

Technology Management: Strategic Model for Developing Nations

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Abstract: Technological leadership helps in building core competence. There is a qualitative and quantitative difference in the capability and competence. Core competencies very important assets and they do not come up in accounting books. Core competencies are mainly abstract and software like rather than hardware. With this as the back drop, it is required to have a strategic structure at national level to support technologies and competencies at all levels within the developing nations.

Keywords: Competencies, Core-groups, Strategy, Technology-nodes, Think-tank

I. INTRODUCTION

India has a long coastline, 7517 km (Approx), and land frontiers of 15,200 km (Approx). Adding to this, its peninsular dimension and strategic location, and trade interests that stretch from Persian Gulf in the West to the Straits of Malacca in the East and from the Central Asian Republics in North to almost the equator in South, make it imperative that India focuses not only on maintaining a good combination of land, air and maritime forces, but also has a proactive vision towards the future. Technological capability and core competency will define how well India is geared up for this vision towards the future. Core competency, which is not just a single skill or technology but a combination of many skills and technologies, will fuel the much needed competitiveness for India.

The concept of management of technology at the strategic level in developing countries is to have organizations which address major issues of technology forecasting, technology policies, financial outlays and technology planning in a time window of 10 to 30 years. The first step in development strategy is to closely integrate the mission, vision, values and long term goals[1]. The policies of the state which support academic research in the fields is really lucrative [2]. The importance of technology in various theatres of operations is depicted in Fig. 1 below:-

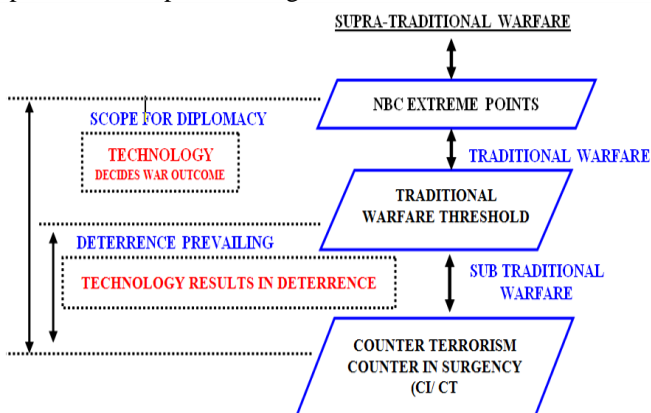


Fig. 1. Warfare and Technology

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The multi pronged approach which shall yield rich technology dividends has been given in this paper. It mainly consists of the followings:-

- National Technology Committee.
- Defence Technology Council.
- Core Group of Technology Professionals.
- Technology Nodes.

The above is depicted diagrammatically below in Fig. 2.

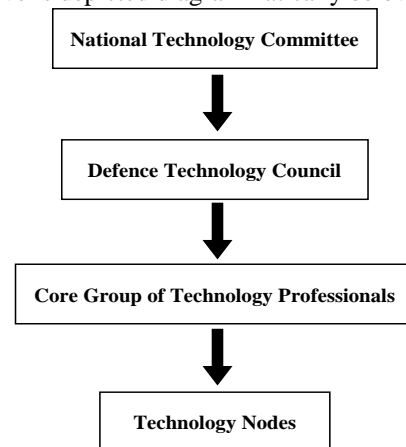


Fig. 2. Techno Strategic Structure

II. NATIONAL TECHNOLOGY COMMITTEE (NTC)

Creation of technology climate has to be a National endeavour in a Nation building scenario. At present, this is a gaping void which needs to be formally addressed for Strategic Management of Technology. The proposed composition of NTC: -

- Prime Minister.
- Defence Minister.
- Minister for Science and Technology.
- Minister for Industry.
- Finance Minister.
- External Affairs Minister.
- Chairman, National Council for Education, Research and Training (NCERT)/ equivalent body.
- Representatives from Defence organization.
- Provision for special invitees.

Framework of Charter of NTC

The time window of the NTC should span a horizon of 10 to 30 years:

- Define Technology Vision for the Nation.
- Benchmark National Technology Mission objectives based on time lines and financial outlays.

- Monitor technology road map.
- Lay down technology policy for all ministries and industries.
- Spot futuristic foreign collaboration needs and formulation of joint working groups.
- Review progress of technology programmes.
- Promote creativity and innovation as a National effort and endeavours.
- Lay down and review policies in professional education.
- Address core competencies, technology leadership in industry and brain drain issues.
- Monitor schedule of major National Technology exhibitions and seminars.
- Frequency. The Committee must meet at least twice a year.
- Search for Council
- Do it electronically.

