



TRANSFER OF TECHNOLOGY CONTRACTS AND DEFENCE SECTOR

TRANSFER OF TECHNOLOGY – An Introduction

- Building military capability – Paramount importance of a nation –
- Notion of Sovereignty – rests on the premise of a secured nation fostered by well – equipped armed forces
- Equipping the armed forces / Building their capabilities – Two routes
 - Indigenous Production – Become Self-Sufficient in meeting the needs of the armed forces
 - Procurement – Arms and Technology Procurement from governmental and non-governmental entities abroad
- Past decades – Progress made in both sectors
- Policy framework – Prefers Route 01
- Practice – More prevalent in Route 02 – India continues to be primarily dependent on imported competitive defence technology for meeting the critical requirements of the armed forces

Scheme of Discussion

PART – A – Conceptual Background	PART – B – Approaches to ToT	PART – C - Drafting	PART – D – Critical Evaluation of ToT Laws and Practice
ToT – Concept & Elements	Types of ToT	Nature of ToT Agreements	ToT – Boon or Bane?
Historical Background	Strategies for ToT	Pre ToT Arrangements	National Goal?
Technology Absorption Timeframe	Structure for ToT	Standard ToT Clauses	Self – Reliance & ToT



PART – A – CONCEPTUAL BACKGROUND

TRANSFER OF TECHNOLOGY - MEANING

Generic Meaning -

*‘Transfer of **Information** and **Hardware** which allows the buyer to independently build up on future upgrades or even superior designs’*

UNCTAD –

*‘technology is the **knowledge** that goes into the creation and provision of a product or service’*

Sakti & Indrani Mukherjee –

*‘a set of instruments or **tools, materials, know-how** and **abilities**’ which may be ‘bought and sold as capital goods, human labour and information’.*

National Academy of Engineering - (*functional perspective*)

*‘including all the **infrastructure** necessary for **designing, manufacture and repair** of technological artifacts—engineering know-how, manufacturing expertise and various technical skills—all are equally important part of technology’.*

TRANSFER OF TECHNOLOGY - MEANING

- **Defence Procurement Procedure –**

- **comprehensive, covering all aspects of design, manufacturing know-how and detailed technical information which will enable the Production Agency to manufacture, assemble, integrate, test, install and commission, use, repair, overhaul, support and maintain the license product.**
- **Design data shall include the details that are needed to give design disposition during production on deviation/ concession; modify/upgrade the licence product and substitute parts and systems of the licence product as required by the certifying agency and the production agency.**

TRANSFER OF TECHNOLOGY – Elements

KNOWLEDGE	EQUIPMENT	ABILITIES
Information or Technical Data – A Step by Step Guide on Usage	Primary Equipment / Capital Goods	Technical Skills – Designing, Development, Production, Use, Maintain, Repair, Overhaul and Improve
Methods of Using	Infrastructure for Usage – eg: Water or Industrial Power	Human Element – Variable Factor Technical Capabilities between seller and buyer
Improvisation		Differing Educational and Work Environment
Maintenance		Resulting in differing absorption capabilities

- Above Elements – Ideal ToT
- A Typical ToT – is a mix & match of these elements
- Therefore TOT is often viewed as a means to empower the technology recipient to design, develop its own products
- DPP – also aspires for this state –
- But practice paints a different picture

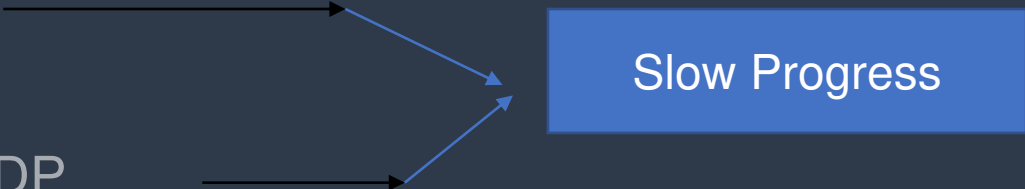
Technology Adoption Time frame

Prototype Phase	Production Phase	Commercial Phase
Phenomenon is discovered in lab through fundamental research Concept developed into Prototype and tried in real life conditions If successful, it is productionized	Technology is improvised upon in order to increase their utility, abilities and reliabilities	Technology is optimally exploited for commercial reasons

