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Knowledge Management for the Diffusion of Knowledge-Based Innovations

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Abstract

This paper highlights the case study organisation of the National Science and Technology Development Agency (NSTDA) as a learning organisation. As NSTDA seeks to provide effective mechanisms for supporting small- and medium-sized enterprises (SMEs), it recognises the importance of knowledge as a mechanism for generating innovations. Thailand realises the importance of science and technology (S&T) for economic development, wealth creation and improvement in the quality of life. It is setting the direction and gaining commitment towards knowledge-based economy through the National Economic and Social Development Plans and phased programmes. In its effort to achieve this aim, the National Science and Technology Development Agency (NSTDA) plays a major role in propelling the national knowledge competence for social and economic development.

1. Learning organisation towards the knowledge-based economy

To support technical change at the national level and to transform technology (invention) into innovation (commercialised product), there needs to be an interaction between the public and private sector [1]. The National Economic and Social Development Plan Number 9 (2002-2006) sets out the direction that the public and private sector work together in order to support knowledge production, knowledge transmission and knowledge transfer within an economy. Learning organisation – the attempt of NSTDA to improve the

innovative capacity of the country can be shown in the Figure 1.

Currently, the manifestation of economy has been towards using information as a factor for competitiveness. For Thailand's progressing up the ladder of development, it has set up the NSTDA (a special kind of governmental organisation under the Ministry of Science, Technology and Environment) with the mission of supporting research, development, design and engineering (RDDE) in scientific and technological areas critical to the country's development. Underlying the NSTDA mission goal are three operational goals : the support of public sector RDDE projects; the support of the technological strengthening in the private sector; and the disbursement of science and technology scholarships for study abroad and locally. In effect, NSTDA's function comprises four main areas of responsibility :

i) Research, development, design and engineering

The undertaking of RDDE includes the basic research, applied research to call for new scientific knowledge. The knowledge generation is to make effective application to the design of lab equipment and machinery.

ii) Technology transfer

Technology transfer refers to the transfer of knowledge from innovation-oriented research projects to meet societal needs within the context of governmental policies.

iii) Science and Technology (S&T) human resources development

The development of human capital is carried out by means of providing extensive education through schools, universities, vocational schools, distance learning approaches.

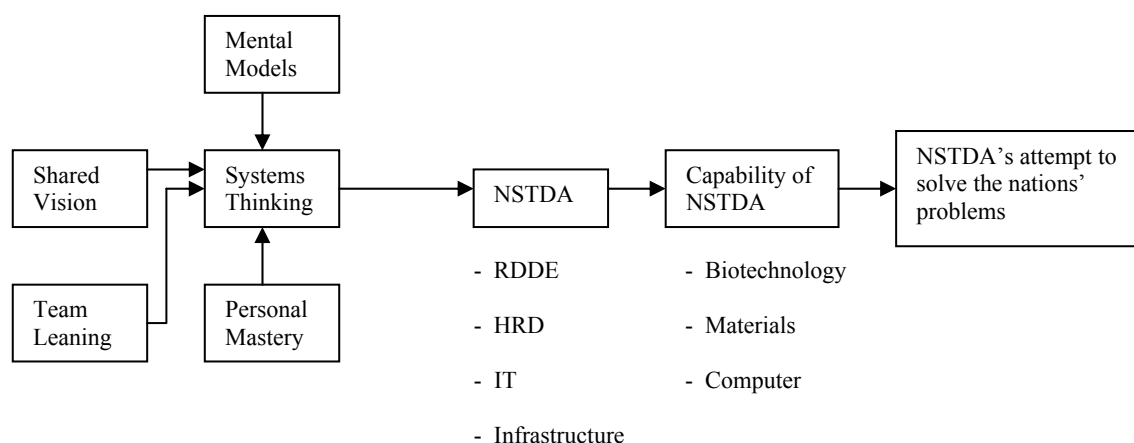


Figure 1 Learning organisation – the attempt of NSTDA to improve the innovative capacity

Table 1 R&D expenditures of Thailand

Year	R&D Expenditures (US\$ million)	R&D as % of GDP	Share of private sector
1989	113	0.17	5.5
1991	154	0.20	8.0
1997	210	0.18	15.0
1999	197	0.18	N/A

Source : The National Research council of Thailand, The National Science and Technology Development Agency

iv) Enhancement of S&T infrastructure

The principal services entail testing/QC services, certification, consultancy, training/ training co-ordination, intellectual property services to support research and development.

