
Editorial: the marketing of technology oriented products and services: an integration of marketing and technology

Guest Editors

Naresh K. Malhotra, Alka V. Citrin and
G. Shainesh

1 Introduction

The recent (2000–2002) drop in the value of technology companies highlights in an unmistakable way the importance of this sector to the global economy. It also points out the crucial role of marketing in the profitability of the technology companies. Technology companies that survived the downturn and are amongst the first to recover are those with a strong marketing orientation. For example, Zantaz, Inc, a Pleasanton, California based software company specialising in data retrieval was not originally focused on marketing to the relevant industry segments. With the technology downfall, the company faced heavy losses in the year 2000. The firm then redirected its aimless marketing efforts by focusing on energy, healthcare and financial services market. It is now expecting profits again [1]. Therefore in Technology marketing, marketing to all is marketing to none. Technology companies need to be focused on the core segments that they intend to serve. To communicate this message and to further our understanding of the marketing of technology oriented products and services, we organised an international conference.

The Indian Institute of Management, Bangalore, College of Management of Georgia Institute of Technology, and the Academy of Marketing Science, USA collaborated to organise an international conference on ‘Marketing of Technology Oriented Products and Services in the Global Environment’ (MTOPS) in Bangalore, India in December 2002. The objectives of the conference were to provide a forum for dialogue between members of the marketing and technology academics and practitioners, and to facilitate further integration of contemporary thoughts into the marketing of technology oriented products and services. A broad spectrum of research interests were represented, the diversity of which was captured in the following seven categories: Marketing Strategy for Technology Products and Services, Customer Interactions and Relationship Management, Internet and e-Commerce, Technology and Globalisation, Pricing of Technology Products and Services, Applications of Technology, and Technology and Services.

We focus on the successful commercialisation and marketing of technology oriented products and services in this special issue of the *International Journal of Technology Management*. Selected papers from the conference as well as other qualified contributions are assembled for this purpose. In this introduction to the special issue we briefly summarise some thoughts on the marketing of technology oriented products and services and then present an overview of the papers that appear in this special issue.

2 Technology marketing and the marketing of technology oriented product and services

It is important to understand the distinction between technology marketing and marketing of technology oriented products and services. Tschirky and colleagues [2] have argued that marketing technology is significantly different from marketing technological products and services as technology has a knowledge defined uniqueness that is not taken into account by normal methods of marketing. Technology marketing is focused on acquisition and turnover market of technology. Yet others have defined technology as the knowledge, skills, and artifacts that can be used to develop a new product or service and/or a new production or delivery system [3]. Technology marketing thus involves the use of these new production and delivery systems to market new products or services.

The marketing of technology oriented products and services on the other hand, involves the full range of marketing activities necessary to successfully market technology oriented products and services. In particular, the marketing of radically new technology can give rise to increased uncertainties in the market place including, technological and market uncertainty. Technological uncertainty includes uncertainty about the performance of the product and its supporting functions. Market uncertainty includes uncertainty related to understanding customer needs for the new technology, the market standards that may evolve, speed of market diffusion of the technology, and determining the market potential for the product.

Companies mainly acquire and utilise technology in various forms. For example IBM has collaborated on a give and take basis with the likes of Dell, Apple and Nintendo to spread its technology faster than it would have been possible through its own internal product range. To understand various options available in buying and selling of technology, companies need to assess how far the technology they plan to use should be developed internally or acquired from outside sources. Also if the technology they have developed should be kept for their own exclusive use or should be shared with their partners and to what extent? These are essentially 'make or buy' and 'keep or sell' decisions that require know how of technical trends, technical processes for development, application and production. They are strategically important and can also be oriented towards acquiring experience of the early applications of important technologies. This helps to develop a faster learning curve. Thus, the licensing agreements concerning the use of technology are not based solely on financial implications but also on application experience and prospects of further development. Tschirky and colleagues proposed the set up of an organisational unit entitled 'Technology Intelligence and Marketing' (TIM) (with specific tasks) for achieving the stated objectives. Notwithstanding this distinction, the technology in most instances is inextricably linked with the products and services that are manufactured or made using it. Hence, technology marketing and marketing of technology oriented products and services do share many common marketing implications. In the following section, we highlight the important role of a customer focus in the development and marketing of technology oriented products and services.

3 Customer focus and marketing orientation

Past research examining the market success of technology-based new products indicates that keeping customer value as an important criteria in product development results in

corporate growth and prosperity [4]. This close relationship between marketing and research and development (R&D) is particularly important when marketing technology oriented products or services where there are heightened market and technological uncertainties. Brook and Brewster [5] propose that it is important to make the customer the focus of R&D and the entire effort of the organisation. These authors proposed a Customer Needs tree in order to intensify the focus of the R&D team in an organisation towards customer needs. The tree is a hierarchy of customer needs for a given market segment with the customer needs at each level weighted to reflect their relative importance. It is jointly developed by the marketing and the R&D team. It offers benefits in the area of idea generation, technology assessment, portfolio management and improved communication across the organisation.

For idea generation it helps to specify the required output and the R&D team can innovate to come up with the desired result. It helps the R&D managers to assess the market viability of the technology by evaluating its importance for the customer. Similarly, the Customer Needs tree helps to maintain the correct technology portfolio as it helps to map the degree to which the portfolio is serving the needs of the customer. As the tree is jointly developed by the marketing and the R&D teams, it helps to make the needs of one transparent to the other. This helps reduce the potential mismatch between the customer needs and the R&D output. The Customer Needs tree is only one way of focusing on customer needs and researchers must develop other methods whereby not only the R&D function but also the entire effort of the organisation can be focused on the customers and potential customers.

Other authors such as Lu and Chang [6] have also studied the R&D and marketing integration. These authors examined the R&D-marketing integration in new product development (NPD) context and postulated eight hypotheses that basically drill to factors that effect R&D marketing integration. After analysing the data from 42 NPD teams in various firms in Taiwan they validate their hypothesis and their major findings are as follows: (1) Organisational Climate methods contribute to R&D marketing integration, (2) If prospector firms have a higher degree of formalisation and centralisation, the higher the level of R&D-marketing integration that is perceived, (3) If defender firms have a lower degree of formalisation and centralisation, the higher the level of R&D-marketing integration that is perceived, (4) In planning, market research, and idea development stages of NPD process, the more formalisation and centralisation, the higher the level of R&D-marketing integration is perceived, (4) In planning, market research, and idea development and commercialisation stages of NPD, if prospector firms have a higher degree of formalisation and centralisation, the higher the level of R&D-marketing integration that is perceived, and (5) In planning, market research, and idea development and commercialisation stages of NPD, if defender firms have a lower degree of formalisation and centralisation, the higher the level of R&D-marketing integration that is perceived. Several of these findings were only partially supported by the data and there is a need to further investigate these hypotheses and do so in other countries.

Similar findings related to the interaction between marketing and R&D have been obtained in Chinese high technology firms. In empirically studies examining the impact of R& D marketing integration on new product performance in Chinese high technology firms, Li and Atuahene-Gima [7] found: (1) Marketing information exchange is related positively to new product performance, (2) Marketing influence on R&D is related

positively to new product performance, (3) Interdepartmental conflict between marketing and R&D is related negatively to new product performance, (4) The positive effect of information exchange on new product performance is stronger where project formalisation is high than low, and (5) The negative effect of interdepartmental conflict on new product performance will be stronger when product newness is high than low. It seems that the radical innovativeness of the new product may moderate marketing's influence on new product performance, but this needs to be systematically investigated. Marketing has been closely linked to technological innovation. Technology of the product is one of the most important factors determining the decision making process in the business-to-business marketing [8]. One of the methods providing much information about the market position of a firm's technology level used in business marketing is the technology portfolio. The result of well-produced technological innovation is new product launch. Development cycles for advanced technologies have been shortened and are becoming shorter. Economics development cycles have an affect on technological life cycles (TLC). Therefore the adequacy of a product must be considered in relation to the environment within which it will be operated rather than solely on the basis of technological efficiency. The concept of TLC needs to be further explored and structure of marketing strategy over the TLC should be systematically examined.

