Title: Idea Generation for New Product Development: Sources and Extraction Strategie

Course:
Year: 1992
Author(s): K. Alessa, F. Birang, M. Kruskopf and L. Lorenzen

Report No: P92028

Abstract: It is essential for manufacturers of consumer and industrial goods to continuously develop innovative new products in order to maintain a healthy growth environment and market viability. Innovation is by virtue ideas. This paper first presents various sources of ideas categorized as internal and external. The report then progresses into a presentation of various methods to extract ideas internally and externally. Information presented is obtained from various sources such as professional journals and text books. As a supplement to the report, there are two interviews conducted with various companies regarding the practice of idea generation.

Idea Generation For New Product Development: Sources And Extraction Strategies

K. Alessa, F. Birang, M. Kruskopf, L. Lorenzen

EMP-P9228

IDEA GENERATION FOR NEW PRODUCT DEVELOPMENT:

SOURCES AND EXTRACTION STRATEGIES

December 1, 1990

EMGT-541 PROJECT

Dr. Dundar F. Kocaoglu

TEAM NO.6

Khaled Alessa
Fred Birang
Mark Kruskopf
Lisa Lorenzen

ABSTRACT

It is essential for manufacturers of consumer and industrial goods to continously develop innovative new products in order to maintain a healthy growth environment and market viability. Innovations are by virtue ideas. This paper first presents various sources of ideas categorized as internal and external. The report then progresses into a presentation of various methods to extract ideas internally and externally. Information presented is obtained from varoius sources such as professional journals and text books. As a suppliment to the report, there are two interviews conducted with various companies regarding the practice of idea generation.

TABLE OF CONTENTS

I. INTRODUCTION

Success in the marketplace can be obtained by internally developing new and innovative products[1]. Unfortunately, few firms are capable of doing this. Many of today's products are modifications of older ones or line extensions, and only 10% of new products are really new[2]. Also, once a program is started, the odds are against it being successful: about one of twenty programs initiated ever result in significant commercial success"[3].

The challenge for the engineering manager is to guide their company in a direction that leads to successful new products. One can start by examining the road map to new product development, the product life cycle model (see Figure 1). There are many variations of this, but they all have four basic stages: conceptual(or idea generation), definition, production, and operational[4]. All these are important, but the stage that establishes the direction of the process is idea generation; without this the remaining stages are incomplete.

Therefore, it is important for the engineering manager to efficiently tap all the available sources for ideas, and select the ones which are most likely to be successful. This paper will identify the different types of sources available and elaborate on what information they provide. It will also study the different methods used to extract ideas from both internal and external sources. Finally, the results of two interviews will be presented.

Two companies will be profiled based upon interviews with key individuals in the product cycle development process. How these two different hi-tech companies obtain and extract ideas will be carefully analyzed and recommendations given based upon research and knowledge of the innovative process.

II. SOURCES OF IDEAS

Sources for new product development ideas can be broken down into two major categories, internal and external[5]. Internal sources are found within the company and external sources are found outside the company. It is important that both sources be used because they provide different types of information [6]. Internal sources can be familiar with the manufacturing aspects of current products and can give insight which can lead to new improvements. External sources supply information from the overall market. Using both internal and external sources will increases chances for a company's success.

A. INTERNAL

Internal sources can include reports generated by the employees, performance information (yields, profits, sales), testing results, but most importantly it includes input from the employees. Giving people a chance to participate in a new product is a way to motivate them[7]. Internal sources includes all functions of the organization from engineering to shipping, because every level can contribute valuable ideas. "The innovation process demands a complex interaction of many parties possessed of a variety of skills, far beyond the capacity of a single individual, no matter how gifted."[8].

Listed below are the different sections of a company and a brief description of how each can contribute to the innovation process.

Manufacturing/Production

Manufacturing is intimately tied to a firms existing products. They may know exactly which part of the assembly is difficult, time consuming, or expensive. Consulting manufacturing before designing a new product could reveal ideas to make assembly easier and more efficient, which parts to eliminate(some may be unnecessary or fail often during testing), and what features would make the product easier to use.

Sales/Marketing

Input from sales and marketing is crucial because they are the main link to the outside world. They receive information from external sources such as customers, competitors, distributors, sales representatives, and consumer groups. These sources will be discussed in more detail under external sources.

Service Department

This organization can provide important reliability data on products and parts. The Service Department see what fails and how frequently. Because they are in constant contact with customers by listening to their complaints and recommendations, they can offer solutions and suggestions for product improvements and enhancements. The service organization may have suggestions on how to redesign a part.

