GOOD MORNING

I'm NJL — for lack of a better title now — Asst. chief Counsel for Patents + other R+D matters — I hope that doesn't intrude on other assignments in Advocacy.

This morning we have the good fortune to be in the hands of J.O. who will discuss her report on

The Role of Patents in the Commercialization of New Technology for Small Innovative Companies

Judith H. Obermayer

Dr. Obermayer is well known to us at Advocacy as not only the author of "The Impact of Govt R+D Funding on start-up of small business" but a very significant bridge into the S.B. community in the area of innovation. Handling any issue of significance in this area arises that Dr. O. isn't concerned with

R&P

Research & Planning, Inc.

215 First Street
Cambridge, Massachusetts 02142

The research forming the basis for this report was conducted pursuant to Grant No. SB-1A-00030-01-1 from the Small Business Administration, with additional funding provided by the Office of Technology Assessment under Contract No. 133.3720.0. The statements and conclusions contained herein are those of the author and do not necessarily reflect the views of the U.S. Government in general, or of the Small Business Administration or the Office of Technology Assessment in particular.

R&P
Research & Planning, Inc.

Judith H. Obermayer, Ph.D.
Vice President

August 28, 1981

Mr. Norman Latker
Assistance Policy Branch
Office of Management & Budget
726 Jackson Place, NW
Room 5217
Washington, DC 20503

Re: SBA Grant No. SB-1A-00030-01-0

Dear Norm:

Enclosed is a copy for you of the final report and executive summary of "The Role of Patents in the Commercialization of New Technology for Small Innovative Companies". The rest have been sent directly to SBA. I think the final version is more readable than the earlier one.

Let me know if you would like anyone else to get a personal copy. I hope you find it useful.

Best personal regards,

Judy

JHO:smm

Enclosures

VI. BIOGRAPHICAL INFORMATION

Background Resume

Judith Hirschfield Obermayer

Dr. Judith H. Obermayer received her B.S. in Mathematics with high honors from Carnegie Institute of Technology (now Carnegie-Mellon University) in 1956. She received her Ph.d. in Mathematics from Harvard University in 1963. While at Harvard she was the recipient of four NSF Fellowships and was a Teaching Fellow. As an Assistant Professor on the Wellesley College Faculty (1969 to 1966) she taught a broad range of courses including probability and statistics.

Over the past fifteen years, Dr. Obermayer has been closely involved in the formulation of policy and decision making at Moleculon Research Corporation. She has served the company in a number of capacities and is currently Vice-President of the corporation. This gives her a broad background in the problems faced by small, technical businesses. In addition, she is Vice-President of the Government Science Policy Division of Research and Planning Institute, an organization involved in policy research and management consulting. She is currently supervising the research project for the Small Business Administration. It involves performing case studies of successful, high technology companies to determine the effect of government funding and policies on their early evolution and growth.

Dr. Obermayer has participated in many conferences involving innovation, invention and licensing. She was appointed to the SBA Task Force on Small Business and Science and Technology which developed policy recommendations and a proposed legislative package to help foster industrial innovation via small, high technology companies. She serves as a Co-chairman of the National Committee for Small Business Innovation, a new organization formed to lobby for the passage of legislation in this area. This Fall she participated in an intensive workshop sponsored by DOE to explore methods for moving new solar technology from universities to the commercial marketplace, using small businesses as the linking agent. Most recently, she took part in the White House Conference on Small Business, serving as resource staff in the Technology and Innovation issue workshop. She has also testified on behalf of small, innovative companies before committees of both houses of the Congress.

THE ROLE OF PATENTS IN THE COMMERCIALIZATION OF NEW TECHNOLOGY FOR SMALL INNOVATIVE COMPANIES

Final Report of a Survey Conducted
by Research & Planning, Inc. for the
Small Business Administration

Judith H. Obermayer, Ph.D.
Principal Investigator

August, 1981

R&P
Research & Planning, Inc.

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ACKNOWLEDGEMENTS

A number of people were instrumental in bringing this research project to a successful conclusion. Bernard Campbell, who was the primary research assistant on this survey, did a significant amount of work on the structure of the questionnaire as well as on the analysis of the results that could not be done by computer. It would have been impossible to deal coherently with all the data produced without good computer programming. I am particulary grateful to Henry Obermayer for setting up and adapting the software that was used, and to Bradford Hauser and Daniel Mezger for their later contributions in this area. Particularly helpful in the preparation of the final report were Alice Falk, who edited the final version, Mary Gail Barberio, and Sheila Murray.

A special word of appreciation is due Dr. William H. Gruber and Dr. Arthur S. Obermayer for their active involvement, help and guidance throughout the project.

Judith Obermayer, Ph.D.
Principal Investigator

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EXECUTIVE SUMMARY

Introduction

In the past, the protection of the patent system has provided a major incentive for the development and commercialization of new technologies. The rate of investment required to bring new products to commercial utilization and the nature and speed of technological progress have changed in the last several decades. The increasing cost of using the patent system, the trend toward litigation and infringement of patent rights and the attitude of the courts toward patents have decreased the contribution of the patent system to technological innovation. Small companies, which have been a critical source of important new technology, have been particularly affected by the problems of the United States Patent System.

The survey explored in detail, from the point of view of small high technology firms, the interaction between businesses and the patent system. It examined how current patent policy and perceptions of policy affect management decision making, and how government procurement policies that relate to patent rights influenced the possible commercialization of new technology. It considersed the usefulness of the patent system to these companies as well as the problems faced by them in relying on patents for market protection, including the cost of threatened litigation. The attitudes and experiences of large firms are

of new technology and hence to the economic growth of the country. The ultimate manifestation of this public uneasiness is the attitude of the courts toward patents. Most patent disputes that go to trial are complicated and require a careful evaluation of a technical area. As in most legal proceedings, the answers are not black and white but various shades of grey. The courts, when in doubt, tend to rule against the patent system and declare the patent invalid. The belief is that such a decision will open up the development of the technology to competition, and that is preferred. Since only a few patents are challenged in the courts, the effect on competition is relatively small.

What is not clearly perceived is the chilling effect that these decisions and the attitude they represent have on the use of the patent system as a whole, and on innovation in particular. It is recognized that only valuable patents are cause for a major legal dispute; when people believe that any truly profitable patent is likely to be declared invalid (after a lengthy and expensive court battle), they look for other methods of protecting their technology. If the technological development carries a high risk of failure without an assured protected market position, it may never be explored at all. At the same time, a dependence on other methods to protect technology makes whatever advances have been made in scientific knowledge inaccessable to the public. Technological development is a sequential process with each step building on a number of previous ones. Without the free exchange of knowledge, progress is drastically impeded.

in awareness by the Congress of the patent system, its role and its weaknesses. There is still little public understanding of the economic reasons for the existence of a patent system. The result has been a decline in support for the patent system which has gradually become less effective at achieving its original purpose. A patent system that operates ineffectively and unreliably is worse than no system at all. A public consensus must be reached on the value of a patent system for the United States and the function it should serve. Then we can go forward with the support of public opinion and the necessary financial resources to build a system that fulfills its purpose.

Population Surveyed

Three separate sets of questionnaires were mailed. Each of the first two mailings were sent to over 400 small high technology companies: the first was aimed at small R&D oriented companies and the second went to companies more oriented toward manufacturing. The third mailing went to about 50 large corporations.

Extent of Patent Use

Although two-thirds of the small companies hold patents, the vast majority hold fewer than 15. In addition, many of the small companies only use a small percentage of their patents. By contrast, the large companies appear to use a greater proportion of their patents. In looking at the use of patents by field of technology, it is clear that small electronics and computer

in the decision not to apply for a patent. The primary reason for not applying for possible patents for all sizes of companies was **dependency on trade secrets and proprietary technology.** For **small companies, matters related to the costs** of obtaining the patent in the first instance, or possibly defending it, **were important influences. Also identified was the belief that patents were not sufficiently reliable and could be ruled invalid too easily.**

Alternate Modes of Protection

The chief alternative to the use of patents is to rely on the protection of proprietary know-how and trade secrets. Over 80% of the small companies and almost all of the large companies use these alternate modes of protection. However, the ratings of the usefulness of these methods show that small companies find them more valuable. This may be a reflection of the extent to which small companies are involved in rapidly changing technical fields where patents quickly become obsolete or it may be a reflection of their lack of faith in the patent system.

Time and Costs of New Product Introductions

Several questions explored the length of time and amount of capital needed for the development and market introduction of new and improved products. The smaller manufacturing oriented companies are the fastest to get new or improved products into the marketplace. They are followed by the smallest, more R&D oriented companies. In general, it takes **small companies less**

Reliability of Patents and Related Costs

There has been general concern that small companies with limited financial resources may be at a distinct disadvantage in defending themselves in a conflict involving patented technology. While the vast majority of companies estimate patent related expenses as less than two percent of overall expenses, several, including two large companies, estimate patent related expenses in excess of ten percent of all costs. The costs associated with patenting new technology are balanced against the degree of protection it is likely to provide. Companies carefully weigh the likelihood of having to defend the patent, the probability that the patent may be ruled invalid, and the ease with which another company can use the information in the patent and invent around it.

About a third of the small companies and all of the large ones have been in a dispute over patented technology. In general, both the total **time for resolution and the cost of resolving conflicts were significantly greater when large companies were involved.** Even in our relatively small sample, five large companies cited cases that went to trial and three went to appeals. In those cases where companies felt that the conflict was not resolved in a fair manner, the main reasons given related to high cost factors.

Relating to Contract R&D for the Government

Until the passage of PL 96-517 in December, 1980, there was no uniform patent rights policy for companies that performed

reach the $2000 level, most companies of all sizes would maintain less than 60% of current patents. **When the fees per patent reach $3000, 60% of the small companies and 52% of the large companies who responded indicated that they would maintain less than 30% of current patents.** The percent of companies that felt maintenance fees would have an impact on their business ranged from 11% at fees of $500 to 39% at fees of $3000. **Over 30% of small companies and over 20% of large companies indicated that the imposition of maintenance fees would make them less likely to apply for a patent in the future.**

Possible Patent Law and Policy Changes

At the time this study was proposed, a large number of possible changes in patent policy were being considered. Many of the most important changes were passed at the end of 1980 and are part of PL 96-517. Although the implementing regulations are not yet in effect, the new law includes provisions for a patent reexamination procedure, for small businesses and universities to receive patent rights for inventions developed under government sponsored research, and for the institution of maintenance fees.

A number of other changes in the way the patent system operates have been suggested. Respondents were asked for their opinions on a number of them. The overwhelming majority favored the extension of patent life in cases where government regulations delay market introduction, and the establishment of a single Court of Patent Appeals. About half of the small companies and most of the large companies also favor an independent Patent and Trademark Office.

It is incumbent upon us to examine any current inequities in the operation of the patent system and disincentives in the government procurement policies to look for ways to restore a more even-handed system and remove barriers to greatly needed innovation. It is easy to document isolated instances of difficulties faced by small businesses in using the patent system with government procurement policies. This study has been done to look at many aspects of these problems and to assess their seriousness as an inhibitor of innovation for a larger sample of companies.

The project explored in detail, from the point of view of small, high technology firms, the interaction between businesses and the patent system, how current patent policy and perceptions of policy affect management decision making, and how government procurement policies related to patent rights influence the possible commercialization of new technology. Of concern was the usefulness of the patent system to these companies as well as the problems faced by them in relying on patents for market protection, including the cost of threatened litigation. We also compared the results with the attitudes and experiences of large firms to document the extent of any disparity in the ways the two groups perceive and use patents. We examined the extent to which the current policies tend to encourage the use of trade secrets and proprietary know-how, as opposed to patents, thereby keeping new, technical knowledge out of the public domain. The impact of patent maintenance fees on corporate strategy was also explored. An analysis of the present situation is followed by the results

and level of reliance on patents. The sixth section was an opinion poll on various legislative proposals related to the operation of the patent system.

To the extent possible, questions were phrased so as to be equally applicable to small and large organizations. The only differences were in questions that measured the size of the organization or level of expenses for various activities. A copy of the actual small company questionnaire is included as Appendix A.

B. Company Selection Process

The initial mailing of over 400 questionnaires went to members of the American Association of Small Research companies and to companies that received grants under the NSF's Small Business Innovation Research Program. These companies are highly technically oriented and many of them have performed contract research for the government. The name of the principal investigator was known to many of them, which tends to improve the response rate on a survey.

In order to balance the R&D emphasis of this initial mailing, a second mailing was made to a more manufacturing oriented group of companies. The companies were selected by using listings by SIC code. The four major SIC code groups used were Group 35, machinery, except electrical; Group 36, electrical and electronic machinery, equipment and supplies; Group 38, measuring analyzing and controlling instruments, and photographic, medical, and optical goods; and Group 28, chemicals and allied products. A firm's industrial group is classified as "manufacturer" when its two-digit code falls between 20 and 39,

natural biases in the responses in favor of the importance of patents.

C. Rates of Response

Mailing	No.of Responses	Percent of Responses
1st Mailing	105	25%
2nd Mailing	49	12%
Large Companies	23	50%

III. SMALL COMPANY PROFILES

The first mailing respondents were primarily very small, fairly young companies, somewhat oriented toward government contracts. A significant proportion of these companies actually do over 80 percent of their business with the government. On the other hand, the second mailing, which was aimed at more manufacturing oriented companies, produced respondents that were a little bit larger, older and less dependent on government contracts. The first group had significantly more involvement in research and development and less emphasis on production than the second group. The first mailing respondents were more heavily oriented toward electronic, computer and physics related technology. The data from the two mailings will be broken down in the later sections if the differences between them seem significant.

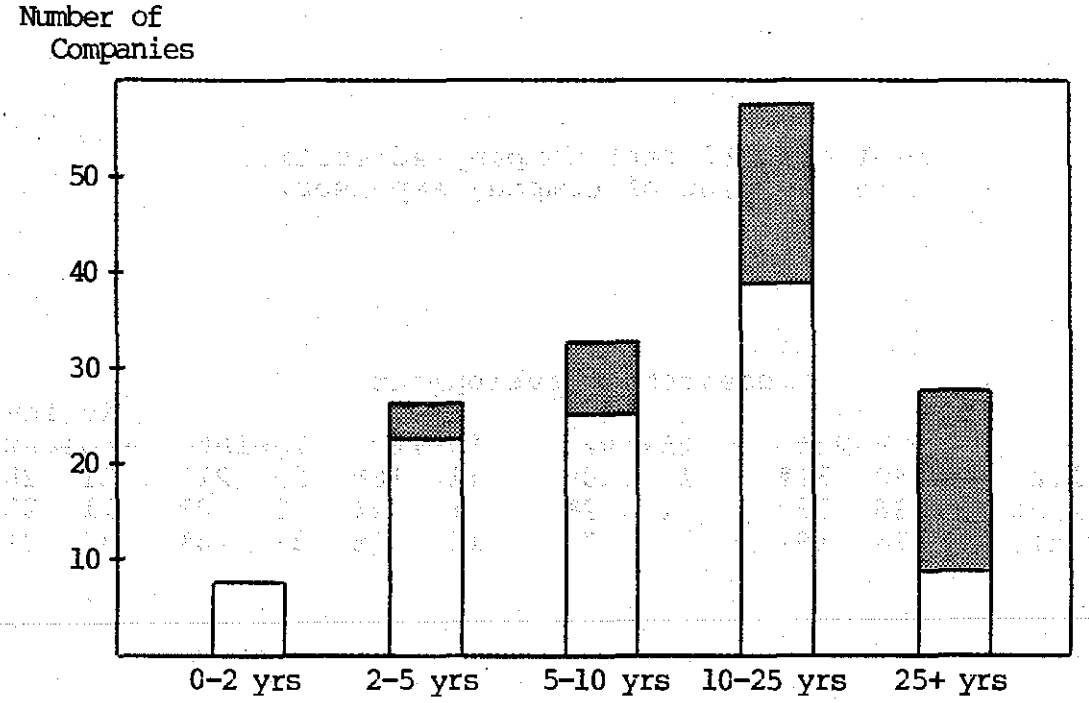


Figure 3.3 Age of Companies

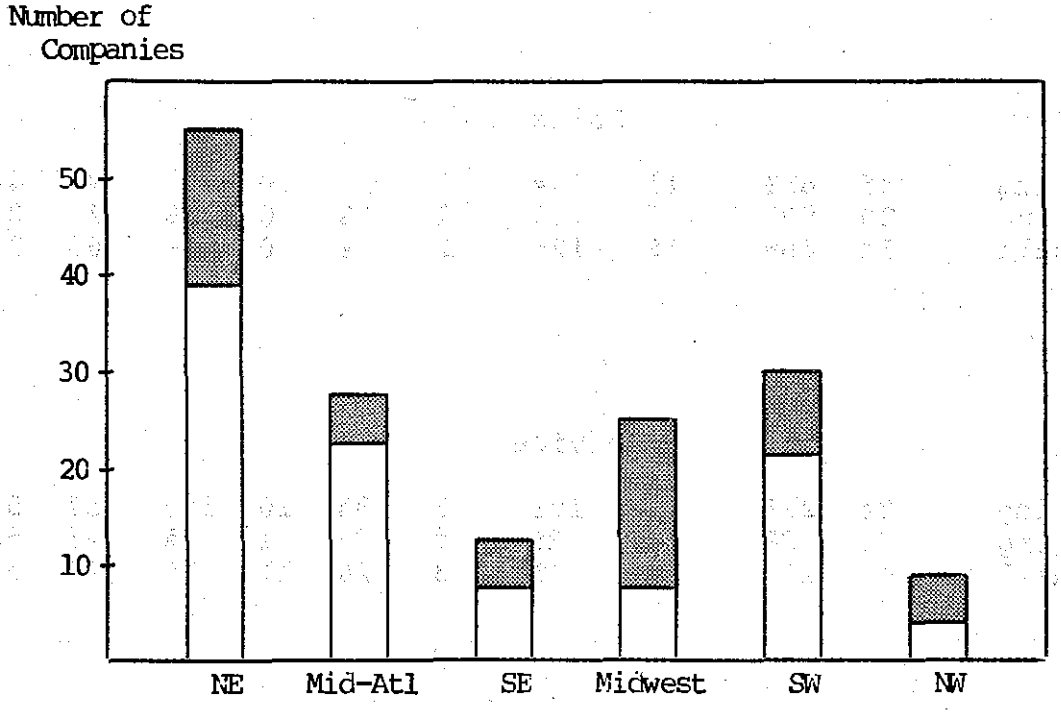


Figure 3.4 Location of Companies

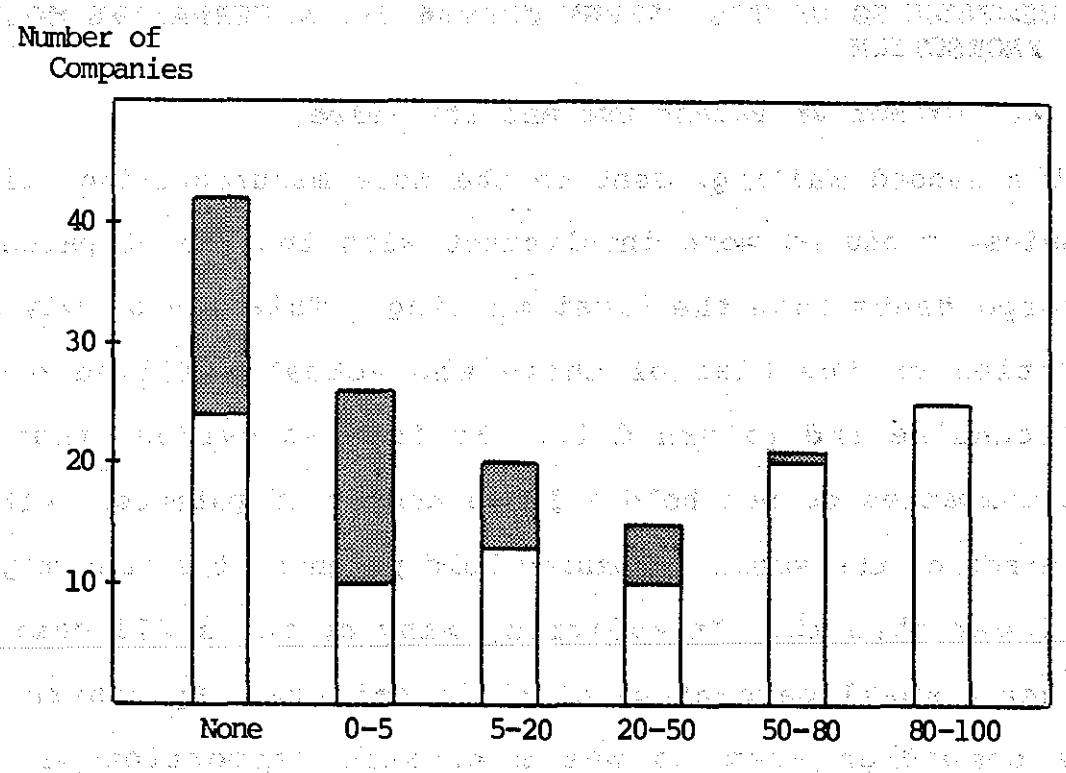


Figure 3.5 Percent of Sales in Connection with Government Contracts and Subcontracts

Primary Field of Technology	1st Mailing		2nd Mailing		Total Small		Large	
Chemistry	16	15%	14	29%	30	19%	10	43%
Electronics & Computers	15	14%	4	8%	19	12%	0	0%
Physics	22	21%	3	6%	25	16%	3	13%
Medical & Biological	3	3%	8	16%	11	7%	1	4%
Engineering & Design	27	26%	10	20%	37	24%	5	22%
Unknown	22	21%	10	20%	32	21%	4	17%

Although the large companies received questionnaires were spread across the fields of technology, those that responded are weighted heavily toward chemical technology and away from electronic technology. Hence, in areas which vary by field of technology, this sample is not the best.

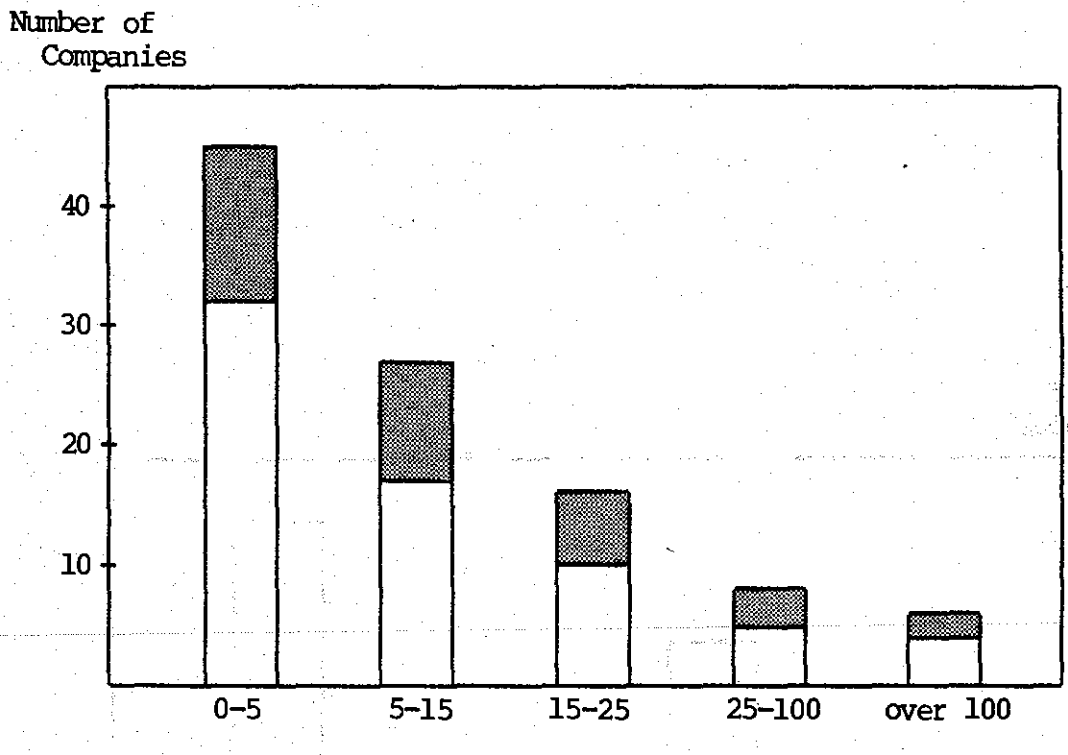


Figure 4.1 Number of Patents Held
Small Companies

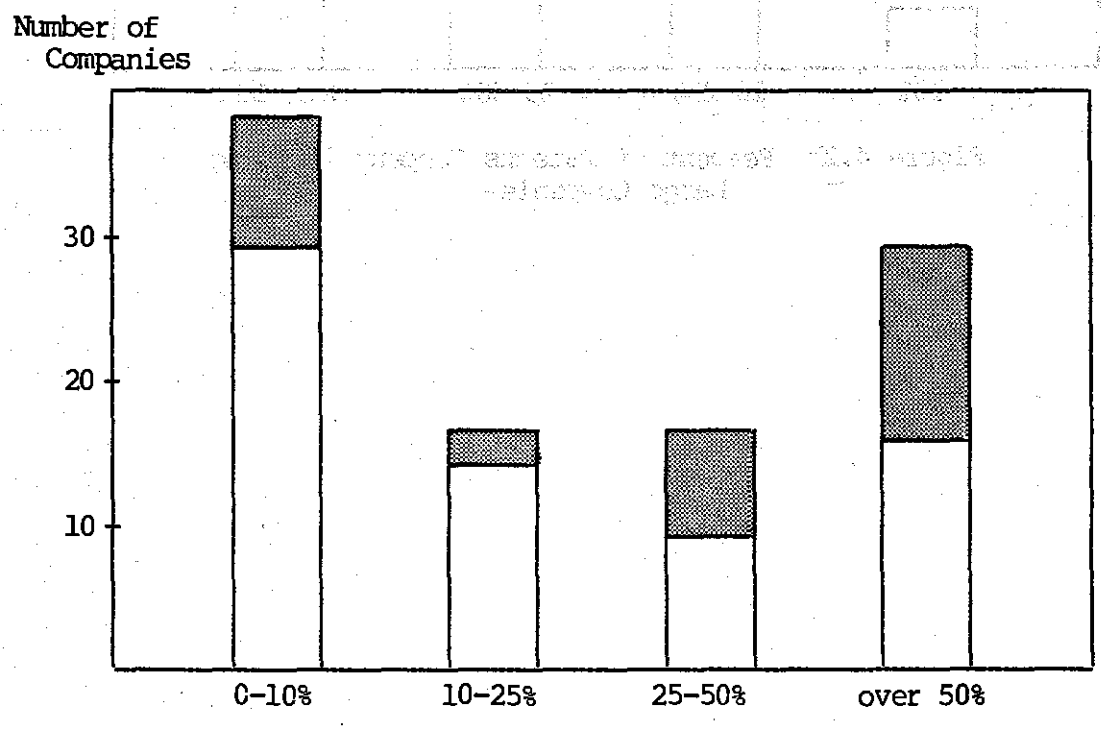


Figure 4.2a Percent of Patents Company is Using
Small Companies

How valuable do you think patents are in your company? (check all applicable)

A. Of little value compared with technical know-how
B. Valuable for defensive purposes
C. Important in establishing proprietary position
D. Essential to business activities

	A		B		C		D	
Small	43	28%	33	21%	53	34%	29	19%
Large	4	17%	16	70%	18	78%	6	26%
Chemistry								
Small	4	13%	5	17%	10	33%	8	27%
Large	1	10%	8	80%	7	70%	5	50%
Electronics & Computers								
Small	3	16%	4	21%	6	32%	4	21%
Large	0	0%	0	0%	0	0%	0	0%
Physics								
Small	11	44%	6	24%	8	32%	3	12%
Large	1	33%	2	67%	3	100%	0	0%
Medical & Biological								
Small	2	19%	1	9%	3	27%	2	19%
Large	1	100%	0	0%	0	0%	0	0%
Engineering & Design								
Small	11	30%	6	16%	14	35%	5	14%
Large	1	20%	5	100%	5	100%	0	0%
Unknown								
Small	12	38%	11	34%	12	38%	7	22%
Large	0	0%	1	25%	3	75%	1	25%

Due to the small sample size and the technology distribution of the respondents, only the chemistry category yielded a sample sufficient to allow confidence that the results reflect the views of large organizations in that industry. It is clear that large chemically oriented companies believe that patents are an extremely important part of their business assets. Although no replies were received from large electronics and computer firms, a number of them are known for extensive use of patents. Their strategies, however, vary greatly, and range from using patents as a bargaining tool for extensive cross licensing agreements to vigorously defending their patents against any infringers.

C. Relationship Between Type of Market and Type of Protection Utilized

Companies were asked to characterize the nature of two specific products important to their company, and to include the types of protection employed. As can be seen from the cross tabulations that follow, the large company respondents use both patents and proprietary technology protection to a greater extent than the small ones. As might be expected, patents are used more for products in high growth and new markets than in older, more stable markets. It is also true that the majority of products that are radically new or fundamentally different from available products use patent protection, as do those products that require a substantial or outstanding level of R&D to develop. Although the mailings are not broken down, in most cases the values from the second mailing fall between the first mailing values and the large company values. Not all characteristics were filled in for all products and frequently more than one descriptive term was checked so percents do not add up to 100. One set of cross tabulations yielded the following (percentages refer to percent of products described):

	Type of Protection Utilized (may be more than one)		
Type of Market	Patents	Proprietary Technology	Brand Name No Legal Protection
Stable	33%	42%	27%
Growth	34%	53%	19%
New	45%	46%	11%

Figure 4.3a Percent of Products for Type of Protection in Different Types of Markets Small Company Products

Level of R&D Required	Type of Protection Utilized: Patents	Proprietary Technology	Brand Name No Legal Protection
Little	14%	29%	14%
Some	36%	36%	21%
Substantial	38%	52%	21%
Outstanding	49%	54%	12%

Figure 4.3e Percent of Products for Type of Protection by Level of R&D Required

One large company president summed up most of the views expressed when he described his company's view:

> Patent values and influence are highly variable from project to project. For entirely new products where we may be entering a field new to us where others have entrenched engineering, manufacturing, and market strengths, a patent position may be of critical significance to the decision to make the investment and enter that field. In this category, we likely view patents similar to small businesses or new ventures. The patent is viewed as a shield to protect the business during its start-up phase when it is most vulnerable. In areas where we feel that we are industry pace setters because of heavy R&D investments, patents are viewed as supportive of this investment and to keep the copyists from our heels, but patents are not likely to alter whether the innovation proceeds. Finally, there may be areas where products are developed to fill out a line where we have high marketing confidence that even a me-too product would be successful because of exposure, service support strengths, etc. In such an instance, patents may have no role except for defensive considerations of patents of others.

D. Barriers to Use of Patent Systems

In order to explore barriers to the use of the patent system, companies were asked to identify factors that played a role in the decision not to apply for a patent. The primary reason for not applying for possible patents for all sizes of companies was dependency on trade secrets and proprietary

Does your company ever use information from the patent office to follow current technological advances?

	Yes		No	
1st Mailing	47	45%	56	53%
2nd Mailing	25	51%	20	41%
Total Small	72	47%	76	49%
Large	21	91%	2	9%

Does your company ever use information from the patent office to follow competitors' activities?

	Yes		No	
1st Mailing	37	35%	57	54%
2nd Mailing	29	59%	19	39%
Total Small	66	43%	76	49%
Large	22	96%	1	4%

F. Alternate Modes of Protection

The chief alternative to the use of patents is reliance on the protection of proprietary know-how and trade secrets. Over 80% of the small companies and almost all of the large companies use these alternate modes of protection. However, in rating the usefulness of these methods, small companies rate them of significantly higher value than do large ones.

Does your company ever employ alternate modes of protection other than patents (e.g. proprietary know-how, trade secrets)?

	Yes		No	
1st Mailing	82	78%	20	19%
2nd Mailing	42	86%	6	12%
Total Small	124	81%	26	17%
Large	22	96%	1	4%

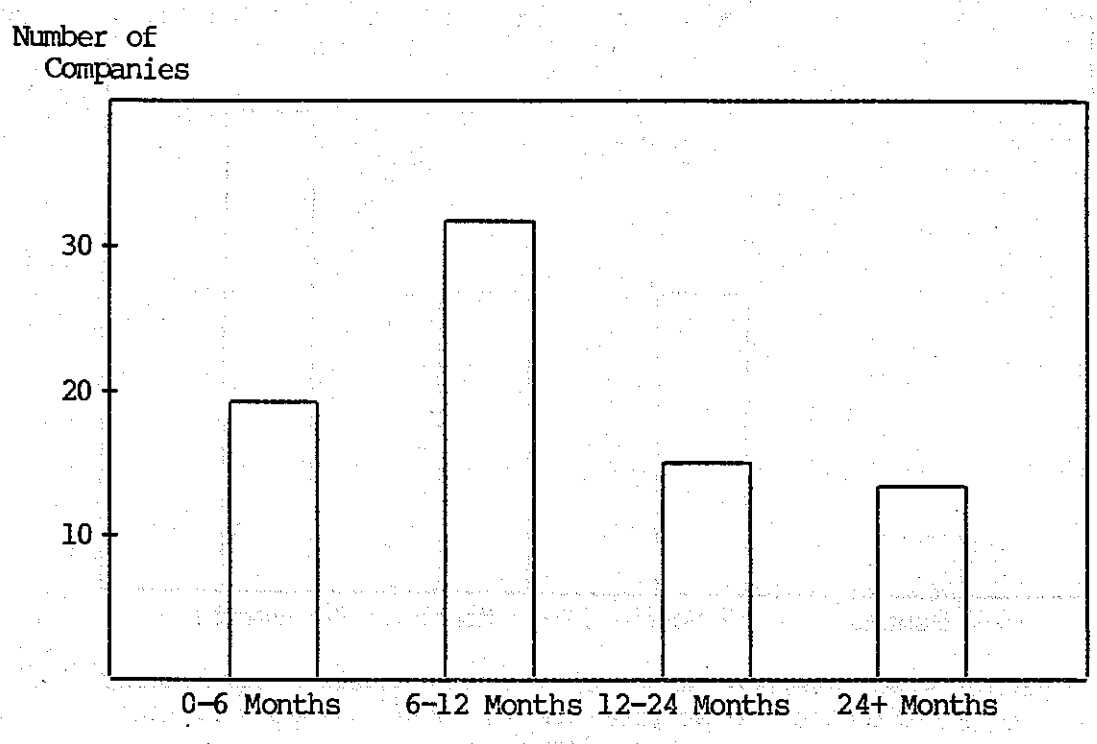


Figure 4.4a Average Length of Time for Product Improvement or Modification to Go from Drawing Board to Marketplace Small Companies - First Mailing

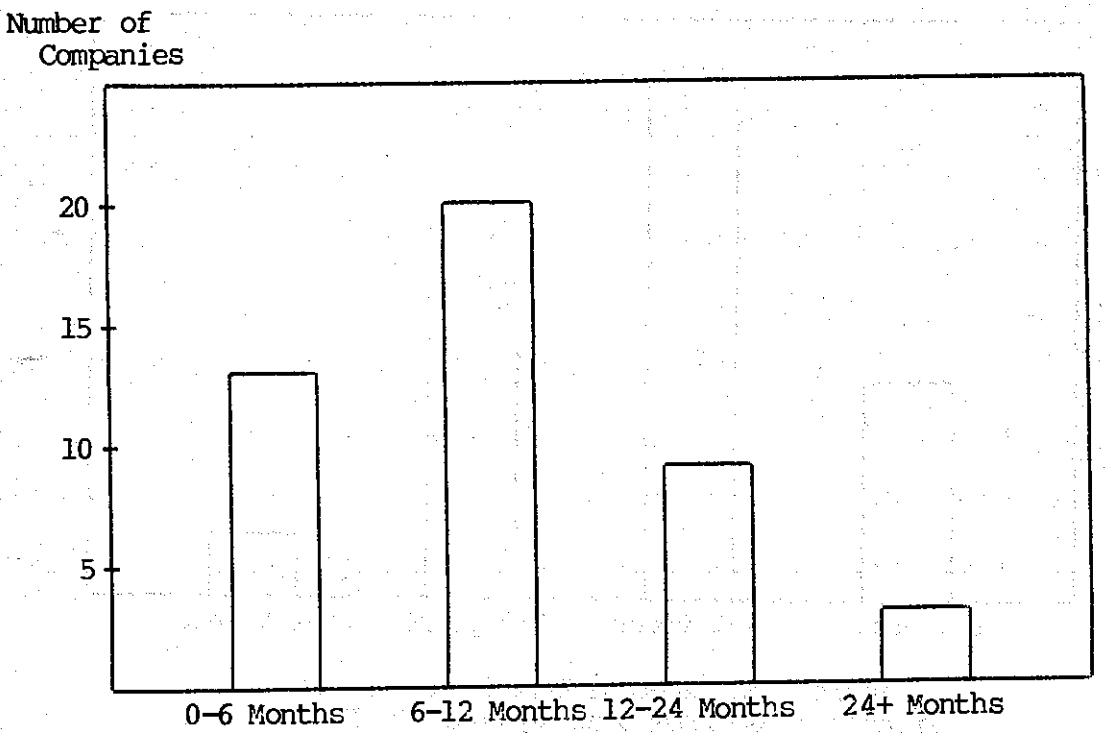


Figure 4.4b Average Length of Time for Product Improvement or Modification to Go from Drawing Board to Marketplace Small Companies - Second Mailing

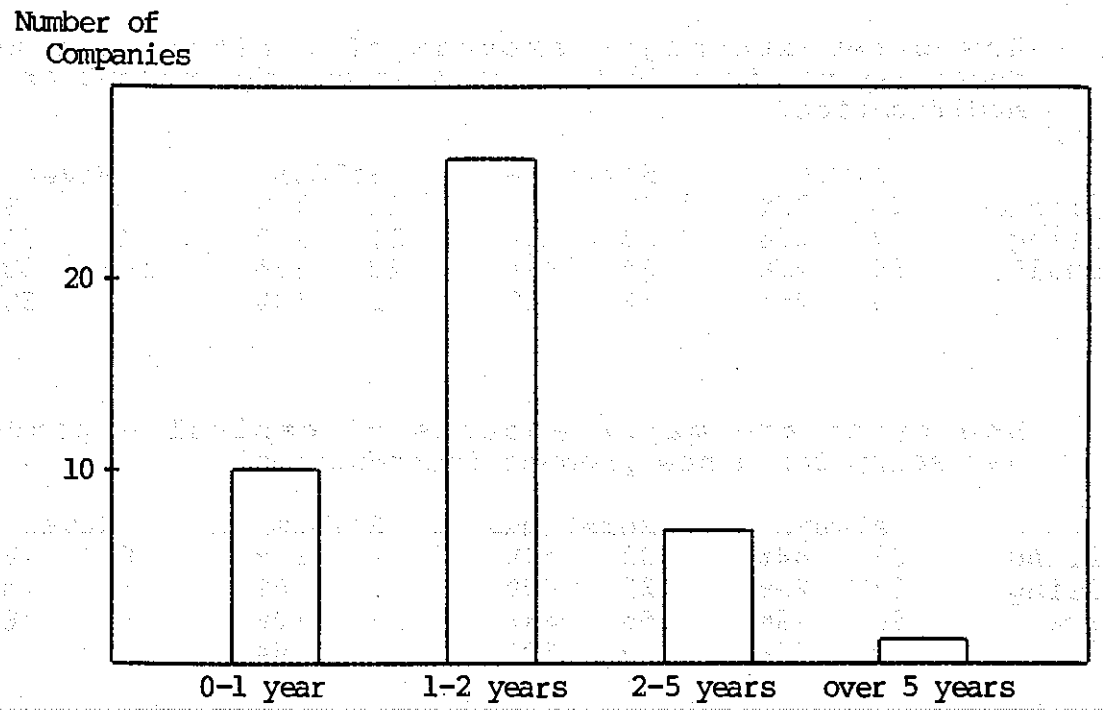


Figure 4.5b Average Length of Time for New Product to Go from Drawing Board to Marketplace Small Companies - Second Mailing

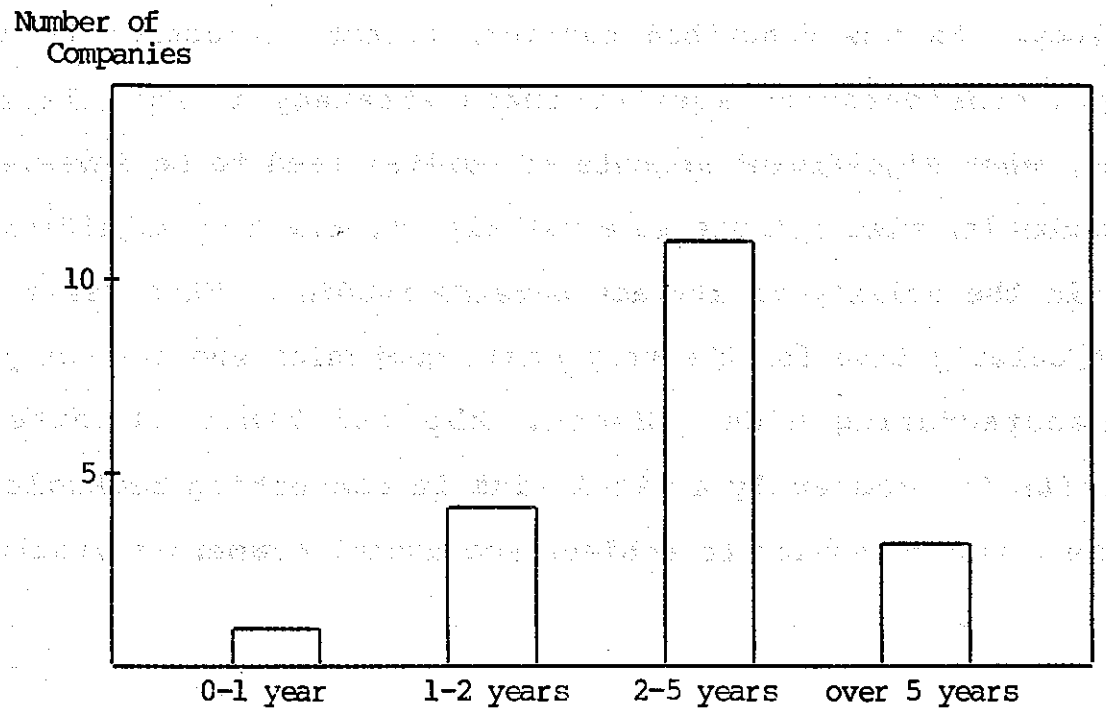


Figure 4.5c Average Length of Time for New Product to Go from Drawing Board to Marketplace Large Companies

How important is outside funding in the development of new technology?

	Very		Moderately		Little		Not at All	
1st Mailing	42	57%	9	12%	8	11%	15	20%
2nd Mailing	8	22%	3	8%	9	25%	16	44%
Total Small	50	45%	12	11%	17	15%	31	28%
Company Sales* (in millions)								
0-$.5	17	34%	5	10%	3	6%	7	14%
$.5-$2	21	54%	2	5%	3	8%	5	13%
$2-$5	7	19%	3	8%	4	11%	9	25%
$5-$20	4	22%	2	11%	4	22%	5	28%
over $20	1	14%	0	0%	2	29%	3	43%

*not all companies indicated their size

How important is outside funding in the marketing of new technology?

	Very		Moderately		Little		Not at All	
1st Mailing	27	36%	21	28%	9	12%	17	23%
2nd Mailing	5	14%	4	11%	10	28%	17	47%
Total Small	32	29%	25	23%	19	17%	34	39%

To what extent do patents play a role in the ability to attract outside funding or in the decision to invest funds (for large companies) for the development and marketing of new technology?

A. Vitally important
B. One of many factors considered
C. Of little importance
D. Of no importance

	A		B		C		D	
Small	32	21%	34	22%	9	6%	8	5%
Large	4	17%	16	70%	2	9%	0	0%
Company sales (in millions)								
0-$.5	11	22%	9	18%	2	4%	4	8%
$.5-$2	14	36%	8	21%	1	3%	0	0%
$2-$5	6	17%	7	19%	1	3%	3	8%
$5-$20	1	6%	6	33%	4	22%	1	6%
over $20	0	0%	3	43%	0	0%	0	0%

cost of any action. **In general, both the total time for resolution and the cost of resolving conflicts seem to be significantly greater for conflicts involving large companies.** Even in our relatively small sample, five large companies cited cases that went to trial and three went to appeals. Interestingly, the one large company that felt the ultimate resolution was unfair indicated their opponent was much larger.

In those cases where companies felt that the resolution of a conflict was not fair, the main reasons stated related to high costs. The only other specific reason referred to an interference case: the company felt that because of the inflexibility of the patent office, the dispute took much longer than necessary to resolve.

Please estimate patent related expenses in the most recent year (in thousands of dollars):

	$0-1		$1-5		$5-20		$20-50		over $50	
1st Mailing	29	33%	33	37%	19	21%	6	7%	2	2%
2nd Mailing	19	46%	8	20%	9	22%	3	7%	2	5%
Total Small	48	37%	41	32%	28	22%	9	7%	4	3%

	$0-10		$10-100		$100-500		$500-1000		over 1000	
Large	0	0%	2	9%	6	26%	3	13%	12	52%

Please estimate patent related expenses in the most recent year as a percentage of total expense:

	0-2%		2-5%		5-10%		Over 10%	
1st Mailing	55	65%	13	15%	11	13%	5	6%
2nd Mailing	35	92%	3	8%	0	0%	0	0%
Total Small	90	77%	16	14%	11	9%	5	4%
Large	18	90%	0	0%	0	0%	2	10%

	Ranking							
	1	2	3	4	4	6	7	8
Resources available to other organization involved								
1st Mailing	0	7	4	0	2			
2nd Mailing	1	1	2	2	2	2	1	
Total Small	1	8	6	2	4	2	1	
Large	0	0	1	1	3	4	1	
Inconsistent court decisions in subject area in question								
1st Mailing	0	1	2	0	0	3	2	
2nd Mailing	2	0	4	3	1	1	2	
Total Small	2	1	6	3	1	4	4	
Large	1	0	2	1	3	1	2	
Publicity likely from taking action								
1st Mailing	1	0	2	2	1	0	2	
2nd Mailing	0	0	1	1	0	0	4	1
Total Small	1	0	3	3	1	0	6	1
Large	0	0	0	0	1	2	4	

Have you been involved in any action (court-related or otherwise) as a result of a conflict? Indicate actions taken.

	1st Mailing		2nd Mailing		Total Small		Large	
Involved in Conflict Action	19	18%	15	31%	34	22%	21	91%
Negotiation	12		5		17		13	
Suit Filed	6		6		12		13	
Interference Filed	5		0		5		1	
Discovery	2		2		4		4	
Trial	2		3		5		5	
Appeal	0		0		0		3	

In a recent example, how long from initiation of action to final resolution (in months)?

	0-6		6-12		12-24		24-48		over 48	
1st Mailing	5	30%	4	20%	6	30%	4	20%	0	0%
2nd Mailing	1	7%	3	20%	2	13%	5	33%	4	27%
Total Small	6	18%	7	21%	8	24%	9	26%	4	12%
Large	1	5%	3	16%	5	26%	6	32%	4	21%

Have you ever avoided product or technological areas due to cost of defending against possible litigation?

	Yes	No
Small	35	81
Large	8	13

As will be seen later in the report, the imposition of additional patent related fees will cause companies to rethink their patent strategy. Unless the patents are believed to be enforceable, companies will turn more toward alternate modes of protection. This will mean less public disclosure of new technology. Unfortunately, the questions asked to ascertain the extent to which the patent system is perceived as useful and reliable (and hence enforceable) reveal a discouragingly negative view. Companies already are complaining about the cost of defending against possible litigation. **One of the key problems is the view that court decisions related to patent enforcement have been sufficiently inconsistant to make corporate decisions difficult.**

Have inconsistent court decisions ever clouded your decisions on the viability of defending your patent rights?

	Yes	No
Small	37	70
Large	13	9

In your primary field of technology, what percentage of challenged patents would you estimate are declared invalid?

	0-25%	25-50%	50-75%	75-100%	Don't Know
Small	8	15	10	7	28
Large	4	7	2	0	8

Has the company ever experienced a problem with contradictions between patent laws and anti-trust laws?

	Yes	No
Small	9	59
Large	9	11

Have you ever obtained exclusive commercial patent rights for technology developed under government contract?

	Yes	No	Don't Know
1st Mailing	19	50	2
2nd Mailing	2	7	1
Total Small	21	57	3
Large	4	7	

Have any attempts been made to commercialize any of your technological developments funded by government contracts?

	Yes	No	Don't Know
Small	40	31	4
Large	5	5	1

Five companies, including one large one, have tried to secure exclusive patent rights for technology developed under government sponsorship and been refused. Of these, three were turned down by DOE, one by DOD and one by NASA.

Do you have patented technology developed under government contract which the government has given or licensed to another organization?

	Yes	No
Small	2	79
Large	2	6

Have you ever had to give background patent rights to the government?

	Yes	No
1st Mailing	12	64
2nd Mailing	1	9
Total Small	13	73
Large	1	9

Have you ever refused a contract because of a background patent rights requirement?

	Yes	No
1st Mailing	5	66
2nd Mailing	1	9
Total Small	6	75
Large	3	7

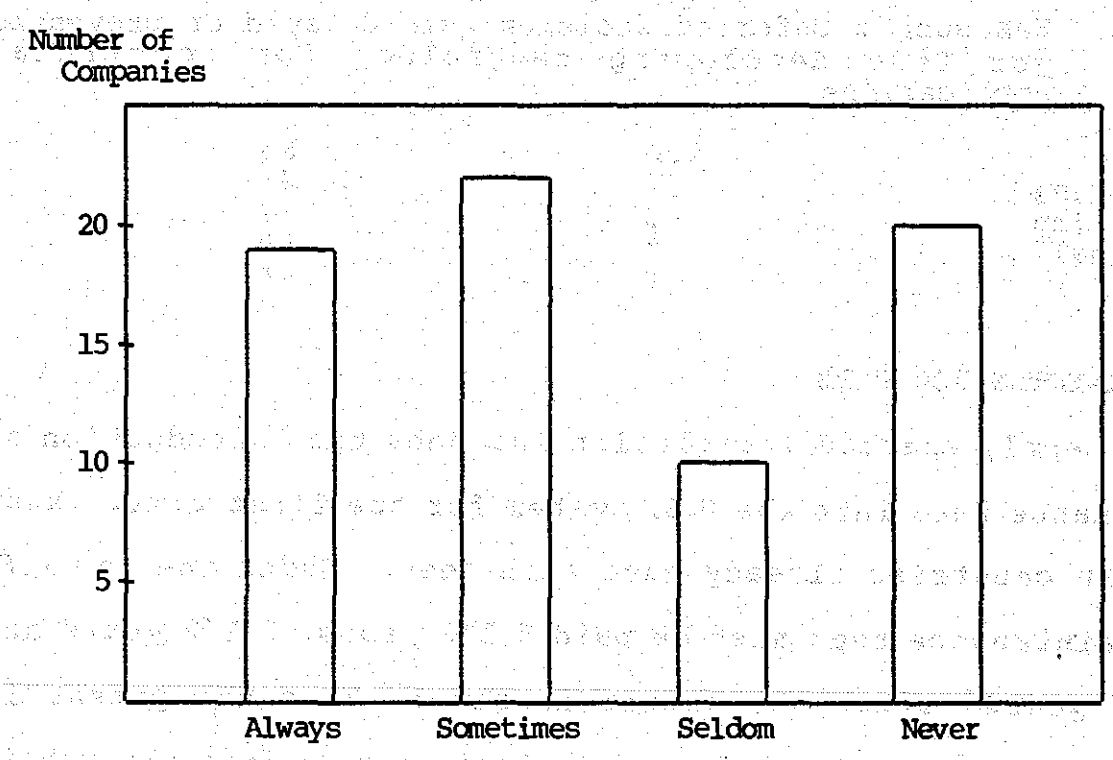


Figure 6a Frequency of Deferral of
Patent Rights Until Contract Completion
Small Companies

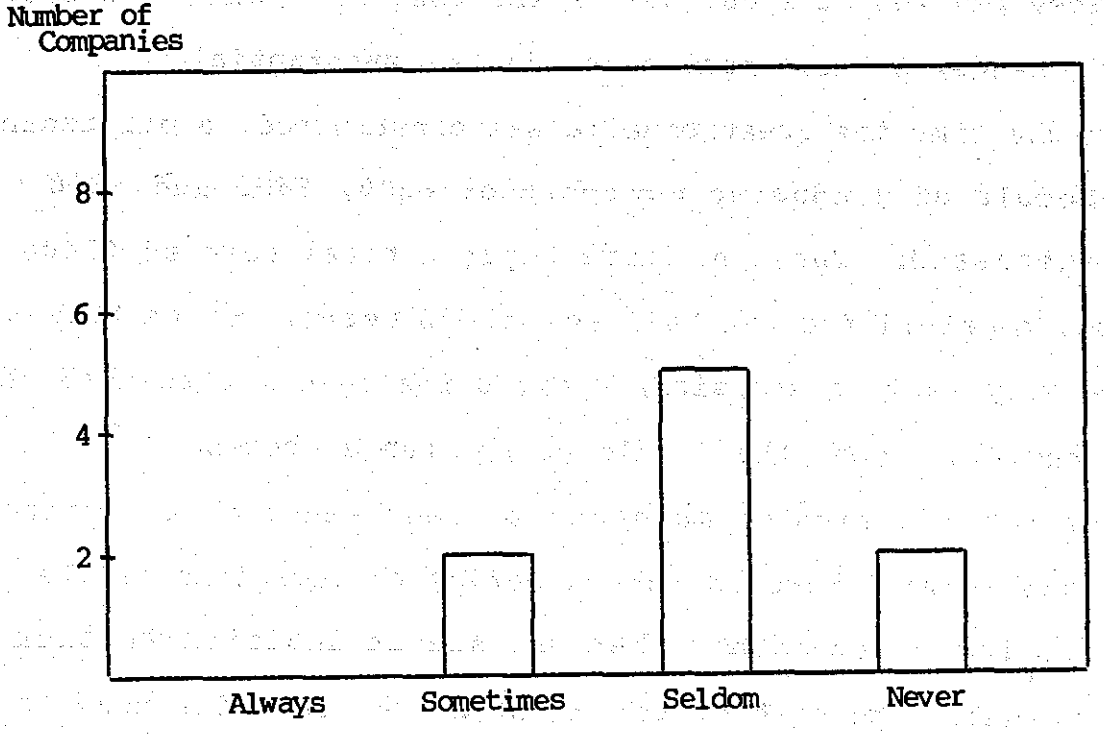


Figure 6b Frequency of Deferral of
Patent Rights Until Contract Completion
Large Companies

when weighing the initial decision. **The results of the survey indicate that the balance is likely to tip against patenting much more often.** The company will turn to alternate modes of protection that keep the new technology out of the public domain. In addition, if the patent is not being used actively as it matures, many smaller companies may find the costs of maintaining the patent too great. **Since it is hard to anticipate which patents will be truly valuable, companies may be seriously jeopardizing their future advantage and business.**

During work on this project, there have been many informal discussions with people from both large and small organizations about the patent system. The general concerns about the cost and reliability of patents as well as the possible impact of the maintenance fees were similar to comments received on the questionnaires. One small company stated that the cost of maintenance fees now prevents them from filing European patents. Another mentioned how cost considerations would make bracketing (obtaining additional patents which expand coverage around a single original or base patent) much less accessible. This strategy is very important in some small high technology businesses.

Another small company respondent looked at his company's current level of patent activity of three patents per year or 51 over a 17 year period and deduced the following:

> At $3,000 per patent, we would be liable for $153,000 in fees, or five years' pre-tax profits at the current rate. The effect of any of the mainenance fees mentioned ($500-3000) would be to inhibit the inventiveness of a company currently producing one patent per engineering man year. Our work leads us into advanced technical areas that are generally 5-10 years from the market place. We

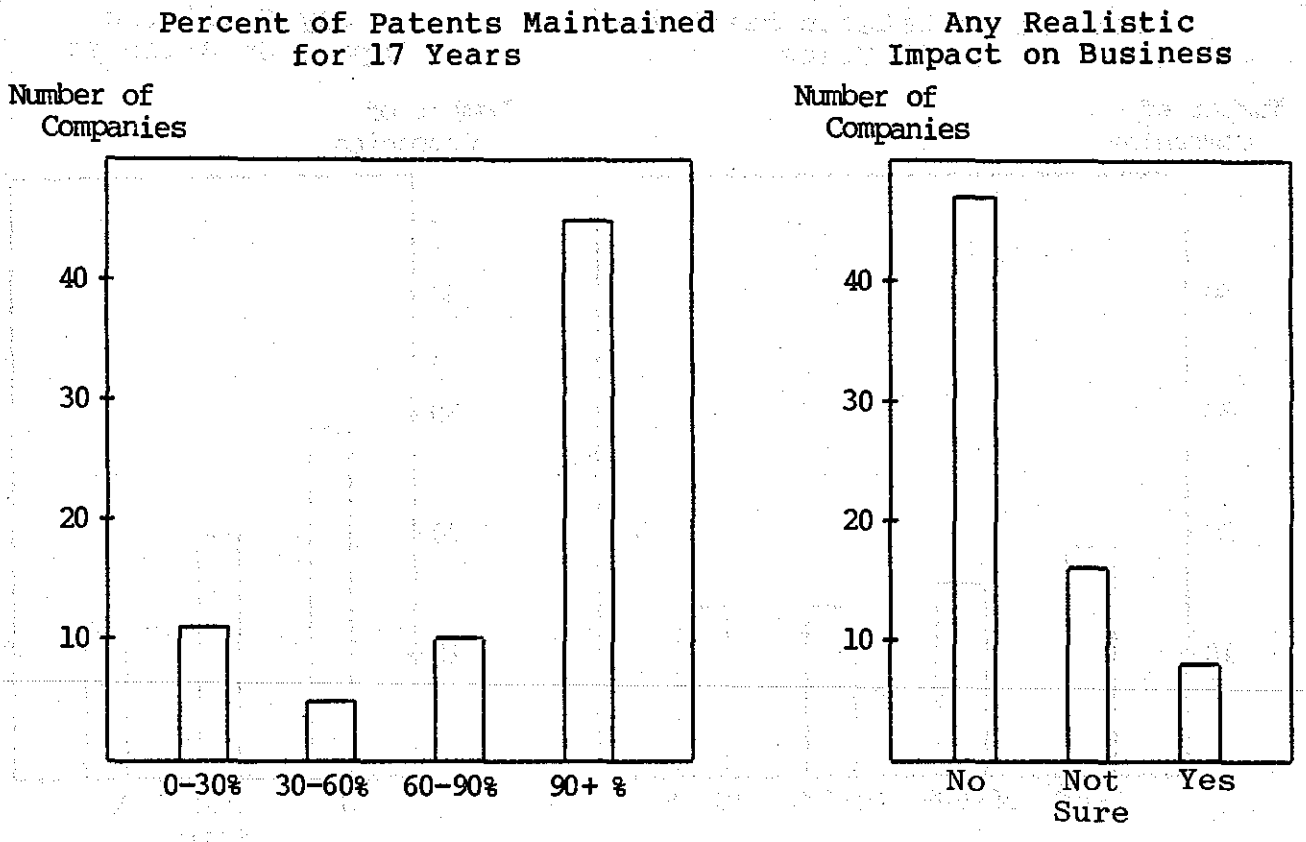


Figure 7.1 Total Maintenance Fees at $500: Small Companies

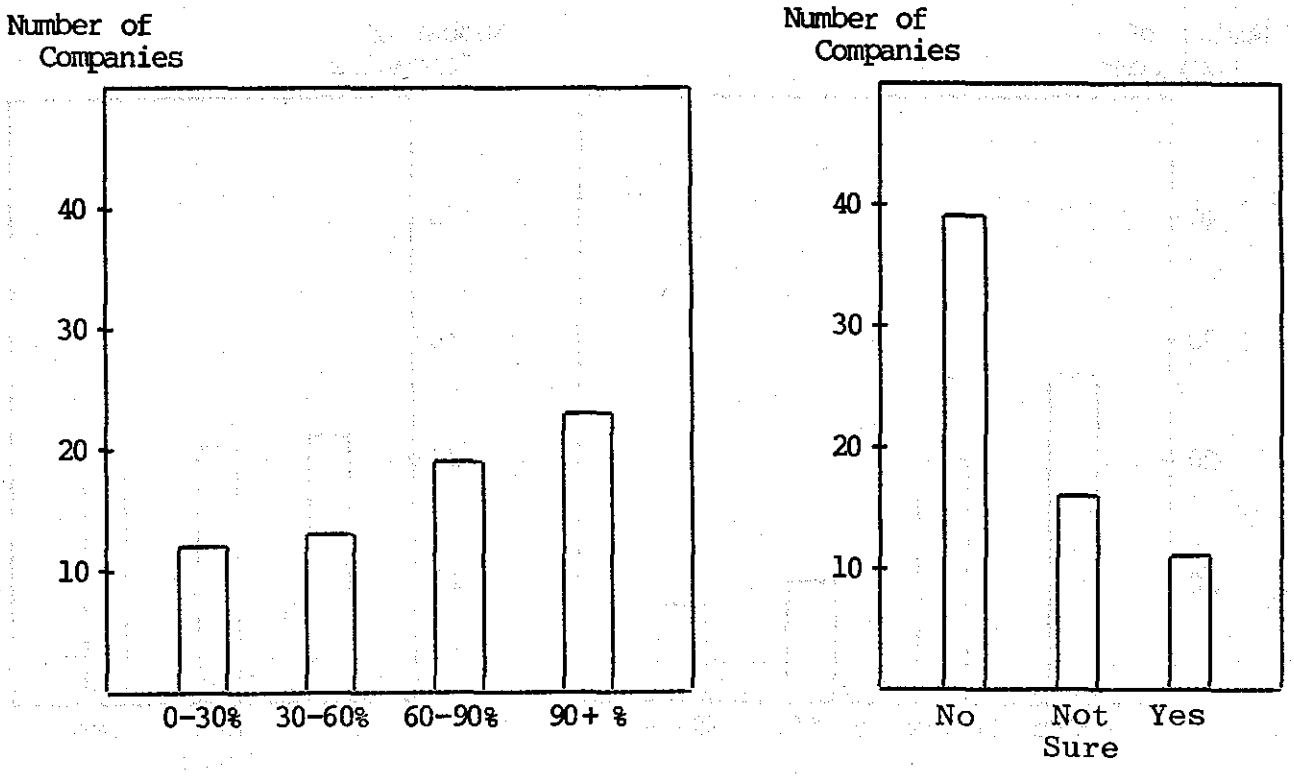


Figure 7.2 Total Maintenance Fees at $1000: Small Companies

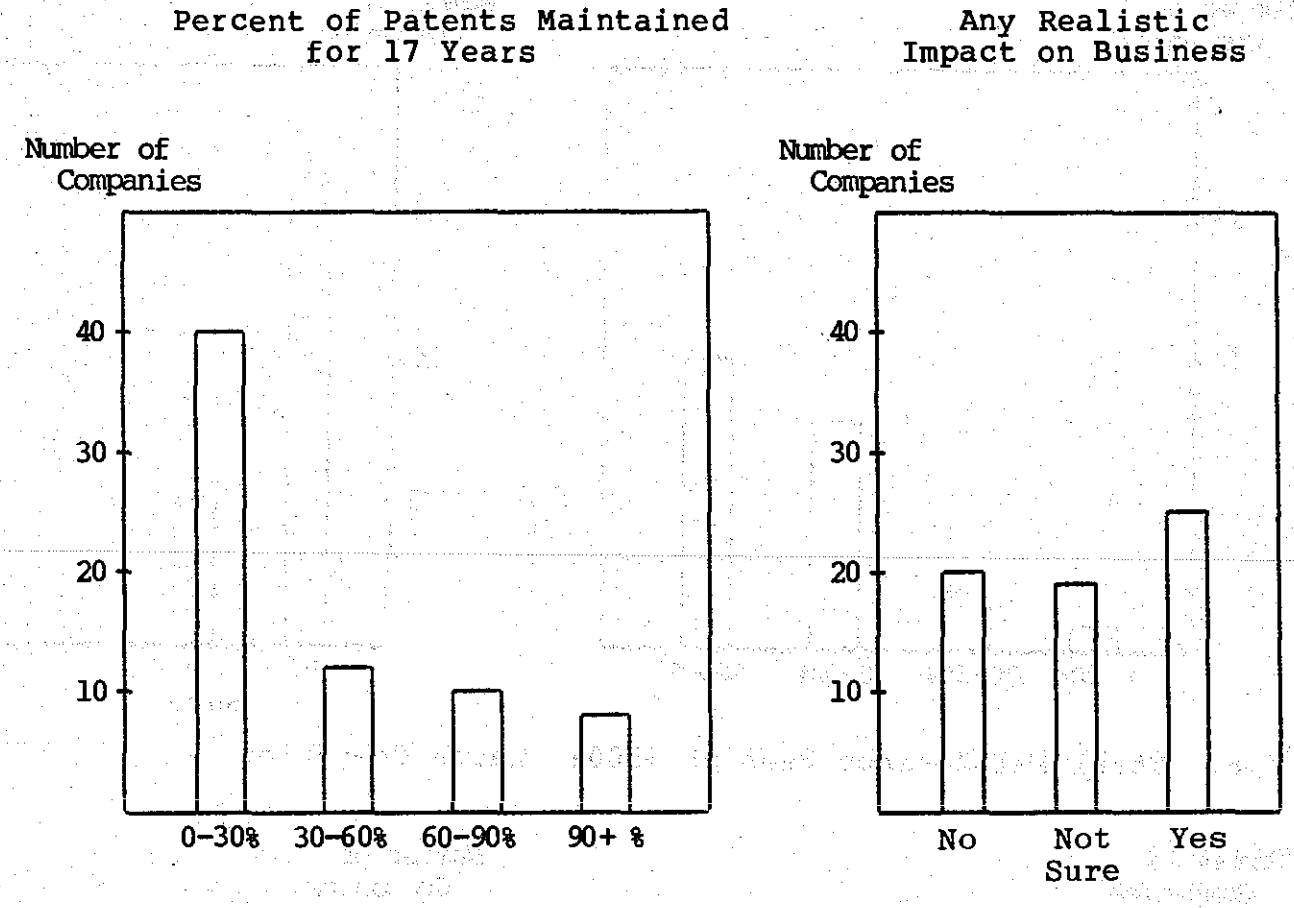


Figure 7.5 Total Maintenance Fees at $3000: Small Companies

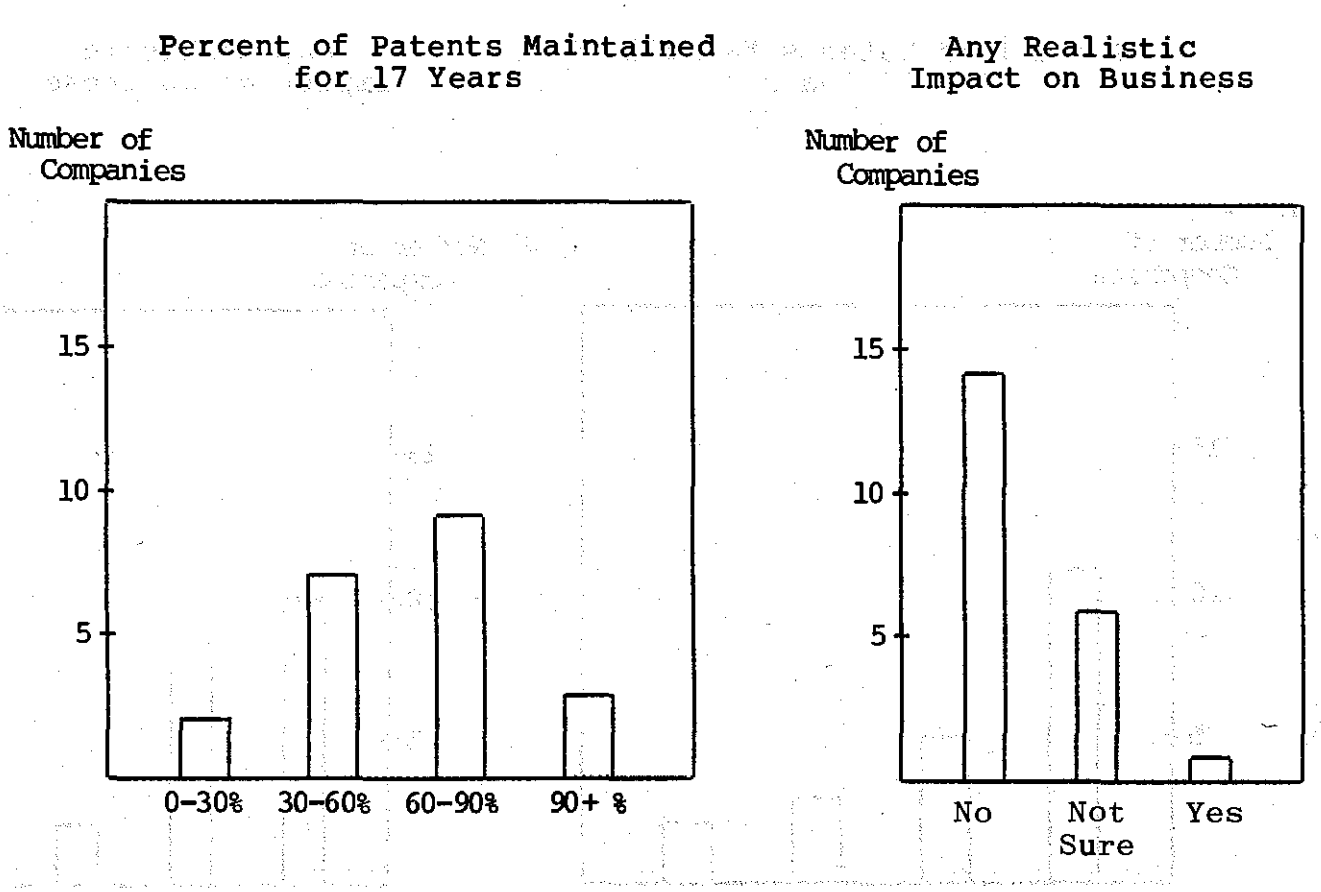
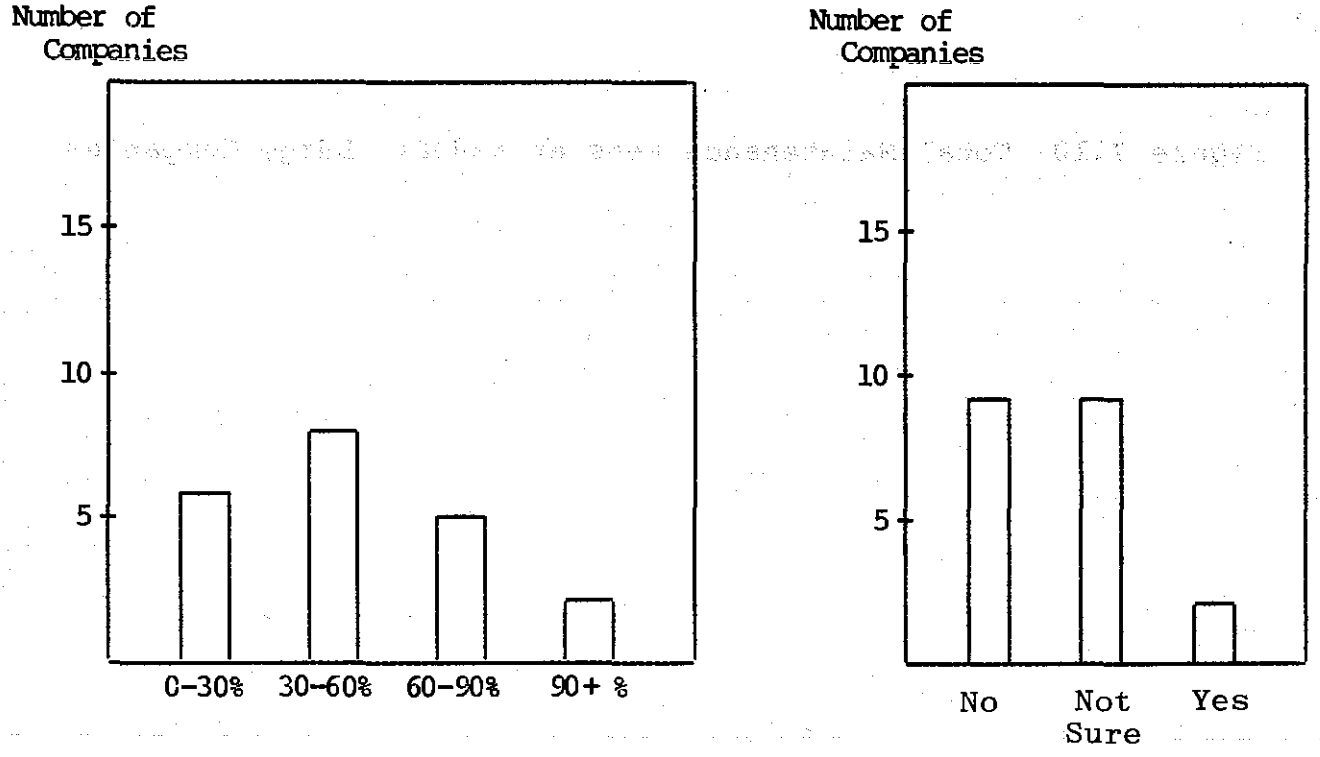


Figure 7.8 Total Maintenance Fees at $1500: Large Companies



7.9 Total Maintenance Fees at $2000: Large Companies

Effect on Use of Patent System

Would you anticipate letting any patents you are currently using in some way lapse because of the imposition of fees?

	Yes	No	Not sure
1st Mailing	24	22	18
2nd Mailing	5	1	2
Total Small	29	23	20
Large	7	9	5

Would the imposition of maintenance fees make you less likely to apply for a patent in the future?

	Yes	No	Not sure
1st Mailing	41	21	18
2nd Mailing	5	6	1
Total Small	46	27	19
Large	4	11	5

VIII. POSSIBLE PATENT LAW AND POLICY CHANGES

At the time this study was proposed, a large number of possible changes in patent policy were being considered. Many of the most important changes were passed at the end of 1980 and are part of PL 96-517. Although the implementing regulations are not yet in effect, the new law includes provisions for a patent reexamination procedure, for small businesses and universities to receive patent rights for inventions developed under government sponsored research, and for the institution of maintenance fees.

A number of other changes in the way the patent system operates have been suggested. Respondents were asked for their opinions on a number of them. The overwhelming majority favored the extension of patent life in cases where government regulations delay market introduction, and the establishment of a single Court of Patent Appeals. About half of the small companies and most of the large companies also favor an independent Patent and Trademark Office.

	Yes		No		No Opinion	
There should be an independent Patent and Trademark Office.						
1st Mailing	50	51%	4	4%	45	45%
2nd Mailing	22	47%	6	13%	19	40%
Total Small	72	49%	10	7%	64	44%
Large	19	83%	3	13%	1	4%

IX. General Conclusions

In the early days of the patent system, it was customary for the individual inventor to apply directly to the Patent Office for a patent. The process required a minimum of time and expense. Over the years, as the system grew and the use of technology broadened, the patent system grew more complex and expensive to use. It is rare today for an inventor to write a patent application without at least consulting a patent attorney. The process of conducting a patent search for prior relevant technology is expensive, and frequently the strength of the patent depends on the extent of the search. Gradually there has been a movement toward patent system use being limited to those more able to afford it.

Coupled with this shift in who uses the patent system has been the influence of public opinion. The general public is uneasy about patents and seems to look on them as a giveaway to business. There is little understanding or recognition of the importance of patent protection to the nurturing and development of new technology and hence to the economic growth of the country. The ultimate manifestation of this public uneasiness is the attitude of the courts toward patents. Most patent disputes that go to trial are complicated and require a careful evaluation

themselves. In order to attract the necessary capital from outside investors, small companies must demonstrate that a protected market niche exists that assures an adequate return on capital invested. Traditionally an important source of that protection has been the patent system. However, a patent system limited more and more to large companies and that affords protection perceived as uncertain at best, leaves the small company in an increasingly difficult position. Substantial costs lead them to seek alternatives to patents such as trade secrets, which in turn reduces their protection in the marketplace, making outside capital investment more difficult to obtain.

This chain of events has clearly been accelerated by the introduction of maintenance fees into the patent system, further weakening the contribution of the patent system to the economic growth and development of the United States. The danger signals and trends are all present in the details of this study.

Perhaps the time has come to reexamine the basis for the existance of a patent system. Do we need a patent system at all? If we do, what should be its functions and goals? How should it be structured to effectively and reliably fulfill those goals? A broad public debate on these issues is a necessary first step. In the last few years, the concern over the decreased rate of innovation in the United States has led to a significant increase in awareness by the Congress of the patent system, its role and its weaknesses. There is still little public understanding of the economic reasons for the existence of a patent system. The result has been a decline in support for the patent system which has gradually become less effective at achieving its original purpose. A patent system that operates ineffectively and

unreliably is worse than no system at all. A public consensus must be reached on the value of a patent system for the United States and the function it should serve. Then we can go forward with the support of public opinion and the necessary financial resources to build a system that fulfills its purpose.

APPENDIX A

SURVEY OF THE USE OF THE PATENT SYSTEM

CONDUCTED BY THE RESEARCH & PLANNING INSTITUTE

I N S T R U C T I O N S :

The following questionnaire has been designed to enable simple check offs for most questions. This means that some questions may not fit your company's situation and you should not hesitate to skip them. If you have been involved in any situation you feel has not been adequately covered by the questionnaire or you had insufficient space for your answers, there is space on the last page for additional comments.

We will be doing follow-ups by telephone of a small number of companies whose response indicates there has been a significant problem and who have indicated a willingness to be contacted.

OPTIONAL (If given, we will send a summary of the results)

NAME: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

TELEPHONE: _____

May we contact you for additional specific information related to your company's experiences?

___Yes ___No

PART I: BACKGROUND QUESTIONS (use most recent fiscal year)

A. Please indicate the sales volume (in millions) for your company
___$0-$.5 ___$.5-$2 ___$2-$5 ___$5-$20 ___over $20 millions

B. Please indicate the number of employees
___0-10 ___10-25 ___25-100 ___100-200 ___over 200

C. Primary field(s) of technology (be as specific as possible):

D. Age of Company:
__under 2 yrs __2-5 yrs __5-10 yrs __10-25 yrs __over 25 yrs

E. Please estimate what percentage of company expenses were incurred for:
R&D___% Production___% Sales___% Service___% Other___%

F. Approximately what percentage of company sales was made in connection with government contracts and subcontracts?
__None __0-5% __5-20% __20-50% __50-80% __80-100%

G. Location of the company main office:
NE___ MidAtlantic___ SE___ Midwest___ SW___ NW___

PART II: (continued)

D. 1. Does your company ever employ alternate modes of protection other than patents (e.g., proprietary know-how, trade secrets)?

___Yes ___No

If you also use patents, please estimate the relative value of these alternate modes of protection in your primary field of technology (check one)

___More useful than patents ___As useful as patents

___Not as useful as patents ___Of little or no use compared to patents

2. a. What is the average time it takes your company to get product improvement or modification from the drawing board to the marketplace?

___Less than 6 mos ___6 - 12 mos ___12 - 24 mos

___more than 24 mos ___Does not apply

b. How often are major amounts of capital expenses necessary for such changes?

___Always ___Sometimes ___Seldom ___Never

3. a. What is the average time it takes your company to get a new product from the drawing board to the marketplace?

___less than 1 yr ___1 - 2 yrs ___2 - 5 yrs

___more than 5 yrs ___Does not apply

b. How often are major amounts of capital expenses necessary for such a new product introduction?

___Always ___Sometimes ___Seldom ___Never

4. Pick two products or processes that are, and probably will continue to be, among the most valuable to your company. For each one, please check all those characteristics that best describe your product (or process) and its marketing strategy.

I	II	
a____	____	In an established stable market and need to maintain position
b____	____	In a growth market and plan to grow with it
c____	____	In a new market area that needs to be developed
d____	____	Product is protected in marketplace by patents
e____	____	Product is protected in marketplace by proprietary technology
f____	____	Product has no legal protection but has brand name recognition
g____	____	Product is same as others already accepted in marketplace
h____	____	Product is slightly improved version of product already accepted in marketplace
i____	____	Product is substantially improved version of product already accepted in marketplace
j____	____	Product is radically new and/or fundamentally different from previously available products
k____	____	Little R&D was needed to develop this product
l____	____	Some R&D was needed to develop this product
m____	____	Substantial R&D was needed to develop this product
n____	____	Outstanding R&D was needed to develop this product
o____	____	Getting product into marketplace quickly was crucial to a successful campaign
p____	____	Reliability and good performance history more important to success than time
q____	____	Does not apply

PART III: (continued)

B. 3. g. Did you feel resolution was accomplished in a fair manner?
___Yes ___No
If not, please explain:_____
_____
_____
_____

C. In your primary field of technology, what percentage of challenged patents would you estimate are declared invalid?
___0-25% ___25-50% ___50-75% ___75-100% ___Don't Know

D. Have you ever felt at a disadvantage when involved in a patent conflict because the other company was larger? ___Yes ___No ___Doesn't Apply

E. Have you ever felt at a disadvantage when involved in a patent conflict because the other company was smaller? ___Yes ___No ___Doesn't Apply

F. Have you ever avoided product or technological areas due to cost of defending against possible litigation? ___Yes ___No

G. Have inconsistent court decisions ever clouded your decisions on the viability of defending your patent rights? ___Yes ___No

H. Has the company ever experienced a problem with contradictions between patent laws and anti-trust laws? ___Yes ___No ___Don't Know
If yes, please include a short summary of most recent situation on page 8 where space is provided for additional comments.

PART IV: CONCERNING CONTRACT R&D FOR THE GOVERNMENT

A. Has your company ever performed contract R&D for the government?
___Yes ___No (If No, go to D1)
If Yes:

1. For which specific departments or agencies have you performed work?_____
2. Was R&D performed for the government done mainly in your primary technical field? ___Yes ___No If not, what field?_____
_____
3. Have you ever obtained exclusive commercial patent rights for technology developed under government contract?
___Yes ___No ___Don't Know
4. Have any attempts been made to commercialize any of your technological developments funded by government contracts?
___Yes ___No ___Don't Know ___Does not apply
5. Have you ever tried to secure exclusive patent rights for technology developed under government sponsorship and been refused? ___Yes ___No ___Don't Know ___Does not apply

If Yes:	most recent situation	other recent situation
a. Which agency or department?	_____	_____
b. Was the technology ever utilized in the commercial marketplace?	___Yes___No	___Yes ___No
c. If you had received rights, approximately how much investment would you have made to commercialize the technology?	_____	_____
d. Did you go ahead anyway?	___Yes___No	___Yes ___No

PART V: (continued)

B. In the following table, assume that the dollar value at the left is the total cost to maintain a patent for the full seventeen years. Please then estimate the percentage of your current patents you would maintain and whether there is likely to be any realistic impact on your business.

TOTAL PAID IN MAINTENANCE FEES	PERCENT OF PATENTS MAINTAINED FOR 17 YEARS (check one)				ANY REALISTIC IMPACT ON BUSINESS (check one)		
	0-30%	30-60%	60-90%	90-100%	Yes	No	Not Sure
1. $500							
2. $1,000							
3. $1,500							
4. $2,000							
5. $3,000							

C. If at any level there would be an impact on your business, please explain briefly what it would be and whether it would relate primarily to current activities or future activities. _____

_____

_____

_____

_____

_____

_____

_____

_____

D. Would you anticipate letting any patents you are currently using in some way lapse because of the imposition of fees?

___Yes ___No ___Not Sure ___Doesn't Apply

E. Would the imposition of maintenance fees make you less likely to apply for a patent in the future?

___Yes ___No ___Not Sure ___Doesn't Apply

PART VI: POSSIBLE PATENT LAW AND POLICY CHANGES

In addition to changes in patent policy already enacted, several others have been proposed. Please indicate which of the following you would favor.

A. Patents should be awarded to the first to file. (Currently patents are awarded to the first to invent) ___Yes ___No ___No Opinion

B. Patent life should be extended to twenty years. ___Yes ___No ___No Opinion

C. Patent life should be extended in cases where government regulation delays market introduction (e.g. FDA approval may take five years). ___Yes ___No ___No Opinion

D. A single Court of Patent Appeals should be established. ___Yes ___No ___No Opinion

E. Attorney's fees in patent matters should be paid by the losing party. ___Yes ___No ___No Opinion

PART VI: (continued)

F. There should be compulsory licensing of patents if the patent holder is using the patent to suppress technology. ___Yes ___No ___No Opinion

G. There should be an independent Patent and Trademark Office. ___Yes ___No ___No Opinion

Comments and other changes you would suggest _____

_____

_____

_____

_____

_____

_____

ADDITIONAL COMMENTS (You may attach additional sheets)

PART IV: (continued)

A. 6. Do you have patented technology developed under government contract which the government has given or licensed to another organization? ___Yes ___No
If so, has that organization received follow-on contracts or hardware orders you expected to receive? ___Yes ___No
What government agency was involved?_____

7. Recently enacted legislation gives patent rights to small business and universities for technology developed under government contract. Is this legislation likely to affect your company's participation in providing contract R&D to the government? ___Yes ___No
If Yes, in what way?_____

B. 1. Have you ever had to give background patent rights to the government? ___Yes ___No If Yes, which agency?_____

2. Have you ever refused a contract because of a background patent rights requirement? ___Yes ___No If Yes, which agency?_____

3. Have background rights issues affected company history or decision making? ___Yes ___No If Yes, please explain:_____

C. 1. In your experience, how often is the decision on patent rights deferred until contract completion?
___Always ___Sometimes ___Seldom ___Never

2. Has such a deferred decision ever delayed or prevented you from developing technology for commercial applications? ___Yes ___No
If Yes, please explain:_____

D. Has past government patent policy inhibited or prevented the application of your most advanced private technology to government sponsored work?
___Yes ___No If Yes, please explain:_____

PART V: MAINTENANCE FEES

Recently passed legislation has authorized the charging of fees to maintain a patent's validity for the full seventeen years (in addition to the patent application fees). These maintenance fees would be due at the end of 3-1/2 years, 7-1/2 years and 11-1/2 years after the date of issue. These fees would be in addition to application fees. Non-payment of any maintenance fees would result in the loss of patent protection.

A. The payment schedule for maintenance fees has not been determined. Would you prefer:
a. Three equal payments _____
b. Increasing payments over time (e.g., 20%, 30%, 50% of total)_____
c. Other (Please explain)_____
d. No opinion _____

PART III: RELIABILITY OF PATENTS AND RELATED COSTS

A. Please estimate patent related expenses in the most recent year:
   1. In dollars:
   ___less than $1,000 ___$1-5,000 ___$5-20,000 ___$20-50,000 ___over $50,000
   2. As a percentage of total expenses:
   ___Less than 2% ___2 - 5% ___5 - 10% ___over 10%

B. Has your company ever been involved in any type of a conflict situation related to patented technology (e.g., interference, infringement) whether or not any action was taken? ___Yes ___No (If No, go to F)
   1. Has your company ever decided not to take action in a case where you felt you were right? ___Yes ___No
   If so, rank the following factors in order of importance (#1 most important) during the decision making process in most recent case:
   a ___ Estimated cost of the action
   b ___ Estimated time needed to complete the action
   c ___ Amount of company personnel time that would be needed
   d ___ Value (monetary or other) to company of positive outcome
   e ___ Resources available to other organization involved
   f ___ Inconsistent court decisions in subject area in question
   g ___ Publicity likely from taking action
   h ___ Other (explain briefly) _____
   _____
   _____
   _____
   _____
   2. Have you been involved in any action (court-related or otherwise) as a result of a conflict? ___Yes ___No (If No, go to C)
   3. Using a recent example of action that has been resolved (or abandoned), please answer the following set of questions.
      a. Did you initiate the action? ___Yes ___No
      b. List types of action taken (by either party) in chronological order (e.g., negotiation, suit filed, interference action filed, disclosure made, trial, appeal) _____
      _____
      _____
      c. State briefly final resolution: _____
      _____
      _____
      d. How long from initiation of action to final resolution?
      ___Less than 6 mos ___6 - 12 mos ___12-24 mos
      ___24 - 48 mos ___over 48 mos
      e. Approximately how much did you spend on this matter?
      ___Less than $5,000 ___$5-$10,000 ___$10-$20,000
      ___$20-$100,000 ___more than $100,00 ___Not sure
      f. What size was the other organization compared to your company (based on sales figures)?
      ___much larger ___somewhat larger
      ___about equal size ___somewhat smaller
      ___much smaller

PART II: USEFULNESS OF THE PATENT SYSTEM VS. PROPRIETARY KNOW-HOW AND TRADE SECRETS

A. Has your company ever applied for a patent? ___Yes ___No
(If No, go to IIB) If Yes:

1. How many patents does your company hold?
___Less than 5 ___5-15 ___15-25 ___25-100 ___over 100
2. What percentage of these patents is your company actually using in some way?
___Less than 10% ___10-25% ___25-50% ___over 50%
3. How valuable do you think patents are in your company? (check all applicable)
____ Of little value compared with technical know-how
____ Valuable for defensive purposes
____ Important in establishing proprietary position
____ Essential to business activities
4. To what extent do you rely on patents to protect your products?
___Always ___Frequently ___Seldom ___Never ___Does Not Apply
5. How important is outside funding in the development of new technology?
___Very ___Moderately ___A little ___Not at all
6. How important is outside funding in the marketing of new technology?
___Very ___Moderately ___A little ___Not at all
7. To what extent do patents play a role in the ability to attract outside funding for the development and marketing of new technology?
___Vitally important ___One of many factors considered
___Of little importance ___Of no importance
___Does not apply ___Not sure
8. Rate the relative importance of the following factors in the decision to promote new technology (#1 most important):
___Patent Protection ___Market potential
___Proprietary information know-how ___Amount of investment required
___Time required to reach market-place

B. If you have technical areas where you have not applied for patents, which reasons are applicable?

1. ____ Not involved in developing new technology
2. ____ Depend on trade secrets and proprietary technology
3. ____ New technology not patentable
4. ____ Patent rights would belong to other organization or government
5. ____ Patent requires public disclosure
6. ____ Patent protection unnecessary or irrelevant
7. ____ Obtaining patent protection is too expensive
8. ____ Defending a patent is too expensive
9. ____ Patent protection is too unreliable, too easy to get it ruled invalid
10. ____ Other:_____
11. ____ Does not apply

C. Does your company ever use information from the patent office to:

1. follow current technological advances? ___Yes ___No
2. follow competitors activities? ___Yes ___No

themselves. In order to attract the necessary capital from outside investors, small companies must demonstrate that a protected market niche exists that assures an adequate return on capital invested. Traditionally an important source of that protection has been the patent system. However, a patent system limited more and more to large companies and that affords protection perceived as uncertain at best, leaves the small company in an increasingly difficult position. Substantial costs lead them to seek alternatives to patents such as trade secrets, which in turn reduces their protection in the marketplace, making outside capital investment more difficult to obtain.

This chain of events has clearly been accelerated by the introduction of maintenance fees into the patent system, further weakening the contribution of the patent system to the economic growth and development of the United States. The danger signals and trends are all present in the details of this study.

Perhaps the time has come to reexamine the basis for the existance of a patent system. Do we need a patent system at all? If we do, what should be its functions and goals? How should it be structured to effectively and reliably fulfill those goals? A broad public debate on these issues is a necessary first step. In the last few years, the concern over the decreased rate of innovation in the United States has led to a significant increase in awareness by the Congress of the patent system, its role and its weaknesses. There is still little public understanding of the economic reasons for the existence of a patent system. The result has been a decline in support for the patent system which has gradually become less effective at achieving its original purpose. A patent system that operates ineffectively and

of a technical area. As in most legal proceedings, the answers are not black and white but various shades of grey. The courts, when in doubt, tend to rule against the patent system and declare the patent invalid. The belief is that such a decision will open up the development of the technology to competition, and that is preferred. Since only a few patents are challenged in the courts, the effect on competition is relatively small.

What is not clearly perceived is the chilling effect that these decisions and the attitude they represent have on the use of the patent system as a whole, and on innovation in particular. It is recognized that only valuable patents are cause for a major legal dispute; when people believe that any truly profitable patent is likely to be declared invalid (after a lengthy and expensive court battle), they look for other methods of protecting their technology. If the technological development carries a high risk of failure without an assured protected market position, it may never be explored at all. At the same time, a dependence on other methods to protect technology makes whatever advances have been made in scientific knowledge inaccessable to the public. Technological development is a sequential process with each step building on a number of previous ones. Without the free exchange of knowledge, progress is drastically impeded.

It has been demonstrated repeatedly that the small business sector is a major producer of innovation, especially when radically new, high-risk technology is involved. However, these companies are rarely in a position to completely fund the development and market introduction of their technology by

In addition to changes in patent policy already enacted, several others have been proposed. Please indicate which of the following you would favor.

	Yes		No		No Opinion	
Patents should be awarded to the first to file.						
1st Mailing	14	14%	75	74%	12	12%
2nd Mailing	10	21%	30	64%	7	15%
Total Small	24	15%	115	73%	19	12%
Large	11	48%	11	48%	1	4%
Patent life should be extended to twenty years.						
1st Mailing	53	53%	24	24%	23	23%
2nd Mailing	18	39%	18	39%	10	22%
Total Small	71	49%	42	29%	33	23%
Large	10	45%	10	45%	2	9%
Patent life should be extended in cases where government regulations delays market introduction.						
1st Mailing	83	84%	6	6%	10	10%
2nd Mailing	35	74%	8	17%	4	9%
Total Small	118	81%	14	10%	14	10%
Large	19	83%	2	9%	2	9%
A single Court of Patent Appeals should be established.						
1st Mailing	74	73%	2	2%	25	25%
2nd Mailing	32	68%	4	9%	11	23%
Total Small	106	72%	6	4%	36	24%
Large	19	83%	3	13%	1	4%
Attorney's fees in patent matters should be paid by the losing party.						
1st Mailing	47	47%	23	23%	30	30%
2nd Mailing	30	64%	7	15%	10	21%
Total Small	77	52%	30	20%	40	27%
Large	11	50%	10	45%	1	5%
There should be compulsory licensing of patents if the patent holder is using the patent to suppress technology.						
1st Mailing	49	49%	31	31%	20	20%
2nd Mailing	28	59%	11	22%	10	20%
Total Small	77	52%	42	28%	30	20%
Large	5	24%	12	67%	2	10%

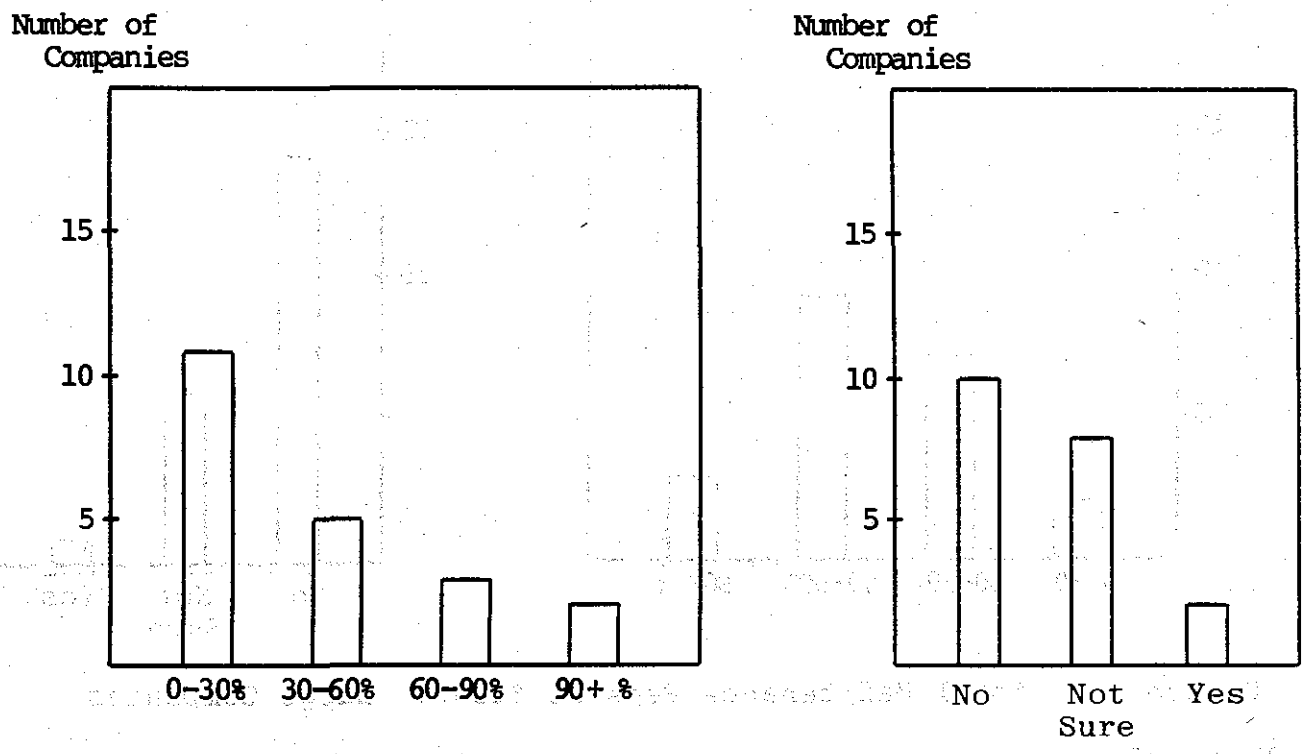
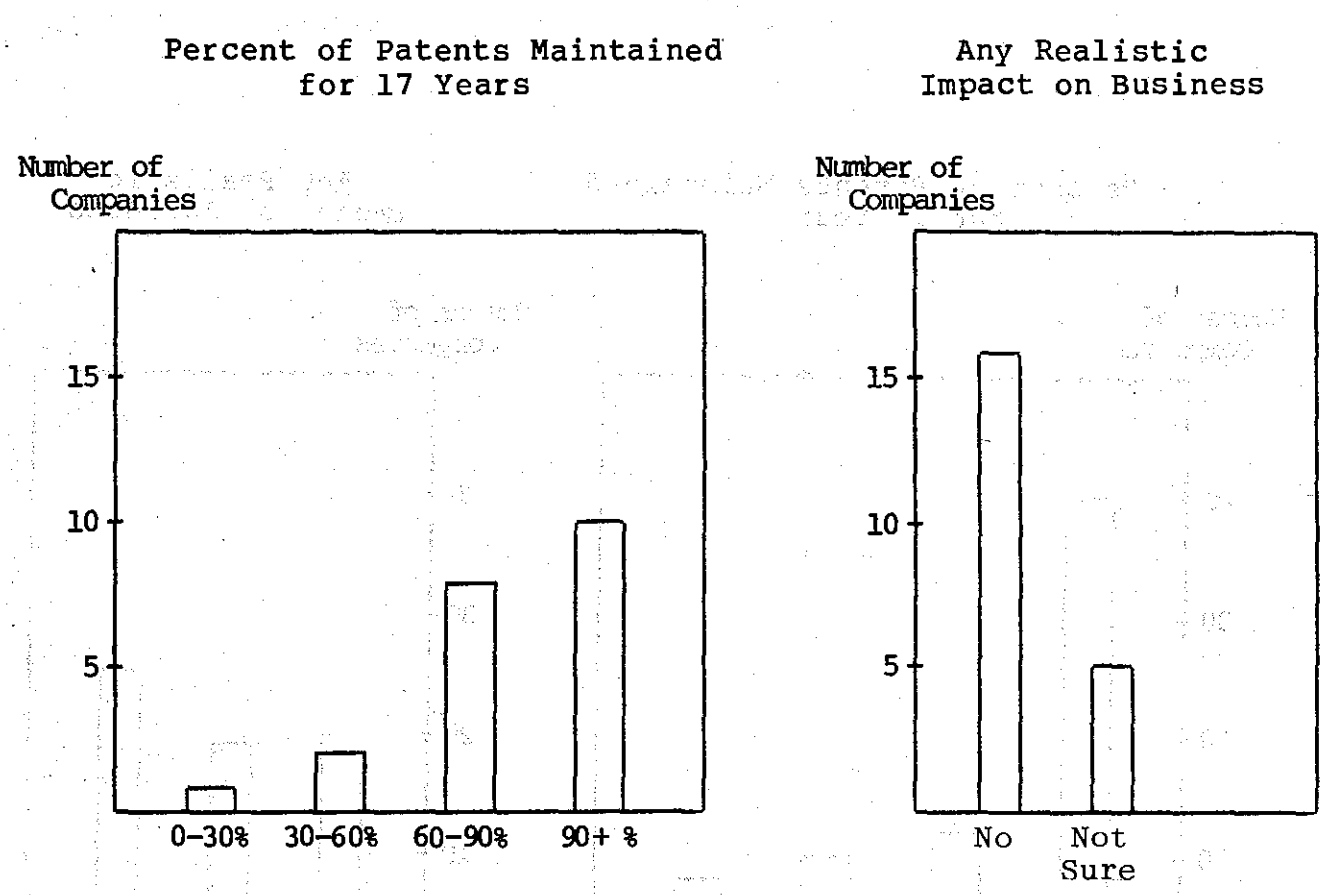
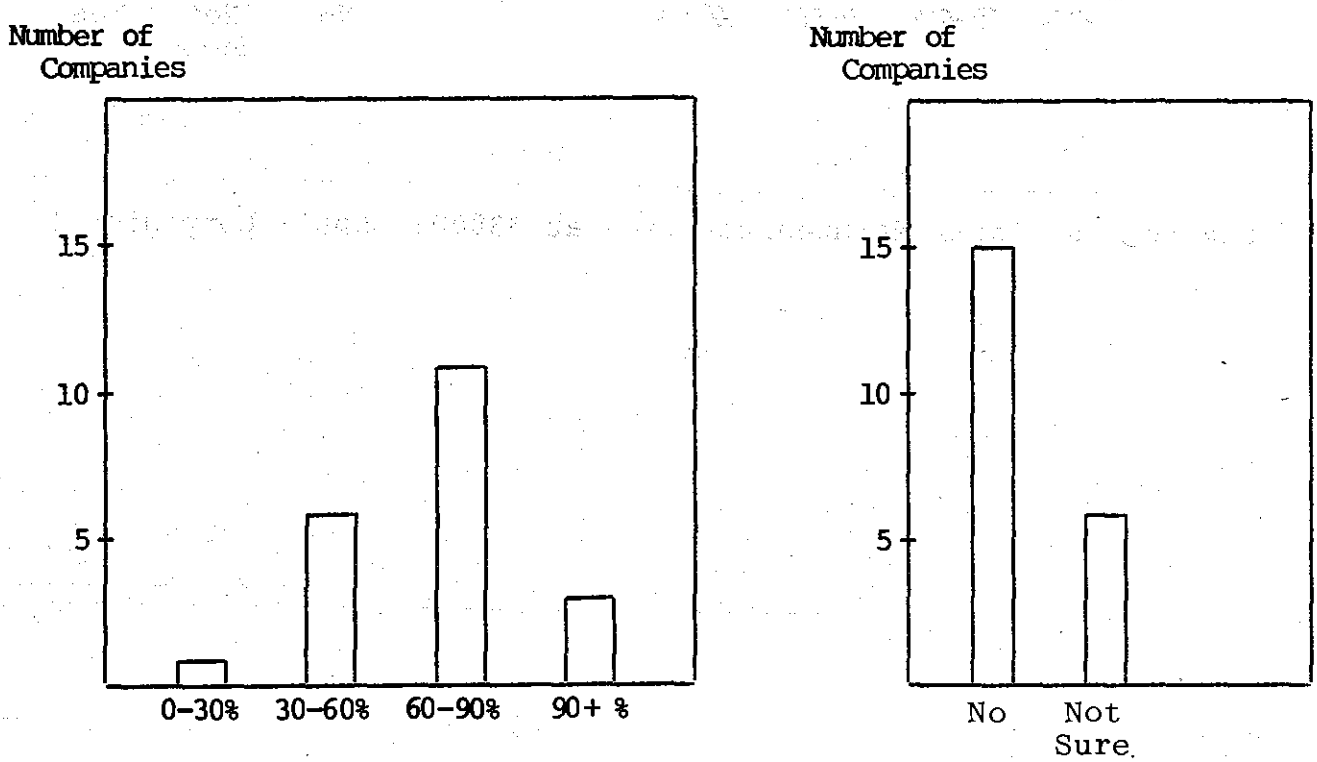


Figure 7.10 Total Maintenance Fees at $3000: Large Companies



7.6 Total Maintenance Fees at $500: Large Companies



7.7 Total Maintenance Fees at $1000: Large Companies

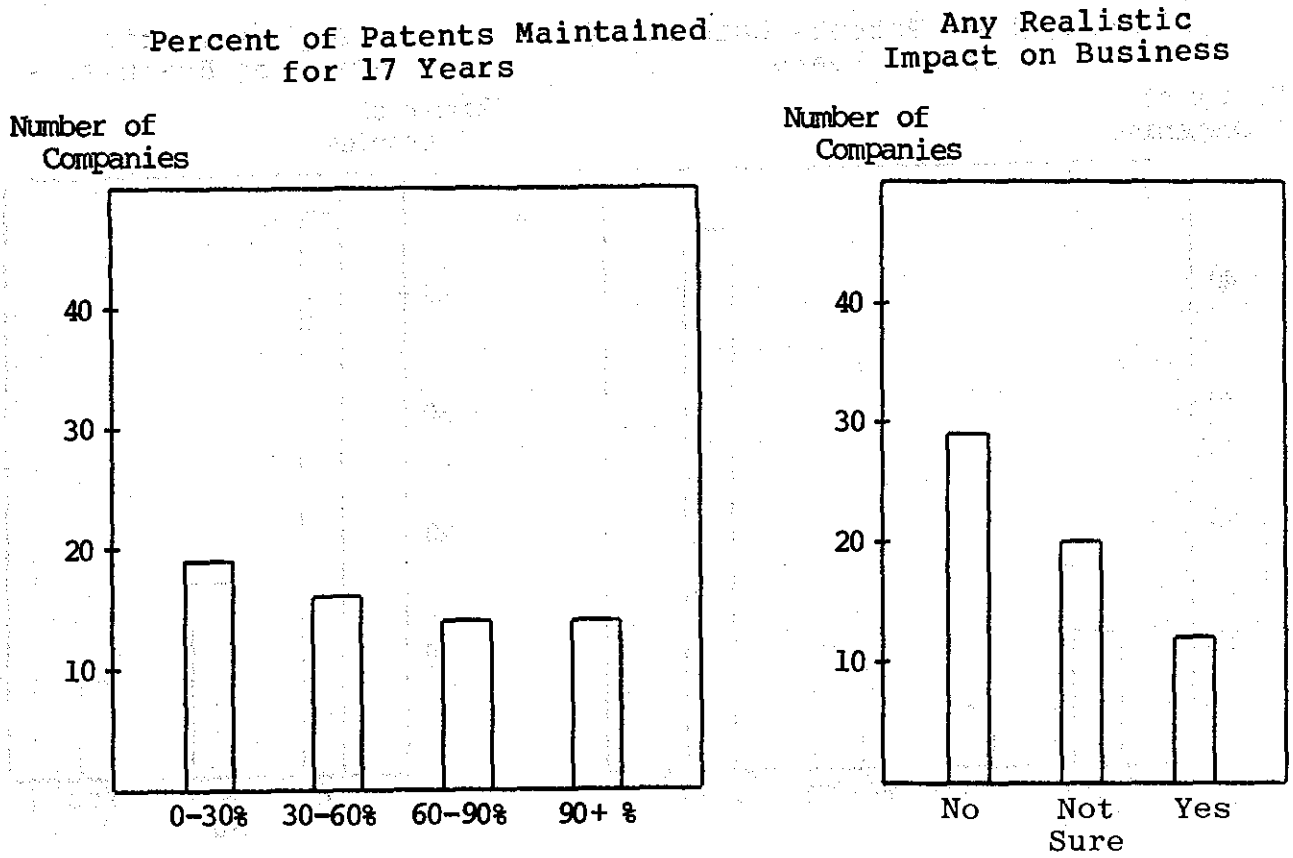


Figure 7.3 Total Maintenance Fees at $1500: Small Companies

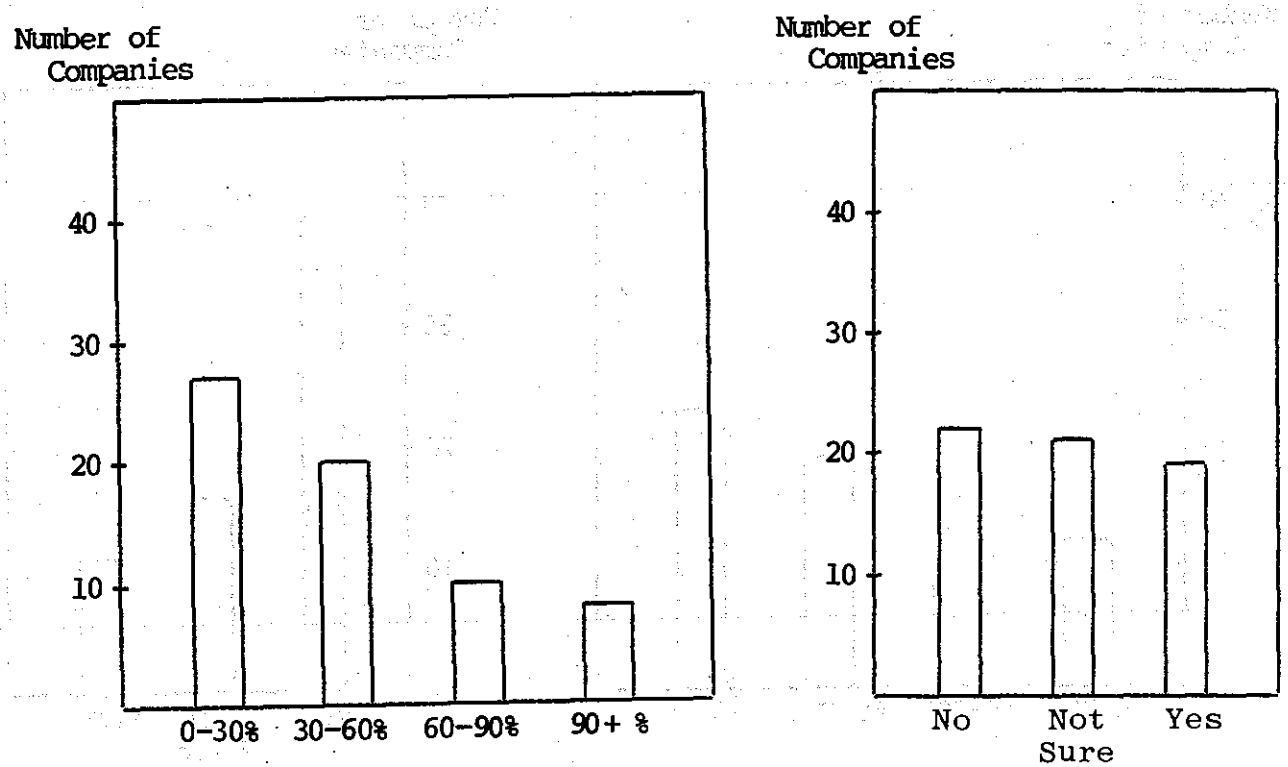


Figure 7.4 Total Maintenance Fees at $2000: Small Companies

could not afford to keep a patent alive that long before being able to test its market value.

One large company patent counsel with whom I recently spoke indicated that he is looking more carefully at what is patented and is recommending fewer filings. He reasons that in his company a large portion of the legal fees are paid to in-house permanent staff, but maintenance fees are out of pocket. Hence a sharp escalation in those costs makes him think twice about a new patent filing.

While there were many negative comments made about any increase in fees, many also agreed with one small company respondent who said, "We would welcome much higher fees if the fees could buy us a substantially more reliable patent system."

Companies were asked to assume a cost for maintaining a patent for the full seventeen years from $500 to $3000. At each level of costs they were asked what percent of patents they would maintain and whether there would be any realistic impact on their business. The answers to the first quesion are summarized in the charts and graphs on the following pages. The percent of companies that felt maintenance fees would have an impact on their business ranged from 11% at fees of $500 to 39% at fees of $3000. **Over 30% of small companies and over 20% of large companies indicated that the imposition of maintenance fees would make them less likely to apply for a patent in the future.**

In the following graphs, assume that the dollar value in each is the total cost to maintain a patent for the full seventeen years. Please then estimate the percentage of your current patents you would maintain and whether there is likely to be any realistic impact on your business.

Has such a deferred decision ever delayed or prevented you from developing technology for commercial applications?

	Yes	No
1st Mailing	7	43
2nd Mailing	0	7
Total Small	7	50
Large	1	4

VII. MAINTENANCE FEES

Recently enacted legislation includes the introduction of maintenance fees into the U.S. system for the first time. Many European countries already have such fees. Under the new U.S. law, maintenance fees must be paid 3 1/2 years, 7 1/2 years and 11 1/2 years after the patent issues to keep the patent in effect. Otherwise, the patented technology goes into the public domain. It is unclear at what level they will be set, but the legislation also requires a gradual increase in maintenance fees until they pay for at least 25% of the cost of running the patent office. Hence, the eventual fees will be substantial.

At the time the questionnaire was constructed, a maintenance fee schedule of graduated payments of $200, $400 and $800 was being discussed. Those numbers imply a total cost of $1400 to maintain a patent for the full seventeen years. Since this was still a very early discussion, various fee levels were used that placed the $1400 near the middle of the range chosen.

The introduction of maintenance fees means that inventors and companies will have to make a series of decisions related to any given invention rather than one single decision whether or not to patent. The cost of the maintenance fees will need to be added into the other costs already associated with a new patent

Has past government patent policy inhibited or prevented the application of your most advanced private technology to government sponsored work?

	Yes	No
1st Mailing	25	65
2nd Mailing	8	31
Total Small	33	96
Large	6	10

One observation indicates an inequity in the way the government has dealt with patent rights decisions. Significant numbers of small companies have undertaken government contract work with patent rights decisions deferred until contract completion. This rarely happens to large companies. A company that cannot be assured of patent rights is hesitant to invest large amounts in filing patent applications. In the words of one respondent: "Neither we nor a licensee will invest in commercialization until we know who owns the patent rights. It is analogous to the situation where a person won't invest in building a house until they know they have clear title to the land."

One difficulty for the small company is that there is only a short time after public disclosure (such as a quarterly report) to file for a patent. In a situation described by one of the respondents: "Decision for granting greater rights to contractor on one invention was never made by the agency--as a result, major aspect of technology reverted to the public because of publication more than one year prior to filing. No further incentive for us to pursue it commercially." This is indicative of the government's insensitivity to the needs of smaller organizations.

VI. RELATING TO CONTRACT R&D FOR THE GOVERNMENT

Until the passage of PL 96-517 last December, there was no uniform patent rights policy for companies that performed contract research and development for the government. Each agency had its own rules. The new legislation mandates that small business and universities (with some restrictions) are entitled to such patent rights. However, some background information on the effects of the prior patent policy may be useful in assessing the impact of the new regulations.

Most companies that do R&D under government contract work in their primary field of technology. The majority of the companies that have received commercial patent rights for technology developed under such contracts were doing work for one of the defense agencies. These agencies have a general policy of giving companies commercial rights for work performed under contract to them. **A significant number of companies indicated that past government patent policy inhibited or prevented the application of their most advanced private technology to government sponsored work.**

Has your company ever performed contract R&D for the government?

	Yes	No
Small	81	71
Large	11	12

Was R&D performed for the government done mainly in your primary technical field?

	Yes	No
Small	75	4
Large	8	2

Approximately how much did you spend on this matter?

	0-$10,000	$10-20,000	$20-100,000	over $100,000
1st Mailing	15	3	1	0
2nd Mailing	7	1	6	1
Total Small	22	4	7	1
Large	4	3	7	7

Of those large companies that spent over $100,000, four spent less than $500,000, one spent between $500,000 and $1,000,000, and two spent over one million dollars.

In those cases where companies indicated they considered the resolution of the conflict unfair, any comments were analyzed.

	Number of Companies Citing Unfair Resolution	Number of those Cases Where Other Company Larger	Reasons if Cited
Small	12	8	4 cost factors, 2 still unresolved, 1 patent office inflexible (interference) 1 long court and defendant related delays
Large	1	1	

It was expected that small companies would frequently feel at a disadvantage when the other company is large, but it seems the reverse is also true. Large companies often feel at a disadvantage when dealing with smaller ones.

Have you ever felt at a disadvantage when involved in a patent conflict because the other company was larger?

	Yes	No
Small	34	12
Large	3	18

Have you ever felt at a disadvantage when involved in a patent conflict because the other company was smaller?

	Yes	No
Small	1	33
Large	13	9

Has your company ever been involved in any type of conflict situation related to patented technology (e.g., interference, infringement) whether or not any action was taken?

	Yes		No	
1st Mailing	28	31%	62	64%
2nd Mailing	22	48%	24	52%
Total Small	50	37%	86	63%
Large	23	100%	0	0%

Has your company ever decided not to take action in a case where you felt you were right?

	Yes		No	
1st Mailing	24	52%	22	48%
2nd Mailing	18	64%	10	36%
Total Small	42	57%	32	43%
Large	20	91%	2	9%

If so, rank the following factors in order of importance (#1 most important) during the decision making process in most recent case:

	Ranking							
	1	2	3	4	5	6	7	8
Estimated cost of the action								
1st Mailing	15	3						
2nd Mailing	9	6	1	1	1			
Total Small	22	9	1	1	1			
Large	8	4	3	1	0	1		
Estimated time needed to complete the action								
1st Mailing	0	2	2	5	3	1		
2nd Mailing	4	0	2	2	0	2		
Total Small	4	2	4	7	3	3		
Large	1	4	2	5	1			
Amount of company personnel time that would be needed								
1st Mailing	1	2	6	3	1			
2nd Mailing	4	5	4	1	2	1		
Total Small	5	7	10	4	3	1		
Large	1	4	3	3	1			
Value (monetary or other) to company of positive outcome								
1st Mailing	2	1	2	3	4	1		
2nd Mailing	6	3	0	2	1			
Total Small	8	4	2	5	5	1		
Large	6	3	2	2				

V. RELIABILITY OF PATENTS AND RELATED COSTS

There has been general concern that small companies with more limited financial resources may be at a distinct disadvantage in defending themselves in a conflict involving patented technology. Several questions were asked to try to determine the extent to which size plays a role in a company's ability to use the patent system fully. While the vast majority of companies estimate patent related expenses as less than two percent of overall expenses, several companies, including two large companies, estimate patent related expenses in excess of ten percent of all costs. There are two distinctly different questions to be decided by a company in relation to the patent system. The first is whether or not to apply for a patent at all. As was seen in an earlier section of this report, certain fields of technology use the patent system more than others. The costs associated with patenting new technology must be balanced with the degree of protection it is likely to provide. Companies carefully weigh the likelihood of having to defend the patent, the probability the patent may be ruled invalid, and the ease with which another company can use the information in the patent and invent around it.

The other decision companies frequently face relates to choosing a course of action when involved in a conflict related to patented technology. About a third of the small companies and all of the large ones have been in such a situation. No distinctions were made in the questionnaire as to who held the patent in question. Some specific questions characterized what happened in terms of types of steps taken, length of time and

How often are major amounts of capital expenses necessary for introduction of product improvement or modification?

	Always		Sometimes		Seldom		Never	
1st Mailing	28	33%	40	47%	11	13%	6	7%
2nd Mailing	7	15%	24	52%	11	24%	4	9%
Total Small	35	27%	64	49%	22	17%	10	8%
Large	5	25%	12	60%	2	10%	1	5%

How often are major amounts of capital expenses necessary for a new product introduction?

	Always		Sometimes		Seldom		Never	
1st Mailing	37	44%	33	40%	8	10%	6	7%
2nd Mailing	13	29%	22	49%	7	16%	3	7%
Total Small	50	39%	55	43%	15	12%	9	7%
Large	8	44%	9	50%	1	6%		

H. Role of Patents in Obtaining Outside Funding

Several questions were asked to determine the extent to which patents play a role in the decision to develop new technology. As was described earlier, patent protection is not the main consideration when business strategy is formulated. However, **when significant amounts of capital need to be invested, most companies view patents as a vitally important or significant factor in the ability to attract outside funding.** This seems to be particularly true for the very small companies who are not yet in a manufacturing mode. **Hence, the existence of patent protection is frequently a vital link in connecting technology with the funds necessary to achieve successful commercialization.**

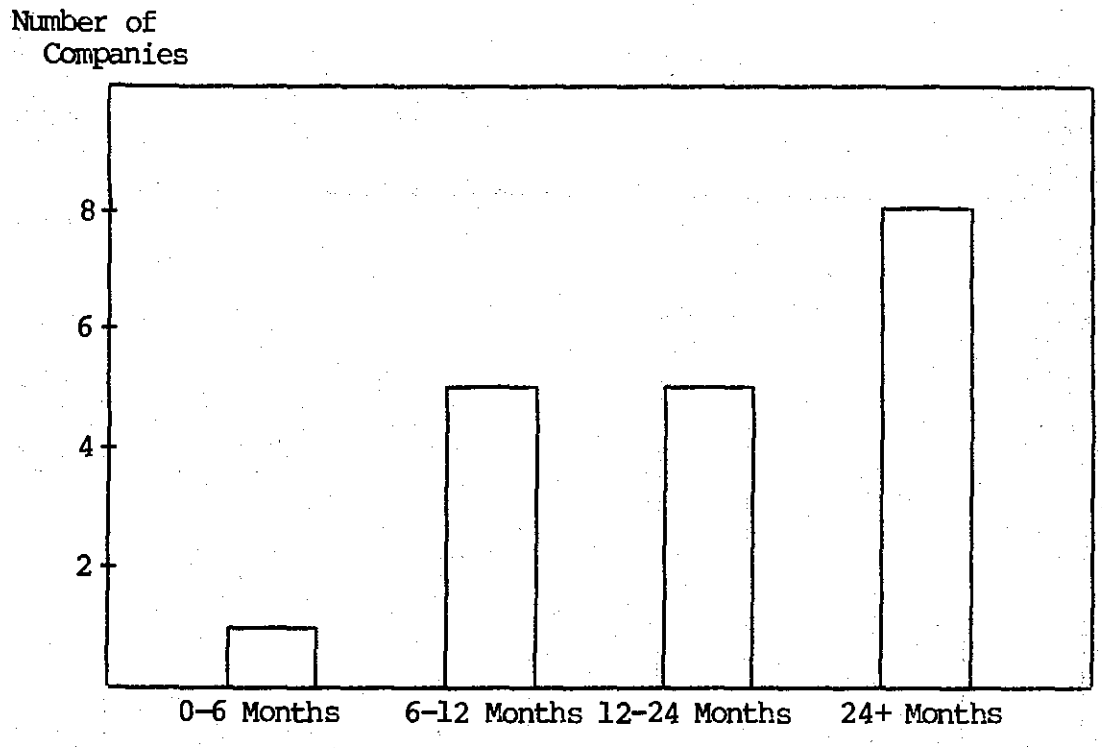


Figure 4.4c Average Length of Time For Product Improvement or Modification to Go from Drawing Board to Marketplace Large Companies

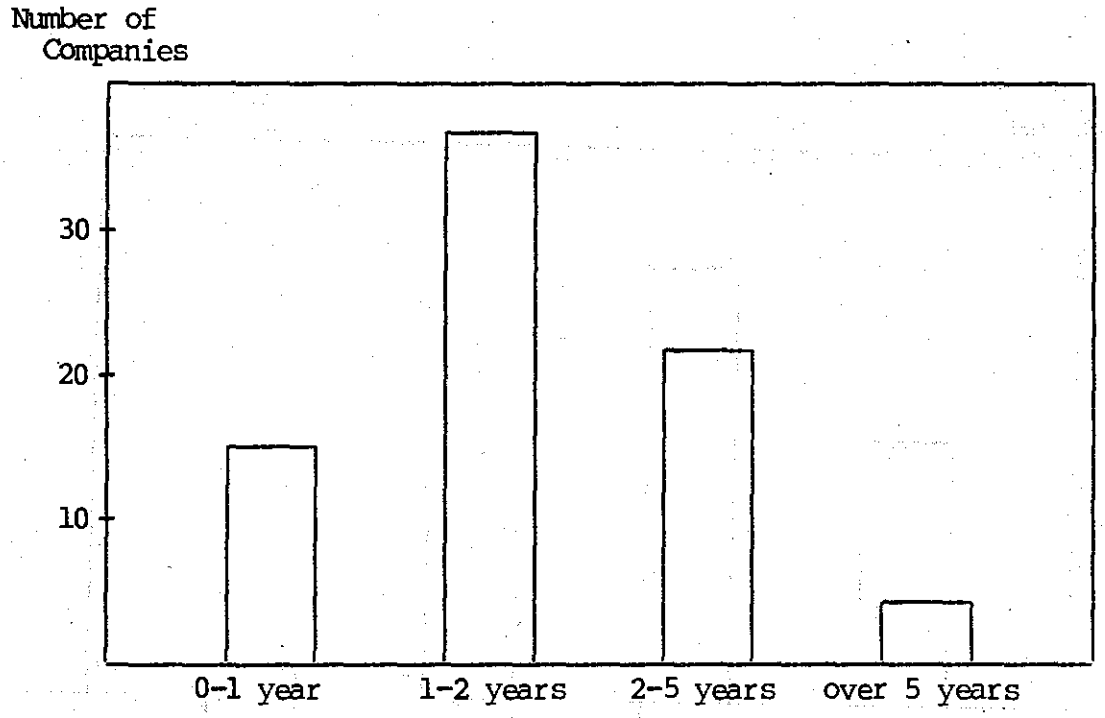


Figure 4.5a Average Length of Time for New Product to Go from Drawing Board to Marketplace Small Companies - First Mailing

If you also use patents, please estimate the relative value of these alternate modes of protection in your primary field of technology (check one):

A. More useful than patents
B. As useful as patents
C. Not as useful as patents
D. Of little or no use compared to patents

	A	B	C	D
1st Mailing	25	22	16	3
2nd Mailing	15	11	5	1
Total Small	40	33	21	4
Large	0	13	6	3

G. Time and Costs to New Product Introduction

Several questions explored the length of time involved and the extent to which capital is needed for the development and market introduction of new and improved products. The smaller manufacturing oriented companies are the fastest to get new or improved products into the marketplace. They are followed by the smallest, more R&D oriented companies. In general, **it takes small companies less than 12 months to bring a product improvement or modification to the market place and less than two years for a new product. By contrast, the large companies indicate over a year for most product modifications and over two years for new product introductions. For the majority of companies, significant amounts of capital need to be invested before such an introduction.**

The obvious difficulty for the small companies is the need to obtain outside funding when the costs are too great to finance the development and marketing from current reserves and income. It is not surprising that the smallest companies are in most need of this type of outside funding.

technology. **For small companies, cost related matters, either obtaining the patent in the first instance or possibly defending it, were important reasons. Also identified by a number of the small companies was the belief that patents were not sufficiently reliable and could be ruled invalid too easily.**

If you have technical areas where you have not applied for patents, which reasons are applicable?

	1st MAILINGS	2nd	TOTAL SMALL	LARGE
Not involved in developing new technology	7	5	12	3
Depend on trade secrets and proprietary technology	43	29	72	17
New technology not patentable	39	8	47	13
Patent rights would belong to other organization or government	28	1	29	1
Patent requires public disclosure	27	17	44	6
Patent protection unnecessary or irrelevant	17	9	26	5
Obtaining patent protection is too expensive	44	18	62	2
Defending a patent is too expensive	32	25	57	0
Patent protection is too unreliable, too easy to get it ruled invalid	33	20	53	2

E. Patent Office as an Information Resource

The patent office is a great storehouse of technical information. In exploring the extent to which companies take advantage of the availability of such information, differences related to company size emerged. Among the smallest companies, less than half use information from the patent office to follow either the technology or their competition. A small majority of the slightly larger companies do use the patent office for information, while almost all of the large companies take advantage of this information source.

	Type of Protection Utilized		
Type of Market	Patents	Proprietary Technology	Brand Name No Legal Protection
Stable	42%	42%	25%
Growth	71%	59%	12%
New	75%	63%	13%

Figure 4.3b Percent of Products for Type of Protection in Different Types of Markets
Large Company Products

	Type of Protection Utilized		
Type of Market	Patents	Proprietary Technology	Brand Name No Legal Protection
Stable	35%	42%	27%
Growth	39%	54%	18%
New	47%	47%	11%

Figure 4.3c Percent of Products for Type of Protection in Different Types of Markets
ALL PRODUCTS

	Type of Protection Utilized		
Type of Product	Patents	Proprietary Technology	Brand Name No Legal Protection
Same as other products available	0%	50%	20%
Slightly improved version of products available	17%	38%	31%
Substantially improved version of products available	41%	46%	22%
Radically new and/or fundamentally different from products available	55%	47%	13%

Figure 4.3d Percent of Products for Type of Protection by Type of Product
All Products

To what extent do you rely on patents to protect your products?

	Always		Frequently		Seldom		Never/Does Not Apply	
Small	12	11%	35	33%	37	35%	23	22%
Large	1	4%	17	74%	4	17%	1	4%

B. Factors in Promotion of Technology

Companies were asked to rate the importance of the following factors in the decision to promote new technology: patent protection, proprietary information and know-how, market potential, amount of investment required, and time to reach the marketplace. There was marked unanimity between both large and small companies on the rating of factors in the decision to promote new technology. **Market potential and amount of investment were far and away the most common choices for the first and second factors.** Patent protection was only a third, fourth or fifth rated item.

