

ARMS BUILD-UP, ARMS CONTROL AND THE RIGHT TO DEVELOPMENT

Yemen and the Houthi Arms Supply Network as a Case Study

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Executive Summary

Question 4 is concerned with how prolonged insecurity and weak arms control affect the right to development. Yemen allows for that relationship to be examined over a meaningful time period because the sanctions regime, procurement record and economic consequences are well documented by several independent sources.

The procurement system has also changed during that period. Finished weapons still appear in interdictions, but recent seizures increasingly contain components, dual-use goods, technical assistance and material for local assembly. Conflict Armament Research examined more than 800 components taken from missiles and UAVs seized in the Red Sea in 2024 and 2025. Company markings were traceable to at least 16 countries and territories, while only about 5 per cent could be linked to Iranian production.¹ Local assembly, however, has not removed external dependence; it has shifted much of it further up the supply chain towards components, equipment and technical inputs.

The UN arms embargo has been unable to adapt to these developments at the same pace. The 2025 Panel of Experts found that, without effective implementation by Member States, the measures had made no significant dent in Houthi capabilities because of weak trigger mechanisms, limited inspection and poor information exchange.² The implementation record underscores this concern. Of 26 communications sent by the Panel to Member States for its assessment, only 12 received written replies. Furthermore, no reports required under paragraph 17 of resolution 2216 had been submitted for seizures made during inspections in Djibouti.³

The consequences of these ineffective measures on development can be seen most clearly in public revenue and maritime trade. After Houthi drone attacks on oil terminals in late 2022, hydrocarbon exports fell from roughly USD 1.14 billion in 2022 to USD 37 million in 2023 and

¹ Conflict Armament Research (CAR), *Powering the Houthis* (May 2026), pp. 4–6, 14–15.

² UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 169–173.

³ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 169, 175–176.

to zero in 2024. By the first half of 2025, capital investment was running 80 per cent below budget.⁴ At the same time, attacks on Red Sea shipping contributed to Suez Canal tonnage remaining around 70 per cent below 2023 levels, with additional freight, insurance and routing costs.⁵

Due to the observed change in procurement, the analysis that follows treats the supply chain, rather than the finished weapon alone, as the relevant unit of arms control. Components, machine tools, guidance and propulsion equipment, shipping documentation, financial intermediaries and technical assistance all form part of that chain. Interdiction is most useful when it leads to investigation of the network behind a shipment, and controls on military procurement remain sufficiently targeted to avoid unnecessary interference with commercial imports on which Yemen depends.

I. Introduction and method

Yemen provides a particularly useful test of the arms-control question because the legal regime and the evidentiary record overlap closely. Security Council sanctions have applied since 2014, a targeted arms embargo since 2015, and the Houthi movement itself has been listed as an entity subject to that embargo since 2022. Successive Panels of Experts have documented weapons, components, procurement routes and enforcement failures in unusual detail.⁶

This analysis concentrates on Houthi procurement because this is where the documentary record is strongest and the relevant Security Council prohibition is clearest. This focus should not be read as an assessment of relative responsibility for the war. The conflict predates the coalition intervention of March 2015, and serious violations have been documented against several parties. Mwatana for Human Rights, which has recorded abuses in Yemen since 2007, documented 1,296 incidents in 2025, including at least 293 civilian deaths and 520 injuries with 626 of the incidents attributed to Ansar Allah.⁷ Coalition conduct is also covered by a substantial open-source record. One source is the Yemen Project, run by Bellingcat and the Global Legal Action Network, which investigates individual strikes under an evidential collection protocol. The second important record comes from Mnemonic, which preserves the underlying material and chain of custody.⁸ Evidence concerning other parties is used below where it bears on the conflict or on development outcomes. For the narrower arms-control analysis, however, the Security Council embargo provides the clearest legal test and the strongest body of primary material.

Council resolutions and sanctions materials set the legal frame for this study. The Panels of Experts supply the factual record on transfers and implementation. Their reports consist of a mix of direct inspection, technical comparison, Member State information and confidential-source reporting. Conflict Armament Research contributes component-level field

⁴ International Monetary Fund (IMF), *Republic of Yemen: 2025 Article IV Consultation*, Country Report No. 26/80 (3 April 2026), para. 6 and table 1.

⁵ UNCTAD, *Review of Maritime Transport 2025*, overview and ch III.

⁶ UNSC Res 2140 (26 February 2014) UN Doc S/RES/2140; UNSC Res 2216 (14 April 2015) UN Doc S/RES/2216, paras 14–17, 20; UNSC Res 2624 (28 February 2022) UN Doc S/RES/2624; UN Panel of Experts on Yemen, UN Doc S/2024/731 (11 October 2024); UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025).

⁷ Mwatana for Human Rights, *Annual Briefing on the State of Human Rights in Yemen 2025* (January 2026).

⁸ Bellingcat and Global Legal Action Network, *The Yemen Project* (2019); Mnemonic, *Yemeni Archive*; Ioannis Kalpouzos, “The Yemen Project: Open Source Investigations and the Law of War,” *Just Security* (23 September 2019).

documentation. Development outcomes come from the IMF, World Bank, UNDP, UNICEF, IPC, IMO and UNCTAD.⁹

This study treats component markings as evidence of technological provenance only. They establish neither a chain of custody nor state knowledge of the transfer. A container loaded in China provides information about where the cargo was shipped and not about what Chinese authorities knew of its contents. The same caution is applied to European, American and Asian company markings on commercial parts. Conflict Armament Research underscores this approach: a company or country name on an item carries no implication of illegality or manufacturer knowledge.¹⁰

UNDP's modelling estimates the development cost of the war as a whole and cannot apportion that cost among arms transfers, embargo implementation, Houthi conduct or coalition conduct. No attempt below is made to calculate an "arms control share" of Yemen's development loss. The analysis instead follows mechanisms whose causal sequence can be documented closely: sustained military capability, attacks on revenue-generating infrastructure, disruption of public finance, and the spread of insecurity into maritime trade.¹¹

II. Legal framework

A. The right to development, peace and disarmament

The Declaration on the Right to Development ties development to peace explicitly. Its preamble treats international peace and security as essential to realising this right and recognises a close relationship between disarmament and development. Article 7 asks States to work towards general and complete disarmament under effective international control and to channel the resources disarmament releases into development.¹² Article 8 names the systems most exposed when conflict persists, such as basic resources, education, health services, food, housing, and employment, while Articles 1 and 2 locate the right in every human person and all peoples, with the human person as its central subject and beneficiary.¹³

The Pact for the Future carries that connection into a contemporary security setting through Action 26, which addresses compliance with disarmament commitments and supports efforts to eradicate illicit arms trafficking. Article 22 of the draft Convention on the Right to Development

⁹ UN Panel of Experts on Yemen, UN Doc S/2024/731 (11 October 2024); UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025); Conflict Armament Research, *Powering the Houthis* (May 2026); IMF, *Republic of Yemen: 2025 Article IV Consultation* (2026); World Bank, *Yemen Economic Monitor: Pushing Against the Tide* (May 2026); UNICEF, *Humanitarian Action for Children 2026: Yemen* (March 2026); Integrated Food Security Phase Classification, *Yemen (Government-Controlled Areas): Acute Food Insecurity Analysis, March–December 2026* (21 May 2026); International Maritime Organization, *Communication from the Secretary-General to Member States' Representatives: Red Sea Incidents* (25 November 2024); UNCTAD, *Review of Maritime Transport 2025*.