Accounting

The accounting department has contact with customers when bills are not paid due to "deficiencies in a companies products. Customer complaints explain why a bill is not being paid and can provide an excellent source of ideas for improved and new products"[9]. If there is a substantial amount of money involved upper management may

get involved, and then the problem will be escalated, making it everyone's priority.

Quality Control

This organization provides information on product reliability and parts quality. The quality control organization can identify problem areas from their product testing and suggest product changes. They also observe problems with incoming parts and discuss the situation with the vendors. The vendor feedback is important to determine which parts are difficult, troublesome and expensive to build. They may have suggestions to simplify the part or a process.

Manufacturing Engineering

Manufacturing engineering can provide valuable information because they see all aspects of building the product. They design the production tooling, setup the assembly line, and listen to problems from the vendors, production supervisors and operators, and equipment manufacturers. Consulting manufacturing engineering on a new product will reveal how to simplify assembly, avoid expensive operations, and possibly identify new applications.

Inventory Control/Warehouse

The inventory control department monitors the flow of parts and products in and out of the plant. They know what parts are consistently late and difficult to keep in stock. This is an indication of a part that is difficult to build or a vendor that is not performing adequately. Perhaps the specifications of a product are too rigid or the materials used are in short supply. This is valuable information when designing a new-generation product. Finally, the warehouse personnel could have ideas for innovative

packaging. Reusable, recyclable, more protective, more space efficient packaging could stream-line the manufacturing of a new product.

As shown above, all areas of a company can contribute directly or indirectly to the development of a new and innovative product. One must remember that a product is not only characterized by its function and appearance, but also its ability to be manufactured, tested, operated, stored, and provide value.

As mentioned earlier, getting everyone involved and participating is an effective method for motivating individuals to work together to introduce a new product. "Involvement is probably the best motivation for getting people behind the successful development and introduction of a new product or idea."[10] Involvement also opens the channels for information flow from one department to the next. This information transfer is especially important between sales and R&D, where critical customer feedback must be exchanged and analyzed.

B. EXTERNAL

While internal sources play an important role in an organization's success, external sources of ideas seems to play an even more important role. "In the scientific industry 80% of innovations judged by users to offer them a significant increment in functional utility were in fact invented, prototyped, and first field-tested by users of that instrument rather than by an instrument manufacturer."[11]. More and more companies are discovering the importance of external ideas. There is always a potential danger using ideas that originate within the company, because company innovators of new ideas often misread the marketplace. "Half of R & D failures were due to marketing problems rather than technical difficulties."[11] Numerous other studies have proclaimed the same results, to name a few, studies by C. Goodye, R Johnston & M. Gibbons, J.W. Lorsch and P.R. Lawrence. The marketplace seems to be determining what the new products are, not the companies themselves. With successful innovations coming from external sources, it is no wonder why corporations are advancing their skills in tapping this rich and abundant resource. No longer are successful companies using only market research techniques, but advanced consumer engineering techniques, focus groups and technological forecasting which will be explained later.

The importance of the customers working with companies to fine-tune products, have input in the final product and the company listening to what the consumer needs and wants cannot be stressed enough. Some companies only use a fraction of the external idea resources available, therefore, this paper will cover several external idea sources which could be overlooked by a company. While recognizing customer needs and desires is important, recognizing the latest trends in technology is also important. Technology is constantly changing and because of this fact, new opportunities represent

a valuable source of ideas.

SUPPLIERS/VENDORS

"Any supplier with technical ability to be of service will be seen by customers as a source of new ideas."[12] Suppliers and vendors make valuable contact with the consumer, who will often voice their opinions and suggestions. This information will frequently not get back to the company who incorporates the use of the vendor/supplier's services and products. Closer relationships with vendors and suppliers is important, as this important feedback loop is often missing in the consumer evaluation process.

CUSTOMERS

The importance of consumer interaction and involvement as an important external source of idea cannot be stressed enough. Marquis [13] found that 75% of the successful projects were stimulated by a market demand or production need. Thus the importance of good evaluating techniques and information gathering is of utmost urgency to any company. One of the most common methods of obtaining consumer opinion is through marketing research. This is a widely used tool by many companies. Another way to gain insight into consumers needs and wants is through a focus group. Focus groups are gaining popularity and attention and will be discussed later. An often overlooked way consumers voice their complaints and suggestions is through the credit department of an organization or a credit collection agency. Not all customers have a proactive relationship with the company, and the only way they supply their feedback is through discontinuing use of a product or deciding to purchase a competitor's products instead. This in itself is an important way to gather valuable information. Perhaps the product did not meet all the customer's needs and if this is the case, a customer assessment is in

order. If the product was not the reason the user decided to switch, but it was the companies reputation, service & repair department, technical support department, market price, or a host of other items that changed the consumer's mind against purchasing the product, the company needs to know these important details and plan a strategy accordingly to combat their deficiencies.