Rate the importance of the following factors in the decision to promote new technology (#1 most important):

	1	2	3	4	5
Patent Protection					
Small	9	9	15	22	41
Large	0	4	5	10	2
Proprietary Information - Know How					
Small	16	16	19	28	11
Large	0	4	6	5	6
Market Potential					
Small	72	14	10	1	2
Large	20	1	0	0	0
Amount of Investment Required					
Small	8	46	26	11	5
Large	2	12	1	5	1
Time Required to Reach Marketplace					
Small	3	12	25	24	26
Large	0	1	9	1	10

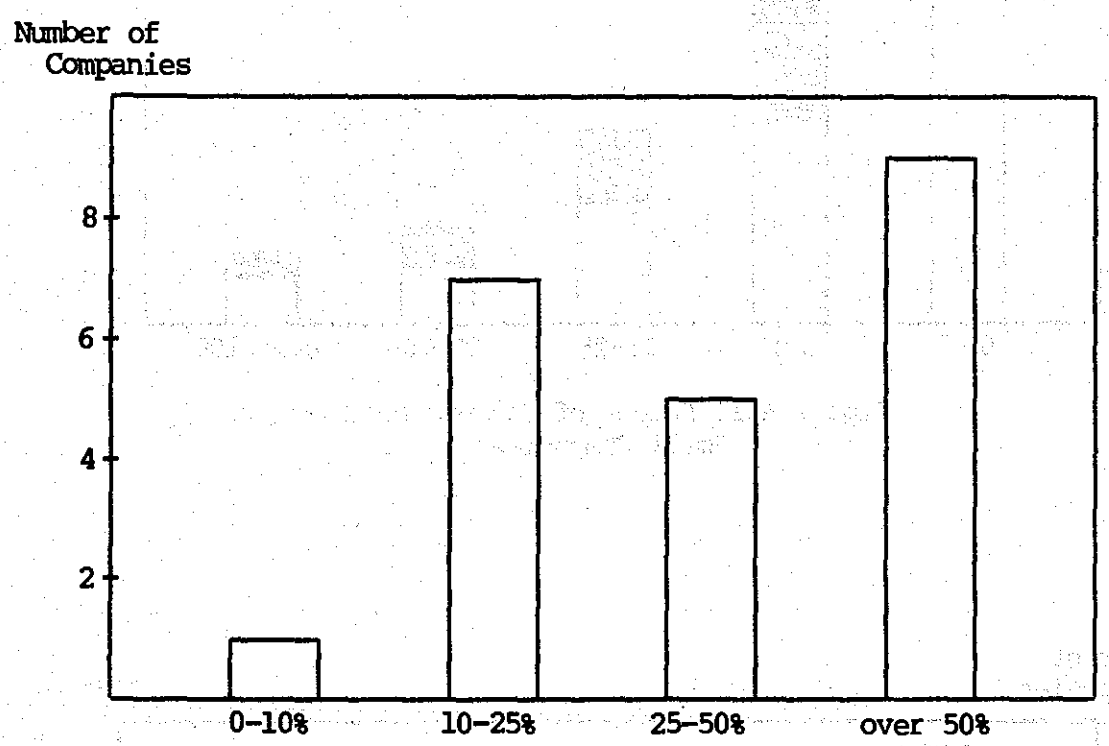


Figure 4.2b Percent of Patents Company is Using Large Companies

IV. USEFULNESS OF THE PATENT SYSTEM VS. ALTERNATIVE MODES OF PROTECTION

A. Extent of Patent Use and Its Value

The second mailing, sent to the more manufacturing oriented companies, produced more involvement with the use of patents by the respondents than the first mailing. This may simply be an indication of the bias of those who actually filled out the questionnaire and returned it. It is also evident that most small companies do not hold a large number of patents. Although two-thirds of the small companies hold patents, the vast majority hold fewer than 15. In addition, many of the small companies only use a small percentage of their patents. By contrast the large companies seem to use a greater proportion of their patents. In looking at the use of patents by field of technology, it is clear that small electronics and computer oriented companies use patents less than any other technical fields.

Has your company ever applied for a patent?
(all of the large companies use patents)

	Yes		No	
1st Mailing	68	66%	35	34%
2nd Mailing	34	71%	14	29%
Total Small	102	68%	49	32%
Primary Field of Technology				
Chemistry	16	64%	9	36%
Electronics & Computers	9	43%	12	57%
Physics	19	73%	7	27%
Medical & Biological	6	86%	1	14%
Engineering & Design	27	84%	5	16%
Unknown	25	63%	15	37%

Level of Different Company Activities (as percent of company expenses)

Research & Development

	0-24%		25-49%		50-74%		75-100%		No level indicated	
1st Mailing	40	38%	11	10%	11	10%	22	21%	21	20%
2nd Mailing	36	73%	1	2%	1	2%	0	0%	11	23%
Total Small	76	49%	12	7%	12	7%	22	14%	32	21%

Production

1st Mailing	12	11%	13	12%	15	14%	5	5%	60	57%
2nd Mailing	4	8%	10	20%	15	31%	6	12%	14	29%
Total Small	16	10%	23	15%	30	19%	11	7%	74	48%

Sales

1st Mailing	45	43%	11	10%	1	1%	0	0%	48	44%
2nd Mailing	29	59%	7	15%	1	2%	0	0%	11	23%
Total Small	74	48%	18	12%	2	1%	0	0%	60	39%

Service

1st Mailing	24	23%	11	10%	3	3%	10	10%	57	54%
2nd Mailing	21	43%	1	2%	0	0%	1	2%	26	53%
Total Small	45	29%	12	7%	3	2%	11	7%	83	54%

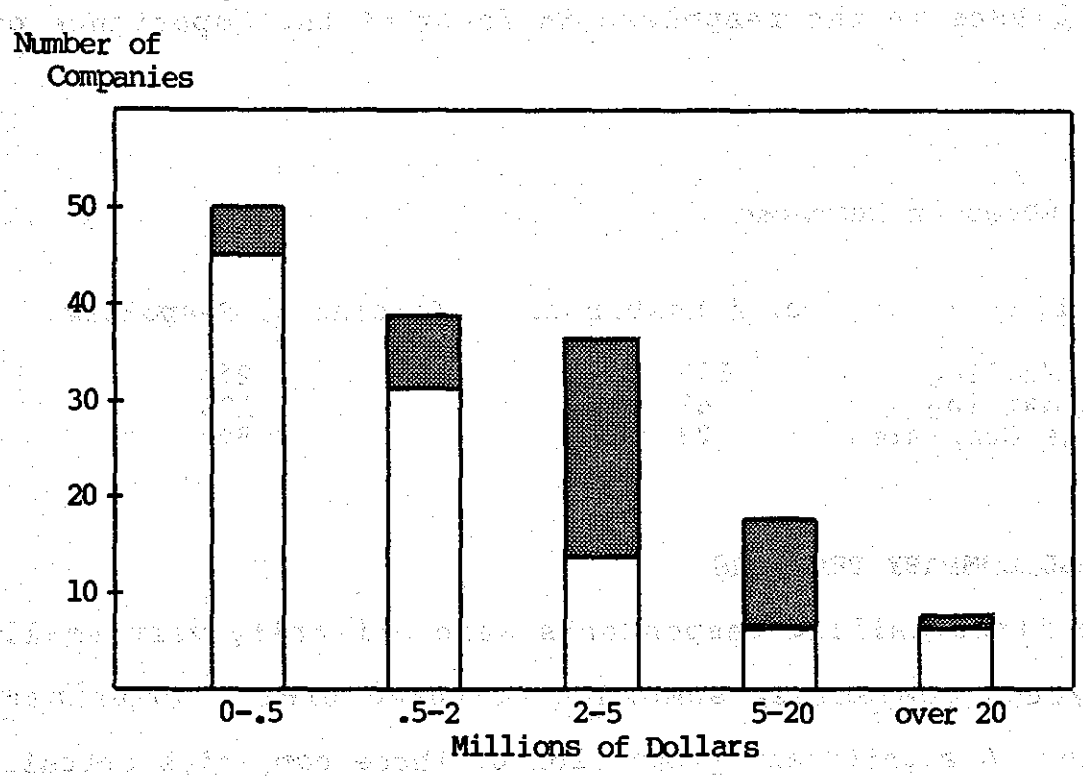


Figure 3.1 Size of Companies by Sales Volume

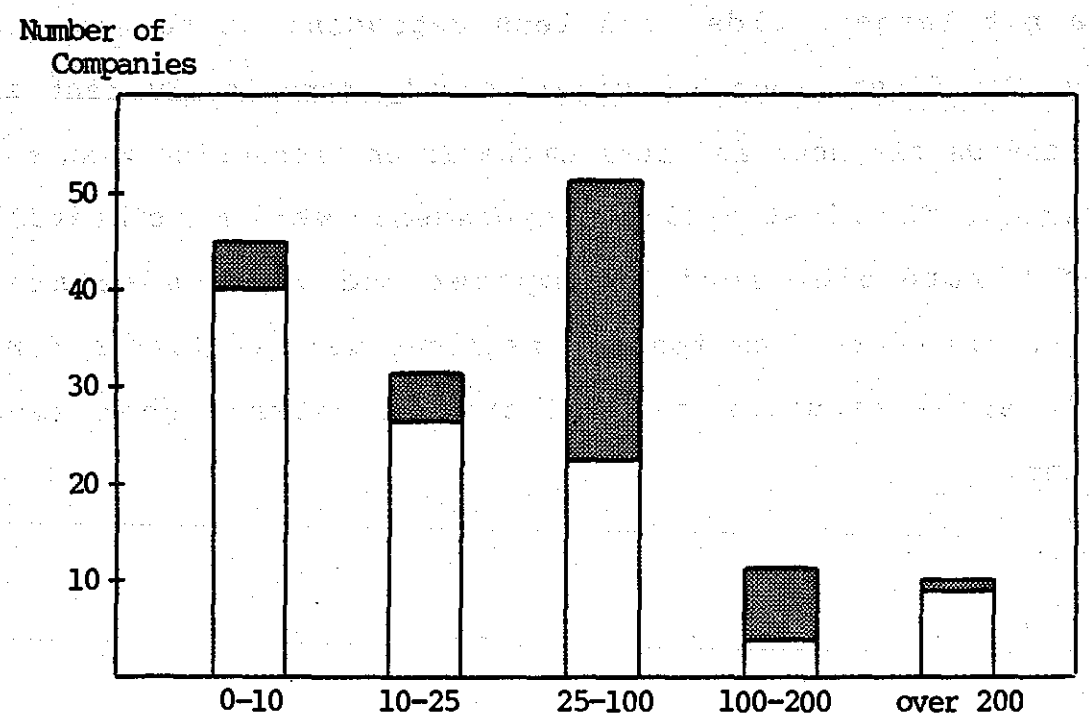


Figure 3.2 Size of Companies by Number of Employees

and thus our choices insured that none of our companies were simply distributors.

Using the four major product groups as a base, ten specific classifications were extrapolated.

1. Electronic Computing Equipment SIC 3573
2. Electronic Assemblies SIC 3679
3. Electronic Components and Accessories SIC 3671-3679
4. Instruments--Laboratory, Scientific, and Research SIC 3671-3679
5. Instruments--Measuring and Controlling SIC 3822-3825
6. Instruments--Optical and Opthammic Goods SIC 3832, 3851
7. Instruments and Supplies--Surgical, Medical and Dental SIC 3841-3843
8. Medical Apparatus--Electronic SIC 3693
9. Industrial Inorganic Chemicals SIC 2813
10. Plastics, Polymers, and Materials SIC 3823

Approximately 40 companies with between 0 and 200 employees were randomly drawn from each of the ten classifications; hence the total mailing figure of 400 companies. An effort was made to avoid any geographical biases within the sample. All questionnaires were sent with a letter personally addressed to a corporate officer and hand signed.

In order to compare the attitudes and experiences of small companies with those of large firms it was necessary to also survey a small group of large corporations. Questionnaires were sent to a senior management person or a senior member of the corporate patent staff. Personal contacts were used whenever possible, and this seemed to markedly improve the response rate. The cover letter included the request that in diversified firms, in order to narrow the field of technology, the response should refer to a single division or other integral business unit, not the whole company. Since, in most cases, the questionnaire was filled out by a corporate patent attorney, there may be some

of an opinion survey of a number of recommendations for changing patent policy.

II. METHODOLOGY

A. Questionnaire Construction

The questionnaires used to try to evaluate the role of the patent system consisted of six sections. The first section asked general background information about the nature and size of the business. The second section explored the extent to which the company uses patents, how important patents are, what are the barriers to using the patent system, and the value of alternate modes of protection. There were also a series of questions to identify the characteristics of two of the most valuable company products or processes. These questions were aimed at seeing if there is any link between certain types of products and markets and the relative importance of patent protection.

The third section contained questions on the magnitude of patent related expenses. The frequency of conflicts over patented technology, the cost of any disputes, the time until resolution, and the size of the other organization involved in the dispute were considered.

The fourth section explored the companies involvement (if any) in contract R&D for the government and the effect of government contract conditions on company strategy and product commercialization.

The last two sections related directly to new and proposed patent legislation. The fifth section explored the likely impact of various levels of patent maintenance fees on company strategy

I. INTRODUCTION

The history of the patent system goes back to the U.S. Constitution, which empowers Congress

> To promote the progress of science and useful arts, by securing for limited times to authors and inventors, the exclusive right to their respective writings and discoveries.

The framers of the Constitution recognized the need to encourage and reward inventors by granting them the right to the initial profits from their own inventions. The lack of such guarantees provides a severe discentive for the large expenditures in time and capital so often required for successful innovation. The social value of patents is enhanced by their time limitations and status as public documents, which provide a process for the eventual diffusion of new technology into the public domain where it can lead to additional technological development.

Over the years, as the structures of our economy, technology and legal system have evolved, the role of patents has undergone a gradual but extensive change. Among the factors that have contributed to this change are: increases in time and difficulties of obtaining a patent, increases in the cost and time of defending patents, frequency with which patents are declared invalid, and attitudes and policies of the government towards its contractors and their patent rights.

Without the protection of a reliable patent system, many of the earliest innovations in new fields of technology from small companies would never have progressed beyond the invention stage.

contract research and development for the government. Each agency had its own rules. The congress in PL 96-517 has mandated that small businesses and universities (with some restrictions) are to receive title to patents resulting from government funding. **A significant number of companies indicated that past government policy inhibited or prevented the application of their most advanced private technology to government sponsored work.** Thus this new legislation should contribute important technology for national objectives.

Maintenance Fees

PL 96-517 which amended the patent and trademark laws, includes the introduction of maintenance fees into the U.S. system for the first time. Many European countries already have such fees. Under the new U.S. law, maintenance fees must paid 3 1/2 years, 7 1/2 years and 11 1/2 years after issue to keep a patent in effect. Without payment, the patented technology goes into the public domain. It is unclear what the level of these fees will be, but the legislation also requires a gradual increase in maintenance fees until they pay for at least 25% of the cost of running the patent office. Hence, the eventual fees will be substantial.

In our survey, companies were asked to evaluate the consequences of a cost for maintaining a patent for the full seventeen years from $500 to $3000. At each cost level they were asked what percent of patents they would maintain and whether there would be any significant impact on their business. Our survey findings indicate that by the time total maintenance fees

than 12 months to bring a product improvement or modification to the marketplace, and less than two years for a new product. By contrast, the **large companies indicate that over a year is required for most product modifications and over two years for new product introductions.** For the majority of companies, **significant amounts of capital must be invested to make such an introduction possible.**

The obvious difficulty faced by the small companies is the need to obtain outside funding when the costs are too great for development and marketing to be financed from current reserves and income. It is not surprising that **the smallest companies are most dependent on outside sources of capital.**

Role of Patents in Obtaining Outside Funding

Several questions were asked to determine the extent to which patents play a role in the decision to develop new technology. As was described earlier, patent protection is not the main consideration when business strategy is formulated. However, when significant amounts of capital need to be invested, most companies view patents as a vitally important or at least a significant factor in the ability to attract outside funding. This seems to be particularly true for the very small companies who are not yet in a manufacturing mode. **Hence, the existence of patent protection is frequently a vital link in connecting technology with the funds necessary to achieve successful commercialization.**

oriented companies use patents less than any other technical fields.

Factors in Promotion of Technology

Companies were asked to rate the importance of the following factors in the decision to promote new technology: patent protection, proprietary information and know-how, market potential, amount of investment required, and time to reach the marketplace. There was marked unanimity among large and small companies on these ratings. Market potential and amount of investment were far and away most often the first and second factor in order of importance. Patent protection was rated only as a third, fourth or fifth factor.

Relationship Between Type of Market and Type of Protection Utilized

The large company respondents use both patents and proprietary technology protection to a greater extent than the small ones. As might be expected, patents are used more for products in high growth and new markets than in older, more stable markets. It is also true that the majority of products that are radically new or fundamentally different from available products use patent protection, as do those products that require a substantial or outstanding level of R&D to develop.

Barriers to Use of Patent Systems

In order to explore barriers to the use of the patent system, companies were asked to identify factors that play a role

It has been demonstrated repeatedly that the small business sector is a major producer of innovation, especially when radically new, high-risk technology is involved. However, these companies are rarely in a position to completely fund the development and market introduction of their technology by themselves. In order to attract the necessary capital from outside investors, small companies must demonstrate that a protected market niche exists that assures an adequate return on capital invested. Traditionally an important source of that protection has been the patent system. However, a patent system limited more and more to large companies and that affords protection perceived as uncertain at best, leaves the small company in an increasingly difficult position. Substantial costs lead them to seek alternatives to patents such as trade secrets, which in turn reduces their protection in the marketplace, making outside capital investment more difficult to obtain.

This chain of events has clearly been accelerated by the introduction of maintenance fees into the patent system, further weakening the contribution of the patent system to the economic growth and development of the United States. The danger signals and trends are all present in the details of this study.

Perhaps the time has come to reexamine the basis for the existance of a patent system. Do we need a patent system at all? If we do, what should be its functions and goals? How should it be structured to effectively and reliably fulfill those goals? A broad public debate on these issues is a necessary first step. In the last few years, the concern over the decreased rate of innovation in the United States has led to a significant increase

included as a comparison and to reveal any disparities in the ways in which the two groups perceive and use patents. Also examined is the extent to which current policies tend to encourage the use of trade secrets and proprietary know-how, as opposed to patents, and thereby keep new technical knowledge out of the public domain. The impact of patent maintenance fees on corporate strategy is also explored. An analysis of the present situation is followed by the results of an opinion survey on a number of recommendations for changing patent policy.

General Conclusions

In the early days of the patent system, it was customary for the individual inventor to apply directly to the Patent Office for a patent. The process required a minimum of time and expense. Over the years, as the system grew and the use of technology broadened, the patent system grew more complex and expensive to use. It is rare today for an inventor to write a patent application without at least consulting a patent attorney. The process of conducting a patent search for prior relevant technology is expensive, and frequently the strength of the patent depends on the extent of the search. Gradually there has been a movement toward patent system use being limited to those more able to afford it.

Coupled with this shift in who uses the patent system has been the influence of public opinion. The general public is uneasy about patents and seems to look on them as a giveaway to business. There is little understanding or recognition of the importance of patent protection to the nurturing and development