¹⁰ CAR, *Powering the Houthis*, pp 3, 14; UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 90–107.

¹¹ United Nations Development Programme and Frederick S. Pardee Center for International Futures, *Assessing the Impact of War on Development in Yemen* (April 2019).

¹² Karin Arts and Atabongawung Tamo, "The Right to Development in International Law: New Momentum Thirty Years Down the Line?," *Netherlands International Law Review* 63, no. 3 (2016): 221–249.

¹³ UNGA Res 41/128, 'Declaration on the Right to Development' (4 December 1986) UN Doc A/RES/41/128, preamble, arts 1, 2, 7–8.

is even more explicit, linking peace and security to disarmament under strict and effective international control in order for those resources to serve the right's full realisation.¹⁴

The Declaration does not itself prohibit a particular conventional-arms transfer, and the draft Convention has not yet entered into force. The right to development is nevertheless given binding expression elsewhere. Article 22 of the African Charter on Human and Peoples' Rights, adopted in 1981, requires States Parties to the Charter to guarantee the economic, social and cultural development of all peoples.¹⁵ In *Endorois*, the African Commission found Kenya in violation of that provision and clarified who qualified as a 'people', who benefited from the right and where the corresponding obligation lay.¹⁶ The African Court later reached a comparable conclusion in *Ogiek*.¹⁷ Neither decision binds Yemen, but both demonstrate that, within regional human rights systems, the right can give rise to concrete legal obligations. The operative prohibition examined in this report is different: it arises from the Security Council measures adopted under Chapter VII. The analysis, therefore, keeps the normative right-to-development framework separate from the binding sanctions rules against which implementation can be assessed.

B. The targeted Security Council regime

Resolution 2140, adopted in February 2014, created the Yemen sanctions committee, an initial Panel of Experts and imposed an asset freeze and travel ban on persons designated as threatening Yemen's peace, security or stability.¹⁸ Resolution 2216 followed in April 2015, adding the targeted arms embargo and expanding the Panel from four experts to five. It did not, however, establish the Panel, as some summaries of the regime suggest.¹⁹

Paragraph 14 of resolution 2216 obliges Member States to prevent the "direct or indirect supply, sale or transfer" of arms and related materiel to designated individuals and entities, to persons "acting on their behalf or at their direction", and to entities they own or control. The prohibition includes technical assistance, training, and financial or other assistance connected to military activities. That breadth is crucial for a conflict where the supply problem has come to include knowledge, components and production capacity alongside finished weapons.²⁰

The embargo's personal scope was expanded to the Houthis as a group, with Resolution 2624 designating the Houthis as an entity subject to the targeted arms embargo in February 2022. Safeguards are built in. Resolution 2511 permits the Committee to exempt activity from the measures on a case-by-case basis where necessary for United Nations or humanitarian work, or

¹⁴ UNGA Res 79/1, 'Pact for the Future' (22 September 2024) UN Doc A/RES/79/1, Action 26, para 47; Human Rights Council Working Group on the Right to Development, 'Second revised draft convention on the right to development' (2023) UN Doc A/HRC/WG.2/24/2, art 22.

¹⁵ African Charter on Human and Peoples' Rights (1981), art. 22(1).

¹⁶ Centre for Minority Rights Development (Kenya) and Minority Rights Group International on behalf of Endorois Welfare Council v Kenya, African Commission on Human and Peoples' Rights, Communication 276/2003 (November 2009; adopted by the African Union 4 February 2010); Human Rights Watch, "Kenya: Landmark Ruling on Indigenous Land Rights" (4 February 2010); Serges Alain Djoyou Kamga, "The Right to Development in the African Human Rights System: The Endorois Case," *De Jure Law Journal* 44, no. 2 (2011): 381–391.

¹⁷ *African Commission on Human and Peoples' Rights v Republic of Kenya (Ogiek)*, African Court on Human and Peoples' Rights, merits judgment (26 May 2017) and reparations judgment (23 June 2022).

¹⁸ UNSC Res 2140 (26 February 2014) UN Doc S/RES/2140.

¹⁹ UNSC Res 2216 (14 April 2015) UN Doc S/RES/2216, paras 14–17, 20.

²⁰ UNSC Res 2216 (14 April 2015) UN Doc S/RES/2216, para 14.

for other purposes consistent with the resolutions.²¹ As Yemen depends heavily on imported food, fuel and medicine, effective arms control cannot restrict commercial access indiscriminately.

Resolution 2801 renewed the measures in November 2025, extended the Panel's mandate through December 2026, and requested additional reporting on flows of dual-use components and precursor chemicals.²² The Panel delivered that report to the Committee on 30 June 2026.²³ The request itself signals a paradigm shift: an embargo designed around arms and related materiel now has to operate against supply chains in which civilian-looking components ultimately end up inside missiles and UAVs.

III. The changing Houthi arms-supply system

A. From finished weapons to components and local assembly

The central technical question is how much of the Houthi arsenal can be produced without outside support. On that point, the 2024 Panel moved beyond general claims about weapons origin. Drawing on military experts, Yemeni officials and persons close to the Houthis, it assessed that the group could not independently develop and manufacture several complex systems, including medium-range ballistic missiles, land-attack and anti-ship cruise missiles, surface-to-air systems, advanced UAVs, uncrewed underwater vehicles, anti-tank guided missiles and specialised electro-optical equipment.²⁴

Earlier scholarship cautioned against looking at the Houthis as a straightforward Iranian proxy, and that caution still holds on the political question. Thomas Juneau, who made the original argument in 2016, developed it in a later study, concluding that the Houthis “are not a simple arm of [Iran’s] foreign policy” and that “Iran has bandwagoned on Houthi successes as much as it has caused them.”²⁵ Material support and political control remain separate questions. Houthi decision-making follows its own domestic logic while significant parts of the group’s advanced military capability depend on external technology, components and assistance, with varying degrees of dependence in different weapons categories.²⁶

Fabian Hinz’s technical assessment maps that variation. Houthi manufacturing is most independent when it comes to basic UAVs and some close-range ballistic systems, although their guidance, propulsion and specialised components still tend to arrive from abroad. Medium-range ballistic and cruise missiles, however, are far less feasible for complete local manufacture. Local assembly, in this context, has not removed external dependence; it simply relocated the point in the supply chain where control remains feasible.²⁷

²¹ UNSC Res 2511 (25 February 2020) UN Doc S/RES/2511, para 3.