Often customers will submit their ideas by mail. This is another valuable source of information, but certain precautions must be made to obtain legal title to the concept, so rights must be obtained from the innovator because of trade-secret laws.

COMPETITORS

For a company to be successful, it must constantly evaluate their competitors and strive to increase their market share. One way to do this is to constantly monitor the competition's progress and new product proposals. Competitors may be an indirect source for "leapfrogging,"[11] which could mean adding on to a new product or borrowing technology. There are five simple steps to leapfrogging: [11]

5-Step Process

1. Purchase latest competitive product
2. Tear product down literally
3. Reverse engineer the product
4. Build-up costs
5. Establish economies of scale (Given known and estimated production runs, combine with selling prices, estimate the competitor's profits).

Competitors most likely will advertise their latest inventions or give hints of what is to

come. Close attention must be paid to literature published by competitors and also patent libraries should be monitored.

INVENTION INDUSTRY

In every industrialized nation there is an "organization" consisting of inventors who are positioned to help individuals capitalize on their inventions. The auxiliary[11] or supportive group consists of:

venture capital firms	banks
inventor's schools	inventor's councils
attorneys	technological expositions
Trademark & Patent office	patent shows
Patent Gazette	inventor's newsletters
consultants on new business	state entrepreneurial patent brokers,
individual investors	Universities

While this list is not complete, it does offer further sources of ideas any corporation could use to gain more insight into useful ideas.

ADVERTISING AGENCIES

Most advertising agencies contain a multitude of creative talented individuals. Often overlooked, they can help generate new product concepts.

RETIRED PRODUCT SPECIALISTS

Often individuals retire with advanced knowledge in a certain technological strength which can benefit another company. These retired individuals can often act as a spokesperson or consultant as long as they do not have any former conflict-of-interests with their previous employer.

UNIVERSITIES

Professors and students can offer a wealth of information for new product ideas, especially in the schools of engineering, sciences and business.[14] Often job/work exchange programs can be beneficial for both employer and student. Universities are constantly doing research and their work followed. Sending employees to a university to increase their knowledge and expertise will enable employees to be exposed to new concepts and technologies which in the long run can benefit companies.

GOVERNMENTS

The Patent office of the U.S. government office is a useful tool to aid manufacturers to find worthwhile new product ideas. The "Official Gazette"[11] provides weekly listing of all new patents issued weekly with condensed descriptions of patented items. This publication also indicates which patents are for sale or license and also lists government and foreign patents. Companies should not restrict their scope of patent searching to just the United States. A company should be cognizant of patents world-wide.

PRINTED SOURCES

There are numerous source of printed information for a company to utilize. Technical and Scientific journals will offer up-to-date technology, trade journals, newsletters and monographs are also other excellent sources. Most ideas are indirect accounts of new products activity in other firms, technical advances that are seemingly unrelated to products, and changed in buyer attitudes.[11]

OTHER MANUFACTURERS

Other firms may develop potentially worthwhile ideas that are not in their corporation's charter design, or they simply changed their mind and want to offset their R & D costs by selling this technology. For example, General Electric established a business opportunities program in the 1960's and offers its spare technologies for sale.[14] General Electric publishes a magazine entitled " Business Ventures."

MARKETING RESEARCH FIRMS

Most of the time marketing research firms are asked to question the consumer about existing or proposed new products. Frequently, the consumer will give additional ideas to the researcher but in the scope of the survey or questionnaire these ideas will get overlooked. Companies should choose marketing research firms which use the latest in assessment methods.

As one can see, the list of external sources is wide and varied, but the message should remain clear. In order for a company to obtain the most out of external ideas, they should explore as many different avenues as possible to increase their idea base. Emphasizing again the importance of customers as sources of ideas, we will explore how customers are used as members of focus groups in exploratory consumer studies further in this report.

