

Technology Transfer : Issues, Challenges and Road Map

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'Technology Commercialization and Transfer'
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TECHNOLOGY TRANSFER

“The process of transferring R&D knowledge, IP, technical expertise or know-how developed by an individual, enterprise, university / academic institution or research institute to another individual, enterprise, university, academic institute or organization”

IMPORTANCE OF TECHNOLOGY TRANSFER & COMMERCIALIZATION

- **Technology is key to economic growth and international competition**
- **Results in manufacturing of R&D output**
- **Facilitates employment generation**
- **Enables wealth creation**
- **Helps in enhancing the National competitiveness**
- **Technology transfer becomes vital, when time-to-market is key to success**

MEANS OF TECHNOLOGY TRANSFER

- **Through movement of people**
- **Through equipment**
- **Through licensing of technology**
- **Through knowledge transfer**

TECHNOLOGY TRANSFER PROCESS

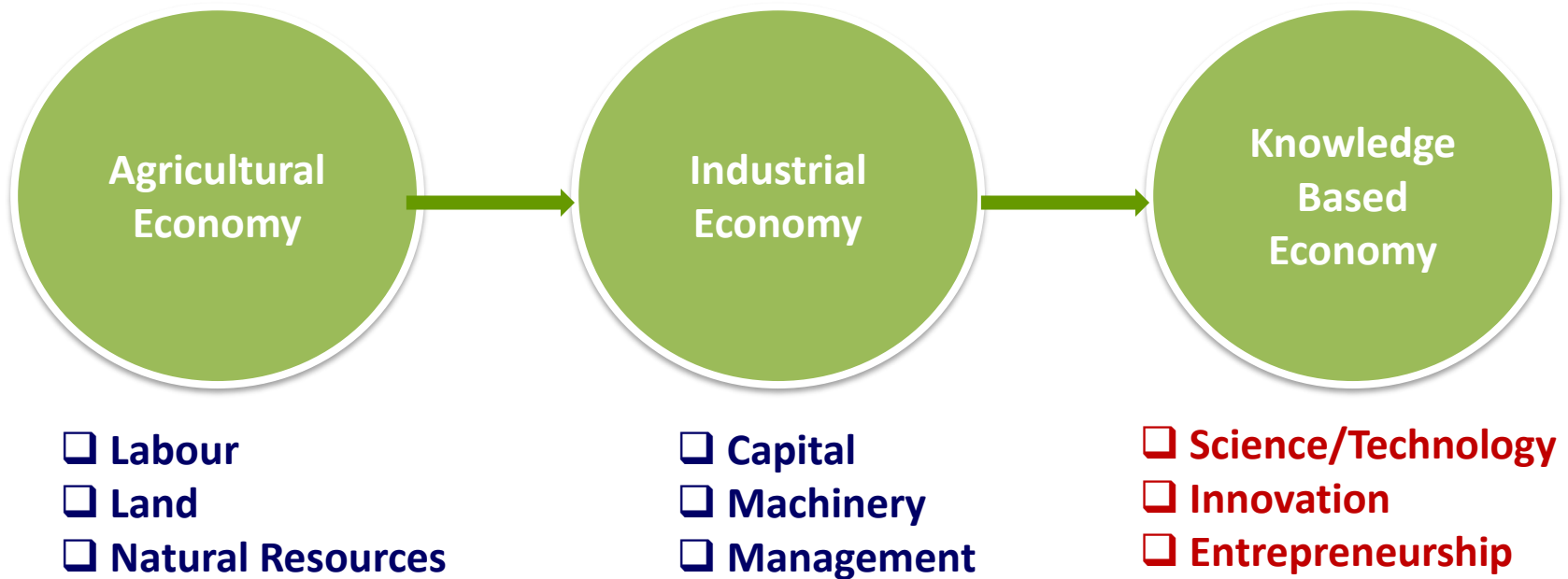
- **Organization of documents for Technology Transfer**
- **Research & Development Report**
- **IP status and territories**
- **Process Flow Diagram**
- **Raw-materials & product specifications**
- **Environmental Issues and Control**
- **Technology transfer docket**
- **Technology Transfer Plan**
- **Agreement**
- **Verification of Technology**

Agreement Provides clear governance, boundaries and deliverables

Invention Vs. Innovation

- **Invention** refers to any new idea / Original Concept that works
- **Innovation** refers to ideas which are converted to profitable use, be it development, refinement, and change of an existing idea / product
- **Innovation** – is basically the oxygen of our future and to lead, industry has to innovate continuously.