²² UNSC Res 2801 (14 November 2025) UN Doc S/RES/2801, paras 7, 15–16, 23–24.

²³ Security Council Report, *Monthly Forecast: Yemen* (August 2026).

²⁴ UN Panel of Experts on Yemen, UN Doc S/2024/731 (11 October 2024), paras 64–65.

²⁵ Thomas Juneau, “Iran’s Policy towards the Houthis in Yemen: A Limited Return on a Modest Investment,” *International Affairs* 92, no. 3 (2016): 647–663; Thomas Juneau, “How War in Yemen Transformed the Iran-Houthi Partnership,” *Studies in Conflict & Terrorism* 47, no. 3 (2024): 278–300.

²⁶ UN Panel of Experts on Yemen, UN Doc S/2024/731 (11 October 2024), paras 64–74.

²⁷ Fabian Hinz, “Made in Yemen? Assessing the Houthis’ Arms-Production Capacity,” International Institute for Strategic Studies (10 April 2025).

Conflict Armament Research made that dependence measurable. Its May 2026 field study examined over 800 components from the missiles and UAVs seized aboard the Al Sherwa in June 2025. Company markings on those parts traced back to 16 or more countries and territories, while only around 5 per cent could be linked to Iranian production.²⁸ Where visible markings allowed a production year to be read, 94 per cent dated from 2020 onward and 38 per cent from 2023 or 2024. This points to a supply chain that has continued to be replenished well into the war's most recent phase. Component tracing of a single weapon type sharpens the picture further: of 98 components tied to the Ghadir anti-ship cruise missile, (the Houthis Al-Mandab 2) at least 94 originated outside Iran, spread across 67 distinct component models that carried the marks of 20 or more manufacturers based in nine countries.²⁹

B. Selected interdictions

The shift is also visible in the interdiction record. The cases below separate material inspected directly by investigators from information supplied by governments or confidential sources.³⁰

Date	Material	Evidence	Significance
2022	Three maritime transfers; the first reportedly carrying 9,000 assault rifles, later ones machine guns	Panel, S/2024/731 (confidential-source reporting)	Evidence of organised bulk supply rather than isolated trafficking
Jan 2024	Cruise- and ballistic-missile propulsion, guidance and warhead components; explosives; ATGM launch posts; machine tools	Panel, S/2024/731; US DOJ prosecution	High-value subsystems, not only finished weapons machine tools indicate local assembly
May 2025	Drone kits, remote-control units, antennas, GPS modules and surveillance equipment concealed in commercial containers	Panel, S/2025/650 (UNVIM inspection)	Dual-use concealment inside ordinary cargo

²⁸ CAR, *Powering the Houthis*, pp. 14–15.

²⁹ CAR, *Powering the Houthis*, pp. 14–15.

³⁰ UN Panel of Experts on Yemen, UN Doc S/2024/731 (11 October 2024), paras 78–83; UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 92–107; US Department of Justice, conviction release in *United States v Muhammad Pahlawan*, ED Va, No 3:24-cr-41 (5 June 2025); CAR, *Powering the Houthis* (May 2026).

Date	Material	Evidence	Significance
Jun 2025	More than 750 tons of ammunition and military hardware, including missile systems, UAVs and MANPADS	Panel, S/2025/650; CAR field documentation	Large-scale supply, although the Panel could not independently verify every element of the shipment

The January 2024 seizure is especially well-substantiated because two separate evidentiary processes addressed the same voyage. The Panel inspected and compared the components, and a United States federal jury later convicted the ship’s captain in June 2025.³¹ The criminal proceeding does not replace UN fact-finding but it provides independent corroboration for part of the maritime network.

C. Land routes, dual-use goods and technical assistance

By 2025, the Panel was describing procurement that had diversified across land and sea. It reported the Shahn and Sarfayt crossings between Oman and Yemen as routes for military-use goods concealed in ordinary cargo or vehicles, with seizures including UAV control devices, servo motors, GPS equipment and communications gear. A September 2024 seizure in Al Mahrah included carbon fibre, a material used in UAV and cruise-missile structures.³² More reporting on the same corridor broadens that picture. Commercially available dual-use components and manufacturing equipment purchased in China for drone production have reportedly entered Yemen, both directly and across the Omani land border.³³ This evidence does not establish official tolerance by Oman. Omani authorities point to CCTV, fencing, patrols, and physical and X-ray inspection at the border.³⁴ International borders are also not the only route as seizures have been reported inside Yemen, between government- and Houthi-held areas. Reported consignments include prefabricated Chinese cranes landed at Aden and carried north to replace port-handling equipment destroyed in strikes as well as equipment required to assemble a drone factory. If pressure on Al-Hudaydah’s maritime approaches increases, more of this traffic may shift onto such internal routes.³⁵

Control of dual-use goods is hard precisely because they are ordinary. Carbon fibre, antennas, navigation modules, processors, servo motors and machine tools all have civilian uses. What makes a shipment significant for an arms control context is the combination of specification, quantity, routing, declared end-user and documentation. CAR found that many components documented in Houthi systems fall within tariff categories on the G7/EU Common High Priority List, which is evidence that component-based controls can travel across conflicts even where the end users and weapons differ.³⁶

³¹ U.S. Department of Justice, conviction release in *United States v. Muhammad Pahlawan*, E.D. Va., No. 3:24-cr-41 (5 June 2025).

³² UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 92.

³³ Bridget Toomey and Ahmad Sharawi, “Preventing Houthi Rearmament Now Can Avert a Costly Future Confrontation,” Foundation for Defense of Democracies (20 January 2026).

³⁴ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 93.

³⁵ “Houthi Forces Are Importing Drone Parts and Supplies from China,” *The Maritime Executive* (13 August 2025).

³⁶ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 92.

