

“High Technology”, Secure Trading Chains and India’s Strategic Trade Controls

Dr. V. Siddhartha

Former Secretary

Science Advisory Council to the Prime Minister

(and several other formers)

An invited lecture

at the

Indian Institute of Management, Bengaluru

31 July 2025

“High Technology”

- > The "height" of a technology is an anthropomorphic adjectival descriptor that means little in itself – besides conveying to the lay a sense of esoteric distance from the familiar technology that is widely resident in every-day products, or the means of their manufacture.
- > There is, however, a category of products, and their attendant technologies, whose trading across national borders is *state-controlled* at various points along their value-chains – from concept to end-use – for reasons of *National Security or/and Foreign Policy* of the countries from which those products or technologies are exported.
- > *That niche category* is the sense in which “High Technology” is used hereafter.

India's High Technology Trading Laws and their Foreign Policy connection with International Regimes

- Three primary Acts govern exports (primarily), as also conditional imports, of High Technology
 - # The Atomic Energy (Amendment) Act, 2015
Commitment to the non-proliferation of nuclear weapons; Nuclear Suppliers Group (1974)
 - # The Chemical Weapons Convention Act, 2000
Signatory to the Chemical Weapons Convention, 1993; OPCW
 - # SCOMET list under the FT(D&R) Amendment Act, 2010
India is a Member [date from] of (formation date): [2016] Missile Technology Control Regime (1987); [2018] Australia Group for Chemical And Biological Weapons Precursors (1985); [2017] Wassenaar Arrangement for Conventional Armaments (1996)
- In addition, The WMD Act, 2005 is the national legal instrument for the implementation of India's obligations under United Nations Security Council Resolution 1540. Besides listed goods, the WMD Act legislates control over WMD-relevant
 - # Export of unlisted goods and technology ("catch-all") # Instruments of WMD-relevant export transactions (e.g. financing, facilitating/brokering)

“Technology” in India’s Strategic Trade Controls

- > India’s laws that regulate foreign trade in listed goods apply also to the supply of know-how – or “intangibles” -- to units that re-process or assemble goods or materials into value-added goods whose specifications take the goods into the export-controllable category. Managements of EPU’s, or of units located in EPZs, have to keep a watch on this.
- > Note that the controls over such “intangibles” apply also to the know-how that may be required for *the use* of the controlled item.
- > One enforcement-significant differentiator of the primary Indian laws from their foreign counterparts is the definition of ‘technology’: The Atomic Energy, FT&DR and WMD Acts define ‘technology’ identically, and emphasise the *content* of information, rather than the means of transmission of this intangible.

Inward Foreign Investment in High-Technology

- > The investment regulatory regime in India for foreign High-Technology is still evolving -- e. g. monitorable offset obligations in aerospace manufacture.
- > Counter-intuitively, closely-held high technology will flow to where the regulatory regime for such exists and is implemented strictly e.g. in gated Technology Parks
- > Because manufacture for global high-technology markets will tend to move from India (including by Indian-owned companies) to even lower-wage country-members of technology regimes, value-addition in India's export basket of high-technology goods, software or know-how will need to move to areas of comparative advantage in *regulated* High Technology; namely to "Intangibles", i.e. # brain-ware # IPR-density, or to # low-volume custom manufacturing.

Corporate governance of High-Technology

> The new regulatory environment will require that companies assure *both* the Indian and foreign state of implementing robust Internal Compliance Programmes (ICPs), i.e. supply-chain security & end-use integrity

Without a robust ICP, neither foreign investment, nor foreign- **or *Indian-owned*** high-technology will be available

ICPs for strategic trade controls and assureable supply-chain integrity will need to be instituted for *both* Imports and Exports

Even for *non-WMD* relevant goods and technology, monitorable ICPs will likely become a conditionality of not only the *importing state* but also of importing *companies*

> Global reputation may well be more valuable to trading partners than the Indian companies' exports to them.

'Trust but Verify':

The mantrum of Private-Public Partnership

> The most cost-effective way to control quality is to ensure that the manufacturing defect does not occur in the first place.

Likewise, the most effective way to ensure compliance with export control law is to monitor and secure the manufacture and movement of export-controlled goods and services *well before* they reach the customs post or electronic border.

It should be obvious that if supervising such supply-chain integrity in *domestic trade* in listed goods and services -- not to say "catch-all" controls -- is not to become an implementation nightmare, then.....

> The management imperative in High-Technology industry is to configure PPPs by, *inter alia*, chaperoning in individual firms Internal Compliance Programmes (ICPs) of material and technology movement integrity that are verifiable by Government.

Governance of High Technology: The confluence of STC and PPP

> It will take time, effort and minute attention to detail to set-up a government-monitorable system of manufacture and trade (both foreign and domestic) – or **STC** -- in high-technology goods and services:

As a country we are not new to this type of technology-based, full-chain, integrity-assurance. The Indian nuclear industry is familiar with the entire systematic of the foreign-policy mediated IAEA safeguards

Even as late as a decade ago, the market-presence of even Public-Sector corporates in High Technology was limited to the Trimurthy of Atomic Energy, Space and Defence. For the most part, private industry functioned as sub-contractors to these. Inevitably, the next wave of expansion, growth and value-addition by OEMs will be increasingly laden with High-Technology products and services for both the domestic and export markets. And these will be subject to STC

> Higher corporate management of members of such industry groupings as SIATI and CII-SIDM will likely need to be educated into different dimensions of *de novo* implementation of 'Trust but Verify' at the confluence of **STC** and **PPP**.



Thank You