III. IDEA EXTRACTION STRATEGIES

Idea sources by themselves do not result in product or process innovations. A successful product innovation program should utilize methods to extract ideas from the sources which were identified in earlier sections. The goal of idea generation is to develop a large number of very different ideas.[15] It is, however, well understood in the industry that only about 2% of the ideas that are generated actually result in successful products. According to one source, Booz, Allen & Hamilton[16], their study demonstrated that for 58 new ideas presented, after screening, business department analysis, technical development feasibility, and innovative ideas further tested, that only one single idea was successful! The results are displayed below:

New Ideas	58
After Screening	12
After Business Analysis	7
After Technical development	4
Tested	3
Successful	1

Shown above is a demonstration of how much significant effort is used in screening and analyzing ideas that really won't be successful. Therefore, it is critical to use proven methods for idea generation in order not only to generate a large number of ideas, but also to make sure that there is quality in the ideas. Idea generation methods can be as simple as setting up information channels or as complex as arranging Focus groups and Creative group methods.[15] [17] We will identify some idea generation techniques such as brainstorming, exploiting technology, focus groups, direct search, customer information assessments and explain each method.

A. INTERNAL

Brainstorming

Brainstorming is a technique developed on the premise that creative ideas can be generated in an atmosphere which encourages creative thinking. It is commonly used as a problem solving technique although some firms also use it to uncover possible problems and flaws in their own or a competitor's product or design. The process is:

1. Selection of problem - This is done in advance and communicated to the group leader.
2. The group is generally composed of 5 to 15 members, both users and experts.
3. Implementation uses the following process:
   a. All members of the group are encouraged to suggest alternative ideas, regardless of appropriateness or other considerations.
   b. The larger number of ideas the better.
   c. Participants should be encouraged to build upon the ideas of others with combinations or modifications.
   d. No evaluation of any kind is permitted, since criticism and judgement may cause people to defend their ideas rather then generate new and creative ones.
4. All ideas are recorded.
5. The leader should enforce the rules, especially the no discussion/criticism rule.
6. Allow a break for incubation of new ideas.
7. Review the list and invite new ideas.
8. Clarify the ideas on the list.
9. Evaluate the ideas for usefulness.

It is apparently helpful if group members have a diverse, but appropriate background and the session goes on long enough to force the group to go beyond the superficial level, at lease 30 to 60 minutes. Some of the major advantages of this technique are:

* less inhibition and defeatism
* contagious enthusiasm
* development of competitive spirit as everyone tries to top the other's ideas

Exploiting Technology

Exploiting technologies means taking advantage of available and forecasted technologies. These technologies are useful if they are applied to market requirements and consumer needs. Exploiting technologies results in communications between marketing and R&D. Marquis(1969) found that in 41 percent of the innovations that he studied, the key information came from the technical experts' ideas within the firm. This proves that there has to be a balance between external information generated by marketing and the technological information available within the company. The marriage of market opportunities and engineering opportunities is consumer engineering. Consumer needs (market opportunities) are identified by use of focus groups and **you tellum the methods**, and Engineering opportunities are identified by technology forecast methods such as Delhi analysis and Trend analysis. [15] [18]

Delphi analysis is a long-range technology forecasting method based on expert judgments. Experts comment on potential technological events that are anticipated in the future. Edgar Pessemier[18] recommends the following:

1. The estimates made by experts and the rationales they used are gathered and handled in a way that protects the anonymity of the respondents.
2. Controlled information feedback is used to make divergent estimates and rationales available to all participating experts.
3. The process of collecting and feeding back expert judgments may be repeated a number of times in the hope of improving the quality of individual judgments.
4. Statistical measures based on final judgments are reported for use in planning and decision making.

Trend analysis can also be used. This methods examines trend data for technological events. Estimations can be made on future technologies by extrapolating the performance of current technologies. A great number of significant ideas can by

generated by matching technical developments with specific market needs.

B. EXTERNAL

Direct Search

Direct search methods are very effective for extracting external sources of ideas. A firm may employ a lawyer to search for patents that are useful to the organization to penetrate new markets. Competitors' activities can also be monitored by a group of individuals allocated specifically for this task. Competitors activities such as sales, distribution, and new product developments can generate ideas about the organization's target markets. Direct search is also a motive for sending employees to trade shows and technological expositions. Simple methods such as systematic analysis of complaints and warranty cards may identify problems that could reflect a new product opportunity.

Focus Groups

Focus groups are formed to create a comfortable forum in which consumers can analyze a problem, propose new solutions or ideas, and suggest enhancements. Focus groups are extremely important because as established earlier, the customer is the single most important source of ideas. We will present a methodology in this section to actually conduct a focus group session.