Resolution 2216 covers technical assistance and training for good reason. The 2024 Panel reported that Houthi combatants had received tactical or technical training outside Yemen, in Iran, Lebanon and Iraq.³⁷ CAR's 2026 study adds physical evidence of the assembly side. Missile modules from the Al Sherwa seizure carried recurring labels and Iranian model designations, which CAR understands as serialised instructions to support the assembly of the components shipped in pre-assembled form inside Yemen.³⁸

Interdicting complete weapon systems, therefore, addresses only one part of the enforcement problem. A seized shipment may remove the immediate cargo but does not prevent replacement if design knowledge, production tooling, guidance components and specialised technicians remain available. Effective arms controls, therefore, have to reach those inputs as well as finished systems.

Financing runs parallel to the physical supply chain. The 2025 Panel identifies taxes on individuals and businesses, customs collections, levies on fuel and cigarettes, profits from parts of the financial sector and control of telecommunications among Houthi revenue sources.³⁹ A study by the Mokha Center for Strategic Studies, based on nearly 68,000 commercial registrations and licences issued between 2014 and 2025, describes a private sector increasingly organised around political loyalty with a dense system of taxes, fees and levies. It estimates customs and tax revenue in Houthi-controlled areas at roughly 700 billion rials (about USD 1.17 billion), Zakat Authority collections at more than 400 billion rials (about USD 667 million), and total revenue at close to USD 3.7 billion.⁴⁰ A second study by the same Center identifies more than 220 internal customs checkpoints across at least ten governorates and associates them with transport-cost increases of 20 to 30 per cent and increases of 10 to 20 per cent in the price of essential goods.⁴¹

These financial structures help explain the limited reach of formal financial restrictions. The Panel points in particular to intermediaries, front companies and informal arrangements.⁴² United States Treasury designations and private-sector blockchain tracing add cryptocurrency-linked procurement channels to that picture.⁴³ Financial investigation, therefore, needs to be part of the same enforcement chain as cargo inspection and component tracing.

³⁷ UN Panel of Experts on Yemen, UN Doc S/2024/731 (11 October 2024), paras 73–74.

³⁸ CAR, *Powering the Houthis*, pp. 11–12, 18.

³⁹ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 109–110, 115–118; Sana'a Center for Strategic Studies, *The Yemen Review: Quarterly October–December 2025* (June 2026), Economy section.

⁴⁰ Mokha Center for Strategic Studies, *The Parallel Economy: How the Houthi Group Is Reshaping the Private Sector and Turning It into a Pillar of the War Economy* (July 2026); Rana Freifer, "How the Houthis Built a Parallel Economy in Yemen," *Al Majalla* (7 August 2026).

⁴¹ Mokha Center for Strategic Studies, *War Economy: Customs Checkpoints in Houthi-Controlled Areas* (2026); "Study Reveals: Houthis Built a 'Taxation Empire' Funding the War Through 220 Internal Checkpoints," *Yemen Monitor* (21 May 2026).

⁴² UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 112; Wadhah Al-Awlaqi, *Yemen Economic Bulletin: The Limited Efficacy of US Sanctions on Houthi Financial Networks* (Sana'a Center for Strategic Studies, 17 December 2021).

⁴³ U.S. Department of the Treasury, "Treasury Maintains Pressure on Houthi Procurement and Financing Schemes" (19 December 2024); U.S. Department of the Treasury, "Treasury Sanctions Houthi Network Procuring Weapons and Commodities from Russia" (2 April 2025); Chainalysis Team, "OFAC Sanctions Iran-Backed Houthi Network for Facilitating Weapons Procurement from Russia via Cryptocurrency" (2 April 2025); TRM Team, "From UAVs to Sanctions Evasion: How the Houthis Use Crypto" (17 April 2025).

D. Non-material assistance: engineering support and targeting data

In September 2026, Anthropic reported that a weapons-engineering cell based in northern Yemen had used Claude over several months to support guided-weapons development. Anthropic did not attribute the cell to the Houthi movement; the relevance here is geographical rather than a claim of formal attribution. The actors used the model for guidance, navigation and control software, including autopilot integration and flight simulation, as well as diagnostics after a failed guided-rocket test.⁴⁴

This is relevant as it points to a new form of technical assistance. . The actors did not need to import a specialist or receive a discrete weapons component in order to obtain engineering support but rather accessed it remotely through a general-purpose AI system. That matters because paragraph 14 of resolution 2216 already extends beyond physical transfers and expressly prohibits technical assistance connected with military activities.⁴⁵ The important question to ask in this regard is how a transfer can be identified and disrupted when it leaves no cargo manifest, shipping record or border crossing to inspect as it is not a transfer of product but a software assistance. The Yemen sanctions mechanisms remain built around shipments, financial networks and identifiable intermediaries. Anthropic reported that the actors divided their work across many sessions to conceal the purpose of individual requests.⁴⁶ This follows the same pattern of the component problem described above: a military programme may only become legible as such once individually ordinary inputs are read together.

While the UNIDIR has examined the implications of AI across the military domain, it has thus far not translated into the reporting mandate on Yemen. Resolution 2801 remains focused on dual-use components and precursor chemicals and does not include AI-mediated engineering assistance.⁴⁷ In this particular case, the relevant activity was detected by the model provider rather than through a seizure or Panel investigation, and the cell had already produced an offline simulation toolkit before its accounts were disabled.⁴⁸ The case, therefore, indicates the need for a practical extension of existing tracing practice, which could ensure the transfer of information about credible weapons-development indicators held by AI or cloud providers to national authorities, the 2140 Committee and the Panel of Experts.

A related issue arises with satellite imagery used for targeting. In April 2025, the United States Department of State accused the Chinese firm Chang Guang Satellite Technology of directly supporting Houthi attacks on United States interests. The reporting at the time, citing US officials, claimed that the company had supplied imagery used to target US warships and international vessels in the Red Sea. State Department spokesperson Tammy Bruce also stated that the support had continued after Washington raised the matter with Beijing.⁴⁹ Chang Guang subsequently rejected the allegation, telling the Global Times that it had no business dealings

⁴⁴ Anthropic, *Countering Misuse of AI: September 2026* (10 September 2026), GTG-87001.

⁴⁵ UNSC Res 2216 (14 April 2015) UN Doc S/RES/2216, para 14.

⁴⁶ Anthropic, *Countering Misuse of AI: September 2026*, GTG-87001.

⁴⁷ UNIDIR Security and Technology Programme, *Artificial Intelligence in the Military Domain and Its Implications for International Peace and Security: An Evidence-Based Road Map for Future Policy Action* (UNIDIR 2025); UNSC Res 2801 (14 November 2025) UN Doc S/RES/2801, paras 15–16.