TRANSFER OF TECHNOLOGY – HISTORICAL BACKDROP

- Production of Competitive Defence Technology –
 - Establishment of Ordnance Factories by Britishers – 1800s/1900s
 - To meet the domestic needs of the country - But Capability – Limited
- Post – Independence – Direct Acquisition of Weapon's System from major military powers
- Parallely – In quest for Self-Reliance – Vast administrative and institutional mechanism was built
 - 1st Step – Establishment of DRDO (1950) – Objective – To indigenously design and develop defence system for the Indian military services
 - Followed by establishment of DPSUs
- Next few decades – Collaborative Defence Procurement – India – USSR Agreements
 - Production of MiG Fighter 21 aircrafts in India
- 1980s – Majority of our defence technology was either procured or collaborated with Soviet technologies

TRANSFER OF TECHNOLOGY – HISTORICAL BACKDROP

- Licensed Manufacture – Most preferred means – to manufacture high – end products was not successful eg: in the manufacture of MiG – 21 (Soviet Union) – India faced difficulty in shortages of trained manpower and poor quality facilities hampered production
- Hence – Ultimately India is dependent on imports – eg: 50 hunters (UK) + 150 (SU from USSR)
- Indigenous Production – Some success stories –
 - Main Battle Tanks
 - Light Combat Aircraft
 - Missile System under IGMDP

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graph LR; A[Main Battle Tanks] --> D[Slow Progress]; B[Light Combat Aircraft] --> D; C[Missile System under IGMDP] --> D;
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- Through Licensed Production – Induction of Large Population System like T-90 tanks, Armoured Fighting vehicles, BMP II, Bofors – FH 177 B Artillery guns, Flycatcher radars
- 2001 – Defence Sector opened up for private sector investment
- 2003 – First ever DPP – to enable faster processing of acquisitions – ToT became a part of DPP in subsequent revisions

TRANSFER OF TECHNOLOGY – HISTORICAL BACKDROP

Indigenous Production – Success Stories – MBT Arjun Dhruv – Advanced Light Helicopter Akash Air Defence Weapons System	ToT Procurement Success Stories – Most of the procurements in ToT Categories Sukhoi 30 fighter aircrafts Scorpene Sub-marine Long Range Surface to air missiles Low – level transportation radars
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- 2008 – Defence Offsets were introduced – formalized in DOG 2012 – 6 avenues for offset discharge – 3 ToT
- 2014 – Make – in – India – to make India a global defence manufacturing hub
- Defence Deal with Russia – for manufacture of Kamov 226 – Multirole Helicopter in India
- 2015 – 2020 – India has received numerous defence ToT proposals from developed countries –
 - US – 17 + 24 (Path-finder projects, Fighter aircrafts, Sub-marines)



PART – B – APPROACHES TO TRANSFER OF TECHNOLOGY

TYPES OF TECHNOLOGY TRANSFER

CATEGORY – I - Complete Transfer of Technology (CToT) – Enables recipient to carry out fabrication, assembly and testing of the item provided by the OEM – Falls under the procurement category of Buy (IDDM) – Indigenous Production

CATEGORY – II – Items manufactured by the OEMs sub-contractor based on direction and documentation provided by the OEM – the same documents are transferred further

CATEGORY – III – Where the manufacturer and the development of the system have been sub-contracted by the OEM to some other vendor based on the procured drawing and specification provided by the OEM - Intermediary

CATEGORY – IV - Item sourced by the OEM against his procurement specification as ‘fully furnished’ may be considered as brought out. OEM will only be able to provide the procurement specification and the source of the supply to ensure availability during the life cycle of the product. In case OEM, in collaboration with his vendor the document for maintenance and training then such transfer might be categorized as M-TOT.

CATEGORY – V - Where the OEM is not willing to transfer the technology (having ownership of design and manufacturing document), same shall be classified as the ‘proprietary item’ such items are generally not included in the scope of TOT

TRANSFER OF TECHNOLOGY – Types – Based on Operation

Capability Desired	ToT Needed
Operate	OToT
Maintain	MToT (M)
Repair	MToT (MR)
Overhaul	MToT (MRO)
Produce/manufacture/assemble/integrate	PToT
Minor design deviation/modification	DToT (Limited)
Upgrade/develop variants/develop alternate products	D&D ToT

