

WHAT DO WE KNOW ABOUT NEW PRODUCT IDEA SELECTION?

Muammer Ozer*

Department of Management
City University of Hong Kong
83 Tat Chee Avenue
Kowloon, Hong Kong
Tel: (852) 2788-7852
Fax: (852) 2788-7220
E-mail: mgozer@cityu.edu.hk

* The Center for Innovation Management Studies (CIMS) at North Carolina State University funded this project. Muammer Ozer is an Associate Professor at the Department of Management of the City University of Hong Kong. His primary research interests include new product idea selection, new product development and new product management. He is currently investigating the interface between new product development and information technology. He received his Ph.D. in marketing from the University of Pittsburgh.

WHAT DO WE KNOW ABOUT NEW PRODUCT IDEA SELECTION?

Abstract

The strength of the emotional feeling implicit in the commonly used phrase “*selecting the next killer app*” powerfully summarizes the importance of new product idea selection. People in Silicon Valley often use this phrase to describe their enthusiastic pursuits of new successful software application ideas. Selecting new product ideas is important not only to high-tech firms but also to many other firms that are trying to discover their next killer products. However, because of the uncertainties and risks associated with new products, not many firms are able to select and introduce such products. Scholars in a wide range of disciplines such as decision sciences, engineering, finance, marketing, new product development, operations management and research, organizational science, R&D and others have developed various approaches that can be used in new product idea selection. In this paper, I review general approaches that have been developed in these disciplines and present them in an integrated framework. I outline key characteristics of each approach and highlight their main benefits and limitations. Based on what we know so far, I also offer a number of guidelines to managers to follow in the new product idea selection process.

New product development is widely considered as an essential activity for the success, survival and renewal of organizations (1). Indeed, according to a survey conducted in 1997, new products introduced in the last five years contributed as much as 50% of total revenues and profits (2). At the same time, the new product failure rate remains to be very high. According to the same survey, the average market success rate ranged from 53% to 61% (2). In addition to being risky, new product development is rather uncertain. There are too many unknowns with regard to competition, technology, customers, economy, customer lifestyles and other environmental factors that firms simply may not know how these factors might affect the success of their new products. Rapid changes in these factors further complicate firms' new product development activities.

One of the key new product development activities that firms use to reduce the risks and uncertainties associated with new products is the careful selection of potentially successful new product ideas. After generating potential new product ideas, firms need to screen them and choose the most suitable one for further development, as they may not have the necessary resources to develop all of the ideas and not all ideas might be viable. Over the years, we have accumulated a vast amount of knowledge as how to select new product ideas. Because of the relevance of new product development to many disciplines such as decision sciences, engineering, finance, marketing, new product development, operations management and research, organizational science, R&D and others, the literature on new product idea selection covers a large body of studies in these areas. Although this literature can be reviewed in several different ways (3), in this paper, I categorize the literature based on eleven general areas that can best capture different approaches available for new product idea selection. As can be seen in Figure I, these approaches include technical, marketing, financial, organizational, strategic, relationship, industrial, competitive, similar case, consumer and consumption, and expert analyses.

These approaches differ with regard to their assumptions, research questions and methodologies. However, it should be noted at the outset that there might be some overlaps across them. For example, marketing and consumer analyses seem to overlap. However, as I discuss below in more details, they are fundamentally different since marketing analysis is more related to the assessment of the match between the marketing requirements of a new product and the firm's marketing capabilities to collect market information and to devise effective marketing

strategies whereas consumer analysis is more related to the opinions of potential buyers of the value of the new product. In addition, it should be emphasized that the approaches are the pure forms, addressing different aspects of the new product idea selection process. As a result, companies often use more than one approach when selecting their new product ideas.

My purpose in this paper is to review the available approaches in various disciplines, integrate them in a framework and present them with an emphasis on their key questions, relevant methodologies, benefits and limitations. I summarize the approaches in Table I and discuss them in more details in the following section. After that, I offer general guidelines for new product managers to follow in new product idea selection. Finally, I conclude the paper with managerial and research implications.

NEW PRODUCT IDEA SELECTION APPROACHES

1. TECHNICAL ANALYSIS

Technical analysis involves determining the technical requirements of a new product and assessing how well they fit with the firm's technical capabilities. Empirical studies have already shown that firms' abilities to meet these requirements lead to higher product and competitive advantages and this, in turn, results in higher product performance (4). As a result, a technical analysis can help companies categorize their new product ideas based on their technical requirements and select ideas that are technically feasible to design, develop and manufacture.

This approach tries to find answers to numerous questions. It first identifies the technical specifications of a new product idea. Second, it outlines the required design and manufacturing processes for designing, developing and manufacturing the new product (5). Third, it assesses the degree of fit between the product and manufacturing specifications and the firm's technical and manufacturing capabilities (6). If the technology is not available internally, it also asks whether the necessary technology is available externally, whether the firm can successfully acquire and implement that technology and whether it can incorporate future changes in the technology into their new products (7). All these questions can help firms determine whether they are technically capable of designing, developing and manufacturing new products and, as a result, select those that are consistent with their technical capabilities. Obviously, there is no point in investing in new products that are infeasible to design, develop and manufacture.

Firms can use a number of methods when they conduct a technical analysis. As one of the most popular methodologies, they can use a checklist that covers all the product and design specifications and matches them with the company's capabilities (8). In addition, they can use a scoring tool to give scores for the match between the specifications and the company's capabilities and select a new product idea with the highest score. Furthermore, they can use environmental scanning to determine whether the required technologies are available outside the company. Finally, they can use decision models such as the Analytic Hierarchy Process (AHP) to structure the technical analysis into sub-categories and prioritize the categories so as to select new product ideas that score high on the prioritized categories (9).

Technical analysis provides numerous benefits to firms. For example, it can help them address technical and manufacturing problems early in the new product development process and thus be able to introduce their new products to the market faster. Otherwise, a poor assessment can result in unforeseen technical and manufacturing problems and can delay the new product market introductions. Moreover, focusing on technical and manufacturing issues during the new product idea selection stage of the new product development process allows them to pay more attention to product quality and reliability, to reduce product defects and failures before the new products are introduced to the market and, as a result, to enhance the products' success (10).

However, technical analysis can force firms to pay too much attention to the technical factors, but ignore the needs of their potential buyers. Although a new product might be very good from a technical standpoint it might not be perceived by the end-users the same way. For instance, it was envisioned that quadraphonic sound systems would be a widely popular improvement over stereo systems because of their technical qualities, however consumers found them more troublesome than they were worth (11). Furthermore, focusing on available technologies may compel firms to pursue new products that they can design, develop and manufacture with their existing technologies instead of exploring new technologies and opportunities.

2. MARKETING ANALYSIS

In addition to technical capabilities, new product development requires marketing competencies as well. While technical capabilities allow companies to design, develop and manufacture the selected new product ideas marketing capabilities can help them collect market information for

the product ideas and introduce the new products to the market more effectively. The resource-based view of the new product development suggests that companies can achieve competitive advantages and thus new product success if their marketing competencies are unique, valuable, non-substitutable, and inimitable (12). Empirical studies also show that marketing capabilities are positively related to new product success (4). As a result, companies can select new product ideas that are consistent with their existing marketing abilities. If they do not possess the necessary marketing competencies required by a new product idea they should not consider it. For example, because of its large population, China offers tremendous opportunities for firms. However, it has been a great challenge for many firms to market their products in China (13). Thus, firms should not consider this new market unless they can address the marketing challenges.

Because each new product idea requires different market information and marketing strategies, firms, for each new product idea, will determine what kind of information is needed to design, develop and introduce the new product and what kind of marketing strategies are needed to market it successfully. After this determination, they need to assess whether they have the necessary marketing competencies to collect the needed information and to market the new product. In case they are not capable of conducting these activities on their own they can also evaluate possibilities for outsourcing these activities. If they think that they are not able to fulfill these activities either internally or externally they can discontinue pursuing the new product idea.

Similar to the technical analysis, firms can use a checklist that covers all the information and marketing requirements associated with the design, development and marketing of a new product and match them with the firm's capabilities. In addition, they can use a scoring tool to give scores for the match between the requirements and the firm's capabilities and select a new product idea with the highest score. Furthermore, they can use environmental scanning to determine whether the required marketing skills are available outside the firm. Moreover, they can use decision models such as the Analytic Hierarchy Process (AHP) to structure the marketing analysis into sub-categories and prioritize the categories so as to select new product ideas that score high on the prioritized categories. Finally, they can also ask the opinions of distribution channel members about the new product's marketability.

A recent survey of marketing, manufacturing and R&D managers has indicated that compared to unsuccessful new products, successful new products involved a greater than average

amount of collection and use of relevant market information (14). Because marketing analysis emphasizes the collection of market information, dissemination of that information in the company, and the marketability of the product it can enhance the market success of new products. In addition, this approach takes into account the opinions of the members of the distribution channel for the new product. The participation of the distribution channel members in the idea selection process can increase their involvement in new product development and their support for successfully distributing the new product in the marketplace.

Despite its clear benefits, companies should also take into account the limitations of this approach. First, the information collected may not be so reliable or useful, as, for example, listening to customers does not necessarily lead to successful new products (15). Second, this method assumes that the company can collect the necessary information and share that information with its departments. Although this is ideal for an effective new product development process, it may not always be true, as there could be conflicts among the different departments involved in the development process (16).

3. FINANCIAL ANALYSIS

One of the primary aims of firms to launch new products is to generate financial results such as sales, profits, and return-on-investment. In fact, the success of new products is usually measured in terms of their financial results (17). Consequently, new product ideas can also be selected based on their expected financial results. Firms can select new product ideas that maximize their financial returns with minimum possible investment. They can also establish financial guidelines to facilitate the selection process. For example, they can set a lower limit for the expected financial returns, suggesting that they will only consider new products that can generate financial returns greater than this limit. Similarly, they can establish an upper limit for their budget such that they will only consider new products that require a budget lower than this limit.

Firms need to have a number of financial information in order to conduct this analysis. For instance, they need to know the financial returns that they can generate from a new product. Similarly, they need to know the amount of financial resources needed to design, develop, manufacture and market it. Because there are uncertainties associated with all these information they also need to have the probabilities of achieving the financial results and of meeting the established budget goals. Finally, they also need to have benchmarks with regard to the

acceptable amount of financial returns and new product budgets so as to be able to assess the financial viability of a new product idea.

Probably one of the most widely used financial analysis methodologies is the Net Present Value (NPV) method. This method identifies the financial benefits and costs related to a new product. Then, it calculates the new product's NPV by taking into account the interest rates and the life of the new product investment. Because of the uncertainties associated with the future returns and costs, the method can also be extended into a decision analysis or option pricing method, which takes into account the probabilities of the uncertain future events (18). Firms can also use mathematical models that seek to optimize numerous financial objectives subject to different resource constraints. The models can be in different forms including linear and non-linear programming, integer programming, and dynamic programming, among others (19, 20). There are also more advanced mathematical models such as fuzzy-based methods. However, they have not been so widely used due to their complexities (21).

Surveys suggest that one of the widely mentioned reasons why firms do not use new product idea selection methodologies is that many such methods are too complex and hard to understand (22). Because everyone can relate to numbers expressed in dollars financial analysis is indeed very easy to understand. In addition, because companies usually have limited resources selecting new product ideas based on the financial considerations allows them to make sure that their new product related expenses are always within their budget and their financial requirements are always met. Otherwise, they might end-up spending beyond their budgets and taking a large financial risk. As a result, financial analysis can offer useful capital management mechanisms and budgetary guidelines for companies in their new product development activities.

Although financial analysis can be highly beneficial in idea selection, it also has certain limitations. First, relying on short-term financial results may pressure managers to focus on financially justifiable ideas and to reject more promising but uncertain ideas, just because they are uncertain and are not easily justifiable (23). Second, many financial analysis methods cannot capture adequately the risks and uncertainties associated with new products (24). Furthermore, these methodologies consider only a "snapshot" of the financial benefits and costs associated with a new product and may not reflect the changes in these factors (25). Finally, this approach

depends on a strong assumption that accurate financial information is readily available, which is not the case in many situations.

4. ORGANIZATIONAL ANALYSIS

In addition to technical, marketing and financial resources, organizational factors such as organizational processes, structures and cultures are also very critical for product success. Particularly, well-executed pre-development new product development activities, the use of cross-functional teams and frequent, political and task-oriented communications have been reported to be positively related to new product success (1). Furthermore, it was reported that compared to less innovative companies, innovative companies encourage calculated risk taking, provide strong management support for innovative activities, foster group orientation and reward innovative activities (26).

Companies can identify the necessary organizational structures and cultures for successfully designing, developing, manufacturing and marketing a new product and match them with their existing structures and cultures. If there is a match between the requirements of the new product and companies' current structures and cultures, then they can select that new product idea for further consideration. However, if they cannot meet the new product's organizational requirements, they can assess whether they can successfully make the necessary institutional changes. If it is possible for them to make the necessary organizational changes they can select the new product idea, otherwise they need to find other new product ideas.

Similar to assessing the fit between a new product's technical, financial and marketing requirements and firms' technical, financial and marketing capabilities, firms can also evaluate the match between the organizational requirements of a new product idea and their existing organizational structures and cultures based on checklists. They can also use scoring tools to quantify the degree of the match. In addition, they can also use prioritization processes to determine whether the requirements are equally important or whether they need to focus on their subsets. Finally, they can utilize internal and external experts to make all these assessments.

Organizational analysis is very useful for identifying whether there are right organizational conditions for designing, developing, manufacturing and marketing a particular new product. A new product can be feasible from the technical, financial and marketing standpoints, however if there is no supporting organizational conditions and processes the new

product idea will never move beyond the idea selection stage. These conditions and processes will help firms put all the resources into action and turn new product ideas into successful new products. Consequently, an organizational analysis can be instrumental for companies to understand the importance of the organizational factors, incorporate them into their decisions and thus enhance the success of their new products. Furthermore, because this approach highlights the importance of the *process* of designing, developing, manufacturing and marketing of new products, it also increases product quality, lowers unit costs and speeds-up the new product development process (27).

Although organizational analysis offers valuable benefits to firms, it also has a number of limitations. For example, it will be very difficult to predict how successfully a new product development process can be implemented. Firms can implement a new procedure such as cross-functional teams and subsequently may realize major implementation challenges due to task and emotional inter-group conflicts (28). In addition, there is also a trade-off between the organizational considerations and new product quality. One of the benefits of using organizational structures and procedures such as cross-functional and dedicated teams is that such procedures increase the speed of new product development (29). However, as Morgan et al. (30) showed fast new product developments do not always generate high quality new products. It follows that too much emphasis on the procedures and related efficiencies can compromise the quality of a new product and its market success.

5. STRATEGIC ANALYSIS

One of the important initial considerations in new product idea selection is to assess the congruency between the objectives of a new product idea and the overall corporate goals and strategies. This means assessing how much emphasis is placed on being first to market with a new product and whether the new product idea can make the company a market leader (5). It also suggests establishing how the new product fits with the other products of the company, whether it is an extension of the company's existing products or it is a new product (7). Finally, it involves evaluating whether the amount of risk associated with a new product idea is consistent with the overall attitude of the company towards risk (31).

Strategic analysis requires firms to determine their corporate strategies that can impact their product innovation activities. This can be achieved by internal audits. Second, they need to

identify the objectives of the new product idea that is under consideration. This can be done by the use of checklists. Third, they should assess the match between their corporate strategies and the objectives of the new product idea by using checklists and scoring tools. Finally, in case there is a mismatch between the corporate strategies and the objectives of the new product idea, they should assess whether it is possible for them to modify their strategies. This can be done by using prioritization and weighting techniques and by asking internal and external experts.

Assessing new product ideas based on their consistency with overall organizational strategies increases the likelihood that the firm can contribute necessary resources and support to the development and launch of the new products (23). In addition, it can create a harmony and synergy among the existing products of the organization. This can be highly relevant when a new product threatens to take away business from the other products of the organization (i.e. cannibalism). Indeed, when many companies introduced their online services they did not realize that their new services were merely taking away sales from their off-line businesses instead of generating new sales (32). A strategic assessment during the idea selection stage of such services could have prevented this cannibalism.

Strategic analysis is very useful to set general strategic guidelines to follow in designing, developing, manufacturing and marketing new products. However, this big-picture-view of the idea selection process can be too general to assess the specific technical, financial and marketing merits of a new product idea. In addition, companies' strategies can be too rigid and, as a result, selecting new product ideas based on their fit with the company's strategies can be very restrictive. In fact, previous research has concluded that companies should be able to modify their strategies if they are to sustain their product innovation (33). This suggests that instead of selecting new products that are consistent with their strategies, companies should be prepared to change their strategies in order to take full advantage of the benefits of product innovation.