⁴⁸ Anthropic, *Countering Misuse of AI: September 2026*, GTG-87001.

⁴⁹ Humeyra Pamuk, Simon Lewis and David Brunnstrom, “US Says Chinese Satellite Firm Is Supporting Houthi Attacks on US Interests,” Reuters (17 April 2025)

with Iran or the Houthis and describing the accusation as fabricated.⁵⁰ The material available publicly does not independently establish the alleged transfer, and the allegation is therefore treated here as such.

If accurate, however, the case illustrates a different enforcement problem from the physical supply chains described above. Satellite imagery can be transmitted electronically and used without any physical items entering Yemen. There is no component to recover, marking to photograph or consignment to inspect. The relevant evidence may instead consist of imagery orders, account records, access logs, communications or other information held by the service provider. This does not make the activity untraceable, but it places much of the evidentiary record outside the customs, shipping and field-investigation channels on which embargo enforcement has traditionally relied.

The position of Chang Guang also makes the allegation relevant beyond a single reported incident. The company was established by the Changchun Institute of Optics, Fine Mechanics and Physics of the Chinese Academy of Sciences together with the Jilin provincial government and other capital. US defence research has documented links between the company and Chinese state and military institutions.⁵¹ In December 2023, the United States Treasury designated Chang Guang for providing high-resolution satellite imagery in support of Russian operations in Ukraine and the Wagner Group.⁵² In May 2026, the State Department designated Chang Guang again as part of an action against Chinese firms involved in providing satellite imagery to Iran. Its fact sheet alleged specifically that Chang Guang had collected imagery of US and allied military facilities in response to Iranian requests and also referred back to its alleged provision of imagery to the Houthis for targeting US military assets.⁵³ These later measures do not independently prove the 2025 Yemen allegation, but they show that the same type of commercial remote-sensing support has arisen repeatedly in US sanctions practice.

The legal framework is already broad enough to make this relevant to the Yemen regime. Paragraph 14 of resolution 2216 covers technical assistance, training and financial or other assistance related to military activities, as well as physical arms and related materiel.⁵⁴ Whether a particular supply of satellite imagery falls within that language would depend on the circumstances, including its intended recipient and military use. The more immediate weakness is institutional. The Panel can gather information from States and other interested parties, but the Yemen regime contains no specific reporting obligation or established procedure for commercial satellite, cloud or AI providers comparable to the reporting required after physical

⁵⁰ Fan Wei and Liu Xin, “Chinese Satellite Company Refutes US Accusation of Supporting Houthi Attacks on US Interests as ‘Completely Fabricated’,” *Global Times* (19 April 2025).

⁵¹ Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, “Chang Guang Satellite Technology Co., Ltd.”; Matthew Bruzzese, *Chang Guang Satellite Technology* (China Aerospace Studies Institute, March 2024), p. 1.

⁵² U.S. Department of the Treasury, “Treasury Imposes Sanctions on More Than 150 Individuals and Entities Supplying Russia’s Military-Industrial Base” (12 December 2023).

⁵³ U.S. Department of State, *Fact Sheet: Disrupting Iran’s Overseas Military Procurement Networks* (8 May 2026).

⁵⁴ UNSC Res 2216 (14 April 2015) UN Doc S/RES/2216, para. 14.

inspections. A practical extension of the tracing approach recommended above would therefore be to establish a clearer route through which credible evidence of non-material military assistance held by service providers can reach national authorities, the 2140 Committee and the Panel of Experts.⁵⁵

IV. Why the embargo has struggled

A. Procurement adapted faster than enforcement

The record does not support the view that the embargo has simply gone unenforced. Member States and UN bodies have carried out major interdictions, UNVIM has inspected commercial cargo, and the Panel has repeatedly traced components and reported violations. The problem is that these measures have been ineffective in producing a sustained reduction in capability.⁵⁶

The change in seized material is also visible in a separate dataset compiled by Peter Salisbury and colleagues at the Century Foundation. It covers roughly 140 land and maritime interdictions between March 2024 and November 2025. Components and raw materials rose from about 35 per cent of recorded seizures by 2020 to more than 80 per cent across 2024 and 2025. The apparent provenance of seized items changed as well: Iran accounted for 37.5 per cent of items recorded in 2015–18 and 21 per cent in 2021–25, while China, largely as a source of components and raw materials, accounted for 35 per cent in the later period.⁵⁷

The Panel's own assessment is more explicit. It concluded that, without effective implementation by Member States, the embargo was 'totally ineffective' and had made 'no significant dent' in Houthi capabilities.⁵⁸ The report identifies weak trigger mechanisms, insufficient proactive investigation, limited cargo inspection and poor information sharing as reasons.⁵⁹ Its cooperation figures are consistent with those findings: 26 communications sent to Member States for the implementation assessment produced 12 written responses.⁶⁰ In a supply chain that crosses several jurisdictions, uneven cooperation at only a few points can be enough to preserve the route. Comparative work on embargoes also suggests that import controls become less effective once some production capacity exists inside the embargoed territory; UNODC data for 2016–17 indicate that land crossings accounted for two-thirds of arms apprehended.⁶¹ Measures aimed at non-state actors face an additional difficulty because there is

⁵⁵ UNSC Committee established pursuant to resolution 2140 (2014), "Work and Mandate: Panel of Experts"; UNSC Res 2801 (14 November 2025) UN Doc S/RES/2801, paras 15–16.

⁵⁶ Peter Salisbury, Henry Thompson and Veena Ali-Khan, *From Smugglers to Supply Chains: How Yemen's Houthi Movement Became a Global Threat* (The Century Foundation, 9 February 2026), sections 1 and 3; UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 173.

⁵⁷ Salisbury, Thompson and Ali-Khan, *From Smugglers to Supply Chains* (9 February 2026).

⁵⁸ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 173.

⁵⁹ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 170–172.

⁶⁰ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 169.

⁶¹ Caroline Klaff, "Why Arms Embargoes Fail: Seven Factors Undermining Collective Action," *SAIS Europe Journal of Global Affairs* 26 (2023).

no equivalent of the reform-for-relief bargain sometimes available in sanctions directed at states.⁶²

B. The reporting and tracing gap

Reporting after interdiction is one recurring weakness. Paragraph 17 of resolution 2216 requires States conducting inspections to report promptly to the Committee, including details of the inspection and the disposal of prohibited items.⁶³ The Panel found that no such reports had been submitted for seizures made during UNVIM inspections in Djibouti.⁶⁴ It received detailed information on only one of the shipments under examination and no information on investigations opened after the others, limiting its ability to identify origins, networks and responsible actors.⁶⁵

A seizure becomes most useful when investigators can follow the cargo back through the network that produced it. This requires preserving components and markings, securing bills of lading and payment records, and identifying intermediaries, beneficial owners and end users.