Focus groups are best suited for evaluating concepts for a new product[17] as opposed to other disciplines in the product planning process such as screening and avluation of ideas, business analysis, development, and etc.. This is true because the idea generation phase is the most flexible step in the new product development cycle when things can be changed very easily. The number of participants in a focus group

can vary between six to twelve people. The group is led by a moderator who has prepared a discussion guide [19]. The moderator's job is to ensure that the discussion stays relevant to the sponsor's concerns. Edward F. Mcquarrie and Shelby H. McIntyre have proposed the following procedure for conducting a Focus Group session[17]:

1. Problem/ Need Identification:
   What problems/shortcomings/unmet needs have you experienced with existing products? What new products in this area would you like to see?

2. Presentation of Product Concepts:
   Statement of product concept. Detailed discussion of product features/capabilities.

3. Evaluation of Product Concept:
   Get global reactions . Solicit reactions feature by feature and ranking of most/least attractive features.

4. Determination of Price Points:
   Either suggest a price to the group or have the group suggest an appropriate price.

5. Extensions to the Product:
   Determine whether options could enhance the product.

6. Suggestions and ideas:
   Summarize group reactions.

The key purpose for conducting focus groups is to expose a new product concept to potential users and assess their input before it is too late. Focus groups determine what the customer will like or dislike about a product before it is fully developed. This method also gives the consumers greater powers
to influence a product at its conception phase. The important outcome of a focus group is ideas and perceptive insights into new product ideas and enhancements.

It is interesting to point out that focus groups are not very popular with statisticians[19]. Because samples are usually very small, questions are not asked the

same way every time, some participants have little or no input, and responses are not independent. The outcomes are ultimately very subjective to the conductor and not strictly dependent on statistical methods.

Consumer Information Assessment

It is often helpful to have internal information on customers. This information is usually available and its value is often underestimated. The first question is why is such information useful? This information will reveal existing needs, leading to minor improvements and reducing complaints. It may also initiate ideas for radical improvements or new products.

The next question is how is this information obtained? Much of it is probably already in file, somewhere. This usually includes: 1) information directly provided from customers through normal business contacts 2) staff information reported in connection with normal business contacts 3) government information provided by systematic surveillance of current and anticipated legislation 4) competitor information regarding products, patents and activities of competitors 5) trade fair information from exhibiting products, studying the competitors exhibits and talking to potential customers 6) review of the literature in trade journals, reports, etc. and 7) systematic questioning and/or creative talks with researchers and other experts.

In addition to the information we already have access to, we can also generate new information by using some of the following techniques:

1. User questioning about problems and needs.
2. User employment through hiring people with user experience.
3. Project cooperation with existing and potential users.
4. Graphical and mathematical models based on user perception of product characteristics.
5. User observation to develop information on unsatisfactory

performance.

6. Working in a relevant environment for a period of time to determine needs.
7. Simulation in laboratory to determine problems.
8. Brainstorming
9. Confrontation to create ideas through analogy.
10. Morphological analysis to break down problems into parts.
11. Progressive abstraction to rank needs.
12. Value analysis to study primary and secondary functions and costs.
13. Delphi method analysis (succession of iterative statements with participants interacting by written communication.
14. Scenario writing to develop alternative futures.
15. System analysis of problems caused by changes in system or related subsystems.
16. Informal contacts with people willing to indicate problems, needs, or wishes.
17. Product safety analysis to determine potential injuries, damages or losses.
18. Ecological analysis for environmental consequences of proposed products.
19. Resource analysis to improve resource allocation in proposed products.

To use this information it must be classified by type and stored where it can be accessed easily. The potential users must be notified of its availability and how to access it. Usefullness of information varies greatly between types of firms so it is important to establish the value of the information before making an effort to accumulate and classify it.

Miscellaneous

Some other methods of Idea generation researched by Horst Geschka and Van Gundy[20 21] include Idea Card Technique, Visual Group Confrontation, Picture Folder Brainwriting, and Morphological Matrix. These methods are mainly tools used in simulating the creative process. Creativity, however closely tied with the idea generation process, is not in the scope of this report.

V. SUMMARY

Success in the marketplace requires the periodic introduction of new and innovative products. The engineering manager is responsible for finding ways to tap all available methods for new product ideas. Once the idea is generated, then his staff can take the steps of definition, production and operation.

There are both internal and external methods of idea generation. Internal sources are those that tap internal information already generated by normal operations, for example, sales and customers service personnel regularly talk to customers. They also have access to competitors and other groups who have an interest in the company's product at the trade shows, etc. They can be encouraged to pass on comments about needed improvements or maintenance problems that generate ideas for new products.

External sources are even more valuable. Users often develop and field-test innovate ideas which can be successfully modified and marketed to a larger group. If companies are keeping in touch with consumer needs and wants, there are many ideas out there just waiting to be developed by someone with development and marketing skills.