6. RELATIONSHIP ANALYSIS

Resource-dependency theory suggests that market environment is inherently unstable and firms need to act to reduce such vulnerabilities. One way of reducing firms' vulnerabilities is to form partnerships with suppliers and distributors (34). Because a firm's resources may not be sufficient to secure the success of a new product, firms are increasingly forming partnerships with their suppliers, distributors and customers. They are also forming relationships with their

competitors in order to set standards for their industry. Building relationships with outside parties has already been recognized as one of the key success factors for firms. Empirical studies have shown that buyer-seller relationships created value to firms (35) and that building relationships with suppliers early in the new product development activities helped firms improve performance, increase product quality and reduce costs associated with new product development (36).

It follows that companies can also consider potential relationships that are required by different new product ideas when selecting or rejecting the new products. If they are not interested in forming partnerships with outside parties they can select new product ideas that they can design, develop, manufacture and market alone. However, because most new products require the support of outside parties such as vendors and distributors they will need to select new product ideas that require relationships that they can successfully and confidently form.

Companies can generate a list of required relationships that are needed to design, develop, manufacture and market a new product idea. Similarly, they need to come up with a list of their existing relationships in these areas. They can match the similarities of the lists by using available scoring tools. They can prioritize the needed relationships by using the traditional decision analysis techniques such as AHP. They should also generate a list of potential partners for the identified relationships by using secondary data, the Internet and external referrals. Finally, they need to assess the suitability of each partner by using available scoring tools. They can even conduct interviews or surveys with the potential partners to determine their suitability.

Relationship analysis can indeed be very useful for firms, as it can force them to take into account the additional resources that they can generate from their partners and explore new product opportunities that are otherwise infeasible. In addition, selecting new product ideas based on the relationships with outside parties gets the partners involved in the new product development process and this can cut the design complexities and alert the project team to potential downstream problems before these problems become difficult to fix (1). This was highlighted in a recent case about Stanley Furniture Company that offered its products online without taking into account its reliance on its retailers. However, its retailers protested so loudly that it had to stop the online service after a couple of weeks (37).

Despite its valuable benefits, this approach also has numerous limitations. For instance, relying on this analysis alone can be very misleading, as not all relationships are successful due

to such factors as the partners' different expectations from the partnership and their dissimilar corporate cultures (38). In addition, too much emphasis on relationships can undermine the true purpose of product innovation. This implies that firms may reject potentially promising new products just because to maintain their relationships with their partners and not to anger them. Finally, this approach may not discriminate new product ideas well when they require similar relationships. More specifically, when two new product ideas require exactly the same type of relationship, but have totally different features, this approach cannot determine which new product idea is more promising.

7. INDUSTRIAL ANALYSIS

Companies need to operate within a business environment including economic, legal, political, social, cultural, technological and competitive environments. Industrial organization-view of the firm suggests that a firm's performance depends on the characteristics of the environment in which it competes. As a result, past studies have concluded that the success of a firm in an environment is a function of such factors as barriers to entry, number and size of competing firms, demand elasticity and differences among competitors (34). In addition, numerous new products such as pharmaceuticals, advanced nuclear reactors, and innovative telecommunications products requiring additional airwave space need to be selected based on a careful consideration of the existing regulations (11). Furthermore, market attractiveness can also be an important consideration, as research also suggests that products are likely to be more successful in large, growing and less competitive markets (1).

Companies can certainly select new product ideas based on their overall fit with the environment. In order to achieve this, they first need to know the environmental requirements of their new product ideas. Then, they need to understand their environment. After that, they need to assess the consistency between the environmental requirements of their new product ideas and their business environment. In case there is an inconsistency between the two, they need to determine whether they can modify their new product ideas so as to make them fit with the environment. If so they can modify the ideas and proceed to the next stages of the new product development process. If it is not possible they need to consider other new product ideas.

Companies can utilize a number of methodologies in conducting this analysis. They can scan the secondary databases available in both governmental and non-governmental institutions

for the relevant information. For instance, Medcof (39) used such sources to determine R&D intensity and the level of R&D spending in different industries and was able to identify high-growth “super-technology” industries. Companies can use online and offline methodologies to reach these databases. They can also ask experts about their opinions regarding how the environment might affect the success of the new product idea. In addition, they can approach futurists to find out how the environment might change in the future (40). Finally, they can utilize widely used Boston Consulting Group’s market-growth and market-share matrices to map the attractiveness of the market and the potential market share that the new product might achieve in that market and select it if the market is attractive and if the new product can generate a large market share in that market.

Besides selecting new product ideas based on their fit with the environment, companies can also look at the environment and generate new product ideas that are in line with the environment. They can, for instance, use visionary techniques that deal with projecting the future from historical experience or visioning the future and working backward to determine related new products ideas for realizing that future in order to identify the new product ideas of tomorrow. The companies can focus on a range of possible future scenarios and their consequences and determine new product ideas that can capture market opportunities before other companies (23).

This approach helps companies ascertain that their new product ideas conform the requirements of their business environment and thus enhance the success of their new products. In addition, it can help them determine market trends and hence be able to introduce new products based on the trends. However, too much emphasis on industrial analysis can drive out innovation by directing resources to existing large markets (41). Instead, companies should go beyond the well-defined business markets and develop new markets, as it has been the case with many classic innovative products such as e-mail, microwave oven, overnight mail and Walkman. In addition, this approach assumes that the environment is stable and the future can easily be predicted.

8. COMPETITIVE ANALYSIS

This approach emphasizes the importance of competition and assumes that new products should be better than those of competitors in order to be successful. Indeed, this assumption has been

proven to be accurate, as numerous empirical research studies with a wide range of products have consistently shown that “product superiority and uniqueness” has the highest impact on the success of new products (42, 43). This conclusion implies that people buy a product if its offerings are better than those of the available alternatives. As a result, this approach assesses the extent to which a new product idea is superior to what is currently or expected to be available and selects it if the product superiority is significant.

With this analysis, firms first need to identify all current and expected competing products, which can be their existing products or the competitors’ products. Then, they need to determine similarities and dissimilarities between the new product idea and the competing products. After that, they need to assess the importance of the similarities and the dissimilarities. Because the purpose is to ascertain the uniqueness and superiority of the new product idea, firms should evaluate the importance of the dissimilarities and decide if their new products are indeed superior. Furthermore, they should also find ways of reducing similarities and making their new products superior. At the end, they can choose a new product idea if it offers important unique characteristics. Otherwise, they need to find other new product ideas that can achieve this.

A number of useful methods are available to conduct this analysis. As a popular method, conjoint analysis can be used to compare the new product idea and the alternative products. This method predicts the likelihood that buyers will choose the new product idea over the alternatives and estimates the expected market share. Because it compares the alternatives based on their specific product feature, it also provides information about the importance of each feature (44). Another method is a Kano survey that captures and categorizes important product features such as “must-be,” “attractive,” “indifferent,” and “one-dimensional” characteristics. After that, a new product is compared to those of the competitors based on these characteristics. At the end, a new product idea that offers better value compared to those of the competitors is selected (45). Alternatively, a gap analysis can also be used. This method plots the features of a new product and those of the competing products and identifies unfulfilled need gaps. The product idea is selected for further consideration if it can fulfill some of the unfulfilled need gaps by offering better product features (46). Finally, in addition to a product level comparison, firms can also conduct a firm-level comparison through benchmarking to assess their strengths and weaknesses, competitive advantages and vulnerabilities against their competitors so as to compete with them better and enhance the success of their new products (5, 46, 47).

Because this approach focuses on competition and puts a large emphasis on product superiority and uniqueness it forces firms to pay attention to these issues at the up-front idea selection stage of the new product development process where it is easier and cheaper to modify or discontinue a new product idea than it is in the later stages of the new product development process. In addition, the analysis can help firms identify unique and superior characteristics of its new product ideas so that they can better position and promote their new products. However, this approach assumes that the product characteristics can easily be identified and described. Moreover, it assumes that similarities and dissimilarities can easily be measured (46).

9. SIMILAR CASE ANALYSIS

This approach is based on the assumption that a new product idea should perform at least as well as other comparable products (3). As a result, firms can compare their new product ideas with existing related products and form an opinion with regard to the future success of their new product ideas. The comparisons can be made with a number of related products. First, they can compare their new product ideas to other similar products (e.g., a car maker evaluates the likely success of its new car based on the success of other exiting cars). Second, they can compare them to other complementary products (e.g., a new hotel service assesses its likely success based on the number of airline tickets sold for that destination). Third, they can compare their new product ideas to the success of an earlier version of the same product (e.g., a computer software company can assume that people will upgrade their software). Forth, they can assess the likely success of their new product concepts based on the success of the same product in other market segments (e.g., a new product was successful in the US and the company assumes that it will be successful in Europe too or a particular line of clothes was successful with adult customers and the company assumes that it will be successful with kids as well.)