III. DEFENCE TECHNOLOGY COUNCIL (DTC)

This is the apex committee at the Ministry of Defence in developing nations which would look into the future technology requirements, decide future technology programmes and lay down technology policies.

Composition. It should be so composed as to be able to facilitate autonomous functioning within the charter laid down by National Technology Committee:-

- Defence Minister - Chairman.
- Service Chiefs.
- Director General Armed Forces Core Technology Group.
- Finance Secretary.
- Foreign Secretary.
- Minister of S&T
- Scientific Advisor to Raksha Mantri.
- Reps of IIT, IIM, BARC and DRDO/ equivalent body
- Chairman Confederation of India Industry/ equivalent body.
- Chairman FICCI/ equivalent body
- Chairman Atomic Energy Commission/ equivalent body
- Provision for special invitees.

Framework of Charter of DTC

The time window of Defence Minister's Committee must span a horizon of 10 to 20 years:-

- Frequency of meeting - The Committee may meet at least twice every year.
- Spell out technology policy for achieving technology mission objectives.
- Review threat perceptions and related technology plans for futuristic transformation of Armed Forces.
- Define Technology Vision and missions for the Armed Forces of Developing nation.
- Prepare and monitor road map to achieve technology missions.

- Review technology programmes for acquisition, transfer of technology and indigenisation and in house research and development.
- Lay down financial outlays for research and development of technologies.
- Review action plans for major technology forecasts
- Formulate consortiums for collaborative defence oriented research within the country and abroad as Joint Working Groups.
- Review progress in core competencies and issues of technology leadership among industries.

IV. CORE GROUP OF TECHNOLOGY PROFESSIONALS

This shall comprise leading professionals who have a reputation of Technology Experts. A pool of National talent, this core group shall be the THINK TANK in all the technology endeavours. Strategic management of technology requires near realistic crystal gazing in a time window spanning 10 to 30 years. In this time horizon, technology forecasting and planning is a challenge. Though a number of mathematical modeling techniques exist as a management tool to forecasting, there is a requirement to bridge the gap by organising core group of technology experts. The intent of creating this organization is to harness technology talent and potential. Important issues of this are as under-mentioned. It should predominantly constitute of learned experts from IITs, BARC, DRDO, IISc and ISRO or equivalent bodies.

The National Technology Committee, through the ministries shall identify and nominate select scientists, technologists and academia, as technology experts, who are pencil beam specialists in various technologies. The tenure of duty of the technology experts may be five years, extendable on a case by case basis. The various fields which shall comprise the core group of technology experts are as below:-

- Communication and Information Technology.
- Stealth Radars, Surveillance and Sensor technology.
- Space and Missile Technology.
- Aviation Technology.
- Automation and Robotics.
- Armament and Warhead Technology.
- Tank Technology.
- Nuclear, Biological and Chemical Technology.
- Any other field perceived as an operational necessity.

Charter of Duties

- Carryout technology scenario building and net assessments and help in generating on innovation oriented environment in their fields.
- Generate technology road maps and scientific input for refinements of futuristic technologies and means to achieve the same.

- Technology experts shall be the advisors to industry & Technology Centres and Armed Forces Core Technology Group.
- Recommend foreign collaboration for raising indigenous technology thresholds.

V. TECHNOLOGY NODES

A number of organisations both in the public and private sectors exist which practice research and development as discrete individual endeavours. This is a heavy investment both in the scarce expert human resource and finances. The aim of organizing Technology Nodes is to generate a single window for the core technology and be the centre of excellence.

One of the aims of technology planning is to identify key areas for strategic thrust. Some of these are core areas of the company's business, and in such cases there has been no waiting for technology planning to start setting them up. Instead, centers of excellence are used as carrier for organizing, planning, controlling and coordinating development in the area of a specific main technology.

A node of excellence is not a building; it is an organizational conduct, a multidisciplinary congregation of people who share the same strategic objective for that technology. The mission of a center is twofold; to maintain strong links between its technical strategic business goals and define its long-terms technical goals, and to continually pursue world leadership in that technology.

Even in an organization delineated by functional departments (e.g., by academic discipline), a task force approach can be used to bring collective focus to particular technology. The center is not a task force because it is permanent until such time as that technology is divested; it can even be treated as budgetary cost center. Because the technologies chosen are of primary importance to the corporation, divestment is unlikely. It is incumbent on each center, however, to be on the lookout for potential substitute technologies and to plan accordingly.

Centers of excellence provide opportunities to bridge departmental, rank, and divisional boundaries among participants. These bridges not only lead to better strategic vision but disseminate technology information and planning techniques to wider audience. The current stage of evolution involves mainly technical representatives in the centers, but plans to call nontechnical business managers too in great proportion.

