

# FINANCING TECHNOLOGY TRANSFER & DEVELOPMENT

*S.M. Junaid Zaidi\**  
*Tahir Naeem\*\**

## INTRODUCTION

At the dawn of the new millennium, new technologies are pushing the horizons of economic development to unprecedented limits. Never before has the development-process been so much influenced and driven by technology. Never before has the socio-economic development of nations been so dependent on access to technological advancement. Equally, never before has the need for monitoring current patterns of production and consumption been so pressing, to ensure achievement of sustainable development.

Access to sound technologies is essential for sustainable development. The developing countries' need for access to technologies is great; however the flows are subject to international transfer of technology constraints and the investment-decisions are influenced by the procurement-criteria of multilateral institutions and international lenders or more precisely "tied-aid" compulsions. The developing country initiatives of employing local component or to disassemble the imported technology have to be compromised, in the wake of their weak bargaining position.

The consequences of "tied-aid" go beyond the distortion of technology-choice. It inhibits the development of domestic capacity in selecting technology – the technology-choice becomes a matter of finding the biggest subsidy, rather than the most appropriate technology! It can crowd out good technologies and viable business models. It also acts to prevent private financial institutions from becoming involved in supporting technology-transfer and developing appropriate expertise.

Introduction of a new technology into a country essentially requires investment, as does the diffusion of existing technologies within a country. Technology-adaptation may also require substantial investments in design and/or production. Financing is also often required (and particularly difficult to obtain) in the early (developmental) phases of a technology-transfer project or business. Without financing, very little technology investment or transfer takes place, but the provision of financing depends upon those who have financial resources--whether multilateral institutions, governments or the private sector.

## OPTIONS FOR FINANCING OF TECHNOLOGY

Many imported and indigenous technologies require change and innovation in the relevant institutions to support their transfer, such as devising new partnerships, new financing mechanisms, new channels for information distribution and new models for participation. Moreover, slow diffusion of imported technologies, together with the consideration of cost and availability of finance, suggest that there is potential for innovation to help support and accelerate the adaptation of imported technology. Certain types of finance appear to offer particular potential for funding transfer of technology, although they may require adaptation to the specific issue.

The development of indigenous technology and adaptation of the imported one requires its dovetailing with the business---commerce. Specifically, this can include development of the right policy-mix, direct support for investment in appropriate technologies, or support for project-preparation and development. The required measures further include policies and programmes to encourage public and private technology-transfer, introducing regulatory measures, subsidies and tax-policies as well as appropriate mechanisms for improved access and transfer of relevant technologies. Also, it is recognized that adapting assistance to local needs requires establishment of working relationships among various external and domestic actors involved and it is clear that coordination under the leadership of the host-country administration is a key to success.

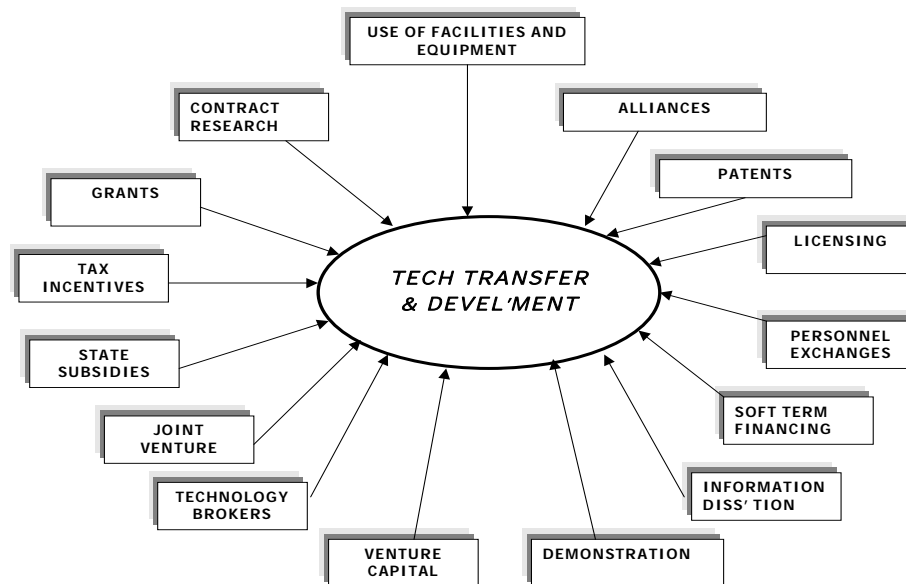
A number of possible options and mechanisms for financing technology-transfer and development are shown in Figure - 1. It is important to understand that the host-country administration is essentially an ensemble of legal, economic and political, or more precisely macroeconomic and geo-political

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\* Rector, COMSATS Institute of Information Technology, H-8, Islamabad, Pakistan.

