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Synergy of R&D and Marketing

Challenge in R&D Management : Tata Steel A Case Study

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Abstract : The purpose of R&D management is to promote innovation as well as wealth creation. The paper traces the history of R&D management-how it has changed from the first generation when only innovation was the main objective to the fifth generation where IT plays an important role. It is now necessary to understand the needs of market for conducting worthwhile research. The author shares his experience of R&D management at Tata Steel. The experience shows that by adopting judicious R&D strategy it is possible to face the challenges of reconciling innovation with wealth creation is possible by a judicious R&D strategy.

Keywords : *R&D Management, Innovation, Steel scenario, Tata Steel, Quality management.*

INTRODUCTION

The process of managing R&D activities has seen several changes in approach in the last few years and several new management methods have been adopted by industrial houses. In today's scenario, globalization processes such as WTO have added a new dimension to competitiveness. The volatility in price and demand of engineered items such as steel adds to the complexity and builds up further business pressure.

In this backdrop, managing R&D has a special significance. However, the approach has been going through several stages since wealth creation & innovation both need to go hand in hand.

Before the second world war, since results of research were perceived as unpredictable, a specific grant used to be placed at R&D's

disposal and the team was asked to be on their own without in any way 'disturbing' the business process of the company. This scenario was described by some as hand-off research and is designated as the first generation R&D. In this situation, the R&D operated outside the main stream of business of a corporate. After the second world war, the scenario changed considerably when the corporate management started taking more interest in the R&D by involving themselves in finalizing the direction of work at R&D, reviewing their activities from time to time and so on . However, the business process and strategy of the company still remained outside the sphere of operation of R&D. This was designated as the second generation R&D. At this stage the management of corporates were not serious about shaping their strategy of business linking it with R&D. The latter to a large extent, was done off line.

With ever increasing competition in the market place and enhanced rate of obsolescence of technology / products, a holistic integration between R&D and other organs of a corporate has been looked upon as a necessary business strategy. In this scheme, R&D is consciously brought into the main fold of activities for a business house. This is designated as a third generation R&D. There are some schools of thought that speak even of fourth & fifth generations of R&D that make use of IT-inputs and inputs from the market place while managing research. Indeed, the rapid strides that IT has made in recent times has profoundly influenced R&D activity today.

The strategic purpose of R&D has been recognized to (i) defend, support & expand existing business, (ii) drive new business and (iii) broaden / deepen technological capability. The methodologies adopted to achieve these goals might vary in their details from one company to another; however in their principles they agree to a large extent across a wide cross-section of companies.

In this paper, an attempt will be made to analyse the steel scenario in general and take a closer look at Tata Steel in particular in so far as the R&D management is concerned.

THE STEEL SCENARIO

One might begin by noting that steel represents the second most voluminous engineered material on the globe, second only to cement. As Fig.1 would indicate, the production of steel today is around

820 mt/yr. and has steadily grown after the fifties keeping pace with the growth of population. The apparent consumption of steel (Fig.2) shows a steady increase, although the rate shows a fall, in the second phase (starting with '70s). The average global per capita steel consumption (Fig.3) peaked at about 170 kg/person and has then shown a declining trend, although it is still around 100 kg/person. In

