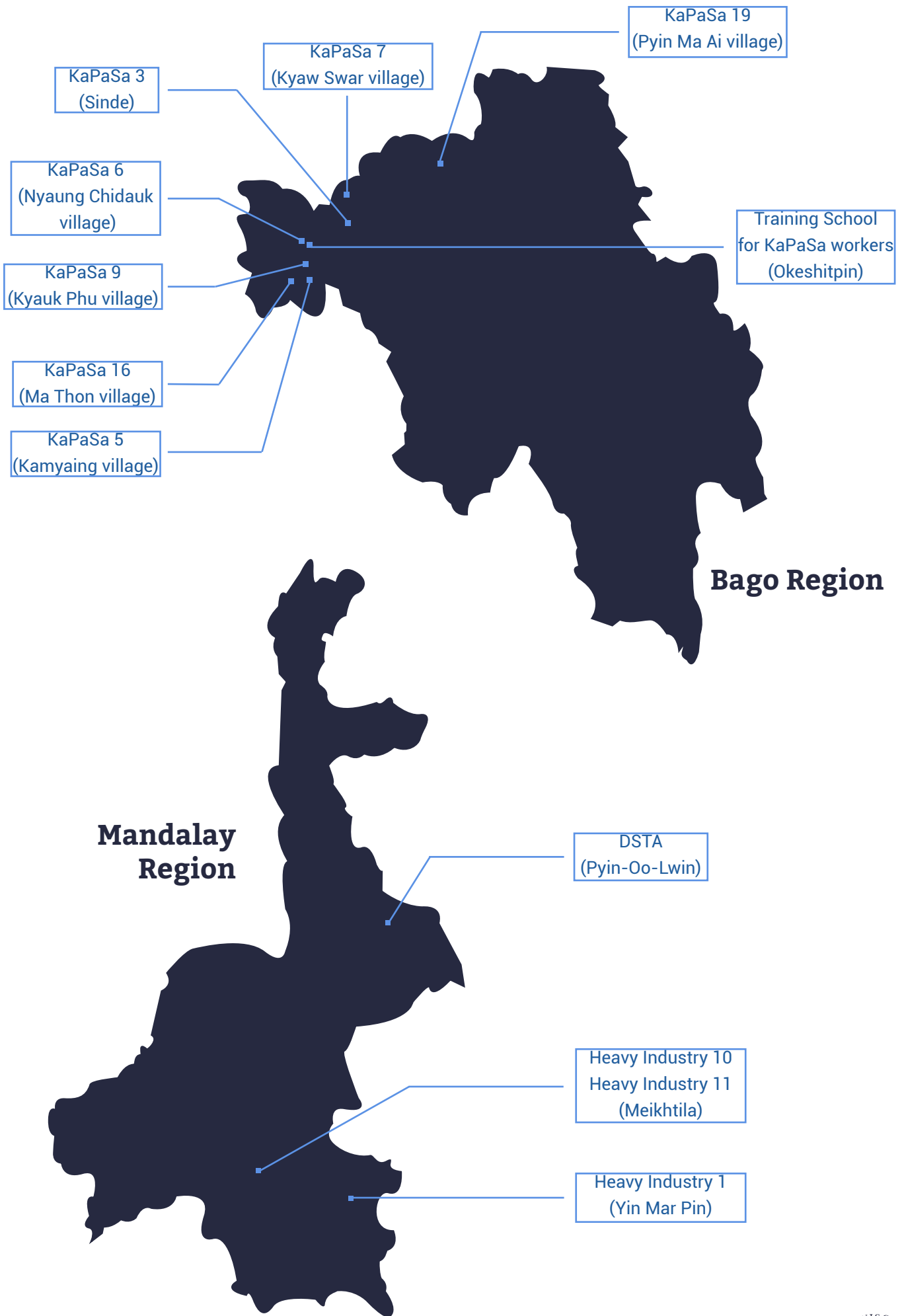
⁵⁵ For example, in July 2022, the Burmese edition of Myanmar Now made public a map with all the KaPaSa factory sites and an overview of each factory's production lines, reportedly based on interviews with CDM soldiers.

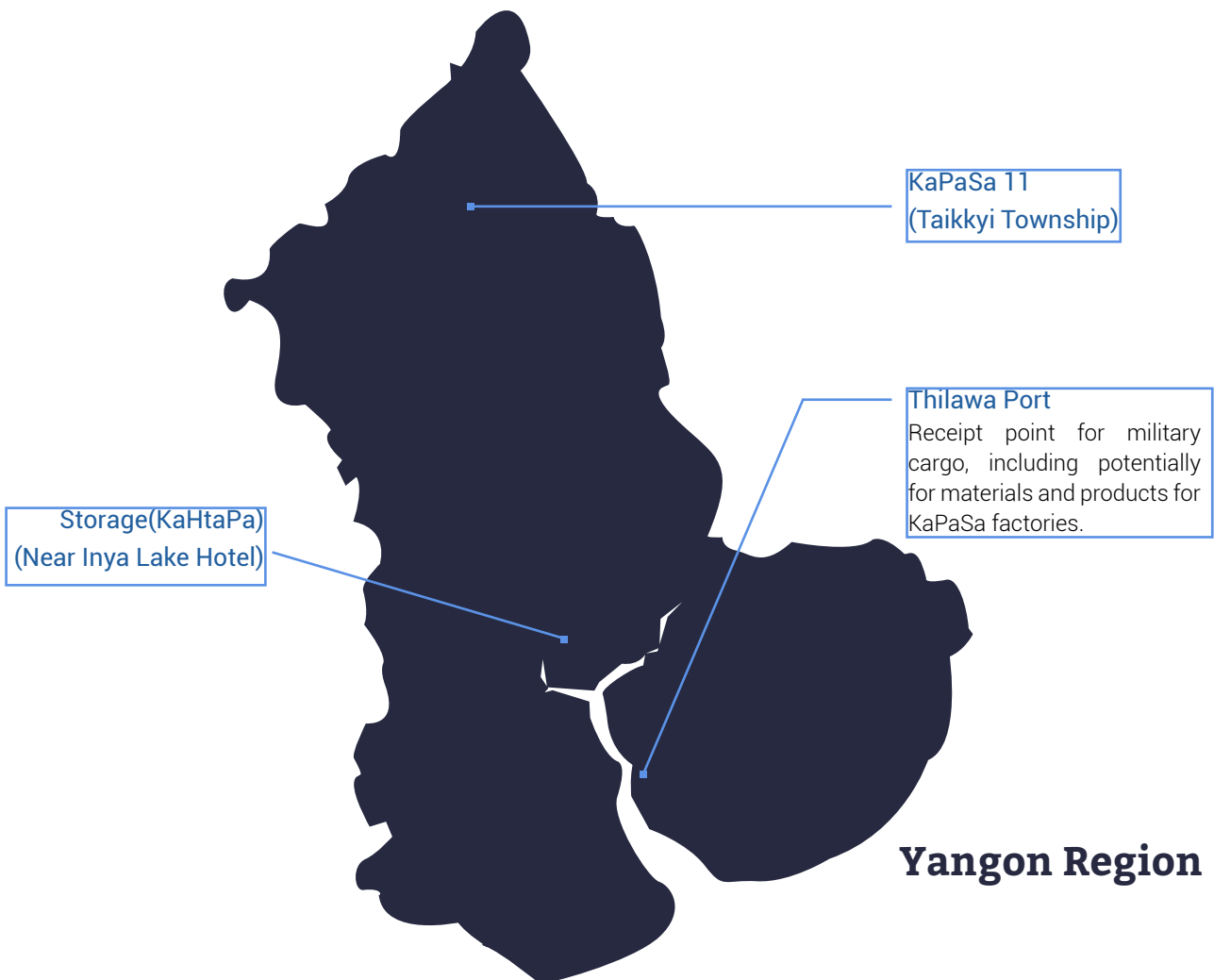
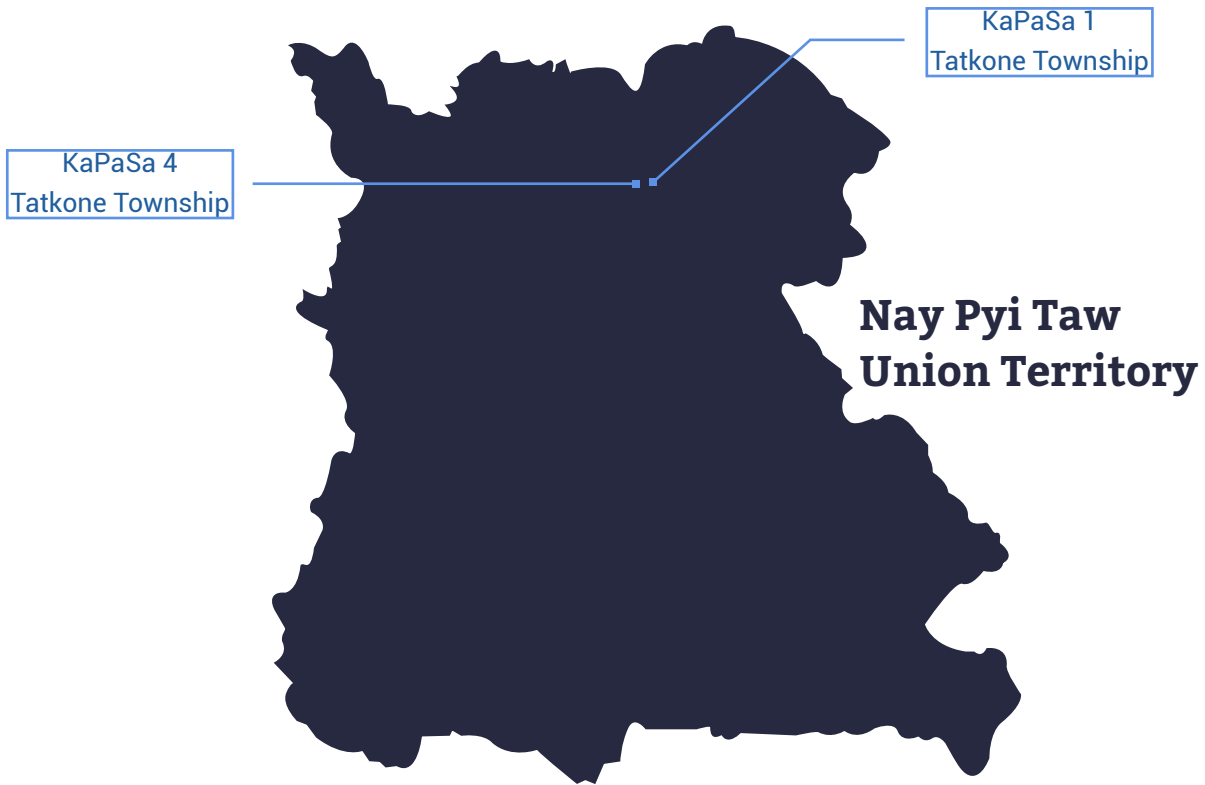
⁵⁶ Since 2021, military convoys travelling to or from KaPaSa factories have been subject to targeted attacks (see, for example, Myanmar Now, 8 April 2022, '*Resistance forces seize materials to build weapons, military responds with airstrikes*') and attempts have been made to disrupt production (for example, in December 2021, local PDFs carried out attacks on an electricity tower supplying six KaPaSa factories).

⁵⁷ Interview with #J2, 7 May 2022. See also Myanmar Now, 26 April 2022, '*From Battlefields to Hospitals, short-staffed junta moves personnel into vacant roles.*'

⁵⁸ See, for example, Frontier Myanmar, 31 August 2021, 'Armed resistance replaces anti-coup protests in Pauk Township' which states that "control of the region is particularly important for the Tatmadaw, because it is home to a Directorate of Defence Industry that produces military supplies like firearms and grenades for the security forces."

⁵⁹ Interview with #J2, 7 May 2022.





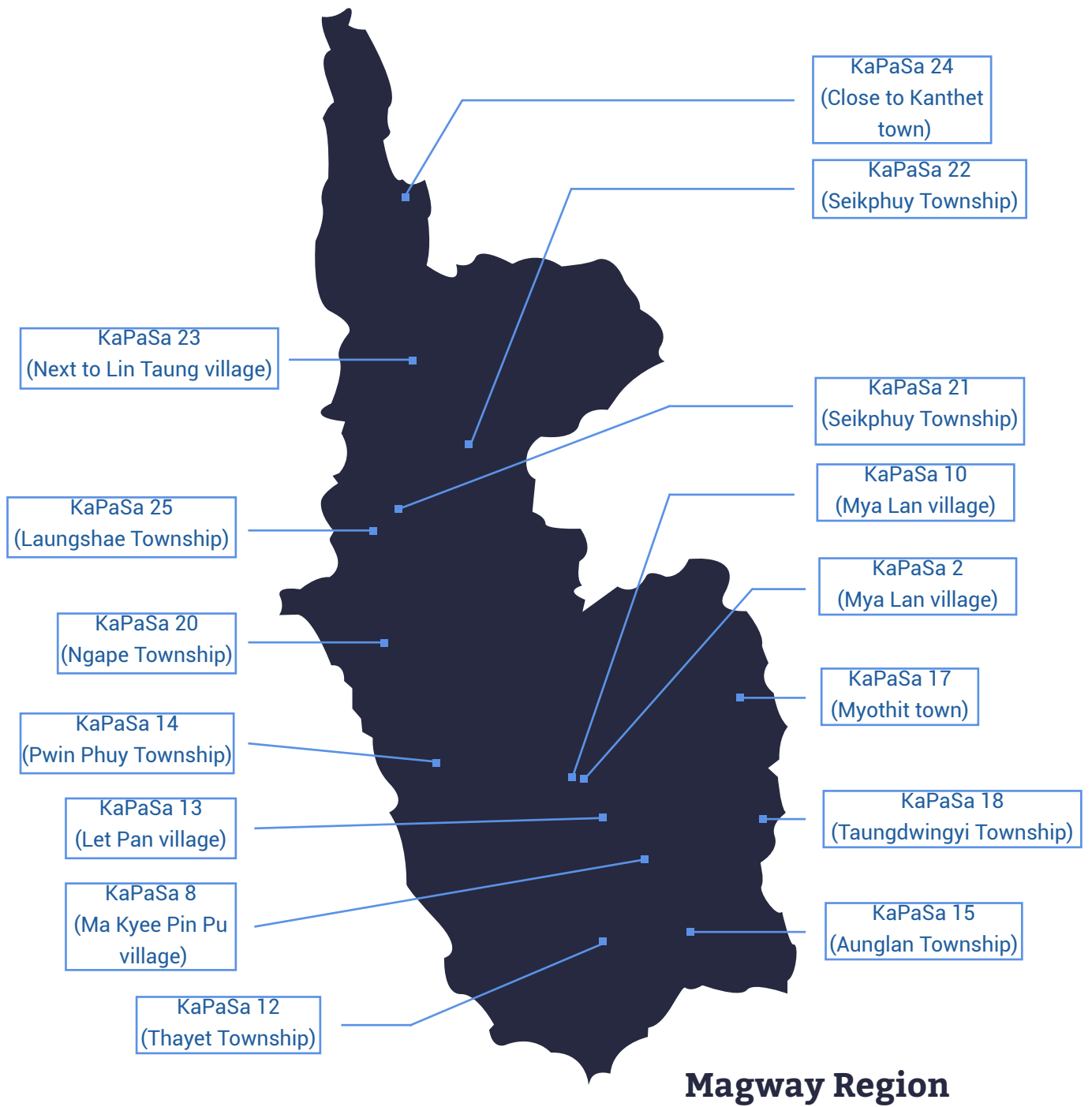


Image: Maps showing the location of KaPaSa factories, central storage units (KaHtaPa) and other locations of strategic importance to KaPaSa production. This map prepared by SAC-M complements previous geo-localisation work done on the locations of KaPaSa factories.⁶⁰

⁶⁰ Hintz, F., 25 December 2020: https://twitter.com/fab_hinz/status/1342250468198776832. See also map published by Myanmar Now (Burmese edition), 2 August 2022.

