Business-driven Research and Development

Managing Knowledge to Create Wealth

Dr Ashok Ganguly

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Prologue

Why I decided to write a book on R&D in industry and why people should be interested in it needs some explanation. In many businesses, and even in the so-called high technology ones, the eyes of CEOs and senior executives have been known to start to glaze over whenever the topic of discussions turns to R&D. This reaction may be traced back to widespread dissatisfaction with R&D in industry, especially in the 1970s and 80s. The only exceptions are among R&D-based start-ups, sponsored by venture capital companies, in areas ranging from IT and genetics to pharmaceuticals and telephonics. Published statistics suggest that while most firms steadily invest in R&D as a measure to enhance shareholder value, entrepreneurial start-ups, originating from scientific ideas and breakthroughs, tend to earmark a larger percentage of their funds to R&D. In developing economies R&D in industry is generally non-existent leading to some serious consequences, which are now widely known.

I began my professional career as a scientist in an industrial R&D laboratory of a multinational subsidiary in India. In due course, I moved to manufacturing and, eventually, became the chairman of the MNC's (multinational corporation's) subsidiary in India. The survival of this Indian subsidiary in the 1960s and 70s was heavily dependent upon import substitution of its key raw material. My understanding of business-driven R&D originated in the successful import substitution efforts of this MNC subsidiary. This company, as a result of its early R&D success, became the largest and most successful foreign company in India. In the course of my working career, through various interactions with the parent MNC as well as actual work experience in Europe and America, I began to notice a growing disenchantment of the business with its R&D, especially during the 1970s and 80s. In due course, I became aware that effectiveness of R&D in industry was an issue of wider concern among many companies in the USA as well as across Europe during these two decades. Thus in 1990, when I was appointed as an Executive Director on the Main Board of the MNC and made responsible for research and technology, the tensions between business and R&D in the company were fairly

palpable. This was about the same time as the IT explosion was beginning to spread, although its impact on business was becoming noticeable mainly in the banking and financial services sector. Simultaneously, the emergence of knowledge management as a formal process had started to be more widely perceived, especially for its impact on business competitiveness and in the creation of wealth.

The imperative to change some of the traditional business beliefs and practices was thus becoming obvious and the lack of connection between R&D and the marketplace was identified as a key weakness by many business enterprises. The only way a connection between these could be established required the joint efforts of business heads and R&D managers. The prerequisite for establishing a wealth-creating connection between the marketplace and R&D demanded a much more profound understanding of consumers/customers in different markets than ever before in the history of modern commerce, while at the same time radically changing the management of R&D and making it an unambiguous business-relevant process. Because these developments were a consequence of an emerging business environment, and therefore had a direct effect on business performance, the readiness to change traditional views, attitudes and work practices was already widely prevalent in our organisation. During the 1990s I also came across examples of similar changes in business-driven relationships taking place in many other companies across Europe and in the USA. On the other hand, in Japanese industries, SBU heads and their R&D colleagues have traditionally tended to work together comparatively more intimately and were therefore somewhat better placed. As in the case of most management advances, the concept of business–R&D intimacy was rapidly adapted across companies in the USA. However, in Europe there still remain a few pockets of resistance. The R&D director of a very large and venerable European MNC in the electrical and electronic business was convinced that he had a ‘responsibility’ to protect R&D from undue business ‘interference’. He had developed arguments to prove that the value of the patents generated in the company’s R&D laboratories, in his charge, represented several-fold potential returns when measured against the company’s investment in R&D. It was another matter that his claims could not be related to business performance of the MNC which happened to be on a downward spiral. In my subsequent encounters with other R&D directors, for example in industry R&D associations in Europe, I found that such attitudes and views as

I have described above were more widely held than one had expected. Fortunately, however, among the vast majority of American and European industries, including the one I was employed in, business managers as well as R&D managers were committed to abandon traditional practices and seek new ways to drive R&D, and thus to achieve specific business objectives.

I was particularly fortunate to have among my most senior research colleagues individuals who turned out to be the principal advocates for the introduction of the new business-driven R&D management process. Incidentally, in our case, the business-driven R&D initiative also called for dismantling geographical and cultural barriers and from that, as a consequence, was born the concept of *borderless laboratories*.