Technological advances also represent an increasing area of opportunities for the innovative company. Competitors can also be an indirect source for "leapfrogging," adding on to a new product borrowing technology. Other potential sources are journals, universities, market research firms, and focus groups.

Once sources have been tapped for all available information and consumer needs have been identified, then engineering opportunities are identified by technology

forecasting methods such as Delphi analysis and trend analysis or through discussion, brainstorming, trade show and other direct search methods, focus groups, and consumer information assessment.

If a company's new product development strategy is clearly developed, identifying and extracting ideas becomes a relatively simple and inexpensive process. It is then the engineering department's responsibility to define the idea more closely, determine whether production is realistic, and make recommendations for continuing or dropping the project.

VI. RECOMMENDATIONS

What stats? Sources for this up?

Statistics clearly indicate that most ideas are generated by customers. However, the roots of idea generation lie within creativity of all individuals. One should not simply limit his search either to external or internal sources. The handful of methods and sources presented in this paper can be utilized easily if companies have clear definitions of their new product development strategies. We don't recommend that any effort be expended to identifying and extracting ideas unless the company develops a Product Innovation Charter [22] first. A Product Innovation Charter is useful in answering the following questions: What is it that the company is trying to produce? Who are the customers? How is the company going to develop the products (available and future technologies) ?

Once the company determines what it is looking for, it can utilize all of the methods that are presented. We suggest that Focus groups, consumer Engineering, brainstorming, and various search methods should all be used to generate as many ideas as possible. All of these methods contribute valuable information that is critical if a product is to prove successful. Of course, we cannot expect every company to allocate unlimited resources to search for ideas, however we don't believe that implementations of idea search programs is a costly endeavor.

Focus groups and brainstorming sessions can be managed efficiently to minimize the time. Search tasks can be responsibilities of all engineers in the organization, therefore not requiring special allocation of resources. Communications channels should be established between Marketing and R&D in order to do the best in consumer engineering.

APPENDIX

APPENDIX A

FIGURES

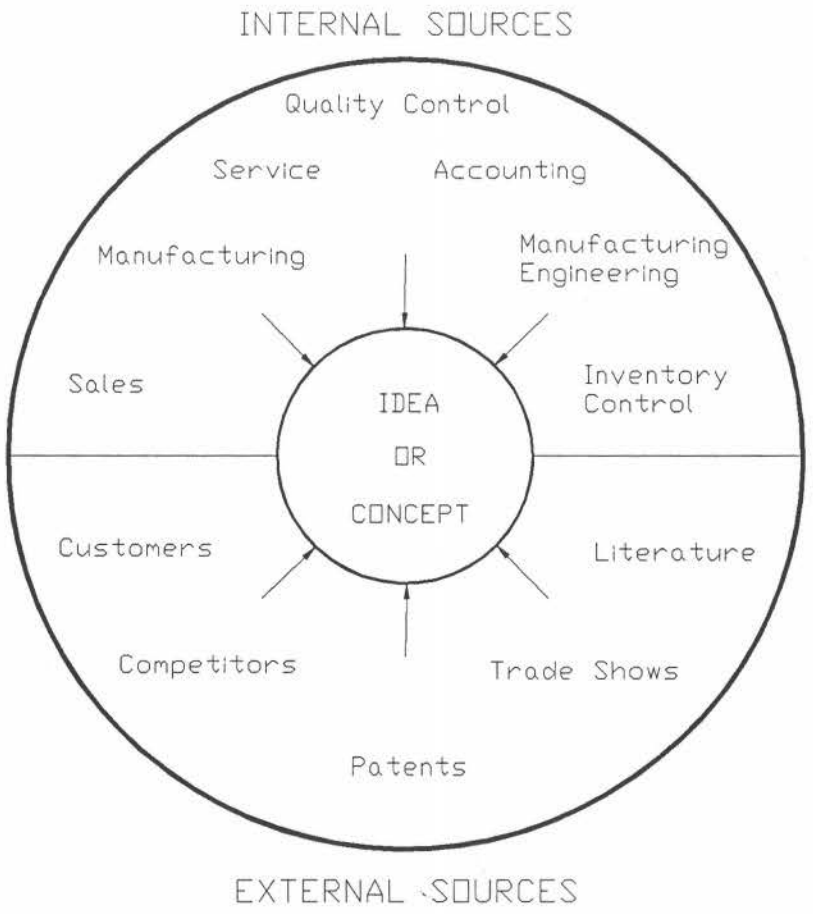

FIGURE 2

(Idea Generation Model)