With this approach, firms first need to determine whether there are any similar cases for the new product idea under consideration. Furthermore, they need to identify the nature of the similarities. After that, they need to ask what they can learn from the similar cases. They can indeed learn many things from those cases. For example, they can determine the probability of success of their new product ideas. They can project the future sales based on the historical sales of similar cases and plan their production and marketing strategies. Similarly, they can find out the costs associated with introducing similar new products and plan their financial budget.

Finally, they can also determine what factors have facilitated or hindered the success of those cases and be more prepared when they introduce their new products (3).

Information regarding the market performance of similar cases and the costs associated with introducing them can be collected through secondary data sources. In addition, they need to collect primary data from customers and internal and external experts to determine the similar cases, as different people might perceive the similarities differently. Once the similar cases are selected, diffusion models and benchmarking techniques can be used to conduct this analysis. Diffusion models mathematically determine the future sales of a new product as a function of previous sales (48). However, because they require historical sales data to make the projections and because there is no such data available for many new product ideas, companies need to find similar cases and build their projections on the available relevant data. For example, Bass et al. (49) predicted the diffusion of DIRECTV, a satellite-based direct broadcasting service, based on the historical TV sales in the 1960s and the cable TV subscriptions in the 1980s. With the benchmarking techniques, companies can identify and analyze similar successful cases or benchmarks and determine ways of performing at least as well as those cases. While the diffusion models focuses more on the prediction of success, this method emphasizes more the ways of achieving a particular level of success (50).

This approach is very useful in determining the future success of new product ideas as well as choosing the best strategies to achieve that success. However, finding a similar case may not be very straight-forward for many new products, as products can be similar in terms of functional, perceptual, and conceptual similarities and it is not very clear which similarity base to use in selecting similar cases. In addition, this approach is built on a strong assumption that the new product idea will enjoy the same business environment, business strategies and consumer perceptions as the similar cases (3). For instance, although other online retailers were successful, Saks Inc., an upscale retailer, had to close its online store due to low traffic. It turned out that people regarded its elegant stores and attentive salespeople as part of the shopping experience. As they were not available online, people did not want to shop there (51).

10. CONSUMER AND CONSUMPTION ANALYSES

Companies design, develop, manufacture and market new products for their customers. As a result, it is also possible to select new product ideas based on the opinions of the target

consumers of the new product idea under consideration. It has been shown in numerous empirical studies that the success of new products depends on the added value that a new product offers to customers (42, 43). Because customers purchase a new product if they perceive a value in it, this approach suggests that the opinions of the target customers can be used as an indication of the likely success of the new product idea. This approach assumes that a new product idea will be successful if the majority of people have a positive attitude towards it.

With this approach, firms first identify their target customers. After that, they determine their opinions about the new product idea under consideration and measure their likelihood of purchasing it. In the process, they can also find out which aspects of the product that they like and dislike and ways of improving the new product idea. Similarly, they can identify which product features are important to them and use this information in marketing the product. In addition to or instead of getting the customers' opinions about a new product idea first, firms can also assess the customers' needs and generate new product ideas that can fulfill the needs.

There are a large number of methods that can be used with this approach. As one of the most popular methods, a survey of the purchase intentions can be conducted. In the survey, the potential buyers are given a brief description of the new product idea and are asked to state their intention to buy it when it becomes available. In the survey, various background information from the buyers is also collected to determine relevant market segments (3). In addition, a survey of the lead users or "would-be-users" is also possible, which collects the opinions of people whose present strong needs will become general in marketplace months or years later. These surveys can be very useful with technical products such as new software, as the lead users or "would-be-users" have domain knowledge about the applications and usage situation of the products. In a case study, it was shown that the opinions of these types of people were indeed more useful than the opinions of software engineers (52).

In addition to stating their overall attitude towards a new product idea, average potential buyers or lead users can also express their opinions pertaining to specific features of the idea. For instance, in a conjoint setting, firms can compare different versions of a product feature to identify the most optimum product characteristics (44). Moreover, they can also compare the features of the new product with those of other competing products in a gap analysis and identify the key strengths of the new product idea (46). Furthermore, firms can conduct multimedia (53) or online experiments (54) in order to determine customers' buying behavior. Finally, instead of

asking potential average buyers or lead users directly whether they like a new product idea, firms can utilize emphatic methods that ask trained anthropologists and ethnographers to analyze consumer behavior and consumption patterns and select the most suitable new products (23).

This approach views customers and consumption at the center of new product development and selects new products ideas that customers like or might like. The customers' opinions can be useful to make predictions about the likely market demand for the new product idea and to diagnose the product's strengths and weaknesses for further improvement. However, because of its emphasis on understanding consumer behavior, this approach may overlook other market dynamics such as competition, technological changes, etc. (23). This approach also assumes that people can clearly articulate what they need, which is not always the case (15). Although using lead users can eliminate this drawback, lead users can also have their own limitations such as their needs may not represent the needs of average customers (23). Finally, the accuracy of this analysis depends on the assumption that environmental conditions are the same when the customers' opinions are collected and when the product is actually launched (3).

11. EXPERT ANALYSIS

Firms do not always have hard data to make idea selection decisions. In addition, the assessment of such factors as technical success, manufacturability, marketability, etc., requires expert opinions. As a result, firms can also ask people with expertise in different aspects of the new product idea under consideration about their opinions regarding its likely success. This approach assumes that there are product experts with accurate opinions. Based on this assumption, firms first need to identify relevant expertise areas for the new product idea. After that, they need to determine people who might have expertise in these areas. Experts are typically selected on the basis of a self-assessed expertise, recommendations of other people (55) and years of experience in the job (56). After they select suitable experts, companies need to elicit their opinions with regard to the probability of success in each area, likely factors that might affect this success and ways of improving the new product before it is launched. They can elicit the opinions of the experts through face-to-face meetings, anonymous questionnaire surveys (e.g., the Delphi technique) and computer-aided or Internet based anonymous group discussions (57).

This approach can be very useful because it provides both diagnostic information and predictions and can be easily adapted to changing decision conditions (58). In addition,

judgments can be relevant when related prior data is not available (59). For example, Suh, Suh and Baek (60) asked experts to prioritize telecommunication technologies for Korea Telecommunication Authority. In another study, Wakoh and Collins (61) used the opinions of managers to score R&D proposals in terms of the degree to which the available management resources meet the requirements of the proposals.

Expert opinions also have a number of limitations. First, experts are not always right. For example, studies indicate that hang-gliders were designed based on the opinions of expert users but not on those of average users; thus, it became a sport for a small number of experts (62). In addition, the selection of experts is not very clear. Internal experts can be very useful, as they are familiar with the firm and the new product. However, they can be emotionally attached to the idea and thus make erroneous decisions. For instance, studies showed that the managers who participated in numerous experimental studies remained committed to pushing a failing product all the way through commercialization, notwithstanding the progressively ominous performance feedback (63, 64). Although they can use outside experts to mitigate this concern, they, then, need to protect their intellectual property and new product ideas.

GENERAL GUIDELINES FOR AN EFFECTIVE NEW PRODUCT IDEA SELECTION

We obviously know a lot about different approaches that can be used to select new product ideas. We also know that the use of these approaches is not widespread. There could be many reasons for the lack of the methods' widespread adoption by managers. One of the widely suggested reasons is that there are no clear guidelines for effectively using such approaches (65, 66). Here, I would like to offer some general guidelines for new product managers to consider when using these approaches in their new product selection decisions. I discuss these guidelines below and list them in Table II.

1. COMPREHENSIVE AND HOLISTIC

New product development is highly risky and uncertain. It is also multi-dimensional, requiring different viewpoints and expertise. In order to reduce the risks and uncertainties and to account for the different viewpoints, firms need to take a holistic view and use as many approaches as possible in their idea selection process. Otherwise, selecting new product ideas based on one or two approaches will not answer all the related questions, as each approach looks at a unique

aspect of the idea selection process. For instance, while technical analysis emphasizes manufacturability marketing analysis focuses on marketability and yet competitive analysis looks at the current and potential competition. Although these approaches individually shed some lights on the uncertain idea selection process the selection decision will be more accurate if it is based on all these multiple views.