Table 1: Assigning of ToT Variant Definitions

STRATEGIES FOR TRANSFER OF TECHNOLOGY

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graph TD; A[STRATEGIES FOR TRANSFER OF TECHNOLOGY] --> B[Path Strategy]; A --> C[Engineering Strategy];
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Path Strategy

Engineering Strategy

- **PATH STRATEGY**

- This strategy comprised of several steps and stages and it depends on country's capacity to decide till which stage it can reach
- Step one - Maintenance & Repair of Transferred Systems - The recipient develops and gains the skill, knowledge and technical know-how as well as attains the needed infrastructure for gaining ability to repair, maintain & rebuild the foreign product. This is done to attain spilloff benefits like developing domestic skills and creation of employment.
- Establish the infrastructure (institutional, HR) for technology absorption

STRATEGIES FOR TRANSFER OF TECHNOLOGY – Path Strategy

- Step two - Assembly of subsystems from imported components This step comprises of the expansion of the manufacturing ability to the recipient of the ToT contract to the assembly stage of the product, this is done under a License Regime by the OEM. Under this step, the recipient is completely dependent on foreign design and information, hence, can't carry their own up gradation, as per their need.
 - Assembling the system with foreign design assistance
- Step three - Final Production of the concerned equipment and production of its basic components This is a crucial step as the recipient develops the capability to manufacture necessary / basic components of the concerned product for which ToT has been entered among the parties, as well as the final assembly of the concerned equipment. Assistance for the establishment, organization and operational facilities to produce necessary component and final assembly line of the concerned product takes place under this step.
 - Production Phase

STRATEGIES FOR TRANSFER OF TECHNOLOGY – Path Strategy

- Step four - Production using Imported design At this step/stage, the production of the concerned product and other similar equipment can start completely in the domestic sphere based on the imported design. The same can be achieved via reverse engineering of the Foreign Product. Here, the recipient entity develops its engineering ability to modify the design provided by the OEM. This knowledge combined with the technical skills & know how, Production and Organizational knowledge acquired via different sources / regime like joint ventures, license etc
 - Develop ability to improvise
- Step five - Capability to design needed product indigenously - At this step it is assumed that the recipient of the ToT has attained the knowledge and capabilities to produce the major components of the concerned product, with minimal dependency on foreign design, technological know-how and know why, organizational knowledge required for production, technical skills & assembly line and other requisite infrastructure for the development, production & maintenance of the concerned product.
 - Develop knowledge and skill set for indigenous production

STRATEGIES FOR TRANSFER OF TECHNOLOGY – Path Strategy

- Step six - Production based on local R&D for new product This is the final step / stage for an entity to achieve in this strategy of independence in the production and development of the needed and desired product. This includes the capability of designing and manufacturing the concerned product completely in the domestic sphere using domestic components. This stage marks the self-sufficiency in the production and achieving the ultimate objective of the ToT.
 - Complete independence in designing, improvising, manufacturing
 - Recipient Country holds the IP Rights

STRATEGIES FOR TRANSFER OF TECHNOLOGY – Engineering Strategy

- Needs a base of technical knowledge and production experience
- Adaptation and development of existing strategy as per the needs of the country

Add On Engineering	Add Up Engineering
Upgrading, Updating, Improvisation and Adaptation of an existing strategy as per the specific use of the user by altering components, features and incorporation of indigenous components	Higher demand of technical know-how and experience from previous production Raise supply chain and integrate the imported components and technical knowledge to develop and produce a new product
For eg: Israel Aircraft Industries; IAI Kfir which is developed from French Dassault Mirage	
For eg: Likewise will be the Python (previously known Shafrir) missiles series; developed and produced by Iran's Rafael Advanced Defence Systems Ltd. is based on the Sidewinder Missiles.	For eg: aircrafts and fighter jets produced by Embraer Corporations like the AMX Ground Attack Aircraft, Brazilian armored vehicles made by Engesa Corporation, South Korean Howitzers, etc

STRUCTURE FOR TRANSFER OF TECHNOLOGY

Horizontal Structure

- ToT Contract is restricted to a single product
- Exchange of Rights over the Access to Design, Technical Know-How, Production, Selling and other rights are available but pertaining to only that product

Vertical Structure

- OEM share the rights of multiple products with the recipients
- Purpose – Acquisition of Requisite Knowledge, Skillset and Infrastructure needed for development and production of a particular range of products, rather than adopting a restricted approach