Most of the issues described above are not likely to appear as being novel to most managers in industry. In spite of this, two reasons persuaded me to write this book. The first is that while there is a general acceptance of the view that business heads and their R&D colleagues need to work closely together in order to derive competitive advantages, most of the published literature describing the ways of achieving this objective happen to be too amorphous to be effective in practice. The second, and probably even more compelling, reason was the amazing transformation which started to take place among scientists in our laboratories following the adaptation of a formal business-driven R&D process. Once the business-driven R&D processes started falling in place, the vast majority of my scientist colleagues turned out to be the most ardent advocates of the new ways of working. Our research laboratories became infused with a new sense of purpose, while individual scientists began to exude high levels of enthusiasm and energy. The root cause for all this excitement and enthusiasm in the laboratories was that the business-driven R&D process enabled the employees to relate their R&D work to clear business objectives. Shifting from hierarchical organisation structures to working in project teams further clarified the role and accountability of individual research scientists, at all levels, as never before. Ultimately the changes brought about by business-driven R&D were seen as being highly motivating by all the individuals involved, whether in the research laboratories or in the operating companies.

Research scientists no longer waited, apprehensively, for the annual funding round, preparing defences to ward off threats to their pet projects and programmes. Business heads took their role as custodians of their research programmes very seriously, since the future of their

business depended upon the success of the R&D projects. In this process, investment in fundamental research also could now be clearly linked to the long-term strategy of business, as indeed were the related scientific partnerships with academia and other external institutions.

The rapid spread of IT had an extremely timely and a most profound influence on business-driven R&D. It helped establish and infuse a highly dynamic and productive innovation culture across the company's geographical spread, linking subsidiaries and operating companies with the help of world-wide IT networks.

The methodologies needed to usher in a business-driven R&D culture in a company are now reasonably well established. From the descriptions in the following chapters in this book, it should be reasonably easy for a firm to adopt processes best suited to its markets and technologies, provided a firm is mentally and culturally prepared to usher in such change. All world-class businesses are already being driven by advances in technology and new knowledge. The half-life of new innovations is rapidly dwindling. In order to sustain market leadership, combining superior consumer understanding, innovation and R&D have become indispensable for business continuity and success. It is therefore no surprise that innovation and technology now figure prominently in the agenda of corporate board deliberations and most CEOs have taken charge and become key sponsors of these changes in their companies.

Improvements in methods and processes for managing R&D in industry will, of course, continue as indeed they should. This book, which began in the early 1990s, is an attempt to describe a small step in that process.

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I am grateful to all my colleagues on the Board of Unilever, who were instrumental in helping me develop the concept of business-driven R&D. However, Mr Jan Peelen and Mr Anthony Burgmans were particularly influential in encouraging me, from the very start, to explore ways and means to weave together business priorities and research programmes in the businesses they headed. The three of us worked together, from the beginning, to develop the concept of business-driven R&D. The concept was so simple, while at the same time so compelling, that in due course other parts of the business readily adopted the new methodologies. In establishing a formal innovation management process described in Chapter 5, we were greatly helped and guided by Professor Kim Clark and his colleague Eric Mankin of Integral Corp. Among my most senior research colleagues Drs Tom Little, Hans Nieuwenhuis, Roger Platt, Lincoln Krochmal, Ray Moran, Alan Mckinnon, Anthony Lee, Alan Evanson, Jan de Rooj, Alistaire Pennman and Jeroon Bordwijk became the most enthusiastic drivers and agents of change. Ms Erika Jones, of Erika Jones and Associates, helped lay the foundation stone for the project team building and project team training programmes described in Chapter 7 which turned out to be a decisive factor for success. Rob Daniel, a senior HR Manager in R&D, was put in charge, and helped launch the new training programmes and prepare the training manuals.

The availability of a user-friendly IT support system turned out to be the second most important success factor. Dr David Frost was responsible for creation of the IT framework described in Chapter 6 which facilitated the project team management process and also laid the foundation for the creation of the world-wide innovation network. It is inevitable that in this brief account it is not possible to acknowledge many others, without whose vital inputs and commitment the concept of business-driven R&D would have remained attractive as an idea rather than becoming a reality. Literally hundreds of employees across our research laboratories, innovation

centres and operating companies made these processes alive by application in their day-to-day work. Last but not least, I acknowledge with gratitude the patience and diligence with which my secretary, Mrs Amy Bharda, typed what at times seemed to be endless drafts of the manuscript.

Preface

The *aim* of this book is to share with readers in industry and academia, as well as with policy makers, my experience and learning as to how science and technology may be managed more purposefully in industry in order to meet well-defined business objectives. Two books were written, by business consultants, on the subject in the 1990s – P A Roussel, K N Saad, and T J Erickson, *Third Generation R&D* (1991), Harvard Business School Press; J V Buckley, *Going for Growth* (1998) New York, McGraw-Hill. Both books contain good descriptions of some of the contemporary industrial R&D and business management issues. As a matter of fact, of the two books, *Third Generation R&D* comes somewhat closer in describing certain real issues in industry. But both texts miss the practical perspective of day-to-day problems of managing R&D in an industrial environment. Furthermore, these books do not deal sufficiently with certain important topics such as the role of human resources, IT, academic linkages and several others which have profound influence on the effectiveness of industrial R&D. These are omissions which are also fairly common in research and review papers published in journals on the subject during the past 10–15 years. This led me to conclude that what had been described in the above two books, as well as some other publications, compared to the reality of an industrial work environment, was significantly diverse. Such gaps in the comprehension of industrial R&D could only be filled by relating certain firm-level experiences.