2. FLEXIBLE

New product idea selection is not to be done in isolation, but needs to take into account the rapid changes in the market environment. As firms proceed in the new product development process, they will gather new information and need to adapt their new product ideas in order to respond to the changes more effectively. However, if their idea selection approach is very rigid in terms of timeframes, budgets, criteria and alternatives their ideas may not be relevant by the time they are fully developed. Instead, they need to be prepared to modify their approaches and criteria and re-evaluate their new product ideas as soon as there is new information (67). Another important issue in new product idea selection is that there is a large time gap between the time when the ideas are selected and the time when they are introduced to the market. Because of this time gap, a selected idea may not be relevant when it is introduced to the market. In order to better respond to the new market conditions, firms can also adopt a flexible approach and instead of selecting the best idea at the beginning they can identify and work on a number of potentially successful ideas, but freeze the concept late in the new product development process (68).

3. DYNAMIC AND CONTINUOUS

Idea selection usually involves a great deal of uncertainty. However, the uncertainty diminishes as companies proceed in the new product development process and as new information becomes available. In addition, because of the changes in the market conditions the information available during the idea selection process might not be relevant when the new product actually enters the market. Hence, a one-time test may not suffice to take into account all the uncertainties and to capture the changes in the information along the development process. Instead, firms can adopt a dynamic approach and repeat testing as new information becomes available. This will reduce the uncertainties and help them incorporate the new information into the new product decisions

as early as possible. Consequently, they can either improve their products or discontinue their development before making further investments into the development (69).

4. USER-FRIENDLY

Numerous survey studies report that not many new product idea selection methods are widely used by managers because they do not understand them (65, 66). In addition, people involved in the new product development process may have different backgrounds and may come from different functional areas. Consequently, they might not have equal understanding of the methods used. In order to better implement and effectively use an idea selection approach people need to be familiarized with it (24, 70). Furthermore, the criteria and metrics used in the approach should be explained to the participants. This can help companies in two ways. First, the clarity of metrics can be one of the important factors in successfully integrating different people such as suppliers into the new product development process (71). Second, the transparency of the criteria and the metrics can also de-politicize the selection process and thus can increase people's involvement in the downstream implementation activities (8).

5. OBJECTIVE

New product practitioners and researchers increasingly believe that the new product development process including its idea selection phase can be highly political because of the large amount of resources and responsibilities involved. In fact, due to pure political reasons, truly successful new product ideas may be eliminated while the value of potentially unsuccessful new product ideas may be inflated (18). As a result, the idea selection process and its criteria should be as objective as possible. In addition, everyone involved in the idea selection process should perceive the process to be as fair, balanced and objective. Otherwise, it can create strong animosity among them towards the idea selection process and this can hinder their participation in the process (70).

6. LEARNING-FOCUSED

One of the key new product success factors is to have a clear and specific product definition (43). Thus, the objective of new product idea selection should go beyond merely selecting the most profitable idea, but include a learning aspect in order to clarify and specify the product concepts

and discover ways of improving them. In fact, many software companies use such approaches and ask their potential users to perfect their new products. In a case study, Bordley (72) asked several technologists to assess a number of R&D projects. During the process, the assessors were forced to think about some “showstoppers.” As a result, the project teams became aware of the issues and tackled them early in the process despite the fact that their main objective was to develop numerical estimates of the value of each R&D projects.

7. IMPLEMENTATION-ORIENTED

Although it is very crucial, new product idea selection is just the beginning of a long process. Most notable, after an idea is selected it needs to be designed, developed, manufactured, and marketed before it reaches the intended buyers. As a result, firms might face numerous challenges in this long process and need the support of everyone involved in the process. One way of securing the support of the relevant parties is to get them involved in the selection process. In fact, it was shown that the involvements of the vice presidents of marketing, manufacturing and R&D of a major manufacturer of heating and cooling systems for large buildings in the selection of new products resulted in better implementation of the selected ideas (17). In addition, firms can also promote a collective ownership of the new product ideas. When people feel that ideas belong to them as opposed to a functional department, they will be more supportive of the ideas, as a recent survey with the members of the Industrial Research Institute has already shown that people in successful firms viewed new product development as a firm-wide process rather than owned by a single function such as marketing or R&D (73).

CONCLUSION

New product development is indeed very important for companies’ competitiveness. At the same time, it is a risky and uncertain business. As an important part of the new product development process, new product idea selection can be instrumental for companies to reduce the risks and uncertainties associated with developing new products. Consequently, researchers in a wide range of disciplines such as decision sciences, engineering, finance, marketing, new product development, operations management and research, organizational science, R&D and others have introduced numerous methodologies for selecting new product ideas. Because of the nature of each discipline, the approaches tend to focus on different aspects of the new product

idea selection issue. For instance, researchers in the area of operations management focus more on the new product's manufacturability whereas scholars in the area of finance focus more on the product's financial returns and researchers in the area of decision sciences primarily deal with the risks associated with the product. In this study, I reviewed new product idea selection approaches available in these disciplines and integrated them in a framework so that new product managers can have a big picture view of the new product selection process without getting lost in the details of hundreds of specific methodologies. I presented the approaches with an emphasis on their key questions, relevant methodologies, benefits and limitations. I also offered general guidelines for new product managers to follow in new product idea selection.

It appears that we know a lot about new product idea selection and have many related methodologies and approaches. However, we still need to know much more about it and hope that future research studies can address them. For example, we need to know more about how to integrate the different perspectives generated by each approach. In addition, the current approaches are usually static and offer a "snapshot" view of the selection process. As a result, we would like to know more about how to make them more dynamic. Finally, the approaches tend to focus on an outcome or decision, but overlook how other key *process* factors such as the decision-making styles of new product managers and the organizational characteristics might affect the idea selection process. Future studies can investigate the roles of these factors as well.

Figure I. A summary of new product idea selection approaches

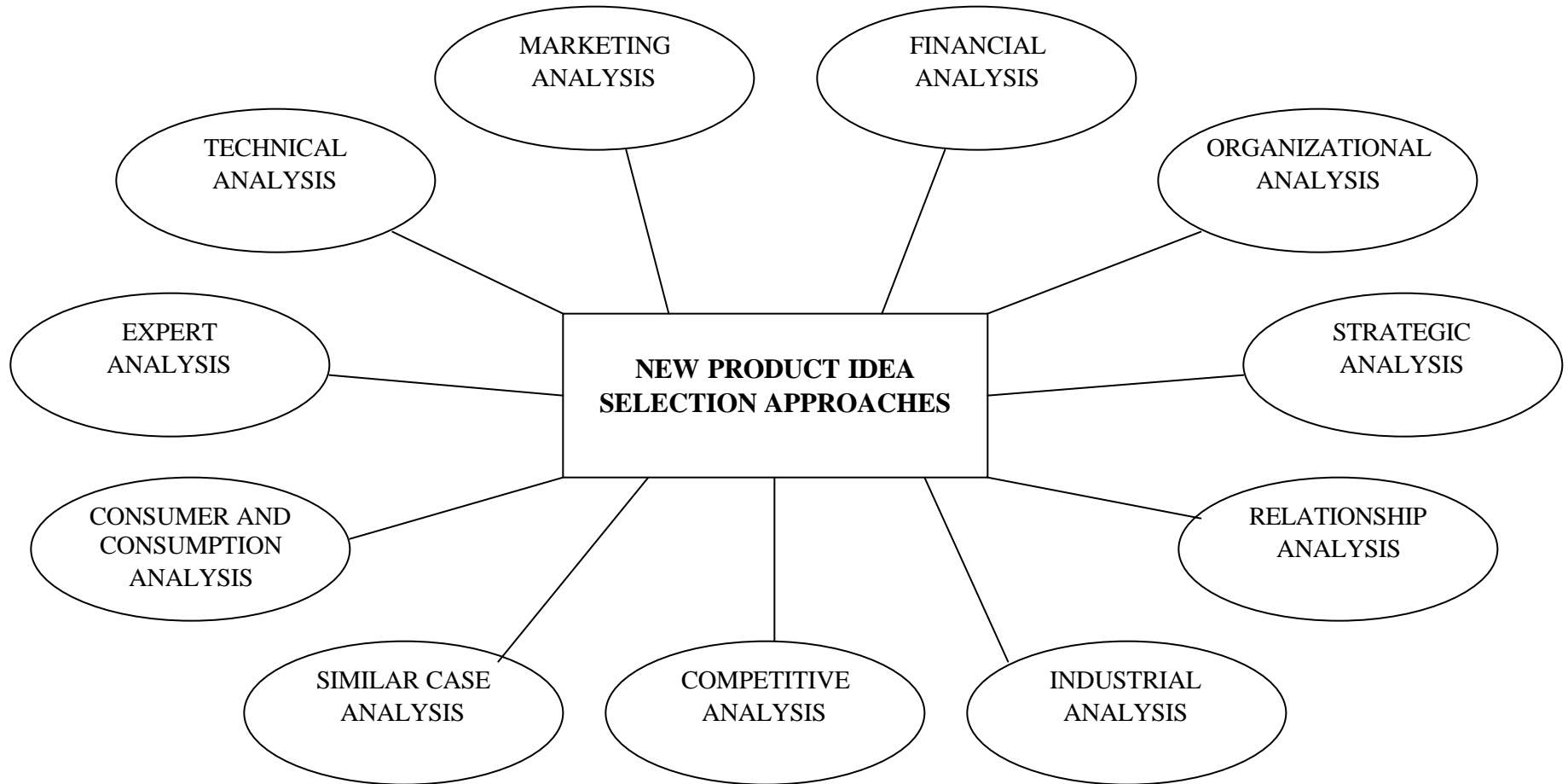


Table I. Characteristics of new product idea selection approaches.