In-depth analysis of satellite imagery of a select number of KaPaSa facilities was done by the James Martin Center for Non-Proliferation Studies (CNS) in 2017 in response to concerns over a potential covert nuclear weapons programme in Myanmar. The CNS identified five factories in Magway Region, each of which presented "similar configurations, consisting of abnormally large square buildings, security perimeters, helipads, and barracks."⁶¹ Specifically, the expert analysis indicates that:

"The sites all have security fencing (in some areas double perimeter fencing) and security gates on roads leading to the facilities, indicating the facilities are of value. The facilities are all located in remote areas away from population centers. In particular, the facilities are nestled in a long valley which provides them with natural cover. New paved roads lead to the facilities. This type of infrastructure is not typical in the area where the facilities are located, again indicating that the facilities are valued. Additionally, re-viewing historical imagery of the locations shows that this region is prone to flooding—the presence of paved roads indicates that access to these facilities is a priority. All of the facilities have a helipad on site, again indicating that the facilities are of importance and that high-level officials visit them. The facilities have housing units, both for individuals in charge of operations and visitors, and for the workers at the facilities. Large warehouses of an almost identical design are present at all the facilities... All of the facilities appear to play some role in manufacturing processes for the military organization that oversees them. There are slightly different features at the sites, indicating that they may be producing different items or are responsible for different pieces of a value chain."⁶²

While CNS only considered five (of the total 25) KaPaSa factories, SAC-M's analysis of satellite images of the remaining 20 factories suggest similar design choices: they are located relatively far away from main settlements, consist of factory halls resembling hangars and have both administrative buildings and dormitories for on-site workers and their families.⁶³ Some of the factory sites are very large in size, with the largest estimated at over 6000 hectares (15,000 acres), stretching for over 10 kilometres.

⁶¹ James Martin Center for Non-proliferation Studies, June 2017, Occasional Paper n. 28: Geo4nonpro.org: A Geospatial Crowd-Sourcing Platform for WMD Verification.

⁶² James Martin Center for Non-proliferation Studies, June 2017, Occasional Paper n. 28: Geo4nonpro.org: A Geospatial Crowd-Sourcing Platform for WMD Verification, pg. 25, references omitted.

⁶³ According to information shared with the SAC-M, KaPaSa factory workers live on site with their families; some of the more recent factories can house up to 1500 workers and approximately the same number of family members.



Helipads visible at KaPaSa 24



KaPaSa 22. This factory reportedly produces MA-1, MA-2, MA-3 and MA-4 small arms (mark III).



KaPaSa 10 that reportedly produces multiple launch rocket systems for vehicles.

Chinese State-owned company NORINCO appears to be playing an important role for the DDI's imports of raw materials for KaPaSa production.

Production Lines

While the military in Myanmar has always been able to find countries willing to sell it arms – even after the imposition of arms embargoes and other restrictive measures imposed by many countries in 1988 – it has never been comfortable relying on foreigners for essential military supplies.⁶⁴ Consequently, the DDI has prioritised developing its in-country capacity to manufacture such essential supplies.

Based on information shared with SAC-M by credible sources,⁶⁵ current KaPaSa production lines include:

- **Small arms**⁶⁶ including:
 - ✧ assault rifles
 - ✧ sniper rifles
 - ✧ anti-material rifles
 - ✧ light machine guns
 - ✧ sub-machine guns
 - ✧ general purpose machine guns
 - ✧ a relatively recent indigenous copy of a 9x19 mm Glock handgun.
- **Light weapons**⁶⁷ such as:
 - ✧ heavy machine guns
 - ✧ light and medium mortars, including 60 mm and 81 mm commando mortars
 - ✧ anti-tank weapons, including rocket-propelled grenade launchers and recoilless rifles
 - ✧ anti-aircraft guns, including 14.5 mm (QJG-02G) and 35 mm (MAA-01) guns, 25 mm self-propelled twin anti-aircraft guns, and type-91 14.5 mm quad guns
 - ✧ various kinds of remote-controlled weapon stations⁶⁸ for armoured vehicles and for sea-based combat platforms.

⁶⁴ Selth A., 2000 for the Canberra Strategic and Defence Studies Centre, 2000, 'Landmines in Burma – the Military Dimension.'

⁶⁵ These sources include, among others, individuals with first-hand experience of the military's weapon production; military-controlled media outlets, discussions on social media forums and closed messaging groups, and images of the Myanmar DDI's booth at the Defense & Security 2019 expo in Thailand where the DDI showcased its products for the first time. The list has also been complemented based on interviews with experts on the design, production, and employment of various military platforms (air, naval, army) in Myanmar. It should be noted, however, that, because of the opacity of the DDI's production and the fact that the sprawling network of KaPaSa factories and associated strategic facilities is constantly changing, this list may not be complete, and some of the items listed may no longer be in production.

⁶⁶ Broadly speaking, small arms refer to weapons designed for individual use, such as revolvers and self-loading pistols, rifles and carbines, sub-machine guns, assault rifles, and light machine guns. See the International Tracing Instrument (ITI) within the framework of the UN small arms process.

⁶⁷ Light weapons are, broadly speaking, weapons designed for use by two or three persons serving as a crew, although some may be carried and used by a single person. They include, inter alia, heavy machine guns, hand-held under-barrel and mounted grenade launchers, portable anti-aircraft guns, portable anti-tank guns, recoilless rifles, portable launchers of anti-tank missile and rocket systems, portable launchers of anti-aircraft missile systems, and mortars of a calibre of less than 100 millimetres. See the International Tracing Instrument (ITI) within the framework of the UN small arms process.

⁶⁸ Remote controlled weapon stations refer to remotely operated weaponised systems often equipped with fire-control systems for light and medium-calibre weapons which can be installed on a ground combat vehicle or sea- and air-based combat platforms.

- **Large calibre artillery systems**⁶⁹ including:
 - ✧ towed artillery: 105 mm howitzer and 122 mm self-propelled howitzer (2-SIU)
 - ✧ heavy mortars: 120 mm commando mortars and 120 mm extended range mortars
 - ✧ multiple launch rocket systems: 122 mm rocket artillery and 124 mm rocket artillery systems.

- **Air defence systems**⁷⁰ including:
 - ✧ short-range man portable air defence system (SA-16)
 - ✧ self-propelled short-range air defence system (MADV)
 - ✧ medium-range air defence system (KS-1M).

- **Missiles and missile launchers**⁷¹ including:
 - ✧ Man-Portable Air-Defence-Systems (MANPADs), including the short-range Igla-1E (SA-16 Gimlet)
 - ✧ a variety of surface-to-air missiles (SAMs), including short- and medium-range (KS-1) and long-range (SA-5)
 - ✧ short-range tactical ballistic missiles (Hwasong-5) in collaboration with the Democratic People's Republic of Korea.⁷²

- **Ammunition and associated components**⁷³ such as:
 - ✧ small arms ammunition (including 5.56x45 mm NATO, 7.62x51 mm NATO, 9x19 mm parabellum)
 - ✧ anti-aircraft gun ammunition (12.7x108 mm, 14.5x114 mm)
 - ✧ grenades including hand grenades, 40 mm rifle grenades and 40 mm launcher grenades, 73 mm and 75 mm anti-personnel rocket propelled grenades
 - ✧ 57 mm, 77 mm and 122 mm rockets
 - ✧ 60 mm, 81 mm and 120 mm mortar bombs
 - ✧ 76 mm, 105 mm, 122 mm, 130 mm and 155 mm ammunition for towed guns
 - ✧ 122 mm and 240 mm rockets
 - ✧ 50 kg/100 kg/200 kg/250 kg/500 kg unguided bombs for the air-force

⁶⁹ The United Nations Register of Conventional Arms (UNROCA) defines large calibre artillery systems as guns, howitzers, artillery pieces, combining the characteristics of a gun or a howitzer, mortars or multiple-launch rocket systems, capable of engaging surface targets by delivering primarily indirect fire, with a caliber of 75 millimetres and above.

⁷⁰ Air defence systems serve the purpose of protecting military bases, assets and mobile platforms from aerial threats such as combat aircraft, attack helicopters, unmanned air vehicles as well as incoming missiles, guided munition, and rockets.

⁷¹ The United Nations Register of Conventional Arms (UNROCA) defines missiles and missile launchers as guided or unguided rockets, ballistic or cruise missiles capable of delivering a warhead or weapon of destruction to a range of at least 25 kilometres and means designed or modified specifically for launching such missiles or rockets.

⁷² See, for example, Xu, T., November 2021, for the Open Nuclear Network 'Institutions Relevant to Ballistic Missile Development in Myanmar.' See also Lintner, B., 23 March 2022, Asia Times, 'Myanmar-North Korea on a new missile making mission.' It should be noted, however, that, while there has been a great deal of speculation about the type of assistance that North Korea has provided or helped the Myanmar armed forces manufacture, few hard facts have emerged. There have been no confirmed sightings, for example, of a Hwasong-5 in Myanmar.

⁷³ Ammunition refers to the material that is fired, scattered, dropped or detonated from any weapon or any weapon system. The term includes both expendable weapons (such as bombs, missiles, grenades, and landmines) and the component parts of other weapons that create the effect on a target (such as projectiles, bullets and warheads).

- ✧ FT-2 precision-guided bombs (500 kg)
- ✧ aerosol bombs and a variety of ammunition for the navy (12.7/14.5/25/37/40/57/75 mm)
- ✧ a variety of anti-personnel and anti-vehicle landmines
- ✧ naval mines
- ✧ cluster munition
- ✧ AZDM 111 A 1/2 fuses
- ✧ explosives, including TNT⁷⁴ and RDX,⁷⁵ emulsion explosives and other high explosives.

- **Weapon sights** including optical sights for 40 mm and 60 mm rocket launchers as well as sights for 81/120 mm mortars.

The DDI also produces various tanks, armoured vehicles and utility vehicles, with new types of vehicles seen to enter production following a 2019 agreement between the DDI, military crony company Myanmar Chemical & Machinery, the Ukrainian State-owned arms conglomerate Ukronoroprom and State-owned arms trading company Ukrspetsexport.⁷⁶ Under the supervision of the DDI, military uniforms and accessories, including uniforms, shoes, bullet-proof vests and magazine pouches are also produced in country. Lastly, at one of its Heavy Industries in Meiktila, Mandalay Region, the military also reportedly produces unmanned aerial vehicles (UAVs).

At present, there is no information to suggest that the DDI exports its weapons to other countries. Nevertheless, the fact that the military, for the first time, showcased its products at the Defense & Security 2019 show in Thailand may attest to the military's intention to do so in the future.⁷⁷ Commenting on this participation, a representative of the military's delegation noted the DDI's interest to seek to enter foreign markets, in particular in the Southeast Asia region, potentially focusing on exporting the made-in-Myanmar sniper-rifle (MA-S).⁷⁸

⁷⁴ Trinitrotoluene, a common type of military explosive.


⁷⁵ RDX is a nitramine explosive compound that can be utilised as a propellant, gunpowder, or high explosive.

⁷⁶ Justice for Myanmar, 8 September 2021, 'Ukraine is arming the Myanmar Military.' Ukrspetsexport has confirmed an initial delivery of equipment and machinery for the plant which was scheduled to commence production by 2020. See "Ukraine to build armoured vehicle assembly plant in Myanmar," Defence Blog, 6 March 2019.


⁷⁷ The products presented by the DDI at the Defense & Security 2019 expo included mortars, grenade launchers, machine guns, rifles, other small arms, scopes and ammunition of large and small calibre.

⁷⁸ Based on information in media article shared during interview with #J2, 8 May 2022.

MA-SERIES SMALL ARMS
MA-S, 7.62 mm SNIPER GUN



TECHNICAL DATA		PERFORMANCE	
1. SYSTEM OF OPERATION	Bolt Action	1. MUZZLE VELOCITY	852 m/sec
2. LOCKING SYSTEM	Rotating Bolt	2. EFFECTIVE RANGE	1,000 m
3. GUN WEIGHT (EMPTY)	7.1 kg (15.62 lb)		
4. OVERALL LENGTH	1,155 mm (45.47 in)		
5. BARREL LENGTH	620 mm (24.4 in)		
6. RIFLING	4 Grooves RH, 1 turn in 12" (305 mm)		
7. FEEDING SYSTEM	5 Rds. Plastic Magazine		



A flyer for the Myanmar-made sniper rifle (MA-S) as showcased by the DDI at the Defense & Security 2019 expo in Thailand.

The DDI's stand at the Defense & Security 2019 expo in Thailand, showcasing a variety of weapons made in Myanmar.



Cartridges for various firearms, as showcased by the DDI during the Defense & Security 2019 expo in Thailand.



