"Technology Management and Industrial Marketing"

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Abstract:
Technology has encompassed all human activities spread from farmers in the remote areas to the human activities reaching out into outer space. Managing this tool of "Technology" which governs the future of the mankind, planet and the universe covers multiple disciplines of sciences and mankind. This paper deals with the "Industrial Technology" which needs an effective "Marketing" tool to establish the frontier technology and realise global benefits. Students of management studies, workforce in the industry, managers, entrepreneurs and industry leaders would get an insight to the ingredients of successes of "Technology Managers" who have brought us to the dawn of the 21st Century. It is desired that this would inspire, assist students to study and choose their industry and organisation to work for; workforce and managers to excel in innovation; and industry leaders to plan for global leadership.

Macro View of Technology Impacts

A prosperous industry is essential, for without its contribution to the country's wealth, neither the education, nor the social services nor defence will be adequately funded[2].

The 19th-Century 'the age of coal' opened the world through steam ships and railways. The 20th-Century 'the age of oil' has freed humankind from the limits of their physique and the force of elements through powered flights, personalised transport and the like offered by availability of cheap energy. The dawn of the 21st-Century 'the age of information' should free the mind and imagination[1].

Indeed the future abounds with uncertainties and opportunities in equal measure: each new invention brings about change, but each change creates a further opportunity for those who are able to respond to it[1].

Science is concerned with discovering facts and studying the relationships of phenomena. Technology is concerned with using scientific knowledge and scientific methods to fulfil a commercial needs[2]. The Technology Management optimally manages and blends science and technology elements to its maximum towards innovation in the industrial world of progress.

Technology can be classified into Low, Medium and High. Each level of technology would have its specific characteristics and role to play. Understanding of technology classification and characteristics will enable its effective management. Low technology company could transfer a threat of liquidation into renewed company growth by moving to a higher level of technology, a move which would be sufficiently be profitable to justify R&D sector to maintain its success. The progress of a Medium technology industry is made through a continuous symbiosis with high technological material industry. High technology industries are regarded as knowledge-based rather than labour-based and represent a trend that will increase. These companies need to be perceptive to social, economic and technical trends and be ready to plan and invest on long time scales[2].

Application of microprocessors have reduced energy consumption and improved efficiency. Thus a shortage of energy (oil) has been transferred into sufficiency. Silicon chip has transformed the operation of financial institutes. Telecommunication has made possible instant access to worldwide information. New Materials technology has provided Speciality Plastics, Super conductivity materials, and Glass

fibre optics. Some 75-lb (33 kg) of glass optic fibre carries out the same function of communication as 100 tons of copper. High quality innovation based on technology is associated with high added value and growth and produces goods, which are difficult to imitate[2].

Preamble
This paper cover a logical cycle of events of a High Technology company management, centred on Customer that acts as a hub supported by Market environment to which it caters. The aspects of Innovation, Patents, Product R&D, Safety, Manufacture, Best Pricing, Field trials, Technology service, Techno-economic study, Liability management, Reuse & Rename, Reinvent and upgrade are covered. High Technology Manufacturing company for its Management would require nothing less than the best people in the field of Science, Legal, Engineering, Marketing, Finance and Technicians.

Inventions
There is a Constant search for new materials to meet the demanding applications to withstand hostile environment for Aerospace and Defence industry. These new materials are later exploited for advancement of Technology industries such as Oil & Petroleum, Power, Nuclear, Offshore exploration, Telecommunications, Electronics and the likes.

'Innovation' involves the creation of new idea, often an invention, together with its progression to the marketing of new material, process or system. It implies a discontinuity sufficiently great to merit an examination of its possible effects on the company's strategies, structure and attitudes[2].

Product Research & Development
High Technology Company would research and develop products using a combination of in-house proprietary or patented materials. These materials would have a cutting-edge technology that no other manufacturer can imitate or qualify the high technical standards requirement. Products developed for Aerospace and Defence industry would gradually replace conventional means, which are unable to meet high standards set for reliability. New technological products have built in reliability and are evaluated for operating life of 40 years, under the designed operating conditions. These innovative products which attract initial high capital cost, pay back for its self over useful life of the product. This is by way of low total system installed cost and low operation and maintenance cost. The development of New products will be done on behalf of a customer organisation. The majority of defence equipment is generated in this way[1].

Intellectual Property Rights[1]
In the U.K. protection can exist in four forms: 1) Copyright; 2) Design Right; 3) Design Registration; and, 4) Patents. Understanding of this intellectual property rights protection is necessary for Technology Management managers. These are very briefly covered in this paper.

- Copyright: Provides protection for 50-years plus for artistic works, and does not cover Industrial protection. Designs for industrial protection is covered for 25-years from first marketing. Copyright does not require registration and provides very limited protection against competitors exploiting a design as it covers only exact reproduction of drawings; copyright cannot prevent competitor making and selling articles that function according to the drawings.
- Design Right: The 1988 Act in the UK abolished copyright protection for design documents and models. Design right protection lasts for the shorter period of

either: a) 15-years from the year in which the design was first recorded in a design document or model, b) 10-years from the year in which the item was first put on sale.

- Registration of Designs: for a design to be capable of registration, it must show, in a visual sense, a degree of novelty that makes it substantially different from existing designs. Registration must be obtained before the product is put on the market and the design must not be revealed to outside sources, it is thus prevents any pre-sales marketing. Protection is given for initial period of five-years but it can be extended by applying to the Registrar for further coverage in periods of 5-years up to a maximum of 25-years.
- Patents: If it is wished to exploit new inventions commercially without competition, then patent protection may be applied for. Patents can be applied to an idea provided that idea meets four-criteria: i) exhibit novelty; ii) not be obvious; iii) be capable be defined in such detail that a skilled person could put the invention into effect; iv) be capable for industrial exploitation. Certain exceptions are intellectual creations such as mathematical models, computer programs and works of art - Medical treatments but excluding specific drugs. A computer program may not in itself be patentable but a device or process that performs some novel function by way of that program could be patentable. Over the years, patent agents have developed a wording and terminology of their own which makes understanding patents difficult for a layman. In general, the less definitive the wording of the specification, the greater the scope of protection. If a challenge is made, it will be the wording in the claims that determines if the challenge is successful. It is worthwhile submitting an 'Informal application' for a patent as one-year is allowable to submit the 'Final application'. The period of protection lasts for 20-years provided renewal fees are paid, annually after the first four-years from the date of filing. Patents right have commercial value, they can be sold by the registered owners and ownership transfers upon the transaction being registered by the patent office. No patent holder can stop a determined attack on his patent by a competitor. Patents may be most successful in protecting a monopoly. Some organisations protect their inventions, to the extent that they do not wish to become the object of an action for infringement from a competitor, but without obtaining patents. This is done by publishing articles that describe the invention without revealing the more relevant secrets; it prevents rival companies that may be developing a similar technique from patenting it as a patent will be held invalid if it can be shown that 'prior publication' of the idea exists. Patents give the most comprehensive cover, but they are not a complete remedy against attack by a determined competitor.

Safety Qualification

High Technology products must be evaluated and qualified to meet Safety standards established by the industry wherein this new product shall be used. Besides meting and often exceeding the industry performance and safety standards, the products are tested and evaluated for reliability over an operating life of 20-years to 40-years. In-house proprietary tests and equipment are often developed, which after over a decade in use are included in the industry standards. Independent certified test laboratories are established to test and undertake to furnish product safety approvals. These safety approvals provide an insurance to protect industry and the manufacturer against industrial hazards.

Best Pricing

High Technology products are priced on the price that the market can bear and benefit by their investment new technological products. High technology prices are not set by the cost, and most often fetch a price fetching a Gross Margin of over 90

percent. Price alone is not the factor: design quality in terms of function, reliability and appearance is equally important.

Field Trials
A customer initially funds High Technology product development, and complete co-operation is sought for conducting field trials during the final development stage. Only after successful field trials over a reasonable operating period, the product is put on a large production volume. This is a critical phase of technology management for an industrial product.

Technology Service
In technology management of industrial product marketing, management of technology service plays a vital link in promotion of one success to the other users within the same market place. Technology Service provides a system and processes information in which the technology product is to be used and the benefits it would provide. It is common that the customer receives this technology service at no cost to the customer. These technology services are also extended by Commercial Information offices of foreign countries to promote export trade for manufacturers of their countries.

Technical-Economic Study
For a high technology product to penetrate a market its management requires sound marketing techniques, and the use of Technical-Economic Study tool is employed. Even after a proven reference, safety approval and acceptance by the engineering and maintenance department, the product will not have ready acceptance by the customer management. For this a Technical and Financial analysis have to be prepared and presented showing long term financial gains the new technology offers.

Liability Management
Even after having the high technical product screened and accepted by the customer, it could fail during plant operation, spelling a disaster for the customer. Manufacturers of High Technology product have to manage by responding to the situation quickly and positively. Manufacturer needs to hold customer's hand all the way; retaining total confidence entrusted in them by the customer. It is not uncommon for such disaster product failures to have taken place, and in all cases of such failures the manufacturer of high technology product has come out well, resulting in a stronger relationship between the manufacturer and the customer. You now have the high technology product well accepted in the targeted market place, and need to exploit other market places whilst the patent protection is still valid.

Reuse and Rename
The high technology product that has been successfully used in the targeted market place would find its need and usage in many other market places. However those market places would not be able to bear prices which reaps 90 percent Gross Margins, but there could be a few markets which could bear the prices having over 80 percent Gross Margins. For these new markets, the product is repackaged differently and reused and is given another product trade name. Separate patents are filed, the product is sent for fresh Safety approvals, and a separate team and business is set up to manage this new high technology business.

Reinvent and Upgrade
Having reaped the benefits of new high technology, of having invented a product and established a market, a time will soon come when the patent protection period will end, and many new competitors would be getting ready to enter the market. The companies plan and manage this situation by upgrading the materials technology

and come out with a higher performance high technology model, to replace their first generation product. In other words a high technology company continuously strives and competes within itself.