\*\* Project Manager, COMSATS Institute of Information Technology, Islamabad, Pakistan.

environment, surrounding technology transfer. Impediments to technology transfer and development, resulting from such conditions, might inhibit the vitality and effectiveness of one or the other mechanism in any particular set of conditions. Such impediments include lack of access to capital, a poorly developed banking-sector, lack of availability of long-term capital, high or uncertain inflation or interest rates, distorted (rather than marginal) cost of inputs, skewed import duties, instability of tax and tariff policies, investment risk (real and perceived), etc.



**Figure – 1: Financing Technology: Options & Mechanisms**

## DIVERSITY IN FINANCING PERSPECTIVES

Investment finance for transfer and development of technology essentially comes either from public sector, private sector, a combination of the two, or from multilateral institutions. Financing perspectives differ enormously, not only according to the project, technology and business, but also according to the investor. Emanating from each one of these perspectives, the financing possibilities differ radically, one from the other--and each contains enormous diversity in itself.

Public finance has traditionally had a crucial role in supporting transfer and development of technology. Public finance has a role different than private finance, which can further vary by type and sector of investment. For example, it is more important for long-term and infrastructure investments. Traditionally governments, as well as their role in social infrastructure (education, health), have dominated investment in physical infrastructure and large-scale technology development. Thus there appears substantial merit in the public sector finding ways to support and encourage technology transfer and development. The advantages of public-sector finance may be offset by assistance in the form of tied aid, which can be detrimental to the long-term prospects for indigenous technology-development, through preventing the establishment of the institutions which support technology choice, financing, operation and management.

In recent decades, however, there has been increasing interest in opening public infrastructure development to the private sector, for example, by privatising state-owned companies, opening markets to competition and awarding projects on Build-Operate-Transfer mode of financing. Through large-scale investments by private sector, both in the physical and social infrastructure sector, private-sector finance is increasingly becoming important in offering prospects for national as well as international diffusion of technology. More importantly, through suitable incentives and innovative models, the relationship between public and private finance is becoming particularly important in the context of technology transfer

and development.

The choice between different financing routes is determined by many factors. One major issue regarding the effective transfer of technologies is the fact that foreign investment tends to be institutionally divorced from host country objectives (supporting self reliance, sustainable development, capacity building, etc.) that have a huge influence on technology-choice and the intended national objectives.

Notwithstanding the mutually complimentary roles envisaged for the public and private sectors, it is noteworthy to recollect that private sector is extremely conscious about the cost of inputs. It expects relatively high rates-of-return and does not often monetise externalities. Instilling private support for technology-transfer invariably requires financial innovations and emphasis on different forms of finance, such as micro-credit, leasing, venture capital and special-purpose funds.

While a number of financing options like leasing, micro-credit, joint ventures, etc., have been in use for a long time and discussion on their merits and de-merits is beyond the scope of this paper, 'venture capital' is discussed for a brief retrospective.

## **VENTURE CAPITAL**

Venture capital is particularly relevant to the development and transfer of new technologies. Venture capitalists are prepared to back risky investments to seek high returns and usually invest in small companies, such as those that have developed new technology, and/or have difficulties raising capital from other investors. Venture-capitalists have a relatively long-term focus, aiming to hold companies for several years before selling them, and have a more active approach than most other types of investors, in terms of participating in management of the company. This means that they can play an active role in supporting technology-transfer, if it forms part of the business-development plans of their investee companies. Venture capital has grown recently in the developed world, but less so in the developing countries, the reason being that the relatively high-risk environments in developing countries make the investors shy away from embarking upon technologies whose technical or market credibility is yet to be established.

One major impediment in establishing venture capital funds had been the absence of a favourable legal and regulatory framework, within which such funds operate. An example from Pakistan is relevant, where efforts had been afoot to set-up Technology Venture Capital Fund (TVCF) under the auspices of the National Technology Policy announced in 1993. The proposed TVCF, being a public unlisted company, was at disadvantage in terms of taxation under the draft-rules being framed by the Securities and Exchange Commission of Pakistan. After protracted follow-up, the tax authorities did accede to the proposed seven-year tax exemption, but have yet not agreed to exemption from minimum tax and from deduction of tax at source.

Venture capital is predominantly relevant to private-sector investments. It requires a relatively sophisticated financial infrastructure. However, venture capital has largely been focused on high-return sectors, such as computer software and biotechnology, and empirical evidence suggests that a relatively small amount of finance has gone into traditional sectors such as agriculture, manufacturing, industry, services, etc. Such sectors still form the backbone of economies in the developing countries but, due to a host of internal and external factors, have had a very mixed track-record in delivering returns to investors. Nevertheless, financing is required in these sectors for maintaining and sustaining the competitiveness of the developing economies, with ever-expanding markets for existing products and technologies.