Grenades, bore cartridges and fuses manufactured at KaPaSa factories and showcased at the Defense & Security 2019 expo in Thailand.

Locally produced mortars, as showcased at the Defense & Security 2019 expo in Thailand.





Cannon ammunition produced at KaPaSa factories and displayed at the Defense & Security 2019 expo in Thailand.



A Myanmar-made rocket propelled grenade launcher (RPG) and Myanmar-made rocket propelled grenades showcased at the Defense & Security 2019 expo in Thailand.





Captured DDI manufactured landmines. In December 2019, seven MM-2 landmines planted by the Myanmar army were discovered near Wan Wah village of Murg Mu Region in Namtu Township, northern Shan State. Photograph originally published on Facebook by the Restoration Council of Shan State (RCSS) on 3 December 2019.

While there are some publicly available estimates about the quantities of the specific categories of weapons that the DDI produces on an annual basis, its actual production capacity is opaque. Complicating the matter further is the fact that a number of rumours and misconceptions about Myanmar's armed forces persist, with some portraying the military as an "enormous, well-resourced and efficient military machine" and others characterising it as "a hollow shell, lacking committed personnel and professional skills, riven by internal tensions and preoccupied with the crude maintenance of political power."⁷⁹ Consequently, any available figures about the DDI's arms production outputs should be considered indicative at best.

⁷⁹ See Selth, A., 2016, 'Strong, Fully Efficient and Modern': Myanmar's new look armed forces (Griffith's Asia Institute Regional Outlook Paper No. 49) pg. 6, footnotes omitted.

The DDI uses the designation of "MA" for Myanmar Army (or alternatively M, for Myanmar) for the nomenclature of most of the made-in-Myanmar weapons.⁸⁰ Over the years, the weapons have been constantly upgraded and improved as a means to respond to reports of malfunctioning and to increase accuracy. To designate these upgrades, the DDI has added an "MK"-suffix followed by the number of the variation (mark I, II, III) to its nomenclature.

DDI-made weapons come with their unique marking – the triangle crest.⁸¹ Where the triangle crest is missing, there may be other ways to distinguish DDI-made products. In the case of tail booms of mortars, the colour, stencilling or other serial number markings may be indicative of their manufacture in Myanmar. According to information received by SAC-M, recent markings imprinted on DDI-made mortar projectiles include markings ER (most likely standing for explosive round), coupled by a number indicating year of manufacture (such as 21 for 2021) and a number confirming batch (such as 318).⁸²

The ability to produce weapons in-country remains an important source of pride for Myanmar's armed forces and is considered essential by its members and supporters in light of the perceived threats to the country's unity and stability.

⁸⁰ Prior to adopting this nomenclature in the late 1990s, older models were labelled "BA" for Burma Army. For the most part, the model numbers associated with the BA nomenclature corresponded to the year they were adopted (e.g., the BA-63, adopted in 1963). See Vining, M., The Firearm Blog, 11 August 2018, '*The Burmese BA-93, A Modified Lee Enfield Rifle Grenade Launcher.*' Anti-personnel and anti-vehicle landmines that are locally manufactured and are typically referred to as MM (Myanmar mine) followed by a number to indicate the precise model.

⁸¹ In the case of older mortar projectiles, the colour and stencilling may also provide indication that they have been manufactured in Myanmar.

⁸² Vining, M., The Firearms Blog, 20 July 2018, '*The MA-13 MK II: Myanmar's Steyr/Micro Uzi Knock-off.*'



Photo - Myanmar Now

Ammunition reportedly used in North Okkalapa Township, Yangon, on 3 March 2021 in response to protests include, second and third from the top, 5.56 mm and 9 mm rounds both carrying the headstamp of the Directorate of Defence Industry and manufactured in Myanmar.



The headstamp on a 5.56 × 45 mm cartridge produced by DDI. The year of production (2010) and calibre (5.56) are marked in Burmese numerals and the headstamp also incorporates the DDI triangle crest.



A protester shows a cartridge during a protest in Mandalay against the attempted military coup. Note the DDI's triangle crest on the primer annulus, confirming local manufacture.

“Doing Business”: Applicable Human Rights Standards

As has already been noted, Myanmar’s military has invested significantly in strengthening and modernising its arms production as a means of reducing the impacts of current and potential future sanctions and arms embargoes. This does not mean, however, that the DDI is not reliant on external resources for this production; to the contrary, the DDI continues to import significant quantities of raw materials, parts and components, and end items, as well as machinery and technology to produce weapons at scale.

This research conducted by SAC-M has identified many companies and States that supply the DDI – directly or indirectly – with the products it needs for this production. In doing so, these companies and States enable continued weapon production by the military in Myanmar, and, consequently, also enable continued gross human rights violations by the military. In light of this, while it is clear that the military must be held accountable for its human rights violations, this report emphasises that concrete action must also be taken by States and companies to end the trade that enables the violations. Doing so is not only morally imperative, but also a requirement under international human rights law, as well as arms transfer agreements, dual-use goods regimes and other restrictive measures that currently apply in relation to Myanmar.

The State Duty to Protect

International human rights law places certain obligations on States to regulate the behaviour of businesses that operate in their territory or under their jurisdiction, and an increasing number of international human rights mechanisms have interpreted this State obligation to also apply in relation to businesses that have or may have adverse impacts on the human rights of people outside their territory.⁸³ This is particularly relevant to States with businesses that have transferred materials, parts and components, and end-items as well as machinery and technology to the Myanmar military and the DDI, and to States from which businesses have relations with the Myanmar military and the DDI, directly or indirectly, through joint ventures and commercial partnerships. In addition to international human rights law, international humanitarian law regulates armed conflict,⁸⁴ such as that currently occurring in Myanmar. Common Article 1 of the four Geneva Conventions places a standing obligation on States to ensure respect for the Conventions’ protections in all circumstances. In its authoritative commentary to Common Article 1, the International Committee of the Red Cross

⁸³ Human Rights Committee, General Comment No. 36 (2018) on article 6 of the International Covenant on Civil and Political Rights, on the right to life, paragraph 22; E/C.12/GC/24, Committee on Economic, Social and Cultural Rights, General Comment No. 24 (2017) on State obligations under the International Covenant on Economic, Social and Cultural Rights in the context of business activities, paragraphs 26 and 28.

⁸⁴ For additional information on the application of international humanitarian law in Myanmar, see, A/HRC/39/CRP2, paragraphs 60-62.

has established that meeting this obligation requires States to “refrain from transferring weapons if there is an expectation, based on facts or knowledge of past patterns, that the weapons would be used to violate the Conventions.”⁸⁵ It has been credibly argued that, once a State knows that the receiving State systematically commits violations of humanitarian law with certain weapons, continuing assistance is necessarily given with a view to facilitating further violations.⁸⁶

In relation to the international transfer of arms and associated parts and components, end-items, machinery and technology, several multilateral agreements currently also apply in relation to Myanmar:

- **The Arms Trade Treaty.** The Arms Trade Treaty regulates the international transfer of most conventional arms, the ammunition/munitions they fire and their parts and components. The Arms Trade Treaty establishes that a State party should abstain from authorising a transfer of the items covered by the Treaty if it has knowledge at the time of authorisation that the arms or items would be used in the commission of genocide, crimes against humanity, grave breaches of the Geneva Conventions, attacks directed against civilian objects or civilians protected as such, or other war crimes as defined by international agreements to which it is a party. If a transfer is not prohibited under Article 6 and if the transfer involves an export, the exporting State is required to conduct an export assessment in accordance with Article 7 which prohibits the transfer where there is an overriding risk that the arms or items will be used to commit or facilitate serious violations of human rights. The Treaty specifically addresses the risk of diversion – the process by which the items covered by the Treaty are delivered to an unauthorised end user or put to an unauthorised end-use – and it requires that States involved in the import, export, transit, or trans-shipment of arms (including components) must cooperate and exchange information with a view to mitigating this risk. If diversion is detected, the State parties concerned must take appropriate measures to address it.
- **The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies.** The Wassenaar Arrangement is intended to reduce threats to regional and international security. It does so by, among other things, promoting the transparency of national export and control regimes on conventional arms and dual-use goods and technologies. The Arrangement establishes lists of items for which participating States – currently numbering 42 – should apply export controls. Similar to the Arms Trade Treaty, the export controls apply to a number of parts and components (such as, for example, fuses) and end-items (such as optical sights). In addition, the Arrangement’s export controls apply to listed machinery and technology that could be used to manufacture weapons and ammunition at scale, such as CNC machines with a specified number of simultaneous movements of the axes of the machines.

⁸⁵ Jean-Marie Henckaerts, eds., *Commentary on the First Geneva Convention: Convention (I) for the Amelioration of the Condition of the Wounded in Armies in the Field*, International Committee of the Red Cross, 15 December 2016, paragraph 162. The Arms Trade Treaty references this obligation when it lists its principle of “Respecting and ensuring respect for international humanitarian law in accordance with, inter alia, the Geneva Conventions of 1949.”

⁸⁶ Marco Sassoli, “State responsibility for violations of international humanitarian law,” *International Review of the Red Cross*, June 2002, Vol. 84 No 846, pg. 413.

- **Regulation (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (recast).** The EU Dual-Use Goods Regulation is the key legislative instrument governing EU exports of dual-use items.⁸⁷ It requires competent authorities in EU member states to consider if goods could be used for internal repression or other serious violations of human rights when deciding whether to grant a licence for the export of any goods that are listed in the Regulation's Annex. This Annex includes a number of items that have been identified in use at Myanmar's KaPaSa factories, including CNC machines. Beyond the EU's Dual-Use Goods Regulation, which applies to all transfers outside of the Union including to Myanmar, the EU has also imposed additional 'restrictive measures' on Myanmar. These include, among other measures, an arms embargo, an embargo on equipment which might be used for internal repression, as well as targeted measures against senior military officers of the Myanmar armed forces⁸⁸ and associated arms brokers.⁸⁹
- **Restrictive measures, including sanctions on specific individuals and entities.** In addition to requirements and prohibitions under the Arms Trade Treaty, the Wassenaar Arrangement and the EU Dual-Use Goods Regulation, relevant restrictive measures have also been applied by individual UN Member States,⁹⁰ including sanctions directly targeting the DDI in Myanmar⁹¹ and to companies brokering arms and equipment deals for the military.⁹²

The Corporate Responsibility to Respect

A foundational principle of the United Nations' Guiding Principles on Business and Human Rights – the most authoritative global standard for preventing and addressing the risk of adverse human rights impacts linked to business activity – is that all business enterprises should respect human rights. In situations of armed conflict, enterprises should also respect the standards of international humanitarian law and, where they fail to do so, both individual personnel and the enterprise itself expose themselves to the risk of criminal and civil liability.⁹³ The Guiding Principles

⁸⁷ The 2021 recast replaced Regulation (EU) No 428/2009.

⁸⁸ For an overview of current restrictive measures by the EU that apply in relation to Myanmar as of 8 November 2022, see <https://www.sanctionsmap.eu/#/main/details/8/?search=%7B%22value%22:%22%22%22searchType%22:%7B%7D%7D>.

⁸⁹ On 8 November 2022, the EU sanctioned, among others, crony arms brokers, Dr Aung Moe Myint, Dr Naing Htut Aung and Tay Za. See Council Implementing Regulation (EU) 2022/2177 of 8 November 2022 implementing Regulation (EU) No 401/2013 concerning restrictive measures in view of the situation in Myanmar/Burma.

⁹⁰ For a record of restrictive measures taken by States in relation to Myanmar since February 2021, see <https://specialadvisorycouncil.org/cut-the-weapons/>.

⁹¹ For example, sanctions on the DDI and its procurement department are currently applied by the US, Canada, Japan and the UK.

⁹² For example, Aung Moe Myint is targeted by sanctions imposed by the UK and Canada, and his business, Dynasty International Company Limited, is also sanctioned by the UK, while the Htoo Group of Companies and some of its key directors and shareholders have been sanctioned by the US, the UK and the EU for providing financial support and arms to the Myanmar military. Dr Naing Htut Aung, the managing director of International Gateways Group of Companies (IGG), is sanctioned by the US; IGG, through its subsidiary Gateways Hongkong Company Limited, was awarded contracts worth millions of US dollars to supply equipment including spare parts and upgrades for the air force's fighter jets and other aircraft and weapons for warships to the Myanmar military. See Justice for Myanmar, 11 August 2022, 'Exposed: companies brokering arms & equipment to Myanmar military'.

⁹³ Guiding Principle 12, commentary. While applying primarily to States, the International Committee of the Red Cross has also affirmed that humanitarian law standards also apply to companies in situations of armed conflict and impose obligations on managers and staff not to breach such standards.

apply to all business enterprises, both transnational and others, regardless of their size, sector, location, ownership and structure. Consequently, they apply to all companies identified in this report as supplying – directly or indirectly – the DDI with products used at the KaPaSa factories or auxiliary industries.

Under the UN Guiding Principles, meeting their responsibility to respect human rights and international humanitarian law standards requires companies to:

- adopt a public policy commitment in which they express their commitment to respect human rights and that is clearly communicated both internally and externally;
- exercise due diligence on their entire value chain (both upstream and downstream)⁹⁴ to identify human rights risks and harms that they cause, contribute to, or are directly linked to by virtue of their business relationships (understood to include relationships with business partners, entities in their value chains, and any other non-State or State entities directly linked to their business operations, products or services), including in relation to the end-use of their products;
- take measures to prevent or mitigate risks of adverse human rights impacts that have been identified, including by using their leverage; and
- enable remediation for any human rights harm that they have caused or contributed to.⁹⁵

Exporting to conflict-affected areas or areas with repressive regimes presents heightened risks of business involvement in serious human rights abuses.⁹⁶ In consequence, exporters to Myanmar of the types of products that have been identified in use at KaPaSa factories face increased liability because:

- The risk of human rights harms arising from the misuse of products is exacerbated in challenging operational contexts such as those presented by conflict areas or under control of repressive regimes.
- Doing business in conflict-affected areas raises the risks of involvement in serious violations of international human rights or humanitarian law committed by State actors such as the military, the police and security forces.
- They are likely to be subject to special conditions, prohibitions or licensing requirements under domestic export control laws and regulations in light of the risky nature of the goods, products and services that they trade in.⁹⁷ As has been outlined above, a number of export controls currently apply in relation to certain parts and components, end-items and machinery and technology that could be used for arms manufacturing.