In a related focus, Antilla [9] examined the role of marketing in innovation management in the Finnish Electrical and Electronics industry. The author assessed the market orientation of high technology manufacturing companies with the three dimensional MARKOR (marketing orientation) scale of Kohli, Jaworski, and Kumar [10] and identified the degree of market driven business. The respondents were asked to self evaluate their company's profit, market share, ROI and so forth. The findings showed that the success of launching of new products and market orientation are directly related to each other. The author also empirically examined the relationship of market orientation and strategic company types of Miles and Snow (prospectors, analysers, defenders, and reactors). It was shown that market orientation was very high in the seven prospector companies and high or very high in the analyser companies. The most unsuccessful strategy type was the defenders.

4 Developing country issues

Developing countries such as China and India are affected by specific factors due to the developmental nature of their economies that should be considered in formulating marketing and management strategies. Wang and Pollard [11] conducted a case study of the Legend Company Group, a successful computer enterprise in China. They identified three key strategies that high technology firms can adopt to flourish in times of growth and to compete against their counterparts in developed countries: (1) exploiting market opportunities for growth consistent with the firms capacity and competitive advantage, (2) continually expanding the business to acquire expertise and capital to enable increasingly sophisticated processes, and (3) cooperation with technical forerunners.

Another issue that is relevant to developing countries is that of marketing and technology transfer. Bennett [12] uses the transaction cost analysis model to find out the factors because of which the transferors of technology assume full or partial control over the marketing of the outputs produced by technology transfer recipients. Data were obtained from the companies involved with technology transfer to the Central and East

European countries. The major findings were that a transferor is more likely to want to become involved in the local marketing of the transferee's product: (1) the lower the transferor's perceptions of the marketing competence of the transferee, and (2) the bigger the transferor's business and/or greater its international experience. It was also found that regardless of whether it is the transferor or the transferee (or a combination of both) that assumes the responsibility for marketing the end products, greater use of independent distributors will occur: (1) The more competitive the market of the end product, (2) The greater the extent to which the transferee's output consists of a simple product, (3) The greater the uncertainty of the business environment within the country, and (4) The lower the degree of asset specificity. Clearly, many other issues are pertinent to role of marketing, and technology transfer in a company's global strategy and should be empirically investigated.

5 Articles in this special issue

Uslay, Malhotra and Citrin present a conceptual framework for marketing of technology oriented products. Their framework encompasses the strategic options of the technology firm, the marketing mix decision, and market related issues. They also review the literature to evaluate recent theoretical developments. Thirty four propositions are extracted from extant research to stimulate thinking across disciplines and functions. They identify perceived gaps in the literature and perspectives for future research. Their article highlights several aspects regarding marketing of technology products and services that researchers and managers need to be aware of in order to be successful in the competitive technological environment.

Vezina and Militaru present a research agenda emphasising the social context of recommendations pertaining to collaborative filtering systems. These recommendation systems allow people to use expressed preferences of thousands of other people in order to find the product they desire based on the level of similarity between tastes. In doing so, they provide not only useful applications, in terms of word-of-mouth – or 'word-of-web', as Rosen has recently suggested – for instance, but also a platform to improve our theoretical understanding of the nature and structure of consumers' preferences.

