Commercialization of Technologies – Opportunities and Challenges

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UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

APCTT
Asian and Pacific Centre for Transfer of Technology

Outline

1. Introduction to APCTT
2. Key Focus Areas of APCTT
3. Importance of Technology Valuation for Successful Commercialization
4. Selected Examples of Technology Transfer
5. Concluding Remarks

1. Introduction

Asian and Pacific Centre for Transfer of Technology (APCTT) was established in 1977 by the member countries of the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP). All Members and Associate Members of ESCAP are defacto members of APCTT

APCTT's work programme covers the entire Asia Pacific region, starting from the Islamic Republic of Iran in the west to Kiribati and Solomon Islands in the East.

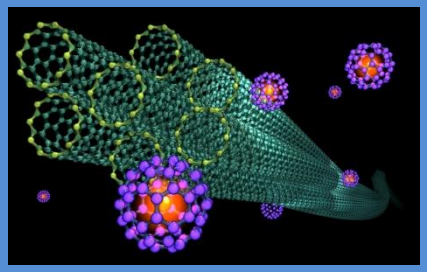
The APCTT building inauguration on 16th July, 1977 Bangalore.

The APCTT building inauguration on 18th November, 1993 New Delhi.

2. Key Focus Areas of APCTT

Science, Technology and Innovation (STI)

Development and adoption of sound science, technology and innovation (STI) policies and support mechanisms by member countries for fostering technology innovation, technology-based entrepreneurship and competitiveness of SMEs.



Technology Transfer

Member country institutional capacity building to identify, acquire and adopt technologies and provide IT-enabled mechanisms to facilitate technology transfer and related intermediary services.

Technology Intelligence

Provide IT-enabled access to technology information services to technology stakeholders in member countries and undertake normative and analytical studies.

3. Importance of Technology Valuation for Successful Commercialization: Case Study – Onion Oil Extraction Technology

- A business firm AB based in an Asian Country X is interested in setting up an onion oil extraction plant.

- Firm AB requested APCTT to identify the technology provider and informed that they had adequate land for setting up the plant on a turn-key basis

- Through APCTT's efforts, a business firm CD based in another Asian Country Y was identified as a potential technology transferor.

Introduction to the Case Study – Onion Oil Extraction Technology

Firm CD offered to transfer onion oil extraction technology under the following terms:

- All machinery needed to set up a production line (crusher, filter, vaporizer etc.), with a processing capacity of 10 tons of onion per day to extract onion oil, would be supplied on a turn-key basis.

- The cost of providing the machinery and commissioning it in Firm AB's factory would be US$ 430,000

- In addition, an annual fixed technology transferee fee of US$ 43,000 should be paid for a period of 20 years.

Introduction to the Case Study – Onion Oil Extraction Technology

Outcome:

Firm AB was reluctant to consider this offer from Firm CD stating that the **annual fixed technology transfer fee was very high** and over a period of 20 years the total payment would be double that of the cost of setting up the production plant. Attempts to get Firm AB to do some analysis and negotiate with Firm CD were not successful.

Key Questions for Discussion

1. Do you think that the prices quoted by Firm CD are high? If you were Firm AB would you consider this offer?

1. What type of analysis would you carry out to decide whether the cost of the technology is reasonable or not? What additional information would you need to do this analysis?

2. What additional information would you ask from Firm CD to supplement your analysis?

Technology Valuation from Buyer's Perspective

Basic data:

Processing capacity	**=**	**10 tons/day**
Cost of plant	**=**	**US$ 430,000**
Technology Transfer (TT) Fee per year	**=**	**US$ 43,000**
Period of TT payment	**=**	**20 years**

Technology Valuation from Buyer's Perspective

Some Basic Assumptions: **(Costs are based on the Indian setting)**

- **Yield (0.5% of onion oil per ton of onion) = 0.005 tons (5 kg)**
- **Land, building and factory construction costs = US$ 500,000**
- **Average salary per shopfloor worker = US$ 150 per month**
- **Average salary per technical/managerial staff = US$ 400 per month**
- **Utility cost (electricity) = US$ 3,000 per month**
- **Cost per ton of onion = US$ 40 per ton**
- **Working days per month = 25**
- **Depreciation rate for the building = 05%**
- **Depreciation rate for plant and machinery = 10%**

Technology Valuation from Buyer's Perspective

Some preliminary calculations:

- **Annual raw material usage = 10 x 25 x 12 = 3,000 tons**
- **At a yield of 0.5%, the total oil extracted per year = 15,000 kg**
- **Total annual shopfloor labour cost= US$1,500 x 12= US$ 18,000**
- **Total annual technical/managerial cost= US$1,200 X12= US$ 14,400**
- **Total annual raw material cost= US$ 40 x 3,000= US$ 120,000**
- **Annual utility costs= US$ 3,000 x 12= US$ 36,000**

Technology Valuation from Buyer's Perspective

Cost of production (in US$) per annum:

• Materials	=	120,000
• Shopfloor labour	=	18,000
• Technical staff	=	14,400
• Utilities	=	36,000
• Depreciation (plant & machinery)	=	43,000
• Depreciation (buildings)	=	25,000
• TT fees	=	43,000
Total	=	299,400

- This can be rounded off to US$ 300,000. Thus the total cost of production per year is US$ 300,000
- The production cost per kg = 300,000/15,000

  = US$ 20

Making a Business Case

- **If the selling price per kg of onion oil is less than US$ 20 then the technology valuation is too high based on the Indian cost setting**

- **If the selling price per kg of onion oil is US$ 30, then the profit before tax (PBT)=(US$ 30 – US$ 20) x 15,000=US$ 150,000**

The question is whether this is a reasonable return?