⁹⁴ Upstream refers to the aspect of the value chain that concerns the sourcing by a manufacturer of the goods needed to make products (or components of products). The downstream value chain refers to the part of the value chain concerned with the delivery of a product (or component of a product) to market, and ultimately to an end-user. A company's position on a value chain is a relative concept. For example, a factory making components to be installed in weapons would be considered downstream of suppliers of raw materials but upstream of the firm that make the weapons. See Amnesty International, 18 November 2021, "JBC Off Track: Evading responsibility for human rights violations committed with JBC machines in the Occupied Palestinian Territories."

⁹⁵ Guiding Principles Part II, the Corporate Responsibility to Respect Human Rights: Guiding Principles 11-24.

⁹⁶ The following section draws heavily from Amnesty International, 18 November 2021, "JBC Off Track: Evading responsibility for human rights violations committed with JBC machines in the Occupied Palestinian Territories," pgs. 30-39.

⁹⁷ For example, products known to be prone or susceptible to misuse or which appear indispensable to the pursuit of certain human rights-abusing policies.

Importantly, the corporate responsibility to respect human rights is independent of States' abilities and/or willingness to fulfil their human rights obligations. In practical terms, this means that companies are always expected to apply their own due diligence in relation to the potential harmful end-use of their products and to seek to prevent or mitigate any harmful impacts associated with such end-use. In other words, where export controls apply, companies are not absolved of their responsibility to respect human rights by the mere fact that their home States have granted the necessary permits authorising exports.⁹⁸ In addition, companies are expected to address risks of harmful end-use of their products through engagement with their business relationships, in particular business relationships that play a key role in the delivery of a given product (or a component of a product) to a market. In the KaPaSa value chain, some of the common business relationships of the companies identified in this report include dealers, distributors, franchisees and licensees. The fact that a company is not selling products directly to the DDI or is not itself present and/or active in Myanmar does not reduce its responsibility to address the risk that its products are put to harmful end-use through the actions or omissions of its business relationships.

In short, doing business in conflict-affected areas like Myanmar or trading in products with a potential harmful end-use requires companies to conduct enhanced due diligence, and this responsibility goes beyond simply applying for, and obtaining, official permits that may be needed for exporting to Myanmar. In the absence of such enhanced due diligence, companies and their personnel may face risk of civil or criminal liability.

Box 1. Addressing the Risk of Harmful End-Use Linked to Diversion

Under the Arms Trade Treaty, the Wassenaar Arrangement, the EU Dual-Use Goods Regulation and national regulations on the export of dual-use goods items, particular care must be taken to ensure that exports are not diverted from their intended use or intended user. Nevertheless, instances of diversion are common and remain a key challenge to the effective implementation of these regimes. The risk of diversion poses important challenges for States authorising exports but also for exporting companies.

There are different ways in which States and companies can prevent and mitigate the risk of diversion. Exporting States, for example, should proactively avoid situations that could later limit their ability to meet their obligations, for example by binding themselves to an export contract in which possible responses to diversion are limited by the prospect of penalties or other liabilities. Adherence to end-use assurances should be a requirement for the fulfilment of contracts from the outset, both in relation to exporting companies and to recipients.

⁹⁸ At present, several lawsuits and administrative proceedings have been initiated across Europe to challenge arms export permits on grounds of alleged human rights impacts or that seek to establish accountability of arms manufacturers and licensing authorities in criminal courts. For an overview of such proceedings see, for example, Schliemann, C., and Bryk, L., November 2019, "Arms Trade and Corporate Responsibility: Liability, Litigation and Legislative Reform."

Taking all reasonable steps to prevent harmful end-use, including through diversion, associated with product promotion, deployment, contracting, sales/licensing and use, should be a central focus of companies' due diligence processes. In terms of prevention and mitigation, there are many ways in which companies can address the risk of harmful end-use associated with diversion, including, for example, by clearly communicating that diversion will not be tolerated and reflecting such expectations as contractual obligations, and having the appropriate internal functions and processes in place to regularly monitor and respond to risks and detected instances of diversion.

The types of measures needed to prevent and/or mitigate the risk of diversion will invariably be linked to the nature of the products. In relation to the CNC machines needed to manufacture weapons at scale, for example, some licensing companies have reduced the risk of diversion by installing devices in their machine tools that will "hobble" the machines if they are moved from an agreed location/use. The intent is to thwart potential movement of machine tools to people, companies or countries that may put the machines to unintended military-manufacture use.

Diversion can occur covertly, and there are well known limits to the ability of States and companies to detect and verify diversion. Nevertheless, where there is credible information to suggest that diversion has occurred, both exporting States and companies have a responsibility to respond. The most appropriate response will depend on the issues at hand in the given circumstances, but can range from States or companies using leverage over the actor or actors involved to prevent further harm and, where the use of leverage is unsuccessful, to halting the business relationship and any further transactions altogether. In all instances, States and companies are expected to take steps to ensure that victims of harm can seek and obtain effective remedy for harms suffered.

Where export controls apply, companies are not absolved of their responsibility to respect human rights by the mere fact that their home States have granted the necessary permits authorising exports.

Critical Supplies Enabling KaPaSa

Production

The following section outlines, in broad strokes, the value chain that enables the Myanmar army's in-country weapon production. It identifies, along five key points of the value chain, some of the companies that appear to play a key role in the supply of products needed to sustain weapon production and/or that are instrumental in the brokering of such deals for the DDI.

The value chain that enables the DDI's arms manufacturing is a highly complex, multi-layered network consisting of a very large number of material suppliers, manufacturers and distributors. Such material suppliers, manufacturers and distributors include both State-owned and private companies that are domiciled in, or under the jurisdiction of, a large number of States. For example, while some of the imports of needed products may be procured directly by the DDI (with the DDI listed as the consignee), Myanmar's military also relies on civilian front companies (at times several layers of such companies)⁹⁹ that are domiciled in Myanmar or legally incorporated elsewhere as a means to evade sanctions by masking the true end-recipient of orders.¹⁰⁰ In addition, some of the companies with whom the DDI does business are part of highly complex networks. By way of illustration, for its arms manufacturing the DDI is known to closely collaborate with NORINCO – formally known as China North Industries Group, a Chinese State-owned company – that consists of at least 46 member units, all of which have several subordinate companies, joint ventures and associate companies¹⁰¹ and whose representatives and agents in Myanmar change on a regular basis.¹⁰²

Licensed Production and Transfers of Technology

Some of the weapons in the DDI's current production lines appear to be manufactured under licence. For many of the weapons being made at KaPaSa factories, however, the licensing situation is unclear, and production is likely taking place without a valid licence.

⁹⁹ For an overview of the companies that continue to broker arms deals for the military, see Justice for Myanmar press release of 11 July 2022, "EXPOSED: 116 companies that have brokered arms & equipment for the Myanmar military."

¹⁰⁰ Other commonly used sanction evasion techniques include the deliberate mislabeling of exports to the DDI. In the case of FRITZ WERNER Industries, for example, machinery supplied to the DDI for the manufacturing of weapons and ammunition was often labelled "agricultural" or "industrial" machinery.

¹⁰¹ See International Peace Service Information Service & Omega Research Foundation, 2016, "Working Paper 2: China North Industries Corporation."

¹⁰² The Myanmar agent for NORINCO is said to be the chairman of Myanmar company Mottama Holdings Limited, U Yan Hoe, who replaced the former NORINCO agent Dr Tun Min Latt.

As has been noted elsewhere, both licensed and unlicensed production imply the acquisition of production technology by an entity (such as the DDI) that did not previously have such technology.¹⁰³ In the most general sense, licensed production is a partnership between an owner of intellectual property (the licensor or licence-grantor) and an entity who is authorised to use such intellectual property rights under certain conditions (the licensee or licence-holder). Put differently, in a licensed production agreement, the licensee – in the case of Myanmar, the DDI – is manufacturing a specific weapon for which it has been given production rights under certain conditions, while the licensor retains the ownership of the intellectual property that is necessary for the production. In some cases, the transfer of production technology to make a specific weapon may have been done without the consent of the owner of the intellectual property; this may be the case, for example, where an entity that is not the original owner of the intellectual property has acquired the needed technology and know-how to produce a specific weapon and then transfers this technology and know-how to another entity without the approval, and perhaps even without the knowledge, of the original owner.

According to information received by SAC-M, some of the weapons currently being produced at KaPaSa factories under licence (including expired licences) reportedly include:

- A wide range of small arms such as assault rifles, sniper rifles, light-machine guns and sub-machine guns. In relation to small arms manufacture in general, it has been observed that Myanmar's military has produced arms under licence, or in cooperation with a foreign country, on almost every major project¹⁰⁴ since the 1950s. Less information is available on whether production of associated ammunition is produced under licence, although close observers have noted that this is unlikely the case as, in general, licensed production of small arms ammunition is rare.¹⁰⁵
- Belt-fed heavy machine guns (locally referred to as the MA-16), originally developed and manufactured by Chartered Industries of Singapore (currently ST Kinetics) as the STK-50MG.
- The 2SIU self-propelled howitzer through a Transfer of Technology (ToT) agreement with Ukraine-based arms companies.
- The SA-16 man-portable air defence system, allegedly manufactured in Myanmar with the technical assistance of North Korea.
- The QJG-02 (known by its export version as the Type CS/LM2): a Chinese anti-aircraft heavy machine gun.
- KS-1B: a Chinese short-to-medium range surface-to-air missile system,¹⁰⁶ with the ToT agreement reportedly limiting local manufacture in Myanmar to a total of twelve batteries.

¹⁰³ This section draws from Small Arms Survey, 2007, 1: Multiplying the sources – licensed and unlicensed military production.

¹⁰⁴ Vining, M., 2019, 'State SALW production and Transfers in Myanmar,' unpublished background paper, Geneva: Small Arms Survey.

¹⁰⁵ Licensed production of small arms ammunition is rare because the product is of limited complexity and, therefore, research and development costs are low.

¹⁰⁶ Reportedly, the KS-1B missile produced in Myanmar is a tailored version of the KS-1A air-defence systems, with the modifications made based on a request by the DDI.

- Military trucks, including the HOWO model through transfer rights by Chinese company Sinotruck.
- Two different models of UAVs, both of Chinese origin and locally produced in Myanmar.

It should be noted, however, that licensed production agreements tend to be shrouded in secrecy and any information about such deals and their content is extremely difficult to obtain. Where licensed production does take place, the contracts permitting such production may have contained specific legal provisions that restricted the production to a certain period of time or to a total number of weapons that can be produced (beyond which further production would be considered illegal). Even where such limits may have been included in contracts, once the technology has been transferred the DDI can, and likely does, continue production despite the fact that the licence may no longer be valid.

In the case of Myanmar, licensed and unlicensed production has typically implied that the DDI has obtained technology and know-how through various types of ToT deals, including:

- Know-how contracts in which the owner of the technology transfers the know-how to the DDI, either in a tangible form (such as, for example, by sharing documents, blueprints of machines or products, technical datasheets, manuals and so forth) or in an intangible form (such as, for example, by offering training to KaPaSa staff or inviting KaPaSa staff to observe the production of a specific weapon in the country where the owner has production sites, or through conversations between engineers associated with the owner and KaPaSa engineers).
- Acquisition of equipment and other capital goods where the technology owner transfers tools, equipment and machinery, entire production lines or components of parts for assembly through a sale or as a donation, the latter often taking place as a means for the technology owner to gain political or economic quid pro quo. Such donations can imply that the donor of the equipment and other capital goods receives, in turn, political support, for example in the context of voting for UN resolutions, or that the donation is done in exchange for obtaining commercial contracts or preferential access to the market in Myanmar.
- Joint venture agreements in which the technology owner enters into a commercial partnership with the DDI or other military-run businesses.
- Turn-key project where the owner hands over an entire industrial plant or production line that operates according to agreed standards.

In the case of KaPaSa production, all these types of technology transfers have been observed (see box 2 below). For example, the DDI has received, from various companies, entire weapon production plants (including a small arms manufacturing plant from Singapore based Chartered Industries of Singapore, currently known as ST Kinetics). In the case of small arms manufacturing, the DDI has reportedly also benefited from direct support from engineers associated with the owner of the original technology (in this case, engineers associated with Israel Military Industries Ltd., IMI),

while joint venture models have been tried and tested with the German company FRITZ WERNER (as Myanmar-FRITZ WERNER Industries). Licensed production deals have also implied that KaPaSa staff, typically at the managerial level, have received regular training from the licensor to ensure smooth production.¹⁰⁷ Lastly, there are reports that some of the ToT deals for weapon manufacturing in Myanmar have involved the owner supplying the DDI with needed blueprints, prototypes, drawings and materials receiving, in turn, commercial contracts worth large sums of money (as evidenced by criminal convictions in South Korea of representatives of, among others, Daewoo, currently POSCO International Corporation).

Beyond ToT deals, close observers have also highlighted the DDI's use of reverse engineering for the development and modernisation for the KaPaSa factories' production lines. Reverse engineering involves deconstructing a specific item to extract design information and seeking to reproduce the design in actual or improved form. The Myanmar military's Electrical and Mechanical Engineering Corps (EMEC) appears to use reverse engineering where the licence has been denied by the owner or where the DDI has not been able to obtain the needed technological know-how through other means.

Without imports of significant quantities of specialised parts and components, the DDI's in-country manufacturing of a variety of weapons is unlikely to function effectively.

¹⁰⁷ Interview with #V4, 30 July 2022.

Box 2. States/Companies Involved in the Establishment of KaPaSa Factories and Production Lines

Following the country's independence in 1948, the Myanmar military was principally relying on surplus World War II equipment inherited from Britain and Japan. From 1957 onwards, however, and with considerable help from the West German government, General Ne Win's regime built a number of factories capable of manufacturing arms, including automatic rifles, machine guns, grenades, mortars and small arms ammunition. In addition to West Germany, Italy assisted Myanmar's military to set up local production of submachine guns (the BA-52, commonly referred to as the Ne Win Sten). In the late 1960s, also with West German technical assistance, Myanmar's military built a plant designed to make high explosives for both military and civilian use.