## **PROPOSAL FOR CREATION OF TECHNOLOGY TRANSFER (TT) & DEVELOPMENT FUND (DF)**

Notwithstanding the importance of venture capital funds in promoting new and emerging technologies for vertical transfer, the developing countries aptly aspire for horizontal transfer of technology. A preferred way to communicate with the private-sector is through suggesting mechanisms, which, on the one hand, provide financial incentives to the private sector and, on the other hand, discipline them to meet the

broader national objectives. Overt and express incentives to motivate the private sector contribute in the horizontal transfer of technology.

Recognizing that technology transfer and development is the key to sustainable development, efforts are needed simultaneously for indigenization of the imported and up-gradation of the local technologies. Accordingly, establishment of a Technology Transfer and Development Fund (the 'TT & DF' and 'Fund' used interchangeably) is proposed with the objective of facilitating technology transfer and development for fostering sustainable development. This is in line with the developing countries' aspirations for increasing self-reliance, to demonstrate the possibilities of public-private partnerships, and to insinuate a "learning-by-doing" opportunity for the local industry.

The Fund will institute lending programmes, with more favourable terms than in ordinary lending for businesses. This will help in reducing the input costs of one key constituent i.e. finance. The Fund will be available to the projects with clearly defined and well-articulated program, along with agreed milestones to promote technology transfer and development.

Besides funding on concessional terms, the Fund will provide a forum for appropriate networking, information gathering and sharing experiences. It will help in lobbying for regulatory changes and encouraging investment. The TT & DF will further be focused on mobilising and multiplying additional financial resources and assisting in the improvement of policy-frameworks, through long-term commitments to capacity building.

### OPERATIONS: HOW DOES THE TT & DF WORK?

COMSATS member countries and multilateral institutions will contribute in the TT & DF and the Fund resources will be used to promote indigenization of technology. The TT & DF will provide concessional finances (initially as loans and subsequently through equity-investments as well), management-support and information about technologies to the probable investors and entrepreneurs.

A schematic organization of TT & DF is shown in Fig. 2. The TT & DF will strive to engage constructively all interested parties in its development and operations. In this regard, strategic guidance will be sought from representatives of member countries, multilateral institutions, participating entities and business community, while remaining sensitive to the mission and objectives of the Fund.

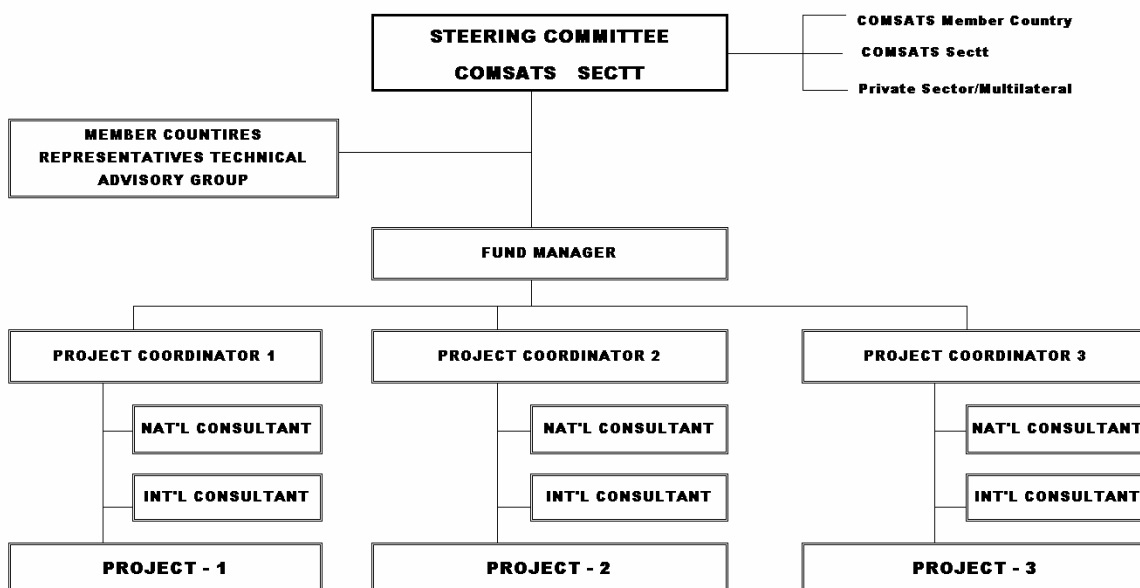


Figure - 2: Organizational Structure of TT & DF

## **BENEFITS OF TT & DF**

The TT & DF will promote technology transfer and development, through a series of projects in member countries. Following a two to three-year pilot phase, the TT & DF will be evaluated, to devise the future operational strategy and subsequent operational programmes for promoting the objectives of the Fund. A significant aim of the programmes will be to catalyse sustainable development through creating vendor-industry in selected areas, remaining attuned to safeguarding the environment and enabling the private sector to transfer technologies and help upgrade human resources.