MOVING TOWARDS KNOWLEDGE BASED ECONOMY



INDUSTRY SIZE

The micro, small and medium enterprises dominate the Indian scenario. Since profit margins of these units being low, they are unable to invest heavily in R&D. Consequently, their ability to translate innovations into technology as well as to take risks in developing R&D based products is limited. Therefore, Industry largely depends on the Publicly funded R&D system for Technologies.

MARKET PULL

India is expected to be third largest economy soon. But due to its large population the buying power of people will remain low. Therefore Indian markets demand high quality, but affordable products. Innovations that reduces manufacturing cost and make available products at affordable prices will find the markets. There exists opportunities for Technology transfer.

INTERNATIONAL ALIGNMENT

India is a signatory to WTO and put in place internationally complaint IP regime. This means without licensing, Indian industry can no more practice the IP protected technologies developed by others. Even sourcing latest technologies may pose problems. Indian Industry has no option but to source or develop technologies that suits its needs.

INDUSTRY & INSTITUTION RELATIONSHIP

There is a disconnect between Industry and Publicly funded R&D Institutions and a challenge to connect these two entities. There is also a great opportunity for India specific Innovations as the market demands and people needs are different.

CSIR MANDATE

- **Promote, guide and coordinate scientific and industrial research**
- **Establish institutions or departments for scientific study of problems affecting particular industries and trade**
- **Establish and award of research studentships and fellowships**
- **Utilise results of researchers towards the development of industries**
- **Establish, maintain and manage laboratories, workshops, institutes and organizations**
 - **To further scientific and industrial research; and**
 - **To utilize any discovery or invention for use to Indian industries**
- **Collect and disseminate information on research and industrial matter**
- **Publication of scientific papers and journal**

IMPACT OF NATIONAL POLICIES

1991 – Economic Liberalization

1995 – Changes in IPR regime

2005 – New IPR regime came into force

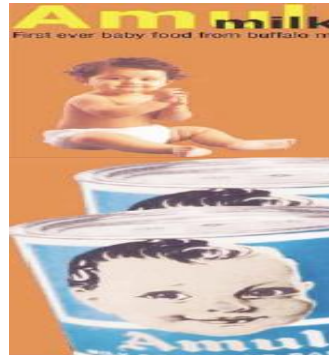
IMPACT ON R&D ACTIVITIES AND KNOWLEDGEBASE

- **'Technologies' became rare**
- **Emphasis on good science and IPR**
- **Number of Research papers & quality Improved**
- **Contract research static**
- **Consultancy decreased**
- **Number of scientists in position decreased**
- **Number of Ph.D students increased**
- **In real terms, budgets shrunk**

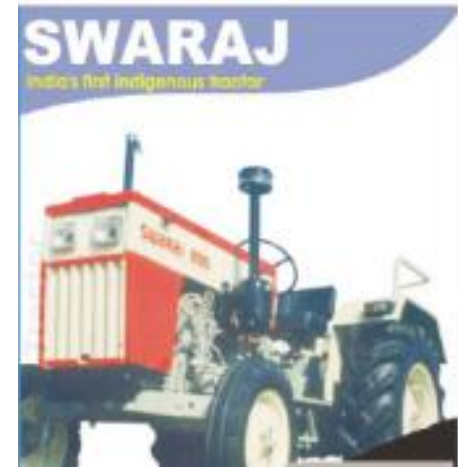
Prior to 1991



Indelible Ink – Mark of democracy!



