Creating Successful New Products:
Challenges for Indian Industry

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Introduction

In the increasingly competitive environment in India, the development and launch of new products have become an important competitive tool. In a crowded marketplace, there is greater need for differentiation; in markets that tend to be stagnant there is pressure to create excitement. The development and launch of new products helps in both situations.

In certain industries like the two wheeler industry, new product development has become critical to survival. Stringent new emission standards and multi-point competition are pushing two wheeler companies to broaden their product lines and introduce new technologies such as four stroke scooters and mopeds. Today, the Indian two wheeler industry has more than fifty models/variants with one or two new launch announcements every month. Such developments are happening in other industries as well, though perhaps not as visibly as in the two wheeler industry.

This paper is prompted by our belief that there are unique problems faced by Indian companies in rapidly developing a new product development capability. While the new product development challenges faced by large, established firms in developed markets have received considerable attention in recent years since the publication of the epochal *The machine that changed the world* (Womack, Jones and Roos, 1990), the problems faced by "emerging market companies" are different and have not received enough attention.

Emerging markets like India are different from developed markets. Emerging markets are often characterised by specific local needs, limited purchasing power and high price sensitivity (Prahalad and Lieberthal, 1998). Khanna and Palepu (1997) have suggested that in emerging economies, to make up for the absence of well-developed markets for labour and capital, firms may have to create their own infrastructure. There are thus contextual factors which can potentially influence an important strategic activity like new product development in the emerging market context and make the challenges before companies in these markets different from those in established economies.

Specifically, unlike established companies in developed markets, Indian companies

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are facing the challenge of structuring, *ab initio*, the new product development process in an environment of limited design skills and experience, few qualified vendors and inappropriate engineering resources. At the same time, they are constrained by limited financial and human resources, a lack of a market orientation, strong centralised control by business family heads, functional chimneys without deep functional expertise, and pressures to change on numerous fronts all at once to cope with the competitive environment. Further, over the last eight years, the complexity of strategy formulation and implementation has increased manifold – from merely obtaining an industrial licence and preventing others from doing so, to managing growth, cost-competitiveness, knowledge, innovation, and business portfolios simultaneously in a globally competitive environment.

In this paper, our focus will be on the challenges in new product development faced by companies in India, an important emerging economy. Our ideas are based on discussions we have had with managers involved in new product development in about twenty Indian companies, reports in the business press and some projects undertaken by our students. At the end, we identify questions that remain either partly or fully unanswered in the hope that these can be the subject of research for Indian companies, consultants advising them, and researchers.

Most of the issues discussed in this paper have their origins in the problems faced by Indian companies manufacturing discrete, engineered goods for either consumer or industrial markets. However, we will also discuss some of the challenges faced by Indian companies manufacturing fast moving consumer goods (FMCG), and by Indian firms involved in information technology/software product development.

New Product Development in India

Till 1991, India had a highly protected economy. Within the economy as well, competition was restricted by a complex licencing system. Not surprisingly, levels of competition were low and the need for product innovation was not felt by many Indian companies. Perhaps the best example of this is the Indian automobile industry, where the two major players, Hindustan Motors and Premier Automobiles made at best cosmetic changes to their Ambassador and Padmini cars respectively over three decades.

In a capital-scarce economy, the risk of developing new products seemed unnecessary. Further, many products manufactured in India were governed by technology licencing agreements that placed restrictions on the modification of products. Indian companies also faced difficulty in absorbing the imported technologies adequately. Further,

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import restrictions made it difficult for companies to source particular components or skills and capabilities they lacked from external sources.

In spite of these problems, some product development did take place Among the outstanding products developed were the Swaraj tractor (Chaudhuri, 1986), Amul buffalo milk powder and a variety of import-substitution products to meet specific defence and governmental applications (see, for example, Krishnan, 1995). Interestingly, even the Swaraj tractor and Amul buffalo milk powder had their origin in government research laboratories, the Central Mechanical Engineering Research Institute and the Central Food Technology Research Institute respectively.