IDEA SELECTION APPROACHES	Brief Description	Typical Questions	CHARACTERISTICS		
			Popular Methods	Benefits	Limitations
Technical Analysis	This approach selects new products based on their technical requirements and the feasibility of meeting the requirements.	<ul style="list-style-type: none"> - What are the product and design specifications? - Is there any fit between the specifications and the firm's technical capabilities? - If not, can the technology be successfully acquired and implemented? 	<ul style="list-style-type: none"> - Checklists. - Scoring methods. - Environmental scanning. - Decision models such as AHP. 	<ul style="list-style-type: none"> - It can help identify and solve technical problems early and increase the speed of product development. - Focusing on technical issues can improve product quality and reliability. 	<ul style="list-style-type: none"> - Too much technical focus can prevent firms from understanding their buyers. - It can force firms to choose ideas that are in line with available technologies, but ignore promising opportunities.
Marketing Analysis	This approach suggests that a firm should select a new product only when it has the needed capabilities to market it (e.g., being able to collect market information about it, to distribute the product, etc.).	<ul style="list-style-type: none"> - What kind of information is needed to design, develop and market the new product? - What kinds of marketing strategies are needed to market it successfully? - Does the firm have the necessary marketing competencies to collect the needed information and to market the new product? - If not, can the firm outsource activities? 	<ul style="list-style-type: none"> - Checklists. - Scoring methods. - Environmental scanning. - Decision models such as AHP. - Opinions of the members of the distribution channel. 	<ul style="list-style-type: none"> - Because it emphasizes the collection and use of market information, it can enhance the market success of new products. - It takes into account the opinions of the members of the distribution channel and this can increase their involvement in the new product development and their support for successfully distributing it in the marketplace. 	<ul style="list-style-type: none"> - The information collected may not be reliable or useful. - It ignores inter-functional conflicts and assumes that the information will be shared in the firm.

Table I. Continued

IDEA SELECTION APPROACHES	Brief Description	Typical Questions	CHARACTERISTICS		
			Popular Methods	Benefits	Limitations
Financial Analysis	According to this approach, new products are selected based on their potential financial returns.	<ul style="list-style-type: none"> - What kinds of financial returns can the new product generate? - What are the required financial resources? - What are the probabilities of achieving the financial results and of meeting the established budget goals? - Are there any benchmarks with regard to the acceptable financial returns and new product budgets? 	<ul style="list-style-type: none"> - Cost and benefit analysis. - Net present value. - Decision analysis. - Option pricing. - Mathematical modeling. 	<ul style="list-style-type: none"> - It is easy to understand and justify. - It helps companies better control their investments and thus reduce financial risks. 	<ul style="list-style-type: none"> - Relying on short-term financial results may force managers to focus on justifiable ideas, but ignore more promising ideas. - It may not capture future risks and uncertainties. - It is a “snapshot” of the financial benefits and costs. - It assumes that accurate financial information is readily available.
Organizational Analysis	This approach selects new products based on the match between firms’ current organizational structures and cultures and the new product’s organizational requirements.	<ul style="list-style-type: none"> - What are the necessary organizational structures and cultures for successfully designing, developing, manufacturing and marketing a new product? - Do they match with the existing structures and cultures? - Can the firm make the required changes if there is no match? 	<ul style="list-style-type: none"> - Checklists. - Scoring tools. - Prioritization processes. - The opinions of internal and external experts. 	<ul style="list-style-type: none"> - The emphasis on the organizational factors can lead to successful new products. - This emphasis also results in positive operational outcomes such as higher product quality, lower unit cost and faster new product development. 	<ul style="list-style-type: none"> - It will be very difficult to predict how successfully organizational changes can be implemented. - There is a trade-off between the organizational considerations and new product quality (i.e., organizational efficiencies do not always lead to high-quality new products).

Table I. Continued

			CHARACTERISTICS		
IDEA SELECTION APPROACHES	Brief Description	Typical Questions	Popular Methods	Benefits	Limitations
Strategic Analysis	The main focus of this approach is that a new product should fit into companies' overall business strategy.	<ul style="list-style-type: none"> - What are the firm's corporate strategies? - What are the objectives of the new product idea? - Is there any match between the corporate strategies and the new product objectives? - If not, can the firm change its strategies? - 	<ul style="list-style-type: none"> - Internal audits. - Checklists. - Scoring tools. - Prioritization processes. - The opinions of internal and external experts. 	<ul style="list-style-type: none"> - It increases the likelihood that the firm can contribute necessary resources and support to the development and launch of new products. - It can create a synergy among the existing products of the firm and can reduce the chances of cannibalism. 	<ul style="list-style-type: none"> - It can be too general to assess the specific technical, financial and marketing merits of a new product idea. - The strategies can be too rigid and thus selecting new product ideas based on their fit with the firm's strategies can be very restrictive.
Relationship Analysis	This approach takes into account firms' dependence on suppliers and distributors and selects new products that can be supported by them.	<ul style="list-style-type: none"> - What are the required relationships to design, develop, manufacture and market a new product idea? - What are the firm's existing relationships in these areas? - Is there a match between the required and existing relationships? - If there is a mismatch, who are the potential partners for the identified relationships? 	<ul style="list-style-type: none"> - Checklists. - Internal audits. - Scoring tools. - Prioritization processes. - Secondary data. - The Internet. - Referrals. - Interviews. - Surveys. 	<ul style="list-style-type: none"> - It allows firms to consider additional resources that are available due to the relationships. - It gets the partners involved in the new product development process and thus they can help fix potential problems early in the development process. 	<ul style="list-style-type: none"> - It can misguide firms to rely on relationships too much and ignore their potential pitfalls. - Too much emphasis on relationships can restrict firms' new product ideas to those that their partners like. - It may not discriminate new product ideas that require similar relationships.

Table I. Continued

IDEA SELECTION APPROACHES	Brief Description	Typical Questions	CHARACTERISTICS		
			Popular Methods	Benefits	Limitations
Industrial Analysis	This approach considers the overall business environment and selects new products that are in alignment with it.	<ul style="list-style-type: none"> - What are the environmental requirements of the new product idea? - What are the environmental conditions? - Is there a match between the requirements and the environment? - If not, can the new product idea be changed so as to make it fit with the environment? 	<ul style="list-style-type: none"> - Online and offline secondary databases. - The opinions of internal and external experts. - The opinions of futurists. - Boston Consulting Group's market-growth and market-share matrices. - Visionary techniques. 	<ul style="list-style-type: none"> - It helps firms better align their new products with the business environment. - It helps firms detect market trends and develop new products to capture the trends. 	<ul style="list-style-type: none"> - Too much emphasis on the current environment can cause firms to focus on the existing markets, but ignore developing new markets. - It assumes that the environment is stable and the future environment can be predicted easily.
Competitive Analysis	This approach emphasizes the importance of competition and selects new products that are competitive.	<ul style="list-style-type: none"> - What are the current and expected competing products? - What are the similarities/dissimilarities between the new product idea and the competing products? - How important are the similarities/dissimilarities? - Is the new product superior? - What are the ways of reducing similarities and making the new product superior? 	<ul style="list-style-type: none"> - Conjoint analysis. - Kano surveys. - Gap analysis. - Benchmarking. 	<ul style="list-style-type: none"> - It forces firms to pay attention to the competitive issues at the up-front idea selection stage. - It helps firms identify unique and superior product features for better product positioning and promotion. 	<ul style="list-style-type: none"> - It assumes that the product features can easily be identified and described. - It assumes that similarities and dissimilarities can easily be measured.