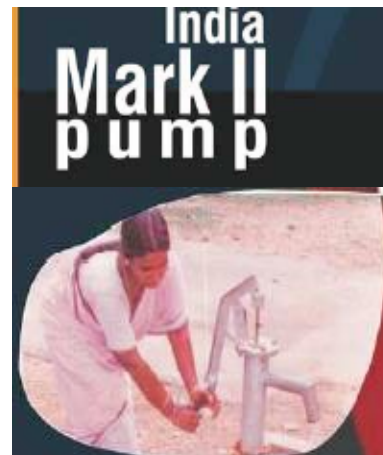
Baby Food



Tractor



New and Generic Drugs



Mark II pump in almost every Indian village

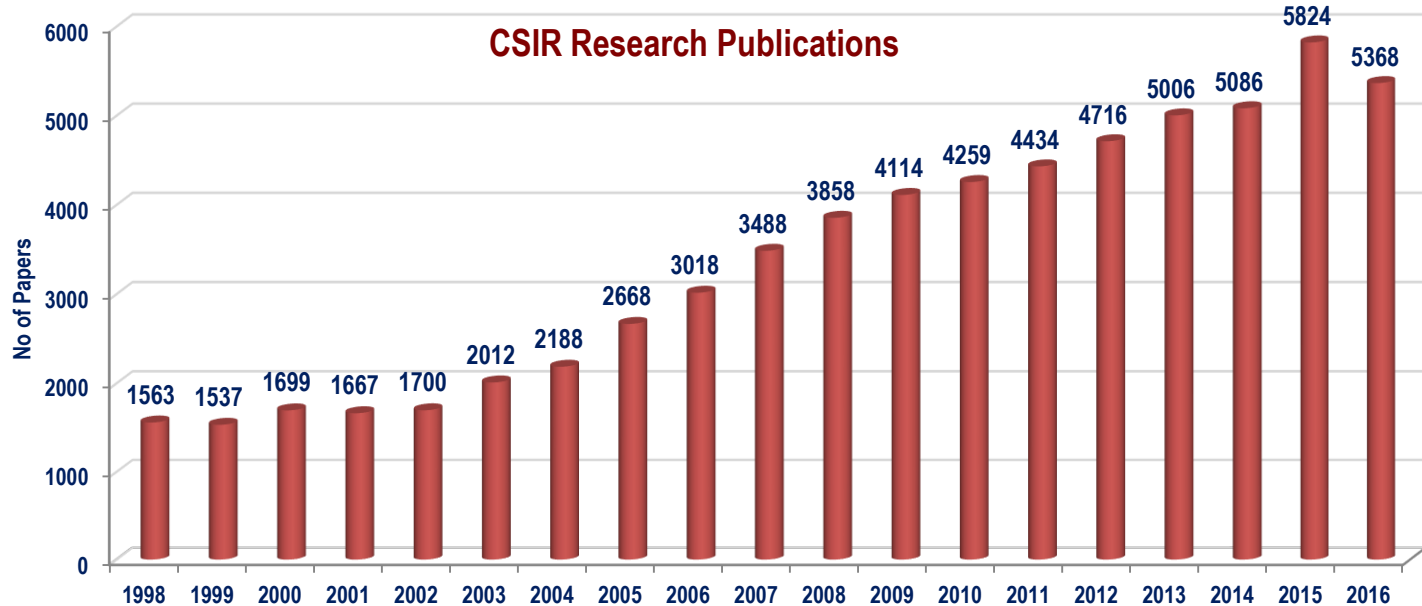


Pesticides

IMPACT ON R&D ACTIVITIES AND KNOWLEDGEBASE

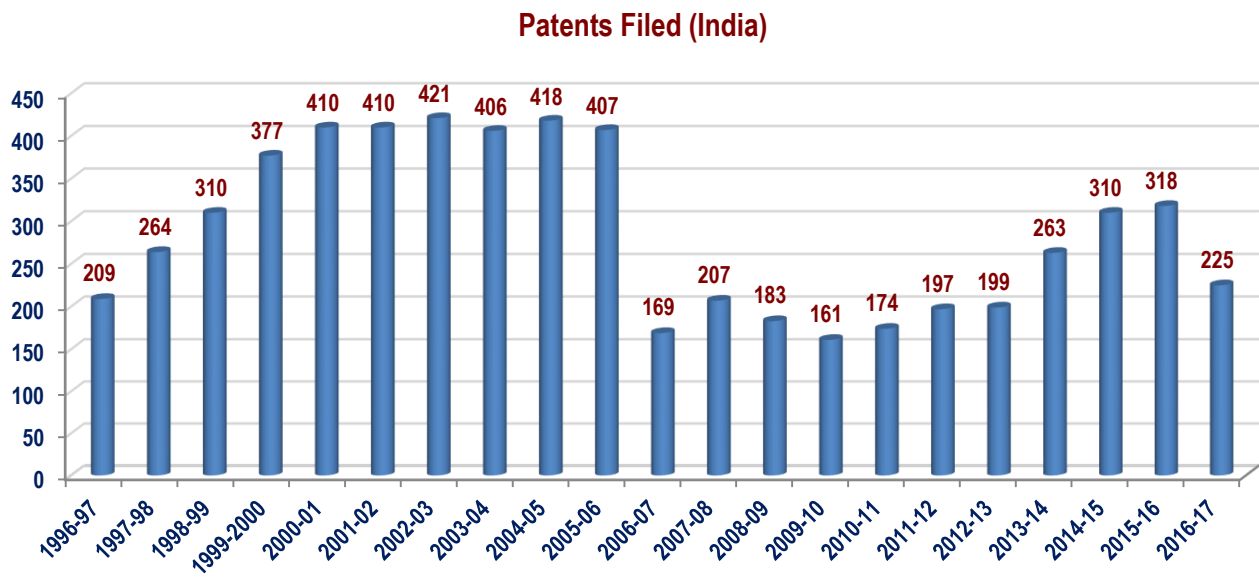
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Since India's entry into the New "TRIPS-compliant" Patent Regime in 1995...



No of Scientists:

- 1995: 5550
- 2006: 4555
- 2015: 3672
- 2017: 3511



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CSIR: BUDGET AND ECF

	Total Allocation (Rs in Crores)	Effective Budget (=Total allocation – Pension Heads-Staff quarters capital & Maint.) (Rs in Crores)	External Cash Flow (Rs in Crores)
2012-13	2909.93	2441.80	494.38
2013-14	3098.70	2357.28	486.48
2014-15	3334.88	2487.68	578.91
2015-16	3988.14	3037.61	557.78
2016-17	3858.35	2924.90	728.30

R&D FOCUS

- **No significant change**
 - **Drugs and pharmaceuticals**
 - **Biosciences**

TECHNOLOGY TRANSFER: MAIN ISSUES

- **Lack of uptake by industry, despite many encouraging initiatives by Government**
- **SMEs ability to adopt and use latest technologies limited – lack of skilled and trained personnel**
- **Disconnect between industry and Academia / R&D institutes – Poor collaborative research efforts**
- **High Technological obsolescence**
- **Rigid stance**

TECHNOLOGY TRANSFER: MAIN ISSUES

- **Inadequate Technology infrastructure**
- **Lacks capability to develop competitive technologies**
- **Lack of incentive to update existing technologies**
- **High cost of Technology**
- **High cost of Money**

TECHNOLOGY TRANSFER: CHALLENGES

- **R&D: Risky & costly**