The same problem appears in component tracing. Since beginning field operations in Yemen in 2016, CAR has issued more than 220 trace or information requests, including 157 concerning the 2024–25 Red Sea seizures, to entities in 23 countries and territories. By May 2026, it had received 73 responses, which is only 33 per cent.⁶⁶ That figure is not a measure of State compliance with resolution 2216, but it is illustrative of how incomplete cooperation can prevent technical tracing from developing into a supply-chain investigation.

C. Targeted enforcement and civilian trade

Yemen's dependence on commercial imports makes indiscriminate restriction especially damaging, which is why the sanctions regime carries humanitarian exemptions and why UNVIM exists to facilitate commercial shipping to Red Sea ports while supporting compliance.⁶⁷

Stronger enforcement need not mean broader restriction. Risk-based controls can concentrate on combinations of indicators such as unusual quantities of sensitive components, false declarations, opaque ownership, repeated routing through known trans-shipment points and goods technically consistent with military production. UNIDIR's work on diversion supports a needs-driven, context-specific assessment of both risk and available tracing technologies. In Yemen, that approach matters because food, medicine, fuel and ordinary commercial goods still need to move with as little additional friction as possible.⁶⁸

⁶² Judith Vorrath, *UN Arms Embargoes under Scrutiny: Obstacles and Options for an Effective Contribution to Conflict Resolution*, SWP Research Paper 2024/RP 12 (Berlin: Stiftung Wissenschaft und Politik, September 2024), pp. 18–19.

⁶³ UNSC Res 2216 (14 April 2015) UN Doc S/RES/2216, para 17.

⁶⁴ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 175–176.

⁶⁵ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 178.

⁶⁶ CAR, *Powering the Houthis*, p. 5.

⁶⁷ UNSC Res 2511 (25 February 2020) UN Doc S/RES/2511, para 3.; United Nations Office for Project Services, *United Nations Verification and Inspection Mechanism for Yemen (UNVIM): Mandate and Inspection Materials*.

⁶⁸ Sarah Grand-Clément and Diederik Cops, *Project D-TECT: Technologies to Counter the Diversion of Small Arms and Light Weapons, and Components of Conventional Weapons*, UNIDIR and Flemish Peace Institute (2023).

V. Development consequences

The development effects cannot be attributed to arms-control failure alone, but several mechanisms can be established. Sustained military capability can prolong insecurity and extend its geographic reach. When that capability is used against revenue-generating infrastructure, the effect is felt in public finances and services while insecurity around ports and shipping adds transport and insurance costs. In an economy heavily dependent on imports, both pressures eventually reach households through public spending, food prices and fuel costs.

UNDP's modelling gives a sense of the scale of the wider loss. By 2019, it is estimated that human development in Yemen had been set back by 21 years relative to a counterfactual in which the conflict did not escalate after 2014.⁶⁹ It is important to note, however, that this estimate concerns the war as a whole and cannot be assigned specifically to Houthi armament or to failures of arms control.

Ichev and Spruk reach a similarly grave assessment using a different method. Their no-collapse counterfactual, based on generalised synthetic control across developing economies from 1990 to 2022, places real GDP about 56 per cent below the counterfactual path and GDP per capita 48 per cent below it. They estimate life expectancy to be 3.4 years shorter and the Human Development Index 0.068 points lower. Infant and under-five mortality is found to be higher by 3.1 and 3.5 deaths per 1,000 live births. The largest effect, however, is on the capacities of the institutions on which recovery itself depends, such as government effectiveness, regulatory quality and the rule of law. Again, these estimates concern Yemen's collapse as a whole rather than any single belligerent or mechanism.⁷⁰

A. Oil-export attacks, public revenue and state capacity

The oil-export episode after October 2022 provides the clearest period for linking military action to development capacity. After the UN-brokered truce expired, Houthi drones struck the Nushayma oil terminal in Shabwa and the Al-Dabba terminal in Hadramawt, which led to a tanker preparing to load crude at Al-Dabba having to leave without its cargo.⁷¹ In November 2022, the UN Special Envoy told the Security Council that Ansar Allah had attacked oil terminals and ports in Hadramawt and Shabwa 'aiming to deprive the Government of its main source of revenue from exporting oil', and warned of significant economic consequences for Yemeni welfare.⁷²

The following shock is well documented. IMF figures put hydrocarbon exports at roughly USD 1.17 billion in 2021 and USD 1.14 billion in 2022, before a fall to about USD 37 million in 2023 and zero in 2024.⁷³ The Fund describes the halt in oil exports as a major shock that pushed the economy into deep recession and reduced government revenue by almost half.⁷⁴

⁶⁹ United Nations Development Programme and Frederick S. Pardee Center for International Futures, *Assessing the Impact of War on Development in Yemen* (April 2019).

⁷⁰ Riste Ichev and Rok Spruk, "From Revolution to Ruin: An Empirical Analysis of Yemen's State Collapse," *Defence and Peace Economics* (2026).

⁷¹ Sana'a Center for Strategic Studies, "Houthis Attack Oil Ports" and "Oil Port Attacks Threaten Government Finances," *The Yemen Review* (14 November 2022).

⁷² UN Security Council, Meetings Coverage, SC/15114 (22 November 2022).

⁷³ IMF, *Republic of Yemen: 2025 Article IV Consultation*, para. 6 and table 1.

⁷⁴ IMF, *Republic of Yemen: 2025 Article IV Consultation*, para. 4.