A second high-explosive filling plant, based on the manufacture of TNT explosives, was constructed in the early 1980s. West German collaboration principally took place through the then State-owned arms manufacturer FRITZ WERNER. In 1984, Myanmar-FRITZ WERNER Industries became the first Burmese joint venture with the Myanmar State-owned Heavy Industries Corporation to make "machinery," a common euphemism for military equipment. Reportedly, FRITZ WERNER's collaboration with the DDI came to an end following the military's crackdown on civilian protestors in 1988 and the sanctions that were imposed by many Western countries, including West Germany, on Myanmar's military as of 1989. There are allegations, however, that FRITZ WERNER continued business with Myanmar's military and the DDI much later than 1989, and the joint venture in Myanmar only filed for liquidation in November 2019. Nonetheless, with the official end to West German assistance in 1989, the SLORC was forced to seek support from elsewhere to sustain its weapon production, and it principally did so by turning to Chinese, Israeli, Singaporean, South Korean and North Korean governments and companies.

Notably:

- A team of Israeli engineers from IMI reportedly visited Yangon in 1991, resulting in Myanmar's launch of in-country production of the 9x19 mm Uzi sub-machine gun. In addition, based on the IMI Galil – the family of Israeli-made automatic rifles chambered for the 5.56x45 mm NATO and 7.62x51 mm NATO cartridges – the DDI set up the production of several locally manufactured small arms models - still in active use by Myanmar's armed forces and police today as the MA-1, MA-2, MA-3, and MA-4 and the MA-S. The extent of Israeli government knowledge of, and involvement in, the encounters between engineers associated with the IMI and with the Myanmar DDI, and the local small arms manufacture in Myanmar that followed, is unknown, although close observers have indicated that formal collaboration occurred and was approved by the Israeli government. For example, the Myanmar Defence Services Museum in Nay Pyi Taw displays an official Israeli gift of an IMI Galil to Myanmar. In addition, according to a report published by the Israeli newspaper Haaretz in October 2022, the Israeli military both armed and trained the Burmese army from the 1950s until at

least the beginning of the 1980s. In September 2015, the visit to Israel by Commander-in-Chief Senior General Min Aung Hlaing, who now heads the military junta, included discussions about industrial arms contracts and visits to Israel's security industries, reportedly resulting in a memorandum of understanding on military cooperation in the defence sector, including acquisition of technology. Following an order of the Israeli Supreme Court in 2019, the implementation of this agreement was suspended.

- In 1998 the then State-owned Singaporean company Chartered Industries of Singapore, currently ST Kinetics, reportedly built and transferred an entire weapon factory to Yangon where it became the basis for the DDI's small arms manufacturing. Allegedly, this modular factory was constructed with the support of Israeli consultants associated with the Israeli company IMI. It could produce weapons and 37 mm ammunition. Because of its modular design, the factory could be easily adapted, expanded and moved. Singaporean engineers also reportedly replaced West German arms manufacturing experts who left Myanmar after 1989. Although there is only sparse public information citing business activities between ST Kinetics and the DDI, a source has suggested that ST Kinetics still sells unspecified equipment to Myanmar through a dealer in Thailand. In 2009, Myanmar media also reported that a KaPaSa factory producing 60 mm, 81 mm, 105 mm and 120 mm mortars had been established with support from Singapore. At present, Singapore also remains an important transit point for the DDI's import of raw materials, items and equipment that feed the KaPaSa factories' production, and many companies that are legally domiciled in Singapore continue to enable these types of purchases for, and transfers to, the DDI.
- Historically, China has been one of the Myanmar military's principal military partners, both for selling military hardware and for the military's in-country arms manufacturing industry. Particularly after 1988, China has reportedly exported tools and entire weapon production plants, notably for small arms manufacturing, as well as expertise needed to operate such facilities in Myanmar. Chinese technical support and expertise also appear to have played a foundational role in the establishment of the DDI's landmine manufacturing. More recently, since the mid-2010s, Chinese companies have enabled the local manufacturing in Myanmar of various surface-to air missiles.
- South Korean company Daewoo, currently POSCO International Corporation, reportedly assisted the DDI from 2002 to 2006 to establish the manufacturing of surface-to-air missiles, air-to-air missiles and rocket launchers, with parts and other materials for this manufacture coming from South Korea. In addition, support was provided to the DDI to produce six different types of artillery shells, including 120 mm artillery shells and 105 mm howitzer high-explosive shells. Fourteen South Korean executives, including six from Daewoo, were ultimately convicted in trial court, appellate court, and then again at the Supreme Court in South Korea on charges of conspiracy and failure to obtain government approval for exporting strategic materials to the DDI in Myanmar.

Recent agreements between Myanmar and a number of foreign countries, including Russia, Ukraine, India and Pakistan, also reportedly include licenced production, through ToTs, of various types of weapons.

Raw Materials

There is no readily available list of the types of raw materials¹⁰⁸ that are required for the DDI's sustained production of various types of weapons produced at KaPaSa factories, although, according to information obtained by SAC-M, the DDI currently relies on various types of military-grade steel for the manufacturing of items such as sound suppressors for the MA-3 assault rifle (AISI-321 stainless steel), 105 mm howitzer artillery shells (AISI 1050 hot rolled carbon steel) and magazine rounds for the MA-2 MK II light machine gun (1.2714 tool steel).¹⁰⁹

In general, the major metallic and non-metallic material groups that are used in the weapon manufacturing sector include steel, aluminium, titanium, copper, cupronickel, tungsten, composites and ceramics. These materials are used in combination with other materials, such as cobalt antimony, nickel, vanadium, zinc, chromium, germanium, molybdenum, borates and lithium, to form specialised alloys.¹¹⁰ The alloys then undergo special treatment, such as forging and casting,¹¹¹ with a view to making them stronger, lighter and more blast resistant, and are then machined into the desired shapes and sizes. For licensed production of weapons, the specification, composition and method of production – in addition to the physical and chemical properties of any raw materials needed for production – are typically provided by the designer of the equipment (most often the technology owner). Consequently, for raw materials, the KaPaSa value chain involves various stages, including the extraction and supply of a wide range of raw materials, refining and processing (alloying or composite production) and conversion into semi-finished and finished products, and a significant number of DDI-approved material suppliers¹¹² are likely to be involved in each of these stages.

Due to the large diversity of potential raw materials and the lack of visibility in the value chain, it is challenging to draw any precise conclusions about the sourcing of raw materials for KaPaSa

¹⁰⁸ The descriptive part on the use of raw materials in the military manufacturing sector draws from KPMG's brief of September 2020, 'Military Materials: Challenges and opportunities.'

¹⁰⁹ Documents obtained from the Myanmar Defence Services Academy, on file with SAC-M.

¹¹⁰ The military manufacturing sector largely relies on the same types of materials that are also used in the civilian sector. At the same time, the materials that feed military end-production typically require a higher purity and special compositions of the alloys to be fit for military end-use purpose. Put differently, the "defence industry" – in Myanmar as well as elsewhere – makes use of commodities or have technical needs that require processes, facilities, equipment and specification that go far beyond those of the civilian market.

¹¹¹ Cast and forged products are critical to the military industry, and they are used for almost all military platforms, components, machine tools and other production equipment.

¹¹² For manufacturers to be able to qualify as raw material suppliers for weapon manufacturing application, having a robust quality management system that conforms with the requirement of the sector is imperative. In addition to the common certifications (for example, AS 9100, ISO 9001 and ISO/IEC 17025), suppliers also need to have their system audited and approved by the original equipment manufacturer to become an approved source of raw material. In Myanmar, additional approvals from the DDI may also be required.

production. The research conducted by SAC-M on the DDI's raw material demands has been pursued along two different, but interlinked, tracks: in-country production of raw materials and imports of raw materials that feed KaPaSa production.

In relation to the in-country production of military-grade raw materials, a few observations can be made:

- Myanmar is a mineral-rich country, and it remains a leading supplier of minerals and ores – including crucial rare earth metals – for many of the strategic material groups used in the weapon manufacturing sector. However, these types of primary concentrates are typically sourced by, and processed in, China rather than the Myanmar military.¹¹³
- As part of the Myanmar military's quest for self-sufficiency in weapon production, the DDI has sought to progressively increase its stockpiles of strategic raw materials to ensure adequate and uninterrupted supply; this appears to be a particularly important endeavour for the DDI in light of current and potential future sanctions that could further prevent it accessing critical materials for its weapon manufacturing. However, SAC-M has not been able to verify what these stockpiles include, nor assess the size of the stockpiles and the rate at which the DDI uses the materials. This has prevented an assessment of how a lack of access to critical materials would affect KaPaSa production rates.
- In addition to efforts to stockpile strategic raw materials, the DDI has sought to modernise Myanmar's iron and steel mills (with Ywama and Pyin Oo Lwin being notable examples) to produce high quality and hardened steel for military production purposes. Such efforts appear to continue and will likely have taken renewed importance after the 2021 attempted coup. Recent MOD and DDI procurement documents obtained by SAC-M confirm that the DDI is seeking to invest in strengthening iron and steel production capacity at the mill located in Pyin Oo Lwin.
- The DDI's efforts to bolster the domestic production of steel for arms manufacturing is also demonstrated by the participation of representatives of the Myanmar-based company Suntac Technologies (also known as Suntac Group of Companies) at the Myanmar-Czech Republic's B2B dialogue in Prague in the Czech Republic in June 2019.¹¹⁴ According to the list of participants and meeting requests for this dialogue, focusing on strengthening economic links and business opportunities, the two Suntac Technologies representatives – U Sitt Taing Aung, the owner of the company and current president of Myanmar's steel association, as well as managing director Ye Phone Hlaing – describe their company's business products as, among others, steel pipes,

¹¹³ China's real strength is not only sourcing primary concentrates but also refining them for industrial use. Mines all over the world deliver their rare earth oxides to China for processing. The fact that China imports 50% of its concentrates from Myanmar underscores this assessment. See Ecker, C., 23 March 2021. 'The Scramble to Secure Rare Earth Elements.'

¹¹⁴ Specifically, in June 2019, Aung San Suu Kyi under the NLD Government visited, as part of her tour to Central Europe, the Czech Republic. In the context of this visit, a bilateral Czech-Myanmar economic forum – the B2B dialogue – gathering business leaders from the two countries took place. SAC M has obtained, and has on file, the list of Myanmar business leaders, including from Mottama Holdings and Suntac Technologies, that attended this forum and their meeting requests.

steel plates, sheets and coil. For the 2019 visit to the Czech Republic, the company representatives specifically requested to meet potential partners in the Czech Republic with expertise in steel manufacturing and the defence sector. Of particular interest is also the fact that, according to the information provided for the meeting requests, U Sitt Taing Aung is listed as also representing Mottama Holdings Limited. Registered with a principal corporate address in Yangon,¹¹⁵ Mottama Holdings Limited is one of the largest conglomerates in Myanmar specialising in industries such as construction, manufacturing, trading, hospitality, property development and logistics. According to information received by SAC-M in November 2022, Mottama Holdings Limited also serves as the new intermediary for business between the DDI and Chinese arms industry company NORINCO, the latter playing an instrumental role in providing a variety of critical supplies to the arms manufacturing sector in Myanmar. Until 2013, Mottama Holdings was known as Asia Metal Company which was sanctioned for its alleged involvement in weapon deals between Myanmar and North Korea. Asia Metal Company was also sanctioned by the United States in 2013 for constructing buildings and supplying construction materials for a DDI factory. SAC-M has not been able to, at this stage, verify what types of companies or steel plants, if any, the representatives of Suntac Technologies visited in the Czech Republic in 2019 nor any potential outcomes of such visits.

- Some of the KaPaSa factories (and associated sub-factories) appear to have, as their sole purpose, the processing and refining of raw materials for military production. At present, according to information shared with SAC-M, the DDI can produce both aluminium and steel for weapon production. Aluminium and steel production reportedly takes place at KaPaSa 24¹¹⁶ and at KaPaSa 6; KaPaSa 24 also has the capacity to melt down weapon parts that have not passed quality control,¹¹⁷ while KaPaSa 6 benefits from the outputs of an iron and steel mill that has been established with Chinese assistance.¹¹⁸
- Close observers have noted that the current quality of some of the raw materials used by the DDI to manufacture weapons – notably high-grade steel – does not seem to meet the necessary standard for manufacturing effective weapons. This appears to be the case with some of the weapons belonging to the MA-family of small arms, in particular many of which have had some of their key components reinforced to compensate for the poor quality of the raw materials used. Due to the poor quality of current raw materials used,¹¹⁹ the DDI may be looking for new supplies, in-country or elsewhere.

¹¹⁵ Mottama Holdings Limited's registered corporate address in Yangon is located in close proximity to the alleged location of the DDI's storage units (KaHtaPa) at Inya Lake and next to the former offices of Myanmar-FRITZ WERNER Industries, the German-Myanmar joint venture that until 1989 reportedly provided "heavy machinery" – a common euphemism for arms manufacturing equipment – to the Myanmar military and the DDI. Mottama Holdings also share offices with POSCO International Corporation of South Korea, which in addition to FRITZ WERNER played an important role for transfers of technology to the DDI and its arms manufacturing in the mid 2000s (then as Daewoo International).

¹¹⁶ Interview with #V4, 12 July 2022.

¹¹⁷ See, for example, Myanmar Now, 8 April 2022: *'Resistance forces seize materials to build weapons, military responds with airstrikes.'*

¹¹⁸ Lintner, B., 23 March 2022, Asia Times, *'Myanmar-North Korea on a new missile making mission.'* The existence of an iron and steel plant associated with KaPaSa 6 has also been confirmed through interviews with #V4, #V11 and #V20 in June and August 2022.

¹¹⁹ Interview with #V11, 8 August 2022.

- Chinese investment in the Letpadaung copper mine, which is jointly operated by Wanbao Mining (a subsidiary of Chinese State-owned company NORINCO) and the military conglomerate MEHL has also reportedly generated the supply of important quantities of copper¹²⁰ to the DDI in the past.¹²¹ At present it is not known whether outputs from this mine still feed KaPaSa production. Individuals formerly associated with the Myanmar armed forces have reported that copper and brass is supplied to the factories from central storage units in Yangon (KaHtaPa),¹²² suggesting that these materials may be imported, in full or in part, to meet the DDI's needs.