Table I. Continued

IDEA SELECTION APPROACHES	Brief Description	Typical Questions	CHARACTERISTICS		
			Popular Methods	Benefits	Limitations
Similar Case Analysis	This approach compares new products to other similar cases and selects them only when the similar cases are successful.	<ul style="list-style-type: none"> - Are there any similar cases? - How similar are they? - What can be learned from the similar cases in terms of market success, production and marketing strategies, budget and critical success factors? 	<ul style="list-style-type: none"> - Secondary data collection. - Primary data collection. - Diffusion models. - Benchmarking. 	<ul style="list-style-type: none"> - It helps assess the likely success of a new product idea. - It helps determine suitable strategies to achieve that success. 	<ul style="list-style-type: none"> - It may be difficult to find similar cases. - It assumes that the new product idea will have the same market environment, business strategy and customer perception as the similar case.
Consumer and Consumption Analysis	This approach selects new products based on the opinions of customers.	<ul style="list-style-type: none"> - Who are the target customers? - What are their opinions about the new product idea under consideration? - Do they intend to buy it? - What do they like and dislike about the product idea? - What are the ways of improving the product? - Which product features are more important to them? - What are their needs that are not filled by the product idea under consideration? 	<ul style="list-style-type: none"> - Buyer surveys. - Lead user surveys. - “Would-be-user” surveys. - Conjoint analysis. - Gap analysis. - Multimedia/online experiments. - Emphatic methods. 	<ul style="list-style-type: none"> - It provides market predictions. - It diagnoses product strengths and weaknesses. 	<ul style="list-style-type: none"> - Too much emphasis on understanding consumer behavior may overlook other market dynamics. - It assumes that people can clearly articulate what they need. - It assumes that lead users can represent average customers. - It assumes that the environmental conditions are stable.

Table I. Continued

IDEA SELECTION APPROACHES	Brief Description	Typical Questions	CHARACTERISTICS		
			Popular Methods	Benefits	Limitations
Expert Analysis	This approach selects new products based on the opinions of relevant experts.	<ul style="list-style-type: none"> - What are the expertise areas in assessing the new product idea under consideration? - Who might have expertise in these areas? - How to select these people? - What are the experts' opinions with regard to the probability of success, likely factors that might affect this success and ways of improving the new product before it is launched? - How to elicit these opinions? 	<ul style="list-style-type: none"> - Face-to-face meetings. - Anonymous survey questionnaires (e.g., the Delphi technique). - Computer-aided or Internet based anonymous surveys. 	<ul style="list-style-type: none"> - It can help predict the future success of the new product ideas. - It can provide diagnostic information for improving the new product idea. - It can fill the information gap when there is no hard data to make decisions. 	<ul style="list-style-type: none"> - Experts are not always right. - Internal experts can be emotionally attached to the idea and thus make biased decisions whereas external experts can compromise the secrecy of the idea.

Table II. Characteristics of an effective new product idea selection process.

1. Comprehensive and holistic.
2. Flexible.
3. Dynamic and continuous.
4. User-friendly.
5. Objective.
6. Learning-focused.
7. Implementation-oriented.

REFERENCES

1. Brown, Shona L. and Eisenhardt, Kathleen M. "Product Development: Past Research, Present Findings, and Future Directions." *Academy of Management Review* 20, 1995, pp. 343-378.
2. Griffin, Abbie. "PDMA Research on New Product Development Practices: Updating Trends and Benchmarking Best Practices." *Journal of Product Innovation Management* 14, 1997, pp. 429-458.
3. Ozer, Muammer. "A Survey of New Product Evaluation Models." *Journal of Product Innovation Management* 16, 1997, pp. 77-94.
4. Calantone, Roger, Schmidt, Jeffrey B. and Song, X. Michael. "Controllable Factors of New Product Success: A Cross-National Comparison." *Marketing Science* 15, 1996, pp. 341-358.
5. Ettl, John E. "Integrated Design and New Product Success." *Journal of Operations Management* 15, 1997, pp. 33-55.
6. Adler, Paul. S. "Interdepartmental Interdependence and Coordination: The Case of Design/Manufacturing Interface." *Organization Science* 6, 1995, pp. 147-167.
7. Kumar, Vinod, Persaud, Aditha N. S. and Kumar, Uam. "To Terminate or Not an Ongoing R&D Project: A Managerial Dilemma." *IEEE Transactions on Engineering Management* 43, 1996, pp. 273-284.
8. Schepers, J., Schnell, R., and Vroom, P. "From Idea to Business- How Siemens Bridges the Innovation Gap." *Research-Technology Management* 42, May-June, 1999, pp. 26-31.
9. Saaty, Thomas. "Priority Setting in Complex Problems." *IEEE Transactions on Engineering Management* 30, 1988, pp. 140-155.
10. Swink, M. "Threats to New Product Manufacturability and the Effects of Development Team Integration Processes." *Journal of Operations Management* 17, 1999, pp. 691-709.
11. Benson, Brien, Sage, Andrew P. and Cook, Gerald. "Emerging Technology-Evaluation Methodology: With Application to Micro-Electromechanical Systems." *IEEE Transactions on Engineering Management* 40, 1993, pp. 114-123.
12. Verona, Gianmario. "A Research-Based View of Product Development." *Academy of Management Review* 24, 1999, pp. 132-142.
13. Wang, C. C. L. "The Rise & Fall of Direct Selling in China: Lessons for International Marketers." *Journal of International Marketing and Marketing Research* 26, 2001, pp.139-150.

14. Ottum, Brian D. and Moore, W. L. "The Role of Market Information in New Product Success/Failure." *Journal of Product Innovation Management* 14, 1997, pp. 258-273.
15. Ulwick, Anthony. "Turn Customer Input into Innovation." *Harvard Business Review* January, 2002, pp. 91-97.
16. Xie, Jinhong, Song, X. Michael and Stringfellow, Anne. "Interfunctional Conflict, Conflict Resolution Styles and New Product Success: A Four-Culture Comparison." *Management Science* 44, 1998, pp. S192-S206.
17. Gensch, D. "A Marketing-Decision-Support Model for Evaluating and Selecting Concepts for New Products." *Interfaces* 31, 2001, pp. S166- S183.
18. Loch, Christoph H., and Bode-Greuel, K. "Evaluating Growth Options As Sources of Value for Pharmaceutical Research Projects." *R&D Management* 31, 2001, pp. 231-248.
19. Hall, David L. and Nauda, Alexander. "An Interactive Approach for Selecting IR&D Projects." *IEEE Transactions on Engineering Management* 37, 1990, pp. 126-133.
20. Bunch, Paul R. and Schacht, Aaron L. "Modeling Resource Requirements for Pharmaceutical R&D." *Research-Technology Management* 45, 2002, pp. 48-56.
21. Machacha, Lilybert L. and Bhattacharya, P. "A Fuzzy-Logic-Based Approach to Project Selection." *IEEE Transactions on Engineering Management* 47, 2000, pp. 65-73.
22. Meade, Laura M. and Presley, A. "R&D Project Selection Using the Analytic Network Process." *IEEE Transactions on Engineering Management* 49, 2002, pp. 59-66.
23. Deszca, G., Munro, H. and Noori, H. "Developing Breakthrough Products: Challenges and Options for Market Assessment." *Journal of Operations Management* 17, 1999, pp. 613-630.
24. Loch, Christoph H., Pich, Michael T., Terwiesch, C. and Urbschat, M. "Selecting R&D Projects at BMW: A Case Study of Adopting Mathematical Programming Models." *IEEE Transactions on Engineering Management* 48, 2001, pp. 70-80.
25. Tritle, Gary L., Scriven, Eric F. and Fusfeld, Alan R. "Resolving Uncertainty in R&D Portfolios." *Research-Technology Management* 43, 2000, pp. 47-55.
26. Saleh, Shoukry and Wang, Clement K. "The Management of Innovation: Strategy, Structure and Organizational Climate." *IEEE Transactions on Engineering Management* 40, 1993, pp. 14-21.
27. Tatikonda, Mohan V. and Montoya-Weiss, Mitzi M. "Integrating Operations and Marketing Perspectives of Product Innovation: The Influence of Organizational Process Factors and Capabilities on Development Performance." *Management Science* 47, 2001, pp. 151-172.