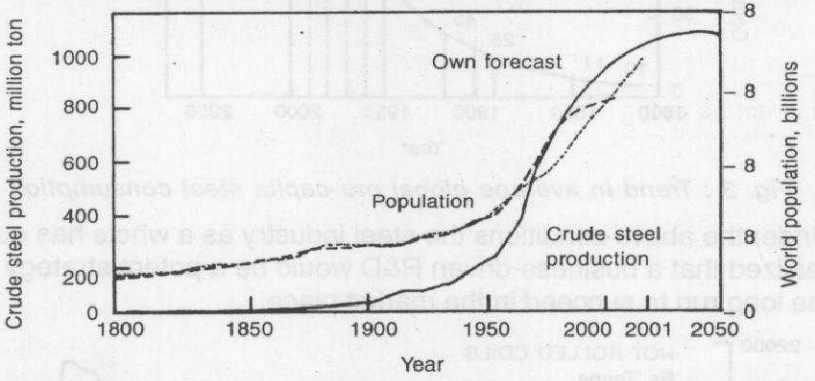

Fig. 1 : Comparison of World population and worldwide crude steel production

India, unfortunately the average consumption is only around 23kg/person (one of the lowest in the world) and the total steel production (both in organized & unorganized sectors) in India is around 26.5 mt/yr., a figure below the earlier projected figure of around 45 mt/yr.

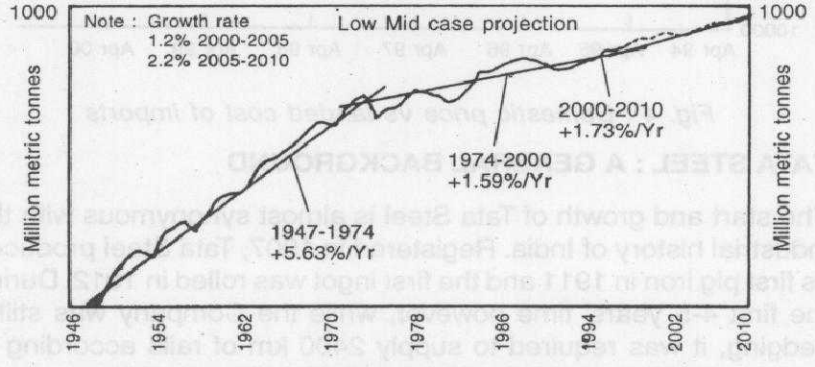

Fig. 2 : World Steel Product Apparent Consumption (Steel Product Basis)

Another aspect of the steel industry, is its volatility of prices (Fig.4). This has impacted the profitability of companies engaged in steel rather adversely around the world.

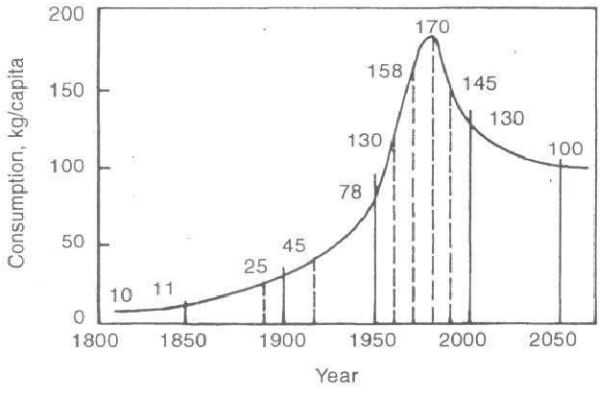

Fig. 3 : Trend in average global pre-capita steel consumption

Under the above conditions the steel industry as a whole has now realized that a business-driven R&D would be a potent strategy in the long run to succeed in the market place.