Das collects and analyses data from 103 companies to identify evaluation criteria and provider characteristics that are associated with goal performance in EC projects. The paper develops a set of anticipations about the effects of project spend on evaluation process attributes, and about evaluation criteria and their association with goal performance. Significant differences were found between small and large e-projects in their ranking of evaluation criteria, as well as in how provider characteristics are associated with project performance outcomes in different sized projects. An identification of critical provider evaluation criteria and attendant quantification of benefits should aid both EC users and e-providers.

High technology companies increasingly meet the demand for rapid innovation by building on the work done by other firms. Many high technology firms use technology transformation, adding their own Intellectual Property (IP) to others' platform technologies to create their own breakthrough innovations or new technologies. Quey and Malhotra suggest purposed play (directed experimentation) is important in the transformation process. They review the old paradigms of organisational technology

adoption and innovation processes and propose a new paradigm that incorporates the role of transformation. They develop an extended organisational technology adoption model and explain its salient characteristics and discuss the implications of the proposed model for intellectual property transfer and value-added product development and marketing for high technology firms.

Durvasula, Lysonski and Mehta investigate the relative importance of service factors such as technology and facilities, how service providers are rated on those factors, and their relationship to customer satisfaction in a B2B environment. The results show that in the ocean freight shipping industry, customers place more importance on factors such as efficiency in complaint handling, and prompt availability of delivery information as compared to the use of latest equipment and technology. Most importantly, customers who had a more favourable evaluation of shipping companies on these factors also experienced a higher level of service satisfaction. Such findings have clear implications for the use of technology in managing customer relationships.

McDonald and Srinivasan propose an analytical framework for innovations, based on the resource-advantage theory of competition. Categorisation of innovations depends on how they contribute to a firm's competitive advantage. They apply this framework to an important segment of the US economy: healthcare (specifically hospitals), to examine the impact of technological innovations for competitive advantage. Their findings show that adoption is higher among bigger hospitals and also teaching hospitals. The proposed classification schema identifies the impact of adopted innovations on an organisation's relative position of competitive advantage, or disadvantage. This should help professional managers to select innovations that support the organisation's strategy, and enable both managers and researchers to study their subsequent impact.

Shainesh has focused on understanding the foreign buyers of the highly competitive software service providers from India. The article draws upon extant literature on organisation buying behaviour (OBB) to understand the factors influencing the behaviour of the buyers of software services. Buying behaviour in a business market is characterised by long cycle times, group decision making, participants from different functional areas and levels and sometimes divergent objectives, and changing roles of the participants during the buying cycle. The high levels of market and technological uncertainty of software services add to the complexity in the buying process. It uses the understanding of the buying process to recommend strategies for managers in software firms to market their services.

Varma and Mookerjee have focused on brand equity for software products used for banking applications. Brand equity is a key source for sustainable competitive advantage and the drivers of brand equity for high-tech industrial products play a major role in the purchase decision. Therefore, an understanding of these factors is important for managers in the software product business. The determinants of brand equity for banking business application software products were identified using a semi-structured interview format. Perceived value and trust were identified as the key determinants of brand equity. Perceived value depends on performance indicators and tangibles, while trust depends on the credibility of the firm, market acceptance of the product and reputation of alliance partners.

Simmons has adopted dimensions of national culture developed through the seminal work of Hofstede to examine predictors of attitude towards software piracy. The three dimensions of Long Term Orientation, Power Distance and Individualism-Collectivism were used for this study conducted among university students in five countries, namely

Australia, Hong Kong, Singapore, Taiwan and USA. The results indicate that the above three dimensions, and particularly Long Term Orientation, are significant predictors of attitude towards piracy.

6 Conclusion

The collection of articles presented herein addresses several of the unique challenges of marketing technology oriented products and services. The research presented in these articles highlight a broad range of perspectives including issues related to the customer, the firm, the product/service, the environment, the market, and the interactions between different marketing functions and technology. From this sampling of the research in this area, the reader is provided with important marketing considerations at both the firm level as well as at the consumer level. It is our hope that this issue will provide insights for furthering the thinking in this research domain.

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