Innovation Again

For a high technology company needs to continuously and on long term basis come out with new technology and newer high performing materials. There are companies that plough back five percent of their annual turnover for funding pure science research activity. Later generation products employ combination of their proprietary technologies to find new solutions to new problems for the high technology industry. This completes a cycle of Technology management for Industrial products, as described at the beginning of this paper.

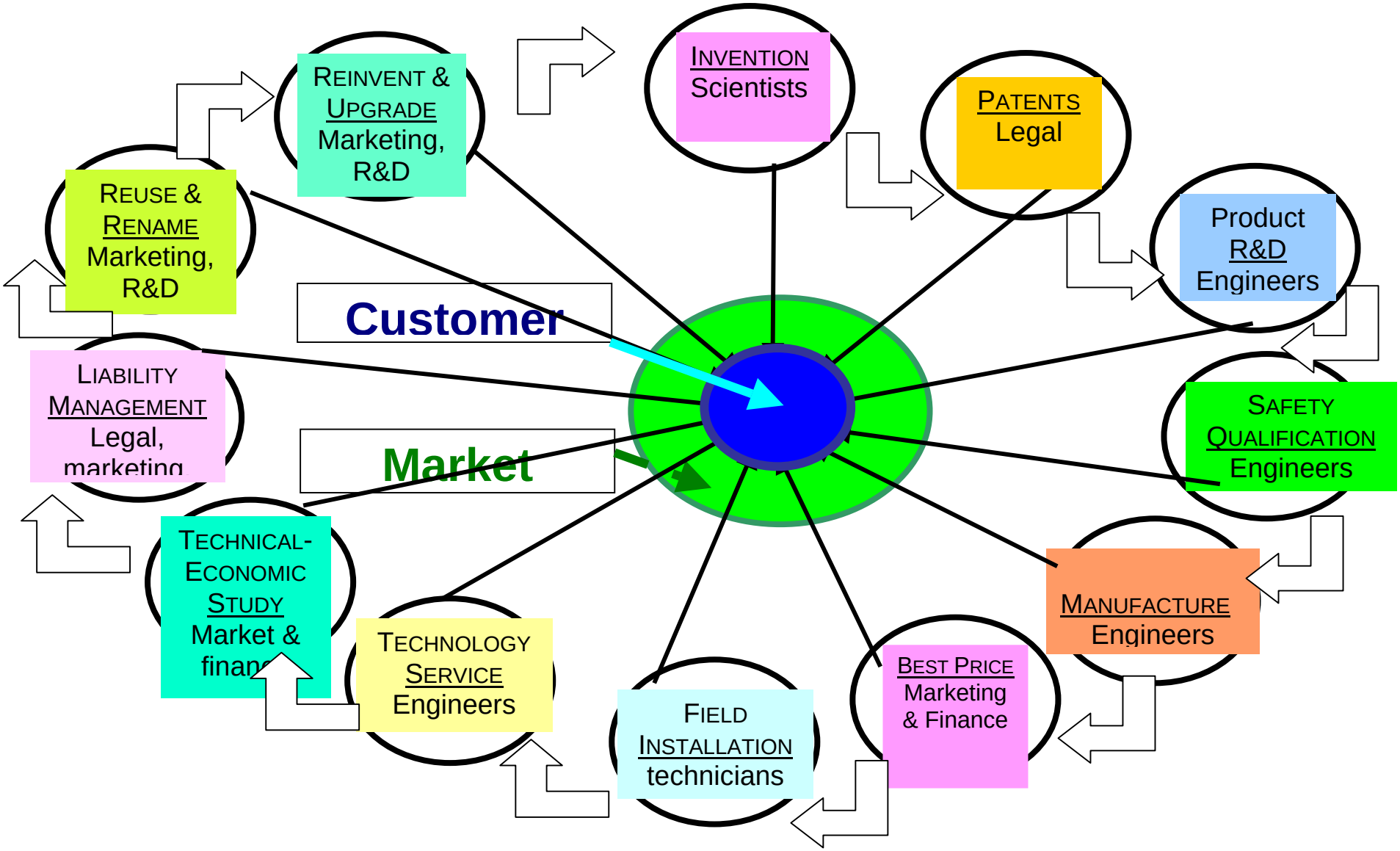
Conclusion

The trend of smaller businesses is clearly towards high technology for which planning is becoming is becoming is essential. Their main strength lies in a quick reaction to crises. A creative group should be formed and trained, both to generate new ideas and explore existing methodologies. A distinction should be made between evolutionary, research and innovative routes to technology products. The management style and personal qualities of a chief executive have a profound influence upon the manner in which a business is conducted. Management must attract and retain men of eminence. It is not always satisfactory to express the company purpose in terms of financial parameters. Rather a set of goals should describe the intended activities of the company which, when achieved, should result in satisfactory turn over or targeted profits.

[Refer Technology Management Cycle Diagram for Industrial Products Marketing]

References and Recommended Books for Reading.

1. 'Managing Innovative Projects': Alan Webb - Chapman & Hall, 1994
2. 'Innovate Through Technology': Charles Parker - British Institute of Management, 1989
3. 'Technological and Market Innovation': Harry Nyström - Wiley, 1993



Technology Industrial Product Management & Marketing Cycle

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