The benefits thus include capacity-building through technology acquisition, skill-development, and evolution of local policies and institutions to support the technology-transfer process, through market intermediation, matching technologies with applications, brokering partnerships, facilitating negotiations and devising financing-packages.

Replication or "indirect" effects likely to result from creation and operation of such Fund include:

- Project designs; through demonstrations,
- Resource mobilization,
- Improved regulatory frameworks and standards,
- Augmenting technical capacity,
- Devising new institutional models, and
- Encouraging stakeholder dialogues,

## **PROJECT PIPELINE: WHAT KIND OF PROJECTS DOES THE TT & DF FUND?**

The TT & DF will be guided to achieve a balanced portfolio, both geographically and technologically. It is intended that the Fund will co-finance projects in small and medium enterprises (industry and manufacturing), renewable energy and, more importantly, in Information Technology. Major emphasis will be placed on projects, which have a great potential for replication and for local adaptation at reasonable costs.

The TT & DF will act directly, as well as through established intermediaries such as other similar investment funds, trade and commerce (business) organizations, large commercial banks, etc., to build capacity for developing economies to facilitate high-quality, attractively packaged, technology transactions.

The Fund, while acting as a financial mechanism, will facilitate firms to implement carefully planned initiatives for technology-transfer and development. Such initiatives would include training of staff, to learn newer skills and enhance productivity, help establish vendor-industry, transplant and adapt organizational work-setting to suit host country conditions, etc. This innovative and inclusive approach is likely to increase the opportunities for member governments (of COMSATS) to serve, *inter-alia*, their intended mandate vis-à-vis promoting sustainable development through facilitating technology-transfer and development programs.

## **SCOPE OF SERVICES**

The TT & DF will provide:

- *Concessional Loans and Grants:* The Fund will initially provide finances as loans on concessional rates; subsequently the Fund will also make equity-investments. Grants will also be provided for arranging inter-industry trainings, in line with Fund objectives.
- *Business Advocacy:* Will serve as an advocacy focal point for interested entrepreneurs and business firms, to assist them to get help from intermediaries (e.g. SMEDA in Pakistan) throughout the COMSATS member countries.

- *Business Development Support:* Will provide a review of a company's current business-position, offering helpful insight in the areas of new opportunities, strategic planning and marketing assessments. Referrals to other state and federal organizations, for any additional information or assistance, will be provided to the interested companies and individuals.
- *Guidance:* Will offer guidance and direction to business firms and entrepreneurs, assisting them to better align their capabilities, to conform to the industry's requirements. This support will be provided via workshops, conferences, meetings, on-site visits and individual assessment of company's capabilities.

## **SIMILAR INITIATIVES**

There are successful examples of special-purpose funds promoting their respective intended objectives and generally helping in resource mobilization. Examples include Global Environment Facility (GEF) by UN, Pakistan Energy Sector Development Fund (PSEDF) by the Government of Pakistan, World Bank, JEXIM, etc., and Prototype Carbon Fund (PCF) by the World Bank and GEF, UN, etc.

The GEF has provided support to projects to the tune of nearly US\$ 2.7 billion and has been successful in leveraging more than US\$ 7.0 billion (2000). Similarly, the PSEDF has been successful in mobilizing resources to the tune of US\$ 5.0 billion (2000), through a contribution of nearly US\$ 845 million.

Experiments like GEF have been instrumental in innovating and showing leadership in finance related to the environment. There are examples, as well, where some banks\*, like Poland Environment Bank, have also been active in working with smaller businesses to improve their environmental impact, often with a focus on energy-efficiency, through providing advice and information. In doing this, they intend to improve the credit-standing of their clients, as well as secure general environmental benefits.

## **EPILOGUE**

The enunciation and operation of TT & DF will act as a prototype of a tangible effort in promoting technology-transfer and development for capacity-building, industrial resurgence and building confidence in the local capabilities. Although, small in proportion to the overall financial market, it would provide a very useful pathfinder role, in promoting and developing new concepts and ideas.

Care has to be exercised, accordingly, in understanding that TT & DF should not be seen as a leading source for facilitating technology-transfer and development; rather, it be seen as an administrative alternative to assist the developing countries in implementing their commitments to achieve self-reliance and sustainable development.

## **BIBLIOGRAPHY**

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\* An example of a successful green financial institution is the Polish Environmental Protection Bank. Established in the early 1990s, it has received substantial equity investments from the Polish National Fund for Environmental Protection, strategic investors and from the private sector. The Fund has, in turn, instituted lending programmes with more favourable terms than in ordinary lending for businesses, seeking to reduce their environmental impact.