dp Policy Brief

3D Printing and the Illicit Arms Trade

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The Illicit Arms Trade

- The "import, export, acquisition, sale, delivery, movement or transfer of firearms, their parts and component and ammunition from or across the territory of one State Party to that of another State Party if any one of the States Parties concerned does not authorize it" (United Nations 2021, Article 3a).

- Illicit arms "flows" are the illicit transfer of weapons that includes the "intentional diversion of firearms from legal to illegal commerce, without involving the movement of items across physical borders" (Mercado and Goodwin 2025).

Challenges

- The increased usage of illicit arms intensifies armed conflicts and perpetuates cycles of violence and instability. These characteristics have led to international bodies and civil society organizations defining small arms as a leading threat to security (Alwishewa 2024).

- The trafficking of illicit firearms is linked to other illicit activities, weaponizing illicit organizations, and facilitating crimes including kidnapping, extortion, armed robbery, assassinations, and poaching (Mercado 2022: 10).

- Illicit arms usage contributes to violations of international human rights law, impacting peacekeeping missions (United Nations 2017).

3D Printing Technology

- 3-Dimensional (3D) printing, also known as digital fabrication technology or additive manufacturing, commonly create physical objects by building up material in layers from a digital model (Lee, et.al. 2019).

- 3D printers can also operate through “reductive processes” which create objects by carving material away from a larger block (Mardis 2018).

- Common material categories for 3D printing include polymers, metals, and ceramics (Hewlett-Packard 2025); however, as technology advances the use of other materials including biological, is expanding (Chia and Wu 2015).

Advantages of 3D Printing Technology

- 3D printing can play a vital role in disaster relief and humanitarian assistance (3D ADEPT Media, 2022).
- 3D printing is able to produce a wide range of products, including houses, automotive parts and medical prosthetics (Chase and LaPorte 2017).
- Characterized by less material wastage, ease of manufacturing and energy efficient making it sustainable for industrial use (Jandyal, et.al. 2022).
- While initial costs can be significant, once in use, 3D printing can be more cost-effective for low-volume production and custom designs (Thomas and Gilbert 2014).

Potential Negative Effects

- The use of 3D printing technology can allow for the production of arms and firearm components that are usually undetectable by x-ray machines, do not require background checks to obtain, and lack serial numbers. (Talbot and Skaggs 2020).

- Easier access to 3D printed arms data files online can facilitate widespread distribution towards unknown actors.
  - For example, data files for the "Liberator," a 3D printed handgun was downloaded about 100,000 times in two days before the United States government took down the files in 2013 (Walther 2015).

- The proliferation of 3D printed small arms has the potential to harm peacekeeping efforts in post-conflict settings (Hartwig, Hassan, Pilkinton, et.al. 2023).
  - E.g. the use of 3D printed firearms in the Myanmar conflict (Martin 2021)

Recommendations

- To address regulatory gaps, international organizations should develop a base legal framework specifically for 3D printed firearms, encourage information sharing among nations, and implement a standardization of 3D printer regulations globally.

- Implement requirements for the licensing and registration of 3D printers capable of producing firearms.
  - Partnerships with 3D printer manufactures could allow for the coding of identifiers into 3D printed products, similar to serial numbers.

- Standardizing software algorithms that block the printing of known firearm & component designs across 3D printer manufacturers and mandating its inclusion could improve detection and prevent illicit firearms production (Listek 2024).
  - A global database of known firearm designs and continued information sharing between law enforcement and manufactures would likely aid these efforts.

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