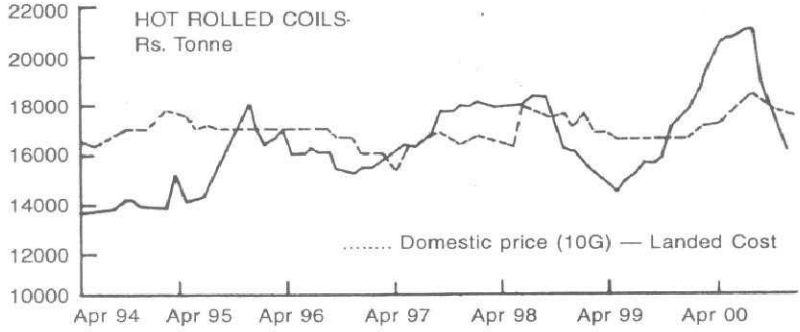

Fig. 4 : Domestic price vs landed cost of imports

TATA STEEL : A GENERAL BACKGROUND

The start and growth of Tata Steel is almost synonymous with the industrial history of India. Registered in 1907, Tata Steel produced its first pig iron in 1911 and the first ingot was rolled in 1912. During the first 4-5 years' time however, while the Company was still a fledging, it was required to supply 2400 km of rails according to British specification for the fighting British Army in Mesopotamia during the first word war. Tata Steel was successful in fulfilling its obligation and in the process won tributes from the British government. The township was re-named as Jamshedpur (from Kalimati)

and the railway station, re-christened as Tatanagar. In the year 1925, the Metallurgical Department for Process Control was established, which was responsible for the quality of products. The Research Department came into being in 1935. Tata Steel was to achieve two other milestone in quick succession, viz. production of plates based on alloy steels for armoured vehicles in 1941-42, that the British Army used and admired in the second world war. Around the same time corrosion-resistant, high-strength steels for the construction of the old Howrah Bridge in Calcutta were supplied by Tata Steel. Starting with less than a million ton/yr. Tata Steel got into the stage of 2 mt/yr. in 1955-56 and over the next 24 years consolidated its position as the leading steel maker in the country. The Company undertook a massive modernisation programme in phases, starting in 1980-81 which was to be completed during the next 20 years. In the first 3 phases (1980-94), L.D steel making, continuous casting of billets, stamp-charging technology for cokemaking, continuous slab casting & modern hot strip rolling, bell-less blast furnace operation and coal injection into blast furnace got completed. During the Phase-IV (1994-2000), the Company attained 3 mt/yr. production, installed a modern cold rolling mill and set up continuous galvanizing / galvannealing coating lines, making the Company the foremost supplier of flat products in the country. Today the Company produces close to 4 mtons/yr. and the customers of Tata Steel include the leading automakers and manufacturers of white goods of the country. It is also a reputed exporter of high quality steel to several advanced countries. Further, there are also a number of international programmes with which the Company is associated. One of the major examples is the ULSAB-AVC (Ultra Light Steel Autobody-Advanced Vehicle Concept) international consortium of 35 leading steel companies of the world; this is the second phase of the initial programme called ULSAB which achieved remarkable success in weight reduction of about 25% with concurrent improvements in all attributes (Fig. 5). This was possible due to : (i) high and ultra - high strength steels ; (ii) laser-welded tailored blanks and (iii) hydro-formed tubes.

Tata Steel have utilized the knowledge gained from the Consortium in getting into the manufacture of superior grade high strength steels for the auto sector. The ULSAB-AVC Programme goes even further in terms of using Advanced High Strength Steels (e.g. DP, TRIP etc.); addressing more stringent crash resistance as well as in in-

troducing a highly environment -friendly (low CO_2-emission) structure for car. Tata Steel are currently sharing all this information with their auto customers.

- A CONSORTIUM OF 33 STEEL COS.
- PORSCHE ENGG. CORPN. AS CONSULTANT

PERFORMANCE OF ULSAB STRUCTURAL

	BENCHMARK	ULSAB	CHANGE
– STATIC TORSIONAL RIGIDITY (Nm/deg.)	11,531	20,800	+80%
– STATIC BENDING (N/min)	11,902	18,100	+52%
– FIRST BODY STR MODE (Hz)	38	60	+58%
– MASS (kg)	271	203	–25%
– CRASH RESISTANCE (5 diff. In H test simulations)	R	R++	↑↑
– COST	–$1000	–$978	No Increase

Fig. 5 : Ultra-light steel autobody PGME (ULSAB)

THE R&D PROCESS AT TATA STEEL: A GLIMPSE

The Company realised quite early that a strategy ("DOING RIGHT THINGS"!) is a necessity after which the right processes ("DOING THINGS RIGHT" !) have to be adopted. Further, after the strategy and the processes are in place, the evaluation of the performance on various indices needs to be done and that, several such E&I (evaluation-improvement) cycles are required to be run.