In the market-led economies, the private sector plays the crucial role in industrialisation. Research and development are recognised as a key factor to generate technical changes and improvements in industry. However, in Thailand, the private sector's spending in research and development is still negligible (Table 1)¹. The problem is that although 80% of the firms in Thailand are SMEs, these firms generally do not engage in R&D activities. To put it another way, they tend to acquire technological capabilities from foreign sources at a superficial level – learning just to operate the systems.

Recognising the importance of private-sector technology development, NSTDA employs various policy measures. Among the policy measures to induce market-led economies are the followings.

1) R&D financing

As NSTDA's funding for R&D supports comes from fiscal budget, NSTDA becomes a major source of fund for providing supports to R&D activities in the public sector as well as private firms. At present, NSTDA has undergone the financial policies for SMEs by setting up NSTDA's Company Directed Technology Development (CD) program to provide financial support to enable private companies to invest in RDDE for commercialisation. The incentives to stimulate RDDE programmes in the form of financial assistance are grants and low-interest loans. Grants have a maximum limit of 75% of project expenses and do not exceed 3 million THB. The maximum amount given as a low-interest loan, which may cover up to a maximum of 50% of the total cost, is 20 million THB per project. The interest rate is one-half the interest rate for 1-year fixed deposits placed at banks plus 1.125% overhead charge. In granting loans, NSTDA considers that the research project of SMEs must accord to NSTDA's three priority areas, i.e. genetic

engineering and biotechnology, metal and materials technology; or electronics and computer technology.

2) R&D Tax Scheme

NSTDA undertakes the tax incentives to induce R&D investment in the private sector. In stimulating private-sector technology development, NSTDA offers tax incentives associated with setting up R&D laboratories and the related imports of machinery and equipment for use in R&D activities. The private businesses investing in R&D can deduct 200% of their R&D expenses for tax calculation².

To encourage firm RDDE activities, other incentives include the increasing depreciation rate for laboratory equipment and machinery used in RDDE, the import duty exemption for the purchase of the equipment for RDDE, the tax exemption from sales of patents and inventions for a certain period of time.

To ensure the relevance of NSTDA's activities to the market demand of the industry, NSTDA also pursues 'demand pull' strategy by simulating the concept of 'clustering' [2] taken place at Silicon Valley in the US. In the US, public research, private (industrial) research and university research often have been intertwined closely [3]. The high technology incubators are set up to draw venture investment into the local economy. The mechanisms employed by NSTDA aim at coordinating and facilitating strategic collaborations and linkages between various research units, educational institutions and industrial sector. NSTDA is situated among the universities (Asian Institute of Technology, Sirindhorn International Institute of Technology, Thammasat University, Rangsit University, Bangkok University) which provide academic links to university research. It has established international collaboration link (e.g. Communications Research Laboratory in Japan, National Science Foundation in the USA, National Research Council in Canada) to ensure that the networks add benefit and value of generating more business for the firms. To the extent that government support policies influence a step further for private firms, NSTDA has orchestrated the R&D attack by getting firms to think through together which approaches ought to be followed and what directions pursued if commercial primacy were

¹ This percentage share contrasts with the situation in the advanced countries, where their private sectors accounted for 2-3% of GDP. The decreasing R&D expenditures in the year 1999 was an aftermath of the financial crisis.

² Science and Technology Development Program, Thailand Development Research Institute Foundation.

to be achieved. Clearly, the NSTDA Science Park offers resources to get the potential firms off the ground.

2. Conclusions

In this paper, the discussion has highlighted some interesting issues about the attempts of Thailand to develop technological capabilities and support SMEs towards the knowledge-based economy. Thailand will be able to survive in the rapidly changing economy provided the organisations and industrial sectors learn through R&D activities (not copy and development activities). This is because the method of learning, to some extent, determines the accumulation of technological capabilities. In effect, there needs to be collaboration between the public and private sectors in terms of developing the linkages and networks to push forward the governmental policy measures. This paper discusses the role of government, especially NSTDA, in producing effective mechanisms to support private enterprises. NSTDA's policy towards improving innovative capacity is in line with the National Economic and Social Development 9th plan in emphasising the development of R&D activities.

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