- **If the seller did not charge a TT fee of US$ 43,000 then PBT would have been US$ 193,000**

- **Thus what the seller is doing is taking US$ 43,000 out of the US$ 193,000 leaving the buyer with US$ 150,000**

- **The profit share (PS) being extracted by the seller is = US$ 43,000 / US$ 193,000=0.2228= 22.28 %**

Making a Business Case

- **Is the yield of 0.5% realistic? What if it is only 0.1% or lower? The whole project will fall apart if this happens. Can onion oil prices go down?**

- **Can the seller give a guarantee that the yield will be consistent at around 0.5%? Can this be certified by a recognized agency? Can we build a penalty clause into the agreement if the technology does not give the desired yield?**

- **The oil extracted will depend on the quality of the onions. If the onions have too much water then the yield will be lower. How can this be prevented? We need to consult with agronomy experts.**

- **Even if the yield is good and the water content can be controlled, what if labour costs, utility costs, and raw material costs go up? Can we pass on these costs to the buyers of onion oil? Is the onion oil market a perfect or imperfect market? Are there many producers of onion oil?**

3. Selected Examples of Technology Transfer

- Theni Bananas (Large scale farming)
- Hydroponic systems in the dry zone of Myanmar (Small holder farming)

Scenario before 2004

- Propagation through suckers of uneven size and untested for viruses

- Trench System or Flood Irrigation; over use of water
- Peasant Farming System
- Condusive Environment for Disease Spread

- No co-ordination among the farmers
- Uneven spread of Technology
- For 1st Crop, net income was only 50000/acre

- Unhygenic harvest methods
- Rough Handling of bunches (30-40% wastages)
- Disposal of stems and leaves make pollution in cities

Scenario after 2004

Prime schemes on Theni Banana...

:: Technical Support

- Tamil Nadu Agricultural University and Michigan State University colloborative project on Supply Chain Management of Banana
- Precision Farming Project, Government of Tamil Nadu
- National Research Centre - Banana, Trichy
- M/s. Jain Irrigation Systems Ltd., for Tissue Culture plants of Banana and Micro Irrigation Equipments
- Farm Fresh Banana, Theni, Tamil Nadu
- M/s. Nader and Ebrahim, Phillipines (Fruit Care)

:: Credit Support

- Canara Bank
- Indian Bank
- HDFC Bank
- Federal Bank

:: Institutional Support

- Ministry of Food Processing Industries, Government of India
- State Department of Horticulture and Plantation Crops, Government of Tamil Nadu
- Expansion of National Horticulture Mission
- Expansion of National Mission on Micro-Irrigation
- Theni District Banana Farmers and Traders Association

Scenario after 2004

- 3200 Farm holdings under Theni Banana Growers Groups

- Farm Fresh Banana *(Cold chain network for ripening and storage)*
- 47 Years Service in Banana Cultivation and Marketing
- Banana Ripening and Cold Storage
- 700 MT capacity

- **Exporter:** M/s. Nader and Ebrahim, Phillipines
- 7 Refridgerated Vans, 120 Outlets and 4 Southern State Markets

- National model for *'Farmers' Corporate'* to link Farmers - Cold Chain Infra and Market

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Theni Banana

Current Scenario: Crop Care

- Propagation exclusively through Tissue Culture plants
  - Uniform
  - Virus eliminated

- Drip System
- Fertigation System

- Capacity building of farmers - *A continuous activity*

- Bunch covers prevents blomishes and damage by insects and pathogens
- Identity of uniform harvest

- Rope harvest with no damage to fingers.

- Plastic crates collection and transport

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Theni Banana

Unique System Approach

1st Crop : 12 months

1st ratoon : 10 months

Field rest and preparation for next crop

Next 8 months

- Goat rearing
- Green manure
- Ploughing back pseudo stems
- Farm yard manure
- Application of microbial consortia

1st Crop + 1st ratoon:

Net Income (min) for acre : 3 Lakhs

Net Income (max) for acre : 4 Lakhs

3200 farmers
30,000 acres } Common technical packages to ensure uniform quality





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Hydroponic systems in the dry zone of Myanmar (LIFT Initiative)

LIFT partner Terre des Hommes (TDH) has been introducing simplified hydroponic horticulture and other innovative water saving technologies to remote villages in the Dry Zone of Myanmar. Landless people and marginal farmers are piloting these, with promising results.

Hydroponic systems in the dry zone of Myanmar

- The simplified hydroponic systems use locally available materials: one litre plastic bottles that are placed in line on a 24 degree slope to allow dripping nutrient solution to pass down from one bottle to the next. The solution is gathered at the base of the structure and reintroduced once again at the top, allowing savings in water and solution.

Hydroponic systems in the dry zone of Myanmar

- The ‘soil’ is carbonized rice husk, and local wood is used to form the structure. These can be set up in 3 metre by 2 metre plots in small compounds and the larger 3 metre by 6 metre version (shared by two families) can manage more than 400 plants.

- The project provides good seeds, and encourages the use of local variety seeds and seed germination for sustainability. Crops that grow well in this system include salads, mustard, morning glory, mint, amaranth, tomato, cucumber and roselli

Hydroponic systems in the dry zone of Myanmar

- In one village alone, 27 hydroponic greenhouses have sprouted up, providing nutritious vegetables for home consumption and for sale.

- Introducing this technology helped small holder farmers save around 20,000 MMK (or $20) per month.

Concluding Remarks

- There is no one size fits all solution to technology commercialization
- Knowing the market and packaging technology (after a comprehensive technology valuation) to meet the stakeholder needs is key to success
- A Value chain analysis and mapping of stakeholder needs is an essential primary step in the technology commercialization process.


Thank You
HILL BANANA

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