The starting point of the R&D process is its alignment with the Company's strategy as enshrined in the Company's Vision statement and the balance score card of the MD/ senior management. Consequently, the balance score cards (BSCs) of the senior management is kept in view while preparing the Key Result Areas (KRAs) for R&D. The main items of KRAs are (i) Finance [improved product mix., evaluations for branding, commercialization of consultancy, involvement in new business etc] (ii) Customers [value creating partnerships and improving their satisfaction] (iii) Internal Processes [value creating partnerships with suppliers, lowering cost of production, ensure safety and environment sustainability, improve Total Business Excellence], (iv) Learning [manage knowledge, encourage innovation and allow the freedom to fail, work towards

enthused and happy employees, unleash people's potential and create leaders who will build the future], (vi) Community [improve the quality of life of the communities we serve].

At the R&D in Tata Steel which is an ISO 9001 : 2000 certified centre, four major Business Processes have been envisaged; these are : Project Management, Customer Management, Materials Management & the Human Asset Management processes. The project management process is actually central to the entire operation while the other three naturally make for valuable support processes. The entire process is run as a part of the Total Quality Management (Fig. 6).

Fig. 6 : Total quality management : Research as a process

The Project Management Process is rather elaborate beginning with the selection process (that passes through several gates internal as well as external to R&D) including the highest level of management, and end with the launching of the projects with appropriate man power, equipment facilities & financial resources (Fig. 7);

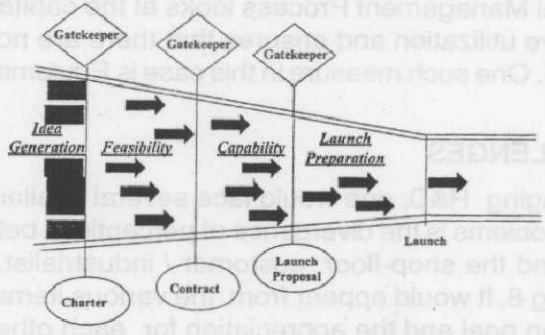

Fig. 7 : Varous Gates (reviewing bodies) in Project Selection & Launch Process

the last two resources are approved by an Apex Board , chaired by the Chief Executive of the Company. Subsequently, the monitoring & review of the project management is done within the R&D as well as in a platform that includes several customers of the projects, who are manages of various wings of operation as well as senior executives of the Company. At the end of a project the report is reviewed & assessed by the customers. The indices that are used for the Project Management process are Project Compliance Index (PCI), Project Performance Index (PPI) and Benefit- to- Cost Ratio (BCR).The Project Compliance Index (PCI) measures the timeliness of the project, Project Performance Index (PPI) indicates the performance in terms of quality of deliverables to the customer and is calculated based on customer perception. The Benefit- to- Cost Ratio (BCR) is calculated based on the new products & innovations in processes yielding benefits, the procedure of calculation is standardised.

The Customer Management Process broadly measures the satisfaction of the customer and the indices used are Customer Satisfaction Index (CSI), and Customer Interaction Index (CII), then latter monitors the level & frequency of interaction of the R&D professionals handling various projects with the key customers within the Company.

The Human Assets Management Process uses the Employees Satisfaction Index (ESI) as the prime measure as well as brings out the creative potential of the group through various publications (including those in scientific journals as well as in- house).

The Material Management Process looks at the capital assets and their effective utilization and ensures that there are no lazy capital lying around. One such measure in this case is Equipment Utilisation Index(EUI).

