

SMALL FIRMS AND FEDERAL
RESEARCH AND DEVELOPMENT

A Report To

OFFICE OF FEDERAL PROCUREMENT POLICY
OFFICE OF MANAGEMENT AND BUDGET

BY

AD HOC INTERAGENCY PANEL

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INTRODUCTION

There is increