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The Relative Impact of Various Marketing Methodologies When Launching Industrial High-Technology Products into Foreign Markets: Findings from Finnish high-tech firms

Abstract

This study attempts to identify the marketing variables and methods associated with the successful or unsuccessful launch of industrial high-tech products into non-domestic markets. Finnish high-tech firms were selected as a population base due to the ambient domestic pressures on those firms to both conduct R&D and to export the resultant high-tech products. Marketing factors found to be related to the successful launch of high-tech products into overseas markets are examined for their managerial implications.

The Problem

The costly R&D efforts found in high-technology industries are a strong incentive for those firms, upon completion of a successful high-tech product development project, to attempt to recoup development costs by attempting to sell into as broad a market as possible. Upon completion of a successful domestic high-tech launch, most firms investigate the possibility of entering overseas markets. The profits gained by the exploitation of high-tech product in the global marketplace can give the firm a strategic advantage by providing even more revenues to put toward future R&D. High sunk and/or fixed cost structures dictate that firms attempt to distribute development costs across as many markets as possible.

However, the marketing methods and knowledge that lead to the successful introduction of a high-technology product launch domestically may not work when entering overseas markets. This study seeks to isolate the marketing methodologies employed by successful Finnish high-technology firms in gaining acceptance in international markets.

Product development is a long, tedious, and expensive process. In Finland over the past two decades, the percentage of R&D expenditures has risen from about 0.7% of GNP to 2.2 % in 1993. This growth of R&D expenditure has been among the fastest of OECD countries (Åkerblom, 1994 and Puhakka, 1992). The rise in R&D expenditures has been crucial to the success of many Finnish industries and companies. However, to support the increased R&D expenditures, much of the reclaimed profits have had to be found in overseas markets.

Increased R&D expenditures are not enough, however. Superior innovation may be worthless without a sufficient customer base. Technology intensive companies most often cite marketing as the area of greatest neglect (Autio, 1989, Shanklin, 1987, Cooper, R.G., 1985, McKenna, 1985 and Lumme, 1994). In Lumme's study marketing and sales topped the list of management capability related factors. Many of the problems new technology companies face are marketing related. Problems may include a lack of corporate identity, lack of marketing expertise, inability to reach target markets and develop customer relationships, difficulty in gaining channels of distribution, and lack

of international contacts. Finnish high-technology companies face an additional hurdle. Figure 1 shows Autio's internationalization hurdle.

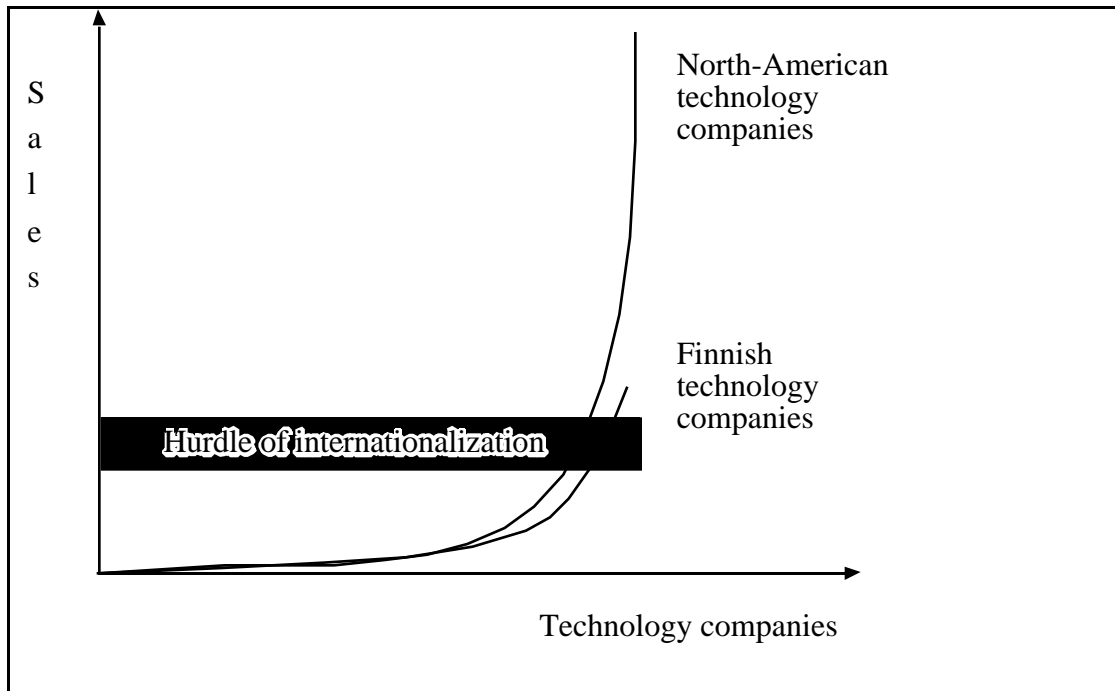


Figure 1. Comparison of Finnish and North American technology companies established within technical research institutes and universities (adopted from Autio, 1989).

Due to the size of the Finnish domestic market, there is a greater need for Finnish companies to internationalize. Otherwise, revenues and profits will be inadequate to support the required expenditures in R&D. Market and marketing related factors contribute greatly toward the hurdle of internationalization effectively blocking many of the efforts of high-technology companies to internationalize. Understanding the needs of customers should be the starting point of R&D even in high technology companies. This approach has been found to significantly contribute to the success of new products (Dougherty, 1990).

Further studies revealed internationalization to be critical to both Finnish and U.K. firms due to their home markets often being too small to permit rapid growth of new, technology-based companies. Going international at an early stage was shown to be critical to achieving rapid growth. This step was concluded to be very difficult, yet crucial, for companies of limited managerial and/or financial resources (Lumme, 1992).

The Effectiveness and Usage of Marketing Methods

The purpose of this study is to determine which marketing methods have been used when launching new high technology products into foreign markets, and how efficient they have been. The research so far does not cover this area. In a broad sense, the marketing methods included here are marketing concept, product, pricing, distribution, personal selling, advertising, publicity, promotion, market organization, use of marketing consultants, market share, new product development, market segmentation,

positioning, differentiation, marketing planning, marketing information systems/marketing intelligence, and market research (D'Aquila, 1992).

Sales or profit performance levels are not necessarily good indicators of the effectiveness of marketing. Performance is often achieved by the company being in the right place in the right time rather than through an effective marketing program (Kotler, 1994). Cooper and Kleinschmidt (1987) demonstrated that a new product's achievement can be measured by numerous means including success/failure, profitability, pay back period, domestic market share, foreign market share, relative sales, relative profits, actual sales versus objectives, actual profits versus objectives, extent of existing market opportunities and extent of new market opportunities (Cooper and Kleinschmidt, 1987). Kotler (1977) suggests additional concepts that can be used in measuring marketing effectiveness. The marketing effectiveness of a company depends on a combination of five activities: Customer philosophy, integrated marketing organization, adequate marketing information, strategic orientation, and operational efficiency (D'Aquila, 1992 and Kotler, 1977).

Technology-Marketing and Global Marketing

An aspect of the strategy/success relationship between marketing and the integration of technology can be found in Cooper's (Cooper, 1985, see also Hauser, 1985) study. As shown in figure 2, the most successful strategy is one that integrates marketing and technology. Here the focus is on the needs of the customer and, at the same time, on the state-of-the-art technology.

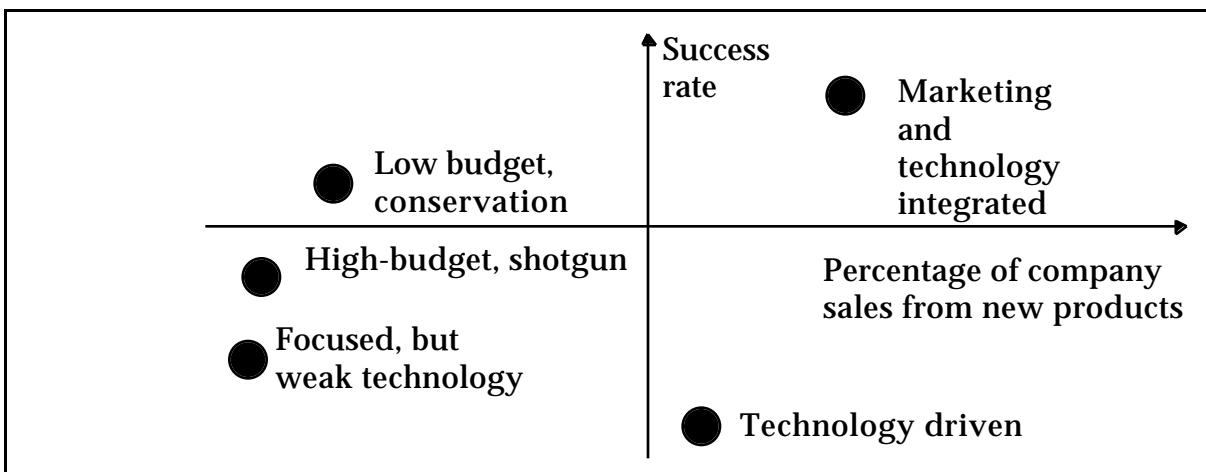


Figure 2. Comparison of new-product strategies on the percent of sales and on the percent of projects that were successful (Adopted from Cooper, 1985).

Hi-tech markets are often newly emerging and are characterized by a latent demand. Markets are often taken completely by surprise, never having dreamed such a product was possible. It was also concluded by Kohli and Jaworski (1990) concerning market orientation that, "*The greater the technological turbulence, the weaker the relationship between market orientation and business performance*" (Note ital. added). The proposition is not that a market orientation is unimportant, but rather that it is less important (Kohli, 1990 and Narver, 1990).

Buskirk (1986) suggests that the role of marketing varies depending upon the stage of technology. While a high-tech firm may be able to gain rapid adaptation into its home marketplace through superior engineering design, by the time the firm is ready to enter overseas markets, the technology has often matured to the point that increased marketing efforts are required to be successful. Many firms have difficulty in successfully integrating their marketing and engineering efforts. Buskirk suggests that a business competing with high-technology strategy succeeds by combining its technical expertise, its ability to gain quickly knowledge about its customers' problems and needs, and its ability to give the customer sufficient technological expertise to be able evaluate and choose a product.

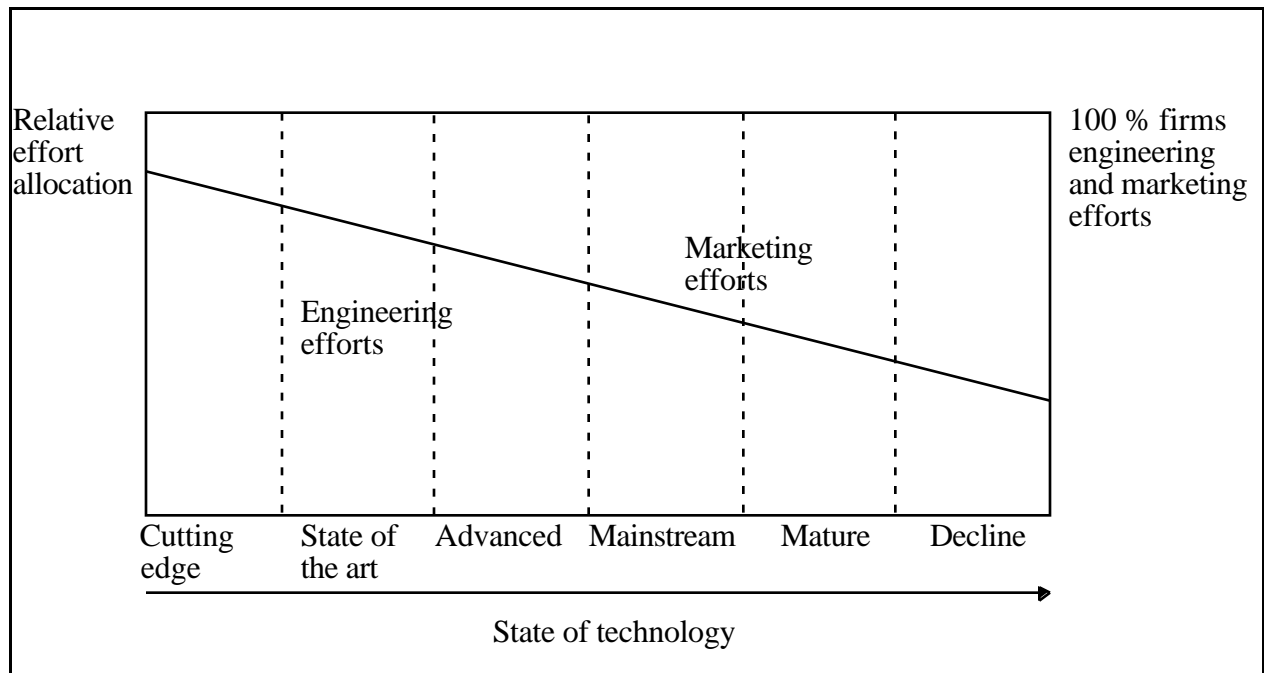


Figure 3. The Balance of Engineering and Marketing efforts across the Technological Life Cycle. (Adapted from Buskirk, 1986).

Goals of the research

The goal of this study is to investigate the efficacy of various marketing methods (marketing concept, marketing mix variables, and marketing organization and planning variables hereinafter referred to as “marketing methods”) used by Finnish companies when launching new high technology products into foreign markets. This research attempts to determine and identify the marketing methods used by Finnish high technology companies in launching new products abroad, and to evaluate the perceived effectiveness of these methods in relation to their predetermined objectives. Marketing methods investigated were selected through a literature review with respect to the special features of high-tech products (D’Aquila, 1992 and Kotler 1977). Broader research issues can be reflected in the following question: “To what extent do Finnish high-technology companies use various marketing methods when launching new products into foreign markets?”

Marketing effectiveness in this study is defined as the relative fulfillment of the predetermined objectives of the sampled high-technology companies (D'Aquila, 1992). Hypotheses are proposed and tested. Differences among different types of high-technology companies were evaluated.

Scope and Limitations of the Study

The subjects of this study were Finnish high-technology firms with experience in the international marketing of high-tech goods. Pure services, management technology, and process technology are outside the scope of this research. Projects, subcontracted products, and consumer products were also excluded. Finland is representative of a number of highly developed countries which are presently attempting to enter international markets with their emerging high-tech domestic products.

Research Methodology

Data were collected from the managing directors and managers or directors of independent profit-centers of firms headquartered in Finland and having sales revenue from both domestic and foreign markets. The reason for using this level of management was an attempt to avoid the intrinsic prejudices that could affect the responses of managers of departments concerning the relative importance of their own departments. Additionally, directors are normally also in charge of strategic decisions and should therefore, have the capability to evaluate new product launches and their results while department heads often do not have enough information to properly address the strategic questions at hand.

The respondents were asked to select one product launch made during the past three years and to reply regarding that product launch effort. The questionnaire was sent out during Spring 1995. The questionnaires were sent randomly to the respondents so that every other respondent answered as regards to successful product launch and every other responded as regards to unsuccessful product launch. All possible efforts were made in the design process of the questionnaires to avoid the problem of selective perception (Millson, 1993). For example a rigorous pretesting of the questionnaire took place. The purpose of the pretesting was to secure that all the questions were understood correctly, and also that all marketing aspects of the launch were covered.

Methodology included the development of questionnaires for both successful and unsuccessful product launches. Successful and unsuccessful product launches were compared. The definition of successful versus unsuccessful product launches was based upon whether or not the predetermined objectives for the launch were reached. In the global marketplace, the success or failure of the launch stage is influenced by internal factors (marketing and business controllables) such as marketing methods and costs, as well as by external factors (marketing and business uncontrollables) such as competition, customers, and the business environment. It is expected that the development of a more complete framework for the appraisal of the role of marketing in the launch stage will be based upon this work.

Research Questions and Hypotheses

The aim of this study is to determine the effectiveness of various marketing methods. As such, the following null hypotheses were generated:

- H₀₁ The use of marketing concept does not affect success at new product launches into foreign markets.
- H₀₂ The use of marketing mix variables does not affect success at new product launches into foreign markets.
- H₀₃ The use of marketing organization and planning variables does not affect success at new product launches into foreign markets.

Sampling, and Data Analysis Methodology

Drugs and medicines, office machinery and computers, electrical machinery for industry, telecommunication equipment, and scientific instruments were identified as high-technology industries by Virtaharju and Åkerblom (1993). In their study, Virtaharju and Åkerblom determined the total technology intensity of various industries, and were able to divide industries in four different categories as follows: 1) high technology, 2) medium-high technology, 3) medium-low technology and 4) low-technology. Drugs and medicines were left out of the present study due to their inherently different nature in comparison to the other industries, especially with respect to government regulation and stringent approval procedures. The problem with industry-based definitions is that the companies within a specified industry are often dissimilar. Every effort was made to avoid such the problems. Respondents were asked in the questionnaire whether the launched product in question was a consumer or industrial product, project, or subcontracted product. Accordingly, if the answer to this question was "Project," "Subcontracted product," or "Consumer Product," the answer was left out of the final sample since it was felt by the researcher that projects and subcontracted products differ too greatly from the balance of the sample population. Projects and subcontracted products are most often "produced" in very close connection with the final customer and, as such, the meaning of advertising can be assumed to be limited. It was also decided that consumer products were to be left out of the scope of the research due to the fact that the use of marketing methods is different (Cooper, A.C., 1986, and Reeder, 1991 and Kotler, 1994).

The initial sample was received from Statistics Finland and included all 298 companies in those industries. Chi-square analysis was used. Relationships measured by categorical data, such as nominal or ordinal data, are typically examined using chi-square analysis. Chi-square analysis was used in the questions where the respondent is asked to circle a number on a scale from 1 to 5 (O'Neal, 1985). Chi-square is the "Likelihood ratio chi-square test" of the hypothesis that the model fits no better than fixed response rates across the whole sample. The likelihood ratio chi-square test is computed as twice the negative log likelihood for model in the analysis of likelihood table (SAS, 1994).

Findings

An effective population of 204 firms was selected with 107 firms choosing to respond to the survey (52.45%). It is felt that many of the non-respondents may not have been “qualified” in terms of the selection criteria, and, as such, the effective response rate might be even higher. Of responding firms, mean sales of the companies were 256 million Finnmarks (MFIM). 44.4% of respondents represent divisions of a larger concern. The mean percentage of R&D expenditures based on sales was 9.6 % which clearly indicates that the R&D intensity is very high in these companies. In this instance it is worthwhile to mention that Alahuhta (1990) assumed in his dissertation that in high-technology industries at least 5 % of sales should be consumed as R&D expenditure. Frequently used percentage is also 4 %. See also OECD’s (OECD, 1994) classification of high-technology products and industries.

The mean percentage of marketing expenditure of sales was 10.0%. The percentage of export share of the sales was 62.4%, which indicates high export intensity. To get an idea what was the ranking order of importance of the various marketing methods, Table 1 was created as follows. The second column (Calc.) was produced by multiplying the fifth level of importance by the corresponding frequency and by multiplying the fourth level of importance by the corresponding frequency and combining the two figures. This calculation was used to rank the marketing methods.

Table 1. The Importance of Marketing Methods in Ranking Order.

| Marketing method | Calc. | Rank | Description of importance |
|--|-------|------|---------------------------|
| 1. Personal selling | 296 | 1 | Very important |
| 2. Marketing concept | 254 | 2 | Very important |
| 3. New product development strategy | 254 | 3 | Very important |
| 4. Differentiation | 252 | 4 | Very important |
| 5. Product/service specialization | 206 | 5 | Rather important |
| 6. Pricing | 189 | 6 | Moderately important |
| 7. Sales promotion | 178 | 7 | Moderately important |
| 8. Market segmentation | 177 | 8 | Moderately important |
| 9. Marketing organization | 161 | 9 | Moderately important |
| 10. Distribution | 154 | 10 | Moderately important |
| 11. Positioning | 141 | 11 | Moderately important |
| 12. Marketing planning | 116 | 12 | Moderately important |
| 13. Market share | 109 | 13 | Moderately important |
| 14. Publicity | 77 | 14 | Rather unimportant |
| 15. Market research | 74 | 15 | Rather unimportant |
| 16. Advertising | 48 | 16 | Very unimportant |
| 17. Marketing information systems/ Marketing intelligence | 47 | 17 | Very unimportant |
| 18. Marketing consultants | 31 | 18 | Very unimportant |

Note: If the marketing method received 250 - 300 points, it was classified as “Very important”, 200 - 249 points “Rather important”, 100 - 199 points “Moderately

important”, 50 - 99 points “Rather unimportant”, and finally 0-49 points “Very unimportant”.

By using a similar procedure, the usage of marketing methods in both successful and unsuccessful product launches, is presented in the table 2.

Table 2. The Rank Order Importance of Marketing Methods in Successful and Unsuccessful Product Launches Into Foreign Markets.

| Marketing method | Successful | | Unsuccessful | |
|---|------------|------|--------------|------|
| | Calc. | Rank | Calc. | Rank |
| 1. Personal selling | 227 | 1 | 69 | 1 |
| 2. New product development strategy | 214 | 2 | 40 | 5 |
| 3. Marketing concept | 213 | 3 | 41 | 4 |
| 4. Differentiation | 189 | 4 | 63 | 2 |
| 5. Product/service specialization | 169 | 5 | 37 | 6 |
| 6. Pricing | 155 | 6 | 34 | 7 |
| 7. Market segmentation | 146 | 7 | 31 | 9 |
| 8. Sales promotion | 135 | 8 | 43 | 3 |
| 9. Marketing organization | 127 | 9 | 34 | 7 |
| 10. Distribution | 126 | 10 | 28 | 11 |
| 11. Positioning | 113 | 11 | 28 | 11 |
| 12. Marketing planning | 98 | 12 | 18 | 13 |
| 13. Market share | 78 | 13 | 31 | 9 |
| 14. Market research | 74 | 14 | 8 | 15 |
| 15. Publicity | 73 | 15 | 4 | 16 |
| 16. Advertising | 44 | 16 | 4 | 16 |
| 17. Marketing information systems/ Marketing intelligence | 30 | 17 | 17 | 14 |
| 18. Marketing consultants | 27 | 18 | 4 | 16 |

Note: Bold font indicates a difference of two or more in rank order.

It can be seen that all the marketing methods examined are used to some extent. The relative importance of the marketing methods, however, seems to be quite different. **Sales promotion** is emphasized more strongly in unsuccessful launches than it is in successful ones. **New product development strategy**, on the other hand, seems to be used less frequently as a marketing method in unsuccessful product launches than in successful launches. Contrary to this, **differentiation** seems to be more frequently used as a marketing method in unsuccessful product launches. **Market share** strategies would appear to be used more often in unsuccessful product launches.

H_{01} - Marketing Concept

" The use of marketing concept does not affect success at new product launches into foreign markets." The purpose is to determine if the use of marketing concept significantly contributes to the success of an international product launch. The null hypothesis was rejected (see table 5), and thus it was found that the use of marketing

concept is a significant factor in success when launching high-technology products into the international marketplace.

Table 5. The Results of the Chi-square Analysis Concerning The Use of Marketing Methods In Successful and Unsuccessful Product Launches.

| Marketing method | Chi-square | Prob>ChiSq |
|---|-------------------|----------------------|
| 1. Marketing concept | 11.679 | 0.0199 |
| 2. Product/service specialization | 6.265 | 0.1802 |
| 3. Pricing | 2.319 | 0.6773 |
| 4. Distribution | 3.483 | 0.4804 |
| 5. Personal selling | 4.045 | 0.3999 |
| 6. Advertising | 5.984 | 0.2003 |
| 7. Publicity | 7.581 | 0.1082 |
| 8. Sales promotion | 4.786 | 0.3100 |
| 9. Marketing organization | 5.761 | 0.2177 |
| 10. Marketing consultant | 2.352 | 0.6714 |
| 11. Market share | 2.727 | 0.6045 |
| 12. Overall strategy in new product program | 7.442 | 0.1143 |
| 13. Market segmentation | 5.227 | 0.2647 |
| 14. Positioning | 5.906 | 0.2063 |
| 15. Differentiation | 2.225 | 0.6945 |
| 16. Marketing planning | 6.117 | 0.1906 |
| 17. Marketing information system/marketing intelligence | 8.480 | 0.0755 |
| 18. Market research | 3.216 | 0.5223 |

H₀₂ - Marketing Mix

"The use of marketing mix variables does not affect success at new product launches into foreign markets." The purpose is to determine if the use of marketing mix variables significantly contributes to the success of international product launch. The null hypothesis failed to be rejected and, as such, it is indeterminate whether marketing mix variables are of critical importance in launching high-technology products into the international marketplace.

H₀₃ - Marketing Organization

"The use of marketing organization and planning variables does not affect success at new product launches into the foreign markets." The purpose is to determine if the use of marketing organization and planning variables significantly contributes to the success of an international product launch. The null hypothesis failed to be rejected (see table 5) and thus it was found that the use of marketing organization and planning variables is not significantly important to success when launching high-technology products into the international marketplace.

Conclusions

1. The adherence to the marketing concept as a marketing method is more commonly used in successful product launches. This is an important finding. Marketing concept is a very important marketing method. Its relative ranking was second among the 18 marketing methods studied, however, the marketing concept was regarded as a very important marketing method both in successful (relative ranking 3) and unsuccessful (relative ranking 4) product launches, but the difference in usage was significant.

2. When launching new products into foreign markets, product and sales related factors appear to have greater importance than marketing related factors among Finnish high technology companies. The high ratings of product related factors in usage are clear indicators that the Finnish high technology companies place more emphasis on product and sales related factors than marketing related factors. A *"Here is what we have discovered in our labs, and produced in our production line and this is what we sell!"* approach seems to be more common than *"What do you really need and what kinds of benefits are you seeking?"*

3. In the successful launch of new high technology product into export markets, careful balance among the various marketing methods is important. Product is the starting point. Failure is difficult to avoid by artificial differentiation and massive promotional efforts. Achieving a certain market share should not be an objective at the outset of a product launch. When launching new high technology products, the situation is often such that there are no markets for the products or that they are very limited. Thus, the emphasis should be on the creation of such markets. Later on, when the product has advanced in its life cycle, the role of market share could increase. This is consistent with Buskirk's (1986) view of the Technological Life Cycle.

4. Among marketing mix variables, product factors clearly have the highest utilization while the non-personal elements of promotion have the lowest usage ratings. Personal selling is the most important promotional element. The strong role of personal selling is probably due to the nature of the high technology products. This research only dealt with industrial high technology products.

5. An 80.4% success rate when launching high technology products into export markets is a fairly high figure in comparison with the findings of other researchers. Zirkle (1993), for example, found that for consumer products the success rate was 75.3%. Caution should be exercised, however, when comparing findings concerning new-product success rates between domestic and foreign markets, as well as those between consumer and industrial markets.

Managerial Implications

These research results offer many critical insights for managers in high-technology firm. Attention needs to be focused on the following points when launching new products into foreign markets:

1. Implement the marketing concept into your organization. Involve everybody in the process including R&D and production personnel.

2. Keep aware of the customers' actual needs. Ascertain that you are capable of delivering the sought benefits. Try not to compensate for the shortages of the product/service offering with overly zealous promotional efforts.

3. Management needs to carefully study the marketing methods to be employed in the launch of high technology products overseas. The launch of a new high technology product into foreign market is clearly a different process than the launch of a domestic consumer product.

Suggestions for Further Research:

1. This study was constructed exclusively from high-tech industrial firms. A similar study of firms producing consumer products and their use of various marketing methods would yield an interesting comparison.

2. Comparative research between countries using a similar research approach to the study in hand would yield external validation as well as the ability to find cross cultural differences.

3. The case study method would bring additional information to marketing theorists and practitioners when speaking about the launch processes of new high technology products. A follow up study of these same managers, using in-depth interviews, might lead to a deeper understanding of these findings.

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