- **Uncertainty in outcome and Long gestation period**
- **Mind-set**
- **Adherence to Time schedule**
- **Lack of experience in introducing first of its kind products globally**
- **Unethical Competition**
- **High patent costs**
- **Infringement**
- **People alignment for new technology**
- **Loss of Key people**
- **Environmental issues**

TECHNOLOGY TRANSFER - ROAD MAP

- **Innovation & Entrepreneurship (Start-ups)**
- **Incubation centers**
- **Focus on specific industrial sectors**
- **Alignment with industry needs through Knowledge Alliances / collaborative partnerships**
- **Adopt demand-driven approach**
- **Risk sharing PPP programmes**
- **IP mapping (Technology Trackers) in chosen sectors**
- **Government incentives to encourage application of improved technologies**
- **Create a right eco-system on capability development**

TECHNOLOGY TRANSFER - ROAD MAP

- **Implementation of technology driven programmes**
- **Focus on technology areas of core competence**
- **Dissemination of relevant technology information**
- **Evolve flexible mechanisms for Technology transfer**
- **Provide outreach programmes for SMEs for effective dissemination.**

Summary

Technology Transfer

- **Innovation and Technology transfer is exciting, but it is a complex process**
- **Innovation and Technology transfer are a judicious mix of management and science, creativity with technology.**
- **Innovation eco-system is necessary for moving into knowledge economy**
- **Knowledge equilibrium needed between industry and R&D institutions**
- **Government incentives are necessary for Technology Development and Transfer**



THANK YOU