28. Pelled, Lisa H. and Adler, Paul S. "Antecedents of Intergroup Conflict in Multifunctional Product Development Teams: A Conceptual Model." *IEEE Transactions on Engineering Management* 41, 1994, pp. 21-28.
29. Zinger, B. J. and Hartley, J. L. "The Effects of Acceleration Techniques on Product Development Time." *IEEE Transactions on Engineering Management* 43, 1996, pp. 143-152.
30. Morgan, Leslie O., Morgan, Ruskin M. and Moore, William L. "Quality and Time- to-Market Trade-offs When There are Multiple Product Generations." *Manufacturing and Service Operations Management* 3, 2001, pp. 89-104.
31. Urban, Glen L. and Katz, Gerald M. "Pre-Test Market Models: Validation and Managerial Implications." *Journal of Marketing Research* 20, 1983, pp. 221-234.
32. Useem, Jerry. "Internet Defense Strategy: Cannibalize Yourself." *Fortune* September 6, 1999, pp. 121-134.
33. Dougherty, D. and Hardy, C. "Sustained Product Innovation in Large, Mature Organizations: Overcoming Innovation-to-Organization Problems." *Academy of Management Journal* 39, 1996, pp. 1120-1153.
34. St. John, Caron H., Cannon, Alan R. and Pouder, Richard W. "Change Drivers in the New Millennium: Implications for Manufacturing Strategy Research." *Journal of Operations Management* 19, 2001, pp. 143-160.
35. Walter, Achim, Ritter, Thomas and Gemunden, Hans G. "Value Creation in Buyer-Seller Relationships: Theoretical Considerations and Empirical Results from a Supplier's Perspective." *Industrial Marketing Management* 30, 2001, pp. 365-377.
36. Hartley, Janet L., Meredith, Jack R., McCutcheon, David and Kamath, Rajan R. "Suppliers' Contribution to Product Development: An Exploratory Study." *IEEE Transactions on Engineering Management* 44, 1997, pp. 258-267.
37. Hagerty, James R. "Furniture Brands Weighs Pros and Cons of Web Policy." *The Wall Street Journal Europe* September 16, 1999, p. 4.
38. Saxton, Todd. "The Effects of Partner and Relationship Characteristics on Alliance Outcome." *Academy of Management Journal* 40, 1997, pp. 443-461.
39. Medcof, John W. "Identifying 'Super-Technology' Industries." *Research-Technology Management* July-August, 1999, pp. 31-36.
40. Millett, Stephen and Kopp, William. "The Top 10 Innovative Products for 2006: Technology with a Human Touch." *The Futurist* 30, 1996, pp. 16-20.

41. Balachandra, R. and Friar John H. "Factors for Success in R&D Projects and New Product Innovation: A Contextual Framework." *IEEE Transactions on Engineering Management* 44, 1997, pp. 276-287.
42. de Brentani, U. and Ragot, E. "Developing New Business-to-Business Professional Services: What Factors Impact Performance?" *Industrial Marketing Management* 25, 1996, pp. 517-530.
43. Cooper, Robert G. "Overhauling the New Product Process." *Industrial Marketing Management* 25, 1996, pp. 465-482.
44. Green, Paul E., Krieger, Abba M. and Wind, Yoram (Jerry). "Thirty Years of Conjoint Analysis: Reflections and Prospects." *Interfaces* 31, 2001, pp. S56-S73.
45. Mello, S. "Right Process, Right Product." *Research-Technology Management* January-February, 2001, pp. 52-58.
46. Vairaktrarakis, George L. "Optimization Tools for Design and Marketing of New/Improved Products Using the House of Quality." *Journal of Operations Management* 17, 1999, pp. 645-663.
47. Dressler, R., Wood, Robert S. and Alvarez, V. "Evaluating R&D Performance Using the Cost Saving Metric." *Research-Technology Management* March-April, 1999, pp. 13-14.
48. Bass, Frank M. "A New Product Growth Model For Consumer Durables." *Management Science* 15, 1969, pp. 215-227.
49. Bass, Frank M., Gordon, K., Ferguson, Teresa L. and Githens, Mary L. "DIRECTV: Forecasting Diffusion of a New Technology Prior to Product Launch." *Interfaces* May- June, 2001, pp. S82-S93.
50. Coombs, R., McMeekin, A. and Pybus, R. "Toward the Development of Benchmarking Tools for R&D Project Management." *R&D Management* 28, 1998, pp. 175-186.
51. Anders, George. "Why – and Where – Internet Commerce is Succeeding." *The Wall Street Journal* December 7, 1998, p. R4.
52. Pliskin, Nava, Balaila, Isaac and Keningshtein, Isaac. "The Knowledge Contribution of Engineers to Software Development: A Case Study." *IEEE Transactions on Engineering Management* 38, 1991, pp. 344-348.
53. Urban, G., Hauser, J. H., Qualls, W. J., Weinberg, B. D., Bohlmann, J. D. and Chicos, R. A. "Information Acceleration: Validation and Lessons From the Field." *Journal of Marketing Research* 34, 1997, pp. 143-153.

54. Dahan, E. and Srinivasan, V. "The Predictive Power of Internet- Based Product Concept Testing Using Visual Depiction and Animation." *The Journal of Product Innovation Management* 17, 2000, pp. 99-109.
55. Keeney, R. L. and von Winterfeldt, D. "Eliciting Probabilities From Experts in Complex Technical Problems." *IEEE Transactions on Engineering Management* 38, 1991, pp. 191-201.
56. Adelman, L. and Bresnick, T. "Examining the Effects of Information Sequence on Patriot Air Defense Officers' Judgments." *Organizational Behavior and Human Decision Processes* 53, 1992, pp. 204-228.
57. Ozer, Muammer. "The Use of Internet-Based Groupware in New Product Forecasting." *Journal of the Market Research Society* 41, 1999, pp. 425-438.
58. Blattberg, Robert C. and Hoch, Stephen J. "Database Models and Managerial Intuition: 50% Model + 50% Manager." *Management Science* 36, 1990, pp. 887-899.
59. Bailey, C. D. and Gupta, S. "Judgments in Learning-Curve Forecasting: A Laboratory Study." *Journal of Forecasting* 18, 1999, pp. 39-57.
60. Suh, Chang-Kyo, Suh, Eui-Ho and Baek, Kwang-Churn. "Prioritizing Telecommunications Technologies for Long-Range R&D Planning to Year 2006." *IEEE Transactions on Engineering Management* 41, 1994, pp. 264-275.
61. Wakoh, H. and Collins, S. "Evaluating Project Proposals." *Research-Technology Management* November-December, 2001, pp. 32-37.
62. Kohn, J. W. and Schooley, G. "Paragliders." In Robert J. Thomas (ed.), *New Product Success Stories: Lessons from Leading Innovators*, New York: John Wiley and Sons, Inc., (1995).
63. Boulding, William, Morgan, Ruskin and Staelin, Richard. "Pulling the Plug to Stop the New Product Drain." *Journal of Marketing Research* 34, 1997, pp. 194-176.
64. Schmidt, Jeffrey B. and Calantone, Roger J. "Are Really New Product Development Projects Harder to Shut Down?" *Journal of Product Innovation Management* 15, 1998, pp. 111-123.
65. Duran, J. A. and Flores, B. E. "Forecasting Practices in Mexican Companies." *Interfaces* 28, 1998, pp. 56-62.
66. Sanders, N. R. and Manrodt, K. B. "Forecasting Practices in US Corporations: Survey Results." *Interfaces* 24, 1994, pp. 92-100.

67. Schmidt, Robert L. and Freeland, James R. "Recent Progress in Modeling R&D Project-Selection Processes." *IEEE Transactions on Engineering Management* 39, 1992, pp. 189-201.
68. Iansiti, Marco. "Shooting the Rapids: Managing Product Development in Turbulent Environments." *California Management Review* 38, 1995, pp. 37-58.
69. Thomke, S. and Bell, David E. "Sequential Testing in Product Development." *Management Science* 47, 2001, pp. 308-323.
70. Henriksen, Anne D. and Traynor, Ann J. "A Practical R&D Project-Selection Scoring Tool." *IEEE Transactions on Engineering Management* 46, 1999, pp. 158-170.
71. Ragatz, Gary L., Handfield, Robert B. and Scannell, Thomas V. "Success Factors for Integrating Suppliers into New Product Development." *Journal of Product Innovation Management* 14, 1997, pp. 190-202.
72. Bordley, Robert F. "R&D Project Selection Versus R&D Project Generation." *IEEE Transactions on Engineering Management* 45, 1998. pp. 407-413.
73. Davidson, Jeffery M., Clamen, A. and Karol, Robin A. "Learning from the Best New Product Developers." *Research-Technology Management* July-August, 1999, pp. 12-18.