The government's response was primarily expenditure compression. During 2023–24, spending was reduced particularly on energy subsidies, goods and services and public wages.⁷⁵ In the first half of 2025, total spending was about 30 per cent below budget, capital investment was 80 per cent below budget, goods and services 40 per cent lower and electricity subsidies 20 per cent lower.⁷⁶ The effects also extended beyond the budget. In government-held areas, the rial weakened from roughly 1,200 per US dollar to around 2,400 per US dollar after the 2022 attacks on the southern terminals. Consequently, purchasing power fell, food costs rose and households cut the number of meals they ate.⁷⁷

While these figures alone don't explain Yemen's wider economic collapse, they demonstrate how military capacity translated into economic degradation and, consequently hindering development: attacks on oil-export infrastructure were followed by the collapse of exports, a sharp loss of government revenue and foreign exchange, and substantial reductions in public investment and service spending. The World Bank estimates that real GDP contracted by 1.5 per cent in 2025 and projects a further decline in 2026, citing blocked oil exports, weak demand and limited access to finance.⁷⁸

B. Red Sea shipping and regional development risk

Houthi anti-ship, missile and UAV capability has carried part of the conflict into the Red Sea and Gulf of Aden. The International Maritime Organization recorded 69 incidents, confirmed by flag States, between 19 November 2023 and October 2024, using criteria that required identification of the vessel, a public claim of responsibility and confirmation by the flag State or company.⁷⁹ Attacks resumed after quieter periods in 2025 and 2026 when on 12 August 2026, the IMO Secretary-General condemned a projectile strike on the cargo ship TIHAMAH off Al Mokha that killed several seafarers.⁸⁰

Incident counts vary substantially across sources, in part because they use different definitions, source bases and time periods. Lloyd's List Intelligence, applying commercial vessel-tracking criteria, recorded 99 Houthi attacks or hijackings between November 2023 and the final incident in September 2025.⁸¹ A peer-reviewed study using a different methodology records 113 vessels attacked between November 2023 and February 2025.⁸² The World Shipping Council counted 120 attacks on ships since November 2023 as of January 2026, while a Baker Institute

⁷⁵ IMF, *Republic of Yemen: 2025 Article IV Consultation*, para. 10.

⁷⁶ IMF, *Republic of Yemen: 2025 Article IV Consultation*, paras. 4, 10.

⁷⁷ Saeed al-Batati, "Ten Years On, Yemen's Economic War Is Raging More Than Ever," *The New Humanitarian* (5 March 2025).

⁷⁸ World Bank, *Yemen Economic Monitor: Pushing Against the Tide*, Report No. 210533 (May 2026).

⁷⁹ International Maritime Organization, *Communication from the Secretary-General to Member States' Representatives: Red Sea Incidents* (25 November 2024).

⁸⁰ International Maritime Organization, 'Statement on Recent Attacks on Ships in the Red Sea' (23 July 2026); International Maritime Organization, 'Statement on Deadly Ship Attack in the Red Sea' (12 August 2026).

⁸¹ Mike Schuler, "Suez Canal Traffic Stalls at 60% Below Normal Despite 100 Days Without Houthi Attacks," *gCaptain* (7 January 2026).

⁸² Ehud Eiran, "Why Do Some Limited Regional Conflicts in the Maritime Domain Have Global Consequences? Evidence from Two Middle Eastern Wars," *Frontiers in Political Science* 8 (2026): 1741706.

working paper recorded 114 ships attacked by September 2025.⁸³ These figures are best treated as separate datasets rather than combined into a single incident total.

Shipping data provides a more consistent indication of the economic disruption. UNCTAD reports that Suez Canal tonnage remained around 70 per cent below average 2023 transit levels through 2025 as carriers continued to divert around the Cape of Good Hope.⁸⁴ Longer routes use more vessel capacity and raise freight and delivery costs. Those costs are especially relevant to Yemen because of its dependence on imported food and fuel. ACAPS identifies higher import costs linked to regional maritime disruption as one factor behind an unusually severe lean season.⁸⁵ CEPR research, by contrast, finds the effect on aggregate inflation relatively contained because freight is only a small share of total input costs, although prolonged disruption would weigh on euro-area export growth.⁸⁶ However, even a modest effect on aggregate inflation can still impose substantial costs on a highly import-dependent economy.

Additionally, the economic disruption of an attack happens not only in its immediate shock but can persist as a vulnerability for much longer. While Lloyd's List data compiled by the Baker Institute shows how the steepest decline in weekly transits through Bab al-Mandab from 500 before the Gaza war to around 200 by when it happened within the first two months after the first attack, Suez traffic remains low. In the first week of 2026, a hundred days after the last vessel was struck, BIMCO recorded Suez traffic still at 60 per cent below 2023 levels. The economic effects of persistent fragility is further underscored by operator's interruption of plans to resume Red Sea routing in July 2025 following two attacks, despite previous months of relative quiet. . Once instability is established, maritime traffic can remain disrupted without continuous attacks on vessels.⁸⁷

While Suez transits of smaller vessels recovered to around 98 per cent by November (what year?), vessels of 7,500 TEU and above have only made about 5.7 per cent of their 2023 Suez transits during 2025. Only nine containerships of 7,500 TEU or more passed through Bab el-Mandeb in the whole of 2025. Measured by deadweight tonnage, overall recovery reached only 35 to 39 per cent of 2023 levels.⁸⁸ Diversion around the Cape adds roughly ten days in each direction on the Far East–Europe route. Although carriers avoid Suez tolls of around USD 300,000 per container-ship transit, they incur additional fuel, charter-capacity and insurance costs.⁸⁹

The consequences of this, however, are not confined to shipping firms or to Yemen itself. Donelli describes a hybrid Red Sea security complex, in which land and sea based threats increasingly overlap. Territorial control allows an armed group to project force into maritime space, while ports such as Hudaydah and Mokha can serve both commercial and military functions as

⁸³ World Shipping Council, *Red Sea Security* (updated January 2026); Kristian Coates Ulrichsen and Jim Krane, *Maritime Chokepoints and Risks to Global Shipping and Energy Security*, Baker Institute for Public Policy (March 2026).

⁸⁴ UNCTAD, *Review of Maritime Transport 2025*, overview and ch III.

⁸⁵ ACAPS, *Yemen: Country Analysis* (22 July 2026 update).

⁸⁶ Maria Grazia Attinasi et al., "Sailing through Storms: The Fallout of Red Sea Disruptions for Global Trade and Inflation," *VoxEU* (26 April 2024).

⁸⁷ Kristian Coates Ulrichsen and Jim Krane, *Maritime Chokepoints and Risks to Global Shipping and Energy Security*, Baker Institute for Public Policy, working paper (March 2026).

⁸⁸ Mike Schuler, "Suez Canal Traffic Stalls at 60% Below Normal Despite 100 Days Without Houthi Attacks," *gCaptain* (7 January 2026); World Shipping Council, *Red Sea: Overview of Necessary Capacity and Current Transit* (January 2026).

⁸⁹ International Transport Forum (OECD), *The Red Sea Crisis: Impacts on Global Shipping* (2024).

dual-use zones for civilian trade and military operations.⁹⁰ Firms and consumers outside Yemen, therefore, bear part of the cost even though they have no direct role in the conflict. At the same time, attacks at sea have prompted retaliatory strikes on ports, airports and other sites inside Yemen, exposing domestic infrastructure to further damage. The Houthis' persistent access to military capabilities enabling maritime attacks has, therefore, prolonged economic disruption despite a relative reduction in front-line fighting after 2022.