The first period of economic deregulation starting in the mid-1980s saw private sector product development activity beginning to take shape. Some examples of this were the microcomputers and minicomputers developed and manufactured by companies like DCM Dataproducts and Hindustan Computers and mopeds developed by Sundaram Clayton Limited, a part of the TVS group. However, these were isolated instances and did not represent the emergence of a full-fledged product development activity in the Indian private sector.

Recent years have however witnessed a major increase in interest and investments in new product development. The most audacious and well-publicised of these is that of the entry of truck major Tata Engineering and Locomotive Company (Telco) into the development and launch of small motor cars. Press reports indicate that Telco has invested as much as Rs. 17000 million in the development of its new Indica, a small car to compete head-on with Suzuki's joint venture with the Indian government, Maruti Udyog (Narayan, 1998b). The Indica was launched in late December, 1998. Two wheeler manufacturer TVS Suzuki is investing Rs. 1800 million in the development and manufacture of a new four stroke scooter, the Spectra, which was also launched in the last quarter of 1998. This scooter has been developed without the direct involvement of Suzuki Motor. Moreover, these are not one-time acts, but represent a significant effort at developing a new product development capability – Telco has already announced plans to unveil a 2000cc turbo diesel car resembling the Toyota Lexus by January 2000 (Menon, 1999), and TVS Suzuki has announced that it will be launching eight new two wheelers (a combination of completely new models and variants of existing models) during the coming year (*The Hindu*, April 27, 1999).

Challenges and Problems

In a generic sense, the challenges faced by Indian companies in new product development are the same as those faced by companies the world over. Indian companies seek to get to market early (or reduce product development cycle times), develop products with "integrity" (Clark and Fujimoto, 1990) that achieve strategic objectives, make optimum use of development and other resources, and to develop not one, but a stream of new products over time. To meet these challenges, contemporary management thinking would advise Indian companies to "get it right the first time", pay adequate attention to the front end of the product development process (Khurana and Rosenthal, 1997), listen to the voice of the customer (Griffin and Hauser, 1993), improve intra-organisational communication, develop a common language to communicate and share product development ideas, and to deploy cross-functional teams in a structured product development process (Ulrich and Eppinger, 1995). Techniques such as concurrent engineering (Hartley, 1992), design-for-manufacture (Whitney, 1988), quality function deployment (Hauser and Clausing, 1988; ReVelle, Moran and Cox, 1998), and value engineering are advocated within such a framework. Other advice includes early supplier involvement, break-up and pipelining of tasks on the critical path, creative use of prototypes through rapid design-test-build cycles (Clark and Wheelwright, 1993), time-pacing (Eisenhardt and Brown, 1998) and "platform-thinking" (Meyer and Lehnerd, 1997). At the strategic level, a clearly articulated strategic intent (Hamel and Prahalad, 1989), a development strategy that chooses the right set of projects and helps integrate strategic planning with R&D strategy (Wheelwright and Clark, 1992), strong top management involvement at early stages of the project, empowerment of project leaders as "heavyweight" project managers (Clark and Fujimoto, 1990), strategic alliances for design or manufacturing, transferring and leveraging skills and capabilities across the company (Prahalad and Hamel, 1990), and setting targets for revenues from new products are in vogue. In addition, the top management is urged to create an organisational climate in which honest failures are tolerated, creativity is rewarded and inter-functional and inter-divisional barriers are lowered to facilitate innovation across the organisation (Kanter, Kao and Wiersema, 1997).

Indian companies face a number of problems in adopting these ideas. Our understanding of these problems is presented below.

All at once, or step-by-step – is there a choice?

Complicating product development decisions in the recent past is the fact that the

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Indian economy has been going through a recession and that the optimism of the early 1990s is clearly on the wane. The international economy is also looking far less robust than it did some years ago. Indian companies are struggling in this environment to simultaneously improve their cost competitiveness as well as be innovative on the product development front. The principal question that arises is "Can Indian companies deal with these challenges simultaneously?"

One of the celebrated examples of a small, poorly performing company transforming itself into a globally competitive giant is that of the Japanese earthmoving equipment (EME) company, Komatsu (Bartlett and Srinivasa Rangan, 1985). From an approximately $160 million producer of poor quality, small bulldozers for the Japanese market, over a twenty year period Komatsu became the world's second largest manufacturer of EME by the early 1980s and, with a share of about 25%, threatened to challenge market-leader Caterpillar's supremacy. While Komatsu's success has been attributed to its clear strategic intent (Hamel and Prahalad, 1989) and its translation into specific objectives within the company, all built around the energising slogan of "Maru-C", what is most noteworthy from our perspective is that in the early years of Komatsu's transformation it focused on one thing at a time. For example, it first concentrated on improving the quality of its flagship small bulldozer. It then shifted focus to a fresh project to reduce costs. It then looked at expanding its product line. Efforts to reduce costs by common parts followed. Each of these steps lasted a few years. During each step, the objective of that particular step guided resource allocation and resource utilisation. For Komatsu, this step-by-step progression was an effective way of focusing limited resources on achieving challenging goals.

However, some Indian companies are trying to do everything simultaneously. They want to achieve product and process quality, product features, and low cost at the same time. They believe that this represents the learning from Japanese best practice. However, as the Komatsu example above indicates, this is not what even an outstanding Japanese company like Komatsu attempted to do.

It might be argued that the competitive environment today is very different from what it was in the 1960s and today there is no option but to try it all at once. Interestingly though, an international expert on manufacturing and product development advocates the step-by-step approach. T.S. Sankar, Distinguished Research Professor in Production and Automation, Ecole de Technologie Superieure, University of Quebec suggests that Indian companies should first develop manufacturing technology based on design capability. He recommends that Indian companies first concentrate on conceiving a product intended to perform specific

functions for specific users, i.e. the creation of a manufacturable entity. Simultaneously, Indian companies should develop the capability for product evaluation and correction of defects during the production process itself, i.e. diagnostics. According to Sankar, "techniques like TQM (total quality management), VE (value engineering), quality circles, etc. are relevant in the next stage – improvement in quality and reduction in cost of a product already in production" (Gopalakrishnan, 1998).

That there is some truth in Sankar's assertion is shown by the TVS Suzuki experience with the Spectra. In spite of following a structured development process and state-of the-art product development management techniques, the company had to subsequently initiate a separate value engineering exercise to be cost-competitive (Krishnakumar and Vagesh, 1999).

Vendors: Partners or "ancillaries"?

A problem faced by Indian companies is the lack of strong vendor support. Indian industry has a long tradition of an ancillary approach to vendors. As the name suggests, this approach has considered vendors as manufacturers of sub-assemblies/components to designs and specifications supplied by the purchaser. This is particularly true in industries like the automobile industry. While these ancillaries have built up good manufacturing capabilities, they have tended to neglect design and development. To make matters worse, the purchasing companies themselves have lacked a strong enough design and process engineering capability to be able to advise their vendors on how to either improve product performance or to lower costs and improve reliability. The power relationship between vendors and the purchaser has also been markedly skewed in favour of the latter.

A result of this history is that there are few vendors who can independently take up design and development of new components/sub-assemblies to challenging performance and cost targets. This virtually rules out the use of "black box" development (Clark and Fujimoto, 1991) – under this approach, the product development team provides the supplier with only specifications of what the component has to do but the detailed design within certain cost targets is left to the supplier - within the country. For Indian companies, this means that they have to either develop products almost completely on their own or work with foreign design houses and suppliers. This has an adverse impact on the time taken to develop new products as well as on costs. Developing and manufacturing components in-house also reduces flexibility, increases investments and reduces the potential benefits of economies of specialisation and scale that could be enjoyed by specialised vendors.

Some companies have encouraged qualified employees to set up their own small units and become suppliers to them. Others, like Telco, have made setting up a network of component suppliers through joint ventures with international giants an integral part of their strategy. However this latter option is not open to all companies.

Finding the right people with the right capabilities: the perennial stumbling block

Another constraint faced by Indian companies is access to appropriate manpower. While it used to be said that the brain drain of qualified scientific and engineering personnel from India was due to the lack of challenging employment opportunities, today's problem is that many of the best engineers go into the highly successful Indian software industry. The software industry offers job opportunities at international locations with attractive monetary benefits. It is poised to grow further, and with the media attention currently given to it, is likely to continue to attract India's best engineers in the years ahead

Design-based courses are also inadequate in Indian engineering institutions. In fact, few Indian engineering institutions have courses which integrate design theory and practice and that require students to create working prototypes. Even in institutions where such facilities exist (as in the IITs), the deterioration of administrative systems has fuelled the decline of workshop facilities. As a result, some institutes have given up the requirement of a design project in the final year, or relaxed the earlier requirement that the product designed "should work." As a result, companies are today forced to create in-house training programmes on product design and development, using expertise sourced from within the country and abroad.

In the area of industrial design there is a slightly different problem – while the Industrial Design Centre (IDC) at IIT Mumbai and the National Institute of Design (NID) at Ahmedabad produce qualified industrial and product designers, companies have experienced difficulties in locating them within their organisations and making the best use of them. A related problem has been finding a common language between designers and the manufacturing and marketing departments (Chatterjee, undated). At least partly as a result of these problems, many industrial designers have set up independent design boutiques but have found that product design projects are few and far between.

Within companies, few of them have employees who combine the technical and managerial skills needed to take on the role of project managers for new product development projects With authority in Indian companies going more with seniority in the hierarchy rather than skills and capabilities, it is very difficult to find employees who can take on the role of

"heavyweight" project managers even if the companies want to set up heavyweight project teams. Further, engineers who have come up from the shop floor and managers in functions like marketing tend to speak a different language altogether. Perhaps, like in many Japanese companies, Indian companies should consider requiring all engineers to start in the sales function before they go into technical roles.

Functional chimneys with inadequate functional expertise

The machine that changed the world (Womack, Jones and Roos, 1990) and other studies of the world automobile industry clearly established the difficulties inherent in following a sequential approach to product development such as from research to development to engineering to production engineering to manufacturing and so on. In this sequential approach, delays were endemic with each functional department returning the product to the previous department for changes and modifications. In contrast, the development of new products through empowered cross-functional teams and the use of techniques like concurrent engineering enabled Japanese companies to develop products in much shorter cycle times.

In India the problem of functional chimneys is compounded by the lack of depth in the expertise of each functional area. Deep functional expertise may be as important as cross-functional integration for successful new product development (Sobek, Liker and Ward, 1998). The lack of expertise in Indian companies means that functional departments take longer than they should to solve problems and that they sometimes do not resolve problems completely, thereby necessitating rework at a subsequent stage This makes philosophies like "do it right the first time" that much more difficult to implement. The lack of functional expertise and certain key skills like process engineering makes it more difficult for Indian companies to absorb technologies sourced from elsewhere. One Indian company in the electronics sector entered into a fresh collaboration agreement with the same technology supplier after the conclusion of the first one with the hope that they could "at least now achieve the same levels of yield as their collaborator" – as the CEO told one of us," At least we now know what questions to ask."

Indian companies need to consider using focused training programmes to improve functional expertise. Besides managerial and behavioural training, they could use company-wide initiatives like Total Quality Management or Total Productive Maintenance to improve inter-functional and inter-divisional communication and coordination.

Size and nature of the domestic market

One of the constraints to product development in India is the size of the domestic market. Markets appear large in terms of raw numbers, but many products have faced limited off-take because of limited purchasing power and high price sensitivity. This makes investment in moulds and dies a risky proposition. Sophisticated computer-based tools for product development such as three dimensional computer-aided engineering and rapid prototyping are also very expensive by Indian standards and there are few public institutions that provide such facilities or services on hire. There was earlier a tendency to make do with less sophisticated design and production methods with lower investments. However that is now proving to be a major stumbling block.

An Indian engineering company keen to improve its products undertook a major restructuring of its product development organisation and processes and encountered this problem. The company had traditionally used vendors with relatively unsophisticated production processes, as it required small volumes at low cost. But the new products envisaged by the restructuring needed the use of significantly better manufacturing processes which would require major investments by vendors. The vendors were reluctant to make these investments given the historical volume levels of the company. The company itself had a culture of maintaining long-tem relationships with vendors and was reluctant to force the issue with them. This impasse proved to be a major bottleneck to improving product development capability.

The exposure of Indian consumers to international products with their superior finish has made product development that ignores external appearance difficult to sustain. Some companies that have taken the risk based on careful and insightful understanding of user needs have been highly successful. Coimbatore-based Elgi group developed and launched a sleek wet grinder that looks more like an international kitchen appliance than the conventional "wet grinder with a motor-attached" common in south India. The Elgi *Ultra* has recouped its investment and more in spite of a price premium over other wet grinders in the market.

Creating a constructive role for top management

For Indian companies large investments in new product development represent a major change in mindset. These investments are also huge from the point of view of the companies themselves. Telco's investment in the Indica project is many times its profits (Rs. 2940 million in 1997-98). Failure to recover a major part of these large investments could

have serious implications for the bottom line of these companies.

Visible top management involvement by CEOs like Ratan Tata of Telco and Venu Srinivasan of TVS Suzuki has been a feature of recent large new product development efforts in Indian companies. While the quantum of the investments involved make top management involvement inevitable, more important is the nature of top management involvement. International studies show that about 80% of the lifecycle costs of a product are determined by decisions taken in the early stages of product development (*The Economist*, 1994). This suggests that if the top management is to contribute to the effectiveness of a project, it has to get involved early. At the same time, top management has to refrain from second-guessing front-line managers who probably understand the market better. Indian managerial traditions of deferring to authority and pushing decisions up the hierarchy could be dangerous in this context. The Japanese advocate an approach described by the term "subtle control"; we need to find approaches suitable to the Indian context.

Unfortunately, as mentioned earlier, the dysfunctionalities of hierarchy and bureaucracy are visible in many Indian companies. There is a strong hesitancy to empower younger managers. At the same time, senior managers and the top management may lack the qualifications and experience to lead a product development effort and take related strategic decisions.

As mentioned earlier, the best way to increase the success of product development activity and to ensure that scarce resources are utilised well, is to put in place a well-structured product development process (Ulrich & Eppinger, 1995). This is not a substitute for strategic analysis and careful selection of new product development projects, but improves the chances of a particular project's success once a decision to develop a product has been taken.

To encourage the use of such structured processes, one approach practiced by an Indian company with several successful product launches to its credit is for the CEO to take major decisions but only after ensuring that a structured process is followed, and a complete analysis is done. Though the project team leader does not have the authority to go ahead to the next stage without a go-ahead from the CEO, the CEO makes sure that the decision that is taken emerges from the deliberations among the product team, subsequent to their following a structured process within a TQM framework. Following this discipline is expected to be good for the company in the long run, make managers feel more comfortable about making major decisions, and at the same time confirm the commitment and involvement of the top management. However, the danger here is that once there are too many products being

developed, such involvement may not be possible. In fact, in another Indian engineering company with a good record of product development, the top management has laid down a well-defined stage-gate process (Cooper, 1990) but with too many gates (reviews) - these impede progress in the project. This points to a need to fine-tune the number of stages and gates as the product development activity becomes a more routine activity, or to differentiate between product development projects depending on their criticality, complexity and resource intensity.

Balancing alliances, learning and product integrity

Both Telco and TVS Suzuki have used a mix of in-house skills and carefully out-sourced specific skills and technologies from international vendors to develop the Indica and the Spectra respectively. For example, TVS Suzuki has consulted specialists in the areas of gear transmission, frames and handles to provide stability while keeping noise levels low. This suggests that a major challenge for Indian companies is to manage alliances with multiple design and engineering consultants. It also means that the core product development teams, in addition to being cross-functional, may also be multi-organisational, thereby increasing the complexity of management of the development process.

This approach has important implications for product architecture. At the system level design phase, clear interface specifications have to be set so that the contributions of different alliance partners can be integrated. For Indian companies, systems design, engineering and management is thus a critical skill because integration across the contributions of the different partners has to take place within the company developing the product itself. Obviously, under such circumstances, maintaining product integrity is a major challenge.

A related issue is the need to put in place mechanisms for learning from the alliance partners. After all, any company that intends to make the development and launch of new products a key feature of its competitive ability can not be eternally dependent on external consultants for core product development capabilities. In general, Indian companies have not shown themselves to be very good at structuring appropriate learning mechanisms to learn quickly from joint venture or strategic alliance partners. This is therefore clearly an area of concern.

Managing the R&D function

Indian companies have historically been low investors in R&D with investment in R&D as a percentage of sales being well below 1%. In fact, a recent study by Chandra and

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Sastry (1998) shows that in a sample of firms, on an average, 0.84 per cent of sales were invested in internal research and development, and under 4% of sales on acquiring and absorbing new technologies. But many companies are now faced with the challenge of creating the necessary capabilities in-house, at least those capabilities which are at the core of the products they develop. While the present approach is to undertake specific R&D projects related to specific products on the anvil, soon companies will have to start long term R&D programmes on generic technologies if they want to be leaders or quick imitators rather than slow followers. Choosing the right technologies to develop, forecasting technology trajectories and anticipating new developments are becoming important. Few Indian companies have these capabilities at this point of time

Roussel, Saad, and Erickson (1991) advocate an approach called third generation R&D in which

> R&D seeks to respond to the needs of existing businesses and to the additional needs of the corporation while at the same time contributing to the identification and exploitation of technological opportunities in existing and new businesses. General management in the third generation mode institutes a strategic and operational partnership between R&D and the other vital functions in which R&D challenges and helps define the company's real technological needs, both today and tomorrow, in addition to helping meet those needs. (p. 35)

However, in most Indian companies, R&D lacks the status to perform any such role. Very few Indian companies even have board-level representation for the R&D function. The practice of appointing a Chief Technology Officer (CTO) is also rare and where a CTO exists, his role seems to be concerned more with information technology. Few Indian companies have business managers with a deep understanding of technology or technology managers with business savvy. Creating such a group of managers might well be crucial to long-term product development success. Indian companies have to go well beyond seeing R&D merely as a source of tax breaks if they are to use it strategically.

Intellectual Property Rights & Knowledge Management

Product development in areas of evolving technologies needs close attention to intellectual property rights in terms of patents, registered designs, trademarks and copyrights. Awareness of these issues in Indian industry is conspicuously poor and only recently have attempts been made to focus greater attention on this area (Ganguli, 1998). A broader question is the whole issue of knowledge management. Today, it is widely believed that in

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many industries physical assets like plant and machinery are being eclipsed in importance by so-called "invisible assets" (Itami, 1987) such as knowledge and particular skills and capabilities.

As a country, we must admit having scant regard for intellectual property rights. Whole clusters of industries have been built around the concept of reverse-engineering and copying others' products. The Indian Patent Act of 1970 which was enacted at the height of our socialist zeal goes a long way to prevent monopoly but provides little incentive for innovation. While we are moving away from this idea at least on the statute book, changes in mindset will take much longer to happen. The CSIR chief, Dr. Mashelkar, has announced a national mission to combat patent illiteracy, but there is a long way to go.

The above discussion focused on the problems faced by Indian companies creating discrete, engineered products. In the following sections, we look at some of the specific problems faced by Indian FMCG and software companies in product development.

Fast moving consumer goods

In the fast moving consumer goods (FMCG) arena, the costs of establishing a new product or brand make failure a very expensive proposition. Advertising and promotion expenditure for new product launches is of the order of hundreds of millions of Rupees; if the new product fails, this investment is largely unrecoverable. In recent times, Indian companies like Marico (edible oils and hair oils), Dabur (food products and beverages) and the Himalaya Drug Company (cosmetics and over-the-counter medication) have braved these risks to launch a clutch of new products.

Many Indian markets, particularly of consumer products, are characterised by large segments that are dominated by low-priced products from the unorganised sector. A challenge for companies is to be able to compete in these price-sensitive segments. This involves development of new products within the context of overall business models that operate based on a cost structure similar to that of the unorganised sector. This problem is equally serious for large Indian private companies and multinational subsidiaries. A good example of this is Hindustan Lever's attempt to enter the large part (estimated to be about 2/3rds) of the tea market dominated by loose teas (Narayan, 1998a). The new product, Brooke Bond A-1 tea is actually not a single product, but a collection of blends specially and independently developed for different regions. HLL's R&D has enabled these blends to be created based on teas sourced from different tea gardens (allowing cost control) and

manufactured at third-party, regional factories. Innovations in supply chain management and distribution have enabled HLL to price the product at just a 5% premium to loose teas.

The aggressive moves by multinational subsidiaries like HLL to mimic the lower costs of smaller players where required and combine this model with their undoubted marketing clout makes it imperative for Indian FMCG companies to re-think their strategies and find appropriate business models that will permit them to compete with these strong rivals.

Software Products

Software product development has the potential to be a highly profitable activity due to the multiplier effect – the variable cost of duplicating software packages is very low and every copy sold thereby offers a potentially high contribution. Product development also enables companies to be at the leading edge of technology. There is a high degree of prestige associated with the international vendors of software products like Microsoft or Oracle. Software product development would also allow Indian software developers to unleash their creativity and fulfil the potential for which they are internationally known.

The movement of qualified engineers into the Indian software industry might have suggested that product development activity in the software industry is growing fast. However, for a number of reasons, Indian software firms have concentrated their attention on providing information technology and software services rather than developing products. Software services enable Indian companies to be highly profitable with relatively low risks. The provision of services has been a natural transition for these companies from body-shopping which served as their entry strategy. In the service business, a lot of conceptualisation can be done by a consultant or some other intermediary. Service projects are well-defined with clear deliverables. The main marketing capability required is relationship marketing and the managerial skills required are principally related to project management. In contrast, to make money from product development, it is essential to capture value through the marketing part of the value chain. But with the principal markets (mainly the U.S.) far away that is a difficult and expensive proposition. Product maintenance over the life cycle of a product is expensive as is providing international support. The development of software products thus requires a different business model from the provision of services, and one that is difficult to sustain. Even companies like Wipro Systems and Mastek which initially went on the product route have subsequently moved away to services.

There are also institutional and social constraints to product development. Software

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product development, particularly at the cutting edge, also involves close attention to IPR and knowledge management issues – some of the problems associated with these have been discussed earlier. Software piracy, in particular, is a major dampener to product development for the Indian market. There is not enough venture or risk capital available in India for product development. Socially, it appears that we are not willing to accept that less than 10% of products will succeed and continue to attach a stigma to failure.

A different form of the problems associated with developing products without adequate functional expertise is seen in the software industry. The need to move to greater value addition and beyond a competitive advantage based merely on labour costs has seen Indian software firms making attempts to convert their experience of developing customer-specific packages into more generic products. While in the former they have strong support and help from their customer, developing generic products is a different challenge altogether The lack of domain expertise within the software industry has made this transition difficult even without considering other issues such as capturing user needs for generic products and marketing the products effectively.

A demanding local customer base is believed to enhance product quality (Porter, 1985). The absence of such a sophisticated customer base in India, as also the size of the domestic market have stunted software product development. The Mumbai-based Mastek, for example, had developed an Enterprise Resource Planning (ERP) software, MAMIS, in the early 1990s. But this product was not able to withstand the competition from established ERP packages when they entered the country (Thiagarajan, 1999). In contrast, the Chennai-based Ramco Systems has had to invest of the order of Rupees one billion in creating Marshall, a sophisticated ERP system that has been sold in international markets. Ramco Systems has overcome some of the problems of the domestic market by aggressively seeking foreign customers; but this has been possible only because of the focused strategic intent and large pool of investible resources available with the company (see Murthy & Krishnan, 1999).

Opportunities in the New Product Arena

Notwithstanding the somewhat pessimistic picture presented of the problems faced by Indian companies in new product development, it is important to realise that there are also tremendous opportunities for these companies. Products designed by MNCs are not always appropriate for Indian consumers and there are many opportunities for Indian companies to use their superior understanding of Indian tastes, preferences and habits to design products to meet Indian needs. The development of an improved air cooler, Symphony, by the

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Ahmedabad-based Bakeri group is an example of a product designed to meet the unique cooling requirements of Indians in dry and hot summers in north India and yet not compromise on external appearance. Mosquito repellents and coils (such as Good Knight), accounting software packages like Tally, and the scooterette, Scooty, designed and manufactured by TVS Suzuki are other examples of products specially designed for the Indian market by Indian companies that have achieved considerable success in the market.

Besides opportunities within India, there are also opportunities in external markets, particularly in other emerging economies. There have been notable successes here as well, such as the export of buses to Sri Lanka by Ashok Leyland, and to Bangladesh by Telco. Tractor manufacturers have addressed external markets in Africa successfully. Manufacturers of the rugged, and dust resistant rural telephone exchanges based on technology developed by the Centre for Development of Telematics have also been able to export their products to some African nations and Vietnam based on the appropriateness of the technology to Indian conditions. India has a unique advantage in being a low-cost economy and yet having relatively better product development and manufacturing infrastructure than many other emerging economies.

The cost advantage of India's manpower can also be used to develop products for more sophisticated markets in association with foreign companies and MNCs. A number of MNCs such as Unilever and Texas Instruments have already set up R&D or product development centres in India to take advantage of Indian skills and capabilities. Small Indian firms may also be able to offer such services to larger companies abroad. A Coimbatore-based company, Soliton Automation, works as part of the network of National Instruments, a large U.S. based automation company, to develop new products for automtation systems both in India and abroad. There are therefore a number of potential benefits for Indian companies developing a product development capability.

The Questions that Remain

In this paper, we have looked at the problems faced by Indian companies in adopting the "best practices" for the management of new product development projects. There is a need for contextual research and experience-sharing on how these problems can be overcome. We list below some of the questions that we believe need to be addressed:-

1. In the contemporary competitive context, should Indian companies develop a new product development (principally design) capability first, or should they attempt to move directly

to an integration of new product development with cost and quality initiatives such as TQM and value engineering?

2. Are there new ways in which Indian companies can quickly develop vendors with design and development capabilities to whom product development of sub-assemblies or components can be sub-contracted? Should companies encourage qualified existing personnel to set up their own ventures as a method of achieving this? Or would it make more sense for companies to concentrate on in-house development until such time as a better vendor base emerges?

3. How can Indian companies develop a quick learning capability? What do they need to do to be able to manage design or manufacturing alliances better?

4. What is the appropriate role for top management in product development in the Indian context? What kind of mechanisms should the top management use to get involved in new product development?

5. What kind of technology strategies should Indian companies adopt? What balance of current product-focused R&D and medium/long-term R&D programmes should they adopt to ensure present and future competitiveness?

6. Based on international experience, is there anything the government or industry associations can do to improve the availability of manpower with design capabilities? Should there be any attempt to wean away people from moving towards the software industry?

7. How should Indian companies look at markets and customer needs so as to be able to identify adequately large segments that could justify large investments in dies, moulds and manufacturing technology for large-volume production of international class new products?

8. What business models do Indian FMCG companies need to adopt to compete successfully with multinationals?

9. What lessons can be drawn from the limited experiences of Indian companies in software product development? Can (and should) the government try to help Indian companies overcome the barriers to software product development? If so, how?

While we acknowledge that these are broad questions that probably cannot be answered in single studies, we believe that smaller research studies need to be designed within this larger context.

Conclusions

Studies across the world on the competitive advantage of nations have shown that a historical emphasis on industrial innovation by a community or the local government has lead to the development of a critical mass of firms and associated ancillary units, eventually leading to the region's long-term competitive advantage. Product development has been a neglected area in India for a long time to the detriment of its competitive advantage. Whatever little product development has taken place has been to counter situations where the Indian firm has been denied imported products or where the imported product was unsuitable for Indian conditions. More emphasis in product development has historically been placed on making modifications of existing products for Indian conditions than on creating entirely new products.

With little historical tradition of industrial innovation, especially in the creation of new to market products, Indian firms struggle to overcome a handicap. Research emphasis on new product development areas that address concerns of Indian firms is therefore welcome from both practice and industrial policy points of view. Such research in the Indian context may also provide a base to extend and test results obtained from studies in the industrially advanced countries. Moreover research on new product development in India can capture new parameters of the product development process that can be tested in the industrially advanced country context of earlier studies. These can also lead to the generation of contingency models of new product development. Besides academic research, there is a need to pool the experience of consultants and the companies themselves as to how they have overcome some of the constraints to product development in India described in this paper.

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