In relation to the DDI's potential dependencies on imports of raw materials for weapon manufacturing, the following observations can be made:

- While the DDI can rely, to an unknown extent, on domestically sourced iron, steel, aluminium and potentially other essential military-grade materials such as copper and brass, it is also dependent on imports of raw materials – in elementary, composite, cast and forged forms – to sustain its weapon production. The DDI's import-need for raw materials is confirmed by leaked MOD and DDI procurement documents.
- While the types of raw materials are not specified in the procurement documents, local sources with knowledge about the inner functioning of the KaPaSa factories have confirmed that the DDI is likely complementing in-country production of iron, steel and aluminium with imports.¹²³
- As has already been noted, Chinese State-owned company NORINCO appears to be playing an important role for the DDI's imports of raw materials for KaPaSa production. This likely implies that much of the imported raw material comes from China. According to information received by SAC-M, Chinese-origin raw materials do not enter Myanmar through land border trading routes, such as the northern Shan state border trading town Muse, but come by sea via Singapore.¹²⁴
- According to information received, raw materials, including iron, copper, aluminium, chromium and high-grade steel, are also being supplied to the DDI by companies legally domiciled in India and Japan.
- The fact that the DDI imports raw materials (rather than relying entirely on domestically sourced materials) may indicate that:
 - ✧ the cost of domestically sourcing materials is higher than importing;
 - ✧ Myanmar lacks the necessary technical expertise to validate the quality of domestically sourced materials for weapon manufacturing;¹²⁵ and/or
 - ✧ the use of materials from already established import sources is more convenient.

¹²⁰ Copper is often used to manufacture ammunition - because copper has a higher melting point, greater specific heat capacity and higher hardness, copper-jacketed bullets allow greater muzzle velocities.

¹²¹ Amnesty International, 2015, 'Open for business? Corporate crime and abuses at Myanmar copper mine.'

¹²² Interviews with #V4, #V11 and #V20 18 June 2022.

¹²³ Interviews with #V20, April 2022 and July 2022.

¹²⁴ See also, Radio Free Asia, 28 April 2021, 'Interview: 'The military coup was not supposed to happen.'

¹²⁵ In the case of steel, for example, in 2020 Myanmar remained the only ASEAN country not to have set quality standards for iron and steel, either locally produced and imported.



Image of PDF-captured materials. In April 2022, resistance forces seized materials for the production of 60 mm and 81mm mortar shells in an ambush on a military junta convoy. The parts were likely being transported to KaPaSa 24 to be melted down after having failed quality control.

Additional research is needed to gain a better understanding of the origins of the raw materials that enable KaPaSa production. Such research should focus on mapping the extent to which Myanmar's military can realistically produce the raw materials needed for in-country weapon production, any ongoing or planned efforts to develop domestic raw material production and the companies – including foreign companies – that are involved in such undertakings. Additional research is also needed to uncover the extent to which the DDI relies on imports of raw materials (in elemental, alloyed or composite forms), where these materials come from, and through which companies.

Parts and Components

Modern weapons cannot be made or maintained without parts and components, many of which are technically challenging to manufacture or may not be cost-efficient to produce in-country. As a result, weapon manufacturing companies often rely on imports of finished parts and components – ready to be used in certain weapons – from sources in many different countries.¹²⁶ This holds true for the DDI: experts with knowledge about the Myanmar military's arms production capabilities concur that significant quantities of specialised parts and components are likely imported and that, without these types of imports, the DDI's in-country manufacturing of a variety of weapons is unlikely to function effectively. The DDI's ability to purchase specialised parts and components internationally remains essential for it to maintain sustained weapon production.

According to information obtained by SAC-M:

- While much of the raw materials used to manufacture missiles comes from Myanmar, several (unspecified) sub-components have their origins in China.¹²⁷
- The manufacture of modern armoured fighting vehicles at Heavy Industry Number 11 reportedly relies on a large proportion of components and parts from China.¹²⁸ By way of illustration, the local manufacture of the BMP amphibious tracked infantry fighting vehicle uses Chinese-origin mission system architecture, turrets and engines, all of which are reportedly purchased by the DDI from NORINCO.¹²⁹
- Reportedly, the DDI also purchased landmine-production equipment from China for the local manufacture of the POMZ-2 (MM1) fragmentation mines and PMN blast mines (MM2) in the 1990s. The transfer of technology reportedly included an agreement for the continuous purchase of components for the landmines from China and Chinese technical assistance for their manufacturing.¹³⁰ SAC-M has not been able to verify, at this stage, whether this arrangement is continuing.
- The DDI has been importing fuses for unspecified end-uses from the Indian Ministry of Defence. In 2022, fuses for 84 mm recoilless rifles were purchased by the DDI through a Myanmar-registered civilian front company (Creative Exploration Ltd.)¹³¹ from India-based company Sandeep Metalcraft.¹³² Sandeep Metalcraft is registered as an official vendor of India's

¹²⁶ In the case of small arms, for example, some of the common sub-components include the gun-barrel, triggers and springs, while common components for associated ammunition include bi-metallic strips and propellant powder.

¹²⁷ Lintner, B., 23 March 2022, Asia Times, 'Myanmar-North Korea on a new missile making mission.'

¹²⁸ Interviews with #V4, #V11 and #V20 on 6 August 2022.

¹²⁹ Interviews with #V4, #V11 and #V20 on 6 August 2022.

¹³⁰ Human Rights Watch 1999 Landmine Monitor Report: "Toward a Mine-Free World," country profile on Burma.

¹³¹ Formerly mySpace International or My Space International Company Limited.

¹³² Justice for Myanmar, 15 July 2022, 'India supplying fuses to Myanmar military, deepening complicity in its atrocity crimes.'

Ministry of Defence.¹³³ Between 2019 and 2021 important amounts of cast boosters, detonating caps, igniters and electric detonators were also shipped to Myanmar by companies registered in India with the DDI listed as the buyer.¹³⁴ In addition, in July 2022, Justice for Myanmar reported that Indian company Sandeep Metalcraft had exported type 447 time mechanical fuses to a military crony company in Myanmar for 84 mm artillery commonly used with Carl Gustaf recoilless rifles. Saab, the Swedish manufacturer of Carl Gustaf rifles, did not respond to Justice for Myanmar's requests for information on whether these fuses would require a Saab licence to be produced, and whether Saab's licensed production agreements with Indian companies prohibited or restricted onward exports from India to other countries.¹³⁵

By way of conclusion, SAC-M's research into the DDI's imports of parts and components suggests that China, through NORINCO, remains a key trading partner for the DDI. Nevertheless, as has been observed by individuals formerly associated with Myanmar's armed forces and KaPaSa factories specifically, the DDI has expressed its discontent with the quality of Chinese equipment, spare parts and services and is likely looking elsewhere for supplies. Additional research is needed to establish not only the extent to which the DDI continues to rely on Chinese parts and components for its arms manufacturing, but also what suppliers may be sought out and from where to replace, or complement, Chinese suppliers of parts and components used in production at KaPaSa factories.

Taiwan functions as an important transit point for the DDI's purchase of high precision CNC machines, including from European manufacturers, for KaPaSa arms manufacturing.

¹³³ Justice for Myanmar, 15 July 2022. India supplying fuses to Myanmar military, deepening complicity in its atrocity crimes.

¹³⁴ Justice for Myanmar, 15 July 2022. India supplying fuses to Myanmar military, deepening complicity in its atrocity crimes.

¹³⁵ Justice for Myanmar, 15 July 2022. 'India supplying fuses to Myanmar military, deepening complicity in its atrocity crimes.' Sweden has [investigated](#) the diversion of earlier transfers of Carl Gustaf rifles from India to Myanmar, circumventing the EU arms embargo. The Swedish anti-tank rifles that ended up in use by the Myanmar army were originally exported to India. In 2012, Sweden [asked India to explain](#) how Swedish weapons had ended up in Myanmar.

End-Items

End-items refers to devices that increase the effectiveness or usefulness of a weapon but that are not, generally speaking, essential for its basic intended use.¹³⁶ For small arms and light weapons, for example, some common end-items include sound suppressors, weapon sights (including optical and thermal), foregrips, flashlights and under-barrel grenade launchers (the latter also qualifying as a weapon in its own right).¹³⁷

In the case of KaPaSa production, weapon sights such as optics are particularly interesting and a potential critical import dependency for the DDI. This is because weapon sights are typically both expensive and technically challenging to manufacture; domestic production requires both high level machinery and technicians. Importing optics is likely to be more cost-efficient than setting up domestic production. While interviews with experts indicate that the DDI can produce an unknown amount of telescopic sights in-country (such as, for example, magnifying optical sights for the MA-10 rocket-propelled grenade launcher),¹³⁸ it also imports important quantities of sights for its small arms and light weapons manufacturing.

According to information received by SAC-M:

- The standard issue telescopic sight that is fitted to the MA sniper rifle (MA-S) is the PSO-1, manufactured in Russia by a Novosibirsk instrument-making factory (NPZ Optics State Plant). At this stage, SAC-M has not been able to verify whether this implies a direct deal with the NPZ Optics State Plant or whether the DDI is able to obtain PSO-1 scopes from third parties.
- Depending on the battle conditions, the Myanmar army is also known to equip its sniper rifles with other types of accessory weapon sights. Such sights have been imported from companies domiciled in India. For example, in 2022, Indian company Tonbo Imaging has shipped Ek long-range thermal imaging sights.¹³⁹ These types of sights have been designed and optimised for assault rifles and sniper rifles and allow soldiers to “see around corners and shoot targets without entering the line of fire.”¹⁴⁰ In June 2021, Indian company Bharat Electronics Ltd. also shipped multi-purpose reflex weapon sights, with the DDI listed as the consignee.¹⁴¹

The military's potential import dependency for weapon sights may increase in the future, as experts on small arms design and manufacturing in Myanmar concur that the direction that the DDI's small arms design is likely taking is the increased use of additional sights. In relation to small arms and light weapons in particular, further research is needed to assess the DDI's current ability to

¹³⁶ Grzybowski, Marsh, and Schroeder, 2012, p. 245 quoted in Small Arms Survey, Graduate Institute of International and Development Studies, Geneva 2018. An introductory guide to the Identification of Small Arms, Light Weapons and Associated Ammunition, p. 127.

¹³⁷ Small Arms Survey, Graduate Institute of International and Development Studies, Geneva 2018. An introductory guide to the Identification of Small Arms, Light Weapons and Associated Ammunition, pg. 127.

¹³⁸ This is also confirmed by the DDI's showcasing of the optic for the MA-10 at the Defense & Security 2019 arms salon in Thailand.

¹³⁹ Information shared with SAC-M by Justice for Myanmar in May 2022.

¹⁴⁰ Tonbo Imaging product description of Ek thermal sight.

¹⁴¹ Shipment records obtained in collaboration with Justice for Myanmar, on file with SAC-M.

manufacture high-quality sights from where the DDI is purchasing sights and to where the DDI may turn for additional supplies in the future. Beyond weapon sights, additional research should also seek to identify other critical end-item dependencies, including, but not limited to, KaPaSa-produced small arms and light weapons.

Machinery and Technology

Automated machining is critical for weapon manufacturing at scale and modern CNC machines (such as milling and grinding machines, lathes and electro-discharge machines) play a critical role. In simple terms, a CNC machine is a computer-controlled carving machine that follows pre-programmed codes that instruct the machine on how to perform a number of functions that are necessary to produce a certain product, including how to move, with which cutting tool and at what feed-rate and spindle-speed. The cutter in the machine's spindle will carve through the material – for example, steel alloys for firearms – and will create the intended shapes. The code that the CNC machine depends on to function is programmed with specific software programmes; the codes made with these programmes are uploaded into the CNC machine along with all the cutting tools, raw materials and work holding needed to keep the material in place during the process.

In the weapon manufacturing industry, CNC machining is an important labour-saving system for manufacturing accurate and cost-effective parts, and is often used to make key components. Their high precision, versatility, and compatibility with a wide range of materials make CNC machines ideal for fabricating weapons such as small arms and light weapons, in addition to missiles and components for other military systems, such as aircraft parts, detection systems and radar technology, combat vehicles and naval ships. Because of their potential military end-use, CNC machines and associated software programmes are covered by dual-use goods regulations, such as the Wassenaar Arrangement and the EU Dual-Use Goods Regulation.¹⁴²

Leaked budget documents from the MOD and the DDI (2016-2021), obtained by SAC-M, contain regular references to purchases of CNC machines and associated spare parts. Information received by SAC-M suggests that CNC machines (lathes, milling, grinding and electro discharge machines) from manufacturers in Austria, Germany, Japan, Taiwan and the US are currently in use at KaPaSa factories. According to individuals with first-hand experience of KaPaSa factories, some of these machines may have been bought in 2005-2006 through intermediary sales agents.

In relation to the military end-use of CNC machines in Myanmar, previous research by the Institute for Science and International Security is illustrative of the DDI's techniques to evade sanctions and to bypass dual-use goods regulations that would prohibit the sale of CNC machines for military end-use to Myanmar:¹⁴³

¹⁴² These regulations apply for exports of CNC machines meeting certain criteria, notably their ability to simultaneously operate with a defined number of axes (typically four or more).

¹⁴³ David Albright, Paul Brannan, Robert Kelley and Andrea Scheel Stricker, ISIS, 2010, "Burma: A Nuclear Wannabe; Suspicious Links to North Korea; High-Tech Procurements and Enigmatic Facilities."

"According to a European intelligence official, in 2006 and 2007 Burma made a series of procurements of extremely high precision, expensive dual-use industrial equipment, including computer-numerically controlled (CNC) machine tools, from companies located in Switzerland, Germany, and Japan...The equipment was ordered by an agency of the Burmese government ostensibly responsible for technical education programs in the country, the Department of Technical and Vocational Education (DTVE) under the Ministry of Science and Technology. However, the equipment is too sophisticated for normal teaching and student endeavors...It is unclear if the procurements in Europe were legal –though if the equipment were ultimately used in a military or nuclear program, these procurements should be against the law in most European countries. The procurement route and the export's legality are unknown for the equipment sent from Japan to Burma. Upon closer examination by European officials, the declared end use of the computer-numerically controlled (CNC) machine tools did not look credible. According to one European intelligence official, the declared end use had too many inconsistencies to believe what was claimed. Some of the CNC equipment was very large, with a base of about eight meters, and declared for use in manufacturing sophisticated locomotive diesel engine parts. But designs of parts given to suppliers appeared incomplete; they were missing key tolerances. Officials suspected that the designs were phony and the equipment would actually be used to manufacture other parts. In addition, the quality and price of the equipment is beyond what Burma would be expected to purchase or need, given its relatively primitive diesel locomotive manufacturing base and its modest plans for expanding this manufacturing capability. European intelligence services yielded that the equipment was multi-purpose, running the gamut of possible uses, including turbines in aircraft, high-technology civilian manufacturing, missile parts, or nuclear component manufacturing. The equipment appeared oversized for gas centrifuge manufacturing. It could still be used to make centrifuge parts, but it is uneconomical to buy such large equipment for this end use. In addition, the equipment appeared too precise for missile manufacturing, but it could still be dedicated to such a purpose."¹⁴⁴

Some of the CNC machines highlighted in the research by the Institute for Science and International Security may have ended up in use at KaPaSa factories (including, but not limited to, for the manufacturing of missile parts). In addition, the way they were obtained may be indicative of the role of other Myanmar-military controlled government departments and units, such as the Department of Technical and Vocational Education (DTVE) under the Ministry of Science and Technology, for the purchase of CNC machines for use in KaPaSa production.