PART – C – DRAFTING OF TOT CONTRACTS

NATURE OF TRANSFER OF TECHNOLOGY AGREEMENTS

Licensed Co-Production Agreement

- The licensee under a series of provisions obtains the rights to deal with the OEM's products
- Effected through bilateral agreements
- In lieu of a license fee

Co-Production Agreement

- Entity to Entity Agreements
- Permits the recipient to acquire technical know-how for the development and production
- This may include right for production of all or some selected components of the product
 - Horizontal – Right to manufacture either whole or part
 - Vertical – Production complex of the recipient entity will not be limited for the production of the concerned product or its component only but will also be producing components for other products of OEM

Joint Venture

- Development or Manufacture of a product by multiple entities
- Inter-firm cooperation in research, design, production and marketing
- Eg: India & Russia's alliance for production of Brahmos missile

Foreign Design Assistance

- This assistance by OEM for designing and developing of a product
- Includes blue print of target product
- Components could be imported or indigenous but assembly to be purely indigenous

PRE-TOT LEGAL INSTRUMENTS

Confidentiality and Non-Disclosure Agreements	Material Transfer Agreements	Licensing Agreement for ToT
The potential recipient does due diligence prior to entering into a ToT Contract This agreement is entered into to protect the information and the research that the potential recipient is given access to and to keep it confidential	When in advanced stages of negotiation but prior to conclusion of ToT Contract, a sample is procured from the OEM MTA is entered into to regulate the use of the sample and protect its IPR	This is the last agreement signed between the OEM and the recipient. This agreement provides details regarding the licensing areas, validity period and arbitration clauses.

KEY NEGOTIATING POINTS FOR TOT CONTRACTS

- DOCUMENTATION –
 - Language – Preferably English
 - Should explain the steps to assemble, maintain, test and refit it when necessary
 - The relevant approvals by certification agencies
- UPGRADES FOR THE PRODUCT –
 - Requisite Information for Upgradation / Improvisation / Modification of the Technology preferably at no additional costs
 - an exhaustive list of all the updates that needs to be provided to the recipient party on a yearly basis
- EXTENSIVE TRAINING
 - Both Classroom and On-the-Job Training to be provided to Recipient Country
 - technical aspects of manufacturing, designing, software, system integration and the installation of the product and testing and maintenance
 - Continuous training on upgrades

KEY NEGOTIATING POINTS FOR TOT CONTRACTS

- MAINTENANCE INFRASTRUCTURE
 - The OEM must provide exhaustive data on the Special Maintenance Tools and the Special test Equipment used by it during the manufacture, assembly and testing the product
- PRODUCT SUPPORT DURING THE LIFECYCLE OF THE TECHNOLOGY
 - Including the provision of spare parts as well as the management of obsolete parts.
 - A Detailed List of commodities which can be used should be provided to the recipient
- DELIVERY SCHEDULE
 - The transfer of all the requisite documents, training period, provision of technical assistance, the supply of spares and proprietary items, must be delivered in a phased manner.
 - In case of nonadherence of the delivery schedule, pre-designated damages must be paid to the recipient.

KEY NEGOTIATING POINTS FOR TOT CONTRACTS

- INDEPENDENT DEVELOPMENT –
 - to seek out local vendors and sub-contractors independently for the supply of requisite parts for the product & not mandatorily depend on OEM
- WARRANTY -
 - Both Material and Documentation Warranty
- PRUDENT IDENTIFICATION OF TECHNOLOGY
 - ToT should strive for critical gaps in commonplace knowledge and promote independency in the recipient party
- CHOICE OF TECHNOLOGY
 - Requirement v Availability
 - Recipient Entity and its Absorption Capacity

STANDARD TOT CONTRACT CLAUSES

Definition and Interpretation Clause

- to bring parties to a mutually agreement upon meaning to certain contract terms, so as to avoid any future contradiction as to the meaning and interpretation of any contract term.
- Clarity, Brevity and Precision
- Boilerplate Clauses – Commonly accepted and incorporated definitions

Choice of Language & Application of Laws

- Different Language – Possibility of Different Interpretation

Representation and Warranties

- It is a declaration from the party conveying the technology that is free from any liens, security interest or any other encumbrances
- Duty of Licensor to indemnify for breach of the same

Financial or Payment and Royalty Clauses:

- The developer of the technology relinquishes the possession of it with the expectation of a potential income that may be generated through the license consideration
- License Issue Fee and Up- Front Payment Clauses
- Equity Ownership and Other Secondary Payment Provision
- c. Term Payment Clauses
- d. Royalty Clauses

Dispute Settlement

Terms of Usage

**PART – D –
CRITICAL EVALUATION
OF TOT LAWS AND
PRACTICE**

TRANSFER OF TECHNOLOGY – PROs and CONs

PROS	CONS
Minimal Gestation Period	Cost – Heavy on country's exchequer – Oligopolistic Nature of the Imperfect High Technology Market
Brings in new machines and processes thereby modernizing the production process	Trade Restrictions – Many anti- competitive
Production Lines require subsidiary firms to manufacture ancillary parts – thus promotes industrial growth	Regulatory Conditions imposed by Laws – FERA / MRTP / Indian Patents and Design Act
Increases employment	

TRANSFER OF TECHNOLOGY – NATIONAL GOALS?

- Has ToT been successful in developing a superior military strength and / or achieving strategic autonomy?
- Procurement (from policy perspective) aims towards building indigenous production capabilities ultimately leading towards achieving self-sufficiency in defence production
- Hence ToT's contribution in achieving self – sufficiency needs to be examined

K Subramanyam, Convenor, National Security Board (2000) – Self – Sufficiency – *In house production of everything that is required by the armed forces, a state which is impracticable for a developing nation*

Ron Mathews – A Nation's proclaimed goal but impracticable economically

- These views are strengthened by practice – No country can be completely indigenous – But it is the dependency on the imports that needs to be regulated
- APJ Abdul Kalam Committee (1992) targeted SRI to grow from 30 % - 70 % in 10 years – Not achieved till date

TRANSFER OF TECHNOLOGY – NATIONAL GOALS?

- ToT – in policy and concept is capable to build indigenous production capabilities
- But ToT Contracts and execution hinders
- Numerous Trade Restrictions are placed
- ToT Elements – Information + Hardware –
 - Significant Information still remains within the control of the OEM
- License Agreements – Limits the use of the products by the Licensee
- Defence ToT – hinges the ability to manufacture a significant portion within the country – but the right to maintain, repair and overhaul still rests with the OEM who has insisted to maintain proprietary rights over the final product
- Limited Absorption Capabilities

TRANSFER OF TECHNOLOGY – NATIONAL GOALS?

- ToT from a Seller's Perspective – Aim – is to maintain competitive edge over the adversary
- Many countries with advanced technology are hesitant to engage into deeper ToTs
- But they may be willing to do so at a later stage when they've developed newer replacement
- Most developers will naturally attempt to squeeze out most of their developed technologies and will be unwilling to assign their full and unfettered rights until the technology holds no scope for development
- Seller's Interest – Revenue through which the R&D costs can be recovered and profits can be made
- Hence through restrictions they try to maintain the maximum control over the technology –

TRANSFER OF TECHNOLOGY – NATIONAL GOALS?

- Restrictions on Use, Volume, Territory, Further alienation, Rights for improvement, Maintenance
- Modification and Enhancement of the Know-Hows
- Restriction to participate in the development or manufacture of a similar product or create derivative work based on licensed equipment
- Price fixing, that is, imposing on the technology recipient the prices fixed by the technology seller.
- These are now being replaced with clauses prohibiting modification, disassembly and reverse engineering.
- Export restrictions or export permission for specified countries only, higher royalties for exported products, etc.
- A close look at the restrictions against the opportunities that ToT may offer for improving capabilities in indigenous design and development reveals that the recipient's hands are well and truly tied. There is no freedom whatsoever for the recipient to channelize the know-how that has been obtained either for upgrading the product or for the development of other products.

TRANSFER OF TECHNOLOGY – NATIONAL GOALS?

- Gap between the Know – How's and the Know-Why's

Know How's

How to fabricate the concerned parts
How to Test Them
How to assemble the parts
How to inspect them
How to test them on an integrated platform

does not include, however, is the knowledge required to carry out major modifications, or upgrades or manufacture future, more capable versions of the product

Know Why's

It is not divulged by the technology seller simply because, by doing so, the technology recipient acquires the knowledge to design and build products which could compete with the original firm.

Development of military systems necessitates an immense amount of investment in terms of money, time and resources. Why then would a developing firm or country fritter this investment away without securing the maximum returns possible?

Thank you

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