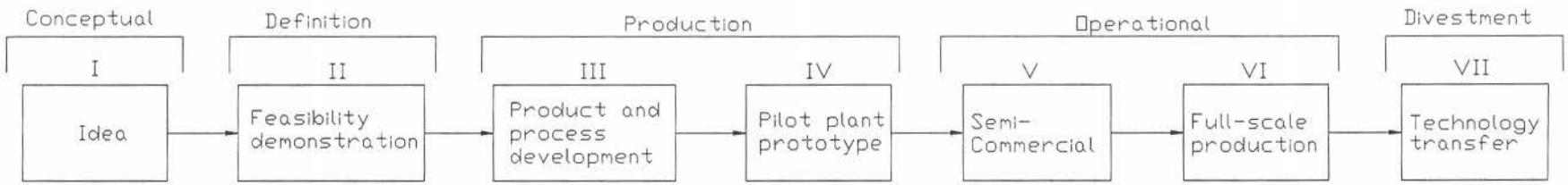

FIGURE 1

(Product Life Cycle Model)

From D. Bruce Merrifield, Strategic Analysis, Selection, and Management of R&D Projects, AMACOM, New York, 1977, pp.28-32.

APPENDIX C

INTERVIEWS

COMPANY PROFILE

COMPANY NAME: ADP, (AUTOMATED DATA PROCESSING)

Major Services: Include payroll, human resource information systems, market data and back-office services to brokerage and financial communities, industry specific to auto and truck dealerships, computerized auto-collision repair and replacement estimating.

Number of employees - 19,000

Revenues,1990	1,714,041
Net earnings	211,710
Earnings per share primary	2.88
Cash dividends	46,194
Cash dividends per share	.625
Return on equity	20.3%
Cash,cash equivalents and marketable securities	536,578
Working capital	352,890
Total assets	1,692,263
Long-term debt	82,098
Shareholders's equity	1,217,025

Overview: Interview conducted by Lisa Lorenzen. Nearly 10% of ADP's revenue comes from ADP Dealer Services. Interviewed was John Oliver of Product Division/Chicago. This division is the primary source used for information in the following topics:

I. Who in the company is responsible for coming up with ideas?

Nearly 100% of ADP's idea sources come from external sources.
Further detail explained in (III)

II. What internal sources if any do you use for new product ideas?

None, rarely used.

III. What external sources if any do you use for new product ideas?

-industrial related publications
-competition
-ADP user groups (25 groups around the U.S. which meet quarterly to discuss ideas, enhancements, problems and concerns.
-observation of clients working environment

-dealer advisory board (board made up of car/truck dealers)

IV. When do you search for new product ideas? (i.e. periodically, continuously or based on product's life cycle?

ADP is continuously searching for new products.

V. What methods do you use to extract ideas from external sources?

Not applicable.

VI. What methods do you use to extract ideas from external
Formal and informal market testing, employ market research companies, analyze user groups and focus groups data. Assemble a financial model based on a 3-5 year market opportunity.

VII. Who has the final say in the decision making process?

No one individual is responsible for the decision making process, it is a collective decision by a team of individuals. These individuals consist of representatives from R & D, Field Test coordinators, Hardware support individuals, representative managers from Product marketing and Product development. These respective managers have more power in the decision making process, yet it is a collective decision by all individuals.

RECOMMENDATIONS:

ADP is a highly successful company. Currently it is a strong market leader in the Dealer Services Division. ADP seems to make the most of utilizing external sources of ideas, mainly its customers. However, because of ADP relying exclusively on external sources, it is neglecting 20% of idea generation which studies have demonstrated comes from internal sources. ADP needs to actively pursue this avenue. Employees are called upon as only having input to enhancements to existing products, not new products ideas. Increased employee interaction could increase better employer/employee relations. ADP should also use some of the other internal sources mentioned by this report. The service department, the accounting department, the inventory control/warehouse areas and even R & D are overlooked as a source of new product ideas.

QUESTIONNAIRE - ENGINEERING MANAGEMENT 541

ATEQ PROFILE:

Annual Sales:	$20 million
Number of employees:	140
Unit price of systems	$2 million
Customer Base:	International

Interview conducted by Fred Birang. Informal interview conducted with Strategic Marketing assistant on week of November 19th 1990.

Question #1. Who in the company is responsible for coming up with new for products?
Answer: Marketing groups as well as Concept & Feasibility groups. Concept and Feasibility is a part of the Research and development group. Its function is to research available and future technologies.