Through the centers, strategic technology planning can be performed even before the adoption of formal planning processes. The centers will continue to function effectively and so become an increasingly integral part of the overall strategic planning system.

The triad is a grouping of business goals, technologies, and R&D projects. In the center of the triad are various planning techniques that emphasize the links among the three strategic entities. The techniques used to evaluate projects and technology planning methods. Technology management consultants typically have specialized associated knowledge with different points along this spectrum. For example, some consultants are particularly adept at applying portfolio management techniques to R&D projects.

Headed by a technologist of eminence, a technology node shall be organized as a research and development node.

Existing Defence Research and Development Organisation laboratories could be suitably reorganized and appropriately staffed as Technology Nodes. The concept is- "one technology -one node".

Technology Nodes are respective technology based technology hubs for producing state of the art technologies. It shall employ all National and collaborative resources to exploit the power of innovation and provide high technology solutions. The major objectives of technology node are as follows:-

- Provide a forum for technology based information sharing and problem solving.
- Formulate technology forecasts and achieve the same.
- Endeavour to raise technological thresholds of Armed Forces and Nation.
- Render technology advice to:-
- Industries to become technology leaders.
- Training institutions to bridge the gap between theory and practice.
- Assist Armed Forces in enhancing combat effectiveness.
- Identify technology voids in the environment.
- Conduct technology workshops and seminars with a view to:-
 - Promote creativity and innovative technology thinking.
 - Study the emerging technology trends and share technology based information.
 - Carry out realistic technology forecasting by generation of implementable ideas.
 - Carry out scientific performance assessment of technologies embedded in the equipment.

VI. RESULT AND DISCUSSION

The need has been felt to have a structure in place for leveraging on the upsurge of technological growth in the developing countries. The developing countries need to ensure that the technology adopted/ developed by an org are required to have the following qualities:-

A. Expenses/ Affordability.

The affordability factor to be kept in mind while deciding on the technology. Project/ product/ technology and innovations should enhance the effectiveness and capability whilst reducing the cost. Upgrades must focus on increasing operational life and better efficiency.

B. Minimum Transition Time.

The focus should be to have minimum time taken for the transition of technology. One must minimize usable capability.

C. Multiple Use.

The technology/ innovations developed can be used in multiple ways, eg- military as well as civil use. This would entail having a common industrial base, thus would result in enhancing the utility and resulting in cost reduction of the technology. Economies of scale will further reduce the cost.



The academia, the industry and the stalwarts of technological advancement are the core strength of an emerging world order. When technology collaborates with the academia, it leads to coming forth of even better and advanced technologies. When technology and industry work in sympathy to each other, it leads to manufacturing of high quality product. The cohesion of academia and industry bring about product improvement. However, When all three players, ie, the academia, the technology and the industry come together it leads to innovation. It is essential that to reap the benefits of such cohesion, and for effective and enhanced comb power, the defense forces need to be present at the scene of this cohesive interaction, preferably in the arena covering innovative development. Our geo-political positioning demands of us to be prepared for contingencies at all possible junctures. We need to keep ahead of everyone even when we have lesser manpower made available for a standing army. The trick to win would be to acquire and manage the most advanced technology combining with it the need of our National strategic interests. A body to plan and format a techno-strat rd map in a fluid international scenario therefore seems to be the need of the day.

VII. CONCLUSION

The new technologies will make the existing technologies obsolete very rapidly [3]. Enabling Technologies lead the thought process of a Strategist as to his requirements or the requirements of the Strategist leads to the emergence of enabling technologies is a question as difficult as the question of first evolution of a chicken or an egg. Their inter-relativity however, has never been a cause of dispute. Strategists are known to focus their vision beyond the present or near future to a more distant future ahead. A technologist too has a distant futuristic vision but the motivating factors or forces driving their vision may be different. A mutually sympathetic vision by these two great forces of society, a comprehensive technology strategy enmeshed with national security strategy can go a long way in conflict management. A well orchestrated technology strategy would help in management of space especially in sub-conventional warfare zone both militarily and diplomatically. In an ultimate analysis, therefore, technology strategy would not only continuously reinforce capabilities at each level of conflict, be it low intensity conflict level, conventional warfare or NBC warfare but also enhance deterrence capability. Further, this would help in achieving revolution in military affairs as a continuum. The strategy needs to be monitored and the necessary adjustment to be done [4]. This synergy between technology and strategy cannot be an arbitrary, knee-jerk process and requires focused and deliberate direction at all levels.

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