The *scope* of the book is built around the fundamental premise that in industry the primary role of R&D is to fulfil business objectives within a framework of time and cost targets. R&D in industry is, however, unlike any other business service function. While the formulation of business objectives is the prime responsibility of business managers, the chances of achieving such objectives can be significantly improved if done jointly with R&D managers. This way of joint working assumes certain competencies among business and R&D managers, in order to understand the changing nature of markets and the power of R&D to deal with them. It, of course, does not work

this way in all firms. IBM in the 1980s and Philips in the 1990s, two prominent companies, owned two of the most prestigious industrial R&D set-ups in the world. Such was the quality of their research that some of their scientists even shared the Nobel prize for their discoveries. Yet both businesses suffered badly – IBM in the 1980s, Philips in the 1990s – primarily because of the vast gap between what customers and consumers were asking for from these firms, as compared to the type of projects their marketing and R&D departments were engaged in. My book's *aim* is to describe some of the reasons as to how and why such gaps develop and what steps may be taken to avoid them.

In the course of exploring the key reasons for the disjunction between R&D and the marketplace, as well as explaining how firms may ensure that such discontinuities may be avoided, the *scope* of the book in *certain related* areas has logically been extended. Description of these areas provides a holistic model of how *business-driven R&D* may be managed to derive sustainable competitive advantage.

One such area is related to the phenomenal spread of education in the developed countries. A consequence of this diffusion is that generating and managing knowledge have emerged as prominent competitive forces for industry and academia as well as for countries. Knowledge links industry, universities and national governments in different ways in order to create wealth; some of these ways are very new, and many of them are not yet well understood. Understanding the power of knowledge management is critical in modernising and driving industrial R&D. Consequently, it is attracting increasing interest from researchers as well as from national governments. Chapter 3 is devoted to the subject of knowledge and some of its impact on *business-driven R&D*.

A second area concerns human resource (HR) development, primarily as it relates to scientists in industry. Historically, this has been a neglected area of management attention. Many of the traditional attitudes, disappointments and disjunctions between industrial R&D and business can be directly attributed to incomplete appreciation of the human resource issues. In course of exploring this subject it was discovered that specially designed HR strategies can dramatically transform the work environment and attitude of scientists in industrial R&D laboratories. Furthermore, these strategies also trigger attitudinal changes in the rest of a corporation with some remarkable consequences. Progressively, R&D and business managers begin

working in new ways and enrich the impact of science on business performance. Interestingly, this new HR initiative also spreads beyond the firm level and facilitates new types of partnerships with universities and other research institutions. As a consequence, such partnerships become sustainable and more productive for the participants in ways which were not achievable previously. Another consequence is that organisation structures in firms begin to change, as well, in order to reflect the new ways of working. Such new HR-driven changes are taking place faster in some corporations than others. But the general trend in most major corporations, in the developed world, is more or less similar to what is described in Chapter 7.

The third area concerns the management of innovation with the help of firm-level innovation networks. Such networks have to be formally set up in a company in order to facilitate communication between operating companies (the interface with consumers/customers), the corporate headquarters (agreeing priorities) and central R&D (using science and technology to drive innovation). This way of networking has only become possible because of advances in IT and telephony. The development and adaptation of user-friendly and task-dedicated software now enables round-the-clock traffic across a firm's knowledge highway. Such a knowledge highway, in turn, permanently and positively influences a company's work culture, managerial attitudes and the speed of response to unmet market needs and new opportunities. The dynamics as well as the sustainability of a firm's knowledge network eventually determine its business performance. In this respect, some of the most profound changes are taking place in the pharmaceutical and electronic industries. The roles of internal as well as external knowledge sources have already begun to change the nature of these two industries dramatically (Chapter 9). Chapters 3, 4, 5 and 9 include a brief survey of literature, the impact of globalisation of business and some other related topics such as risk management, and so on.

I have been planning to write this book since 1997. As far as I am aware the subject has not been addressed by any other industrial R&D practitioner in the recent past. I have learnt some very valuable lessons as a head of a major industrial R&D set-up and wish to share these with a wider audience, without infringing on any confidential corporate issues to which I may be privy.