Question #2. What internal sources, if any, do you use for new product ideas?
Answer: The inside Optics, Laser and controls experts are relied upon to provide feasibility information and marketing. The semiconductor Capital equipment industry is technology driven as well as market driven. The growth of the company depends on the advancements in optics and laser technology.

Question #3. What external sources, if any, do you use for new product ideas?
Answer: Current customers (users) and potential customers, as well as competitors' activities are used for marketing information. The technology advancement information is gathered through vendor conferences, technical symposiums, technical publications, and etc.

Question #4. When do you search for new product ideas: i.e. periodically, continuously, or based on a product's lifecycle?
Answer: ATEQ is continuously exploiting the markets and available technologies to expand product line.

Question #5. What methods do you use to extract ideas from internal sources?
Answer: Periodic Marketing Brainstorming sessions. Concept and feasibility groups submit technology forecast plans (5 year plans) to marketing.

Question #6. What methods do you use to extract ideas from external sources?
Answer: MRS: Market Requirement Specifications. This is a questionnaire which inquires about required specifications of the equipment as the customer sees it

applicable for their production and market. The customer base is very limited, therefore periodic meetings are also held with customers to review applications of the machines.

Question #7. Who has the final say in the decision making process?
Answer: The product line is driven and solely decided by Marketing.

ANALYSIS:

ATEQ has a formal structure for identification and extraction of sources of ideas. The Market Requirement Specifications is the method used for gathering consumer information, periodic brainstorming meetings, and information exchange channels are present for gathering internal ideas. ATEQ has introduced three new successful products to the market in the past year. This success seems to be a result of having clear strategies for new product development and also exploiting the markets and technologies for generating feasible ideas.

APPENDIX C

REFERENCES

1. Booz-Allen and Hamilton, New Product Management for the 1980s. New York: Booz-Allen and Hamilton, Inc., 1982

2. Wind, Yoram and Mahajan, Vijay, "New Product Development Process: A Perspective for Reexamination," Journal of Productive Innovation Management, 1988;5: p. 305.

3. Mullins, P.L., "Capital Budgeting for Research and Development," Management Services, May-June 1969,pp. 45-50.

4. Cleland, D.I. and Kocaoglu, D.F., Engineering Management, McGraw-Hill Book Company, p. 74.

5. Shannon, R.E., Engineering Management, John Wiley & Sons, 1980, p.53.

6. Wind, Yoram and Mahajan, Vijay, "New Product Development Process: A Perspective for Reexamination," Journal of Productive Innovation Management, 1988;5: p. 310.

7. Shannon, R.E., Engineering Management, John Wiley & Sons, 1980, p.54.

8. Livesay, H.C., Rorke, M.L., and Lux, D.S., "Technical Development and the Innovation Process," Journal of Product Innovation Management, 1989;6: p. 269.

9. Shannon, R.E., Engineering Management, John Wiley & Sons, 1980, p.54.

10. Bobrow, E.E. and Shafer, D.W., Pioneering New Products, Dow Jones-Irwin, 1987, p.33.

11. The New Product Decision by Dale Flesher, Tonya K. Flesher, Gerauld U. Skelly, National Association of Accountants, Ontario, Canada 1984.

12. A study of successful Products, Unsuccessful Projects and Projects In Process in West Germany," by Arthur Gernstenfeld, Vol EM-23, No.3, August 1976.

13. "The Dominant Role of the User In Semiconductor and Electric subassembly process innovation," Eric Von Hippel, IEEE Transactions of Engineering Management, Vol EM-24, No.2,
May 1977.

14. "Its A Myth That All Inventors Come From the Outside," George Wise, Research Technology Management, July-August 1989, pp 7-8.

15. Glen L. Urban,John R. Hauser, Design and Marketing of New Products, Prentice Hall Inc., 1980 P122-P145.

16. John Ward, Profitable Product Management, Heineman, London, 1984, P185.

17. Edward F. McGuire, Shelby H. McIntyre, Journal of Product Innovation Management, 1986, P1:40-47.

18. Edgar A. Pessemier, Product Management Strategy and Organization, Robert E. Krieger Publishing, 1986, P245.

19. Wells, William , Group Interviews In; Handbook of Marketing Research, McGraw Hill 1974.

20. Horst Geschka, Journal of Product Innovation Management, 1986; P1:48-56 From Experience, Creativity workshops in Product Innovation.

21. Van Gundy, A.B. Techniques for Structured Problem Solving, New York, Van Norstrand Reinhold 1981.

22. R. G. Cooper, Defining the New Product Strategy, IEEE Transactions on Engineering Management, Vol. Em-34, No. 3, August 1987.