¹⁴⁴ David Albright, Paul Brannan, Robert Kelley and Andrea Scheel Stricker, ISIS, 2010, "Burma: A Nuclear Wannabe; Suspicious Links to North Korea; High-Tech Procurements and Enigmatic Facilities."

According to information received by SAC-M from credible sources, Myanmar-based company Mottama Holdings Limited, acting as an intermediary between the DDI and Chinese arms industry company NORINCO, plays a pivotal role for the DDI's purchases of high-precision CNC machines for KaPaSa factories. In particular, Mottama Holdings Limited appears to assist the DDI with obtaining critical maintenance for its CNC machines. For example, according to information received, several CNC machines manufactured and sold by Austrian company GFM Steyr are currently in use at KaPaSa factories, including for manufacturing gun barrels. As a means of evading EU sanctions and dual-use goods export controls applicable to Myanmar, Mottama Holdings reportedly ships the GFM Steyr machines to Taiwan and engages GFM Steyr's technicians to assist with technical updates and maintenance, after which the machines are shipped back to Myanmar and the DDI. It is not known if the GFM Steyr technicians are aware of the end-use of the machines they are working on when performing this type of maintenance in Taiwan.

Mottama Holdings Limited is also reportedly the importer, for the DDI, of high precision CNC machines from Germany, including from German CNC manufacturing company DMG MORI, with purchases taking place in Taiwan. In the absence of sanctions on Myanmar, Taiwan appears to be the preferred transit point for the DDI's CNC machines as well as the preferred location for the performance of technical maintenance on these machines.

In order to perform their functions, CNC machines rely on specific software programmes. SAC-M has identified software programmes made by German, Israeli and French companies that are currently being used at KaPaSa factories and associated research institutes. These software programmes have been used to draw, design, and test the design and manufacturing of sound suppressors and 30-round magazines for small arms made in Myanmar, and to record the performance of locally manufactured antennas for UAV control systems.

Additional research is needed to uncover how the DDI obtained these CNC machines and how associated software programmes have ended up at KaPaSa factories and whether necessary export controls have been applied for and, if obtained, on what grounds. Additional research is also needed to identify what due diligence the companies concerned have exercised in relation to the export of their CNC machines in use at KaPaSa factories, and in particular what measures the companies have taken to prevent or mitigate the risk of harmful end-use, including through diversion. It would also seem appropriate for companies to hinder any further purchases by the DDI or associated entities and companies of spare parts for, and to refrain from any maintenance repairs to, the CNC machines already acquired.

Conclusions and Recommendations

Since the 1990s, a succession of arms embargoes and sanctions have been imposed on Myanmar's military by foreign governments. These types of measures have principally sought to prohibit the trade of military or dual-use goods that may be used by the military for internal repression. Important as they may be, these measures have not been fully effective in preventing the military from committing atrocities against the civilian population. On the one hand, this failure stems from the fact that several UN member states continue to sell weapons to the military. An equally important factor, however, is the fact that Myanmar's armed forces can produce, in-country, a variety of weapons that are being used to target civilians.

However, even if the military has invested significantly in strengthening and modernising its domestic weapon production, it continues to be reliant on external supplies to keep this production running. SAC-M has sought to uncover information about transfers of technology to the Directorate of Defence Industries, the principal organisation in Myanmar overseeing the army's weapon production, and to identify some of the suppliers of products – including raw materials, parts and components, end-items as well as machinery and technology – that the DDI needs to sustain its weapon production. SAC-M has identified companies whose products are currently being used at KaPaSa factories to manufacture weapons, as well as civilian front companies for Myanmar's armed forces that play a role in brokering deals for the DDI to obtain the materials it needs. These companies and their home States are listed in an annex to the present report.

While it is clear that the military must be held accountable for the grave violations of human rights and humanitarian law that it has committed and that it continues to commit, this report also emphasises that action must be taken by companies and States. This is not only morally imperative – it is also a requirement under international human rights law and international humanitarian law, and is reflected in arms transfer agreements, dual-use goods regimes and other restrictive measures that currently apply in relation to Myanmar, its armed forces and associated front and crony companies.

Based on SAC-M's research, the extent to which the companies identified in this report have met their duty to respect human rights, including by conducting robust due diligence, is unclear. It is also unclear whether their home States can be considered to have met their obligation to protect against human rights violation and abuse, including by applying appropriate export controls.

Companies identified in the report should immediately stop doing business with the Myanmar military's Directorate of Defence Industries and associated companies, and they should investigate how their products have ended up in use at KaPaSa factories. Beyond this, companies should also take steps to prevent future harmful end-use of their products by the DDI through robust due diligence to identify, prevent and mitigate the risk of harm associated with the sale/licensing and deployment of their products in Myanmar. For the harms that have already been suffered by civilians in Myanmar as a result of this business, companies should provide for, or cooperate in, the remediation of such harms, including by collaborating with any future administrative or criminal proceedings. SAC-M

recommends that the home States identified in this report investigate and, as relevant, initiate administrative and/or legal proceedings against the companies whose sub-components, end-items, machinery and technology are relied upon by the Myanmar military's Directorate of Defence Industries at KaPaSa factories. States should also adopt targeted sanctions against the KaPaSa, its leadership, and its network of brokers that have been identified in this report.

This report merely scratches the surface of a highly complex, multi-layered network of a large numbers of licensors, material suppliers, manufacturers and distributors – both State-owned and private companies that are domiciled in, or under the jurisdiction of, a large number of States – that feed the KaPaSa factories' production. The report does not undertake the immense task of mapping out the Myanmar military's weapon manufacturing industrial base and associated value chains in their entirety, although undertaking such an endeavour is a key recommendation of this report. Additional, longer-term research is needed to identify critical supplies with a view to disrupting the DDI's in-country weapon production. SAC-M encourages all parties with relevant information to bring this forward and invites them to do so by using the dedicated email address established to this end.¹⁴⁵

The Special Advisory Council for Myanmar is a group of independent international experts who came together in response to the military's attempted coup of February 2021 in Myanmar, to support the peoples of Myanmar in their fight for human rights, peace, democracy, justice and accountability. For information about SAC-M and details of our work, please visit -

<https://specialadvisorycouncil.org/>

¹⁴⁵ Information can be communicated to the following email address: exposekapasa@proton.me. Other secure methods of communication are available on request.

Annex. Companies Identified as Enabling Current KaPaSa Production

To protect the safety of those that have supplied information, the following list will not identify the factory at which the particular item is/has been used nor, where deemed too risky, the source of the information. As necessary, this type of information and other evidence-related materials will be made available on a case-by-case basis upon request by legitimate parties (such as judicial bodies, State authorities, civil society organisations and media) for appropriate purposes.

Licensed Production and Transfers of Technology

Company	Home state	Item	Additional information	Source
ST Engineering Land Systems Ltd. (STELS) doing business as ST Kinetics (formerly Chartered Industries of Singapore)	Singapore	Licence and ToT for STK 50MG belt-fed heavy machine gun, produced in Myanmar as the MA-16. Transfer of a prefabricated factory, built in Singapore by Chartered Industries of Singapore, to Yangon for small arms manufacturing.	Reportedly, there appears to have been substantial supervision by Israeli engineers for the manufacturing of the prefabricated factory in Singapore.	Vining, M., 4 August 2020, 'Seeking supplies: developments of small arms production and industry in Myanmar.' Small Arms Survey.
Israel Military Industries Ltd., IMI	Israel	ToT, including through support from Israeli IMI engineers in the 1990's for the manufacturing of Uzi submachine guns and establishing the local manufacture in Myanmar of copies of the IMI Galil family (automatic rifles chambered for the 5.56×45 mm NATO and 7.62×51mm NATO cartridges).	N/A	Vining, M., 4 August 2020, 'Seeking supplies: developments of small arms production and industry in Myanmar.' Small Arms Survey.

Company	Home state	Item	Additional information	Source
POSCO International Corporation (formerly Daewoo)	South Korea	ToT, including blueprints and machinery to manufacture artillery shells, including 120 mm artillery shells and 105 mm howitzer high-explosive shells; support for the DDI to establish factory to manufacture surface-to-air missiles, air-to-air missiles and rocket launchers, with parts and other materials for this factory coming from South Korea.	Reportedly the transfer of know-how and technology was done in exchange for valuable commercial contracts in the gas sector. The transfers were done between 2002 and 2006. Fourteen Korean executives, including six from Daewoo, were ultimately convicted in trial court, appellate court, and then again at the Supreme Court in South Korea on charges of conspiracy and failure to obtain government approval for exporting "strategic materials" to the DDI in Myanmar.	The Irrawaddy, 13 November 2007, 'Daewoo officials, others on trial for exporting arms to Burma.'
China Jiangnan Space Industry Co./ China National Precision Machinery Import and Export Corporation	China	License and ToT for HQ12 (KS-1M in Myanmar) surface-to-air-missiles.	Production reportedly began in mid-2010s. Image of presentation by representative of China National Precision Machinery Import and Export Corporation to the DDI indicates that discussions for a ToT began in 2010 and concluded with local manufacture of a limited number of KS-1Ms in Myanmar in 2016. In 2017, a reportedly locally manufactured KS-1MB was showcased at the Myanmar military's Armed Force Day Parade.	Defence Studies Blog, 30 October 2019, 'Myawaddy news finally disclosed how Myanmar Get ToT of KS 1B Missiles from China.'
China Aerospace Science and Technology Corporation (CASC)	China	CH-4 UAV	The CH-4 can carry AR-1 missiles, capable of hitting soldiers, tanks and small boats within 1.5 meters of the target.	Diamond, C, 28 March 2017, 'China to Open Drone Factory,' Defence News.

Company	Home state	Item	Additional information	Source
China North Industries Group (NORINCO)	China	Anti-Aircraft (AA) guns	QJG-02G 14.4 mm AA gun. The Myanmar agent for NORINCO is said to be the chairman of Myanmar company Mottama Holdings Limited, U Yan Hoe, who replaced the former NORINCO agent Dr Tun Min Latt.	Individuals formerly associated with Myanmar's armed forces
Ukroboronprom	Ukraine	ToT for local production in Myanmar of 2SIU self-propelled howitzers as well as BTR-4 armoured personnel carriers and MMT-40 light tanks.	Joint project between DDI, Ukroboronprom, Ukrspecexport and Myanmar Chemical & Machinery.	Justice for Myanmar, 8 September 2021. 'Ukraine is arming the Myanmar Military'
Ukrspecexport	Ukraine	ToT for local production in Myanmar of 2SIU self-propelled howitzers as well as BTR-4 armoured personnel carriers and MMT-40 light tanks.	Joint project between DDI, Ukroboronprom, Ukrspecexport and Myanmar Chemical & Machinery.	Justice for Myanmar, 8 September 2021. 'Ukraine is arming the Myanmar Military'
Myanmar Chemical & Machinery Company Limited	Myanmar	Broker of joint project between DDI, Ukroboronprom and Ukrspecexport for local production in Myanmar of 2SIU self-propelled howitzers as well as BTR-4 armoured personnel carriers and MMT-40 light tanks.	Joint project between DDI, Ukroboronprom, Ukrspecexport and Myanmar Chemical & Machinery.	Justice for Myanmar, 8 September 2021. 'Ukraine is arming the Myanmar Military'
China Aerospace Science and Technology Corporation (CASC)	China	UAV	Yellow Cat A2, Myanmar's locally manufactured variant of the Chinese CH3A surveillance drone.	Panda, A., 9 June 2016. 'Is Myanmar using Armed Chinese drones for counter-insurgency?'

Company	Home state	Item	Additional information	Source
China Aerospace Science and Technology Corporation (CASC)	China	UAV	Yellow Cat A2, Myanmar's locally manufactured variant of the Chinese CH3A surveillance drone.	Panda, A., 9 June 2016, 'Is Myanmar using Armed Chinese drones for counterinsurgency?'
Sinotruck	China	Multi-purpose tactical truck	Licence production of the HOWO model. Sinotruck has several entities active in Myanmar. In 2011, Sinotruck signed an agreement with No1 General Heavy Industries Enterprise to upgrade the No1 Myanmar Automobile Plant using a loan from China. The upgrade allowed for production and assembly of Sinotruck's HOWO model truck.	Justice for Myanmar, 29 March 2021, 'German-linked trucks featured in brutal Myanmar Crackdown.'

Raw Materials

Company	Home state	Item	Additional information	Source
China North Industries Group (NORINCO)	China	Iron, aluminium, copper, brass	Reportedly through shipments coming via Singapore to Yangon, rather than entering Myanmar through border trading routes such as the northern Shan state border trading town Muse. The Myanmar agent for NORINCO is said to be the chairman of Myanmar company Mottama Holdings Limited, U Yan Hoe, who replaced the former NORINCO agent Dr Tun Min Latt.	Radio Free Asia, 28 April 2021. Interview: 'The military coup was not supposed to happen' Confirmed by individuals formerly associated with Myanmar's armed forces.
Myanmar Wanbao Mining Copper Limited (subsidiary of China North Industries Group (NORINCO))	China	Copper	According to leaked documents, the previous operator of the Letpadaung mine (joint venture between MEI and Ivanhoe Myanmar Holdings Ltd., a subsidiary of the Canadian company, Ivanhoe Mines, now Turquoise Hill Resources) sold 100 tonnes of copper to the Office of Defence Service Industry, potentially for the domestic production of ammunition.	Amnesty International, 2015: ' Open for business? Corporate Crime and Abuses at Myanmar Copper Mine '.
Myanmar New Power Group	Myanmar	Aluminum nitrate	According to information received by SAC-M, the company has provided 6859 tons of aluminum nitrate for making explosives.	Individuals formerly associated with Myanmar's armed forces.