THE CHALLENGES

While managing R&D, one would face several challenges. One of the major problems is the divergence of perceptions between (R&D) scientists and the shop-floor customer / industrialist. This is presented in Fig 8. It would appear from the various items that, a lack of a common goal and the appreciation for each other's positions are the main problems. At Tata Steel, the various platforms of interaction between the R&D researchers and their customers as well

HOW THEY PERCEIVE EACH OTHER

AN INDUSTRIALIST IS :

- Basically a mercenary
- Profit oriented and not future oriented
- Not interested in R&D
- There is no research, not much design, development or feed back
- Does not 'receive' communication
- Does not trust the scientist
- Excessively respect westerns ability

A SCIENTIST IS :

- Largely unreliable for my purpose
- Does not deliver
- Interested only in writing papers
- Leaks to the other hence competition pre-empts
- Long run costs are high
- Has different goals altogether
- Talks 'something'
- No economic sense
- No time sense
- Does not figure in my model

Fig. 8 : Perception of Scientists & Technologists

as longish placement of the former in the shop floor / marketing have to a large extent addressed these issues. Eventually, pursuing a business - driven R&D at Tata Steel ensures that all units of the Company are integrated properly (Fig 9)

Fig. 9 : Integration of various units of a corporate including R&D

The second and perhaps the more formidable challenge lies in the shape of ensuring an environment & a policy for R&D which while engaging itself in wealth creation for the present, would also nurture and encourage creativity and develops a long term perspective. For this to happen, a suitable quality objectives is chosen, as given below.

Tisco R&D's quality objectives

- Creating a world class knowledge-base and enabling the company to become the supplier of the most sought after deliverables.
- Providing effective back-up to the company in utilizing the facilities & raw material resources optimally, for remaining ahead of competition.
- Developing cost-effective and environmental-friendly new products & processes.
- Ensure satisfaction of R&D's customers by providing quality services.
- Scaling newer heights of excellence in innovative research by promoting a learning, satisfied and motivated human - asset.

Further, the range of projects includes around 20 percent of such projects that are exploratory in nature and in principle, can deal with only innovative ideas. Regarding long-term projects, it is ensured that the long-term business strategy of the Company (as evident through the business score cards of the senior management) is translated into some of projects of the R&D as well. A schematic of the project strategy adopted in the short, medium & long term is depicted in Fig. 10.

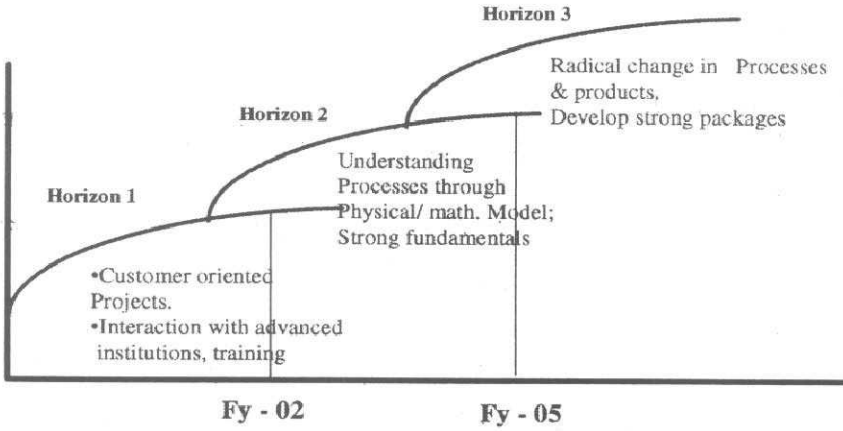

Fig. 10 : Short term, medium term & long term strategy

CONCLUSION

The importance of a business-driven R&D in today's industrial world that has become highly competitive, particularly in the post-WTO scenario has been demonstrate Further, it is shown that although the steel scenario today deals with over 800 million tons per year, the volatility of prices & fragmentation makes it a difficult business from the stand point of profitability. The R&D policy adopted by Tata Steel is dealt with in some detail. It is shown that the challenges of reconciling innovation with wealth creation is possible by a judicious R&D strategy.

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