C. Household welfare

The humanitarian situation in Yemen remains critical. UNICEF's 2026 Humanitarian Action for Children appeal estimates that 19.7 million people require humanitarian assistance, 40 per cent of health facilities are partly functioning or out of service, and 3.2 million school-age children are out of school.⁹¹ Human Rights Watch raised the number of people requiring assistance from 1.3 million in 2024 to 19.5 million in 2025.⁹²

Household surveys illustrate the effects of economic pressure. ACAPS found 57 per cent of surveyed households unable to meet minimum food needs in February 2026, compared with 64 per cent in December 2025, an improvement it attributed largely to seasonal factors. Food accounted for roughly 72 per cent of household income and between 62 and 69 per cent of households were using crisis or emergency coping strategies, including reducing adults' food intake, selling assets and, in some governorates, begging.⁹³ The IPC provides a narrower food security measure for government controlled areas. Its May 2026 analysis estimated that roughly 5 million people were in Phase 3 or worse between March and May 2026, rising to about 5.4 million in the June - September projection period.⁹⁴

Economic pressures compound at household level. Families already facing food insecurity have little capacity to absorb delayed public salaries, weaker electricity provision, higher transport costs, partially functioning health services and lost schooling due to insecurity and diversion of resources away from recovery.

VI. Findings and recommendations

Over time, the composition of Houthi supply has shifted from bulk movements of rifles and complete weapons towards guidance modules, propulsion components, commercial electronics, carbon fibre, machine tools and labelled missile subassemblies. This change helps explain how a legally substantial embargo can remain operationally weak. It further illustrates how negative effects on development continued after front-line fighting subsided as capabilities accumulated during the war were subsequently used against oil infrastructure and Red Sea shipping.

⁹⁰ Simone Donelli, "Maritime Disruption in Yemen: The Making of a Hybrid Red Sea Order," *Middle East Policy* (2025).

⁹¹ UNICEF, *Humanitarian Action for Children 2026: Yemen* (March 2026), pp. 1–2.

⁹² Human Rights Watch, *World Report 2026: Yemen* (2026).

⁹³ ACAPS, *Yemen Joint Monitoring Report*, issue 14 (5 May 2026).

⁹⁴ Integrated Food Security Phase Classification (IPC), *Yemen (Government-Controlled Areas): Acute Food Insecurity Analysis, March–December 2026* (21 May 2026).

The embargo has proven to be effective in selected cases. Major consignments have been intercepted and procurement is almost certainly slower and more expensive than it would be without sanctions and interdiction. The Panel's narrower assessment, however, still stands: implementation has not meaningfully reduced the capabilities it observed.⁹⁵

The described shift to local assembly is the first reason identified here for the embargo's limited effectiveness. Complete weapons remain relevant but dual-use electronics, propulsion and guidance equipment, carbon fibre, machine tools, precursors and technical assistance have been shown to be just as important for maintaining capability. Resolution 2801's request for dedicated reporting on dual-use components is a useful step in that direction.⁹⁶ Routine documentation, tracing and risk analysis after interdiction could subsequently translate that reporting into practical effect.⁹⁷

Secondly, current post-interdiction practice is weak. The Panel's findings support systematic tracing after a seizure.⁹⁸ Components and markings need to be preserved, commercial and financial records obtained, beneficial owners and intermediaries identified, and relevant information transmitted promptly to the Committee and Panel. The aim is to build an evidentiary picture of the procurement network rather than treating each seizure as an isolated event.

For this tracing to become effective, available information needs to become more consolidated across institutions and jurisdictions. As stated above, the Panel received 12 written responses to 26 communications, while CAR's trace requests produced a 33 per cent response rate.⁹⁹ Customs authorities, port and flag States, manufacturers and distributors, financial intelligence units and sanctions investigators each hold only part of the relevant record. More consistent exchange among them would make jurisdictional gaps harder to exploit. Attempts to consolidate information can also include support to states handling large inspection volumes but lacking technical capacity through the provision of equipment, training and access to specialist tracing support.

Digital technologies are a further dimension of this and should be integrated into any information consolidation mechanism.

The northern Yemen case shows that evidence relevant to the embargo may first appear inside an AI provider rather than in customs, shipping or financial records. Where such evidence credibly points to weapons development for a designated actor, national authorities should have a route for passing it to the 2140 Committee and the Panel. This would extend the existing tracing logic to another source of military assistance without creating a separate sanctions regime for AI.

Crucially, any tighter system needs to account for Yemen's dependence on civilian imports. Food, fuel and medicine remain essential, and the existing framework already provides for

⁹⁵ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 173; Salisbury, Thompson and Ali-Khan, *From Smugglers to Supply Chains* (9 February 2026).

⁹⁶ UNSC Res 2801 (14 November 2025) UN Doc S/RES/2801, para 15.

⁹⁷ CAR, *Powering the Houthis*, pp. 14–18; Grand-Clément and Cops, *Project D-TECT* (2023).

⁹⁸ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), paras 175–179; Hiruni Alwishewa, "Human Rights Due Diligence for Arms Companies: Lessons from Supply Chain Regulations," *European Journal of Risk Regulation* 16, no 2 (June 2025): 704–720.

⁹⁹ UN Panel of Experts on Yemen, UN Doc S/2025/650 (15 October 2025), para 169; CAR, *Powering the Houthis*, p 5.

humanitarian exemptions.¹⁰⁰ Inspection systems should therefore distinguish military procurement from legitimate commerce as precisely as possible. Success should not be judged only by the number of seizures. The oil-export episode shows that when military capability is used against an economic chokepoint, the resulting effects on revenue and public services are also relevant to whether the control regime is serving its broader purpose.¹⁰¹

For this study, the right to development is most useful as a criterion for examining the effects of sanctions implementation. The objective is to reduce the conditions that sustain armed insecurity without unnecessarily constraining the civilian systems through which people work, trade and access essential services. In Yemen, that points to an embargo implementation system that is more capable of tracing military supply chains and sharing evidence, while remaining narrowly targeted enough to protect ordinary commerce and the public resources needed for recovery.

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¹⁰⁰ UNSC Res 2511 (25 February 2020) UN Doc S/RES/2511, para 3.

¹⁰¹ UN Security Council, Meetings Coverage, SC/15114 (22 November 2022); IMF, *Republic of Yemen: 2025 Article IV Consultation*, Country Report No 26/80 (3 April 2026), paras 4, 6, 10–11, table 1.

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