Company	Home state	Item	Additional information	Source
Mottama Holdings Limited	Myanmar	Raw materials of unknown nature.	<p>According to information received by SAC-M in November 2022, Mottama Holdings Limited serves as the new intermediary with between the DDI and Chinese arms manufacturing company NORINCO. Mottama Holdings Limited's registered corporate address in Yangon is located in close proximity to the alleged location of the DDI's storage units (KaHtaPa) at Inya Lake. Until 2013, Mottama Holdings was known as Asia Metal Company which was sanctioned for its alleged involvement in weapon deals between Myanmar and North Korea. Asia Metal Company was also sanctioned by the US in 2013 for constructing buildings and supplying construction materials for a DDI factory. Mottama Holdings Limited reportedly facilitates the DDI's purchases of raw materials, including steel, for arms manufacturing.</p>	Individual formerly associated with Myanmar's armed forces.

Company	Home state	Item	Additional information	Source
Suntac Group of Companies (also known as Suntac Technologies)	Myanmar	Raw materials of unknown nature	U Sitt Taing Aung, the owner of Suntac Group of Companies, is reported to have a military import licence to import raw materials needed to build arms factories and make weapons in Myanmar. According to information received by SAC-M, U Sitt Taing Aung represented Mottama Holdings Limited at the B2B forum in Prague in June 2019, where he requested to meet Czech companies with skills in steel manufacturing for the defence industry.	The Irrawaddy, 5 November 2021. 'Low-Profile Junta Crony Imports and Makes Arms for Myanmar's Military.' Czech Myanmar B2B Forum, Prague, Czech Republic, on the occasion of Daw Aung San Suu Kyi's official visit. List of participants and meeting requests on file with SAC-M.
STE Global Trading Pte. Ltd.	Singapore	Raw materials of unknown nature.	Owner U Tun Hlaing is reportedly a key player for the supply of materials needed by the DDI to manufacture weapons. In 2021, the Singaporean prosecutor opened an investigation following a complaint against STE Global Trading Pte. Ltd. for "breaking UN sanctions on North Korea enabling the Burmese military to procure weapons from the country."	The Irrawaddy, 12 October 2021. 'Low-profile Arms Dealer Continue to Supply Myanmar Military's Weapon.'

Company	Home state	Item	Additional information	Source
Excellence Metal Casting Pte. Ltd.	Singapore	Raw materials of unknown nature.	Owner U Tun Hlaing is reportedly a key player for the supply of materials needed by the DDI to manufacture weapons. In 2021, the Singaporean prosecutor opened an investigation following a complaint against Excellence Metal Casting for "breaking UN sanctions on North Korea enabling the Burmese military to procure weapons from the country."	The Irrawaddy, 12 October 2021. ' Low-profile Arms Dealer Continue to Supply Myanmar Military's Weapon.
DPW Singapore Enterprise Pte. Ltd.	Singapore	Raw materials of unknown nature.	According to information received by SAC-M, DPW Singapore Enterprise Pte. Ltd. supplies the military with required raw materials for the military to produce small arms and ammunition.	Individuals formerly associated with Myanmar's armed forces.
Shwe La Ngwe La Company	Myanmar	Raw materials of unknown nature.	According to information received by SAC-M, Shwe La Ngwe La supplies the military with required raw materials for the military to produce small arms and ammunition.	Individuals formerly associated with Myanmar's armed forces.
Chan Hein Company Limited	Myanmar	Raw materials of unknown nature.	Founded by U Kyaw Hein and his wife Daw Mya Dar Yu.	Individuals formerly associated with Myanmar's armed forces.

Parts and Components

Company	Home state	Item	Additional information	Source
Indian Ordnance Factory Board (OFB), now known as Directorate of Ordnance (Coordination & Services), the Department of Defence Production (DDP) of Ministry of Defence India	India	Fuses	Shipment in 2021.	International Peace Information Service, Arms Trade Bulletin March-April 2021 . 'Arms transfers to Myanmar.'
Solar Industries India Limited	India	Boosters, detonating caps, igniters, electric detonators.	Shipments done between 2019-2021.	Shipment records obtained by Justice for Myanmar, on file with SAC-M.
Sandeep Metalcraft Pvt. Ltd.	India	Fuses	Mechanical time projectile fuses 447, widely used for large-calibre ammunition for 84 mm recoilless rifles. Shipments done between 2019-2022.	Justice for Myanmar, 15 July 2022, 'India supplying fuzes to Myanmar Military, Deepening Complicity in its Atrocity Crimes.'
Creative Exploration Ltd. (formerly mySpace International or My Space International Company Limited)	Myanmar	Fuses (imports for DDI)	Mechanical time projectile fuses 447, widely used for large-calibre ammunition for 84 mm recoilless rifles. Shipments done between 2019-2022.	Justice for Myanmar, 15 July 2022, 'India supplying fuzes to Myanmar Military, Deepening Complicity in its Atrocity Crimes.'

End-Items

Company	Home state	Item	Additional information	Source
NPZ Optics State Plant	Russian Federation	Optical sights	The PSO-1 scope, manufactured by NPZ Optics State Plant is the standard-issue optical sight for the Myanmar Army's sniper rifle.	Individuals formerly associated with Myanmar's armed forces.
Tonbo Imaging Pte. Ltd.	India	Ek thermal sights	Thermal sights for sniper rifles, initial shipments done in 2022.	Individuals formerly associated with Myanmar's armed forces.
Bharat Electronics Limited (BEL)	India	Trinetra Multi-Purpose Reflex Weapon Sights	A highly precise reticule, superimposed on the target scene, acts as an aim point for accurate firing. Runs on commercially available batteries. Shipment done in 2019.	Shipment records obtained by Justice for Myanmar, on file with SAC-M.

Machinery and Technology

Company	Home state	Item	Additional information	Source
DMG MORI Aktiengesellschaft	Germany	CNC turning and milling machines: 3-, 4- and 5-axes.	While not specifically addressing Myanmar's defence industry, in an advertisement from 2017, DMG MORI noted that it "sees further opportunities in its emerging markets such as...Myanmar, where it aims to help small- and medium-sized companies' transition from three- to five-axis application." In relation to the use of DMG MORI machines and technology in the defence industry broadly, in February 2022 the Egyptian Minister of Military Production Mohamed Ahmed Morsi held talks with the Board Chairman of DMG MORI, Christian Thönes, to discuss cooperation issues of mutual interest, including means to boost cooperation between the Ministry of Military Production and DMG MORI in the field of industrial digitization.	Individuals formerly associated with Myanmar's armed forces.

Company	Home state	Item	Additional information	Source
FRITZ WERNER Industrie-Ausrüstungen GmbH	Germany	Unspecified spare parts for machinery.	Starting in the 1950s, FRITZ WERNER assisted the DDI to lay the foundation for the domestic production of small arms and ammunition, including by supplying machinery to produce explosives and a complete rolling mill for sheet brass. Observers with direct experience from KaPaSa factories have informed SAC-M that, even if there are no more sales of new equipment from FRITZ WERNER, it is still supplying spare parts to some of the machinery still in use at KaPaSa factories. Machinery exported to Myanmar was often labelled agricultural or industrial machinery for permits and shipment purposes.	Radio Free Asia, 28 April 2021. Interview: 'The military coup was not supposed to happen' Individuals formerly associated with Myanmar's armed forces.
Index Group: Traub	Germany	TNA CNC Turning machine (Traub)	Machines reportedly imported after 2005/2006	Individuals formerly associated with Myanmar's armed forces.
Tsugami Corporation	Japan	CNC Precision Automatic Lathe	BO325-II	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Myanmar Chemical & Machinery	Myanmar	N/A	Myanmar Chemical & Machinery has reportedly brokered a 2019 deal for a joint project between DDI, Ukroboronprom, Ukrspecexport to produce 2SIU self-propelled howitzers in Myanmar.	Justice for Myanmar, 8 September 2021. 'Ukraine is arming the Myanmar Military'

Company	Home state	Item	Additional information	Source
All TROOP Tech Co., Ltd.	Taiwan	CNC Wire-cut Electric Discharge Machine	N/A	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Exetec EDM Solutions	Taiwan	Electro discharge wiring cutting machine	ED400C V6550G	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Finetech Machine Tool Co., Ltd.	Taiwan	CNC Vertical Machining Centres	SMV-1060-H3L SMV-1270-H3L Machines reportedly imported after 2005/2006.	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Mecatron Machinery Co., Ltd.	Taiwan	CNC Vertical Machining Centre	VMC 1480	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Palmary Machinery Co., Ltd	Taiwan	CNC Cylindrical Grinding Machine	Extomax OCD-3260 P	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Supertec Machinery Inc.	Taiwan	CNC Grinding Machine	G18P-40CNC	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.

Company	Home state	Item	Additional information	Source
TAKISAWA Taiwan Co., Ltd.	Taiwan	CNC Lathe	NEX-108 Slant Bed 2-axis CNC Lathe	Individuals formerly associated with Myanmar's armed forces. Photographic evidence on file with SAC-M.
Victor Taichung Machinery Works Co., Ltd.	Taiwan	CNC Turning Machines	N/A	Individuals formerly associated with Myanmar's armed forces.
Ukrspецexport	Ukraine	Horizontal boring, welding, cutting and lathe machinery.	Shipments done between 2015 and 2020 as part of the joint project between DDI, Ukroboronprom, Ukrspецexport and Myanmar Chemical & Machinery to produce 2SIU self-propelled howitzers (as well as BTR-4 armoured personnel carriers and MMT-40 light tanks) in Myanmar.	Justice for Myanmar, 8 September 2021. 'Ukraine is arming the Myanmar Military'
HAAS Automation Inc.	United States	CNC milling machines	VF3 / VF5 CNC milling machines. Machines reportedly imported after 2005/2006.	Individuals formerly associated with Myanmar's armed forces.
GFM Steyr	Austria	CNC machines for manufacturing of gun barrels.	According to information received by SAC-M, CNC machines manufactured and sold by Austrian company GFM Steyr are currently in use at KaPaSa factories, including for making gun barrels. According to information received by SAC-M, GFM Steyr technicians also perform maintenance on CNC machines shipped from KaPaSa factories to Taiwan. It is not known if the GFM Steyr technicians are aware of the end-use of these machines.	Individuals formerly associated with Myanmar's armed forces.

Company	Home state	Item	Additional information	Source
Mottama Holdings Limited	Myanmar	N/A	<p>According to information received by SAC-M in November 2022, Mottama Holdings Limited serves as the new intermediary between the DDI and Chinese arms manufacturing company NORINCO. Mottama Holding Limited's registered corporate address in Yangon is located in close proximity to the alleged location of the DDI's storage units (KaHtaPa) at Inya Lake. Until 2013, Mottama Holdings was known as Asia Metal Company which was sanctioned for its alleged involvement in weapon deals between Myanmar and North Korea. Asia Metal Company was also sanctioned by the US in 2013 for constructing buildings and supplying construction materials for a DDI factory. Mottama Holdings reportedly facilitate the DDI's purchases of CNC machines for arms manufacturing, in addition to facilitating the maintenance of CNC machines in use at KaPaSa factories by shipping the machines to Taiwan for service and maintenance and then shipping them back to the DDI and Myanmar.</p>	Individuals formerly associated with Myanmar's armed forces.

Company	Home state	Item	Additional information	Source
Life & Challenge Co. Ltd.	Myanmar	Support for repairs of CNC machines.	Life & Challenge reportedly assists Mottama Holdings, and the DDI, with CNC machinery support services, including for shipment to and from Taiwan for maintenance and repairs.	Individuals formerly associated with Myanmar's armed forces.
Systèmes Dassault	France	3D EM simulation and analysis software.	CST Studio Suite. Used for the design and performance analysis of Yagi-Uda antenna for UAV control system.	Leaked documents from Myanmar's Defence Services Academy.
Systèmes Dassault	France	CAD Software for 3D modelling.	SOLIDWorks. Used at KaPaSa factories to draw, design and test soundsuppressor for the MA-3 rifle.	Leaked documents from Myanmar's Defence Services Academy.
Siemens Digital Industries Software	Germany	Software CAD/CAM/CAE	NX, formerly known as "Unigraphics," is an advanced high-end CAD/CAM/CAE which has been owned since 2007 by Siemens Digital Industries Software.	Individuals formerly associated with Myanmar's armed forces.
CIMATRON	Israel	CAD/CAM software for manufacturing, toolmaking and CNC programming applications.	Used to programme CNC machines for the design and manufacture of MA2 MK III 30 round magazines.	Leaked documents from Myanmar's Defence Services Academy.
Myanma Five Star Shipping Company	Myanmar (State-owned)	Ships goods and items to the DDI.	The company is listed as the standard freight company for much of the materials and items ordered by the DDI for in-country production of weapons.	Shipment records obtained by Justice for Myanmar, on file with SAC-M.

Company	Home state	Item	Additional information	Source
MCM Pacific Pte. Ltd. (MCM Pacific Pte. Ltd. is the Singaporean branch of the Myanmar conglomerate Myanmar Chemicals & Machinery Co. Ltd.)	Myanmar	Various items including inorganic compounds such as industrial manganese dihydrogen phosphate; trichlorethylene; army-green cathodic electrophoretic coating; chromium oxide; and "auxiliary materials" for a value of 500 000 USD.	MCM Pacific-DDI deals have been signed from 2016 onwards. U Aung Hlaing Oo, a businessperson who runs Myanmar Chemical & Machinery Co. (MCM), reportedly also assists the Myanmar military to procure the machinery, equipment and technology needed to manufacture sophisticated weapons, including through brokering deals with Ukraine.	The Irrawaddy, 29 September 2021. 'Myanmar junta crony plays key role in arms purchases from Ukraine'
Star Sapphire Trading Company Limited – a subsidiary of Star Sapphire Group	Myanmar	Brokers deals, including upgrades to DDI manufactured small arms.	The managing director Dr Tun Min Latt has dealt in defence technology and products from China and, previously, Israel. For instance, he had upgraded the army's small arms, including sniper rifles, with Israeli technology. According to information received by SAC-M, Dr Tun Min Latt was the former agent for NORINCO in Myanmar, brokering deals between NORINCO for a variety of products used by the DDI at KaPaSa facilities.	Justice for Myanmar, Press Release 26 April 2022. 'Star Sapphire Companies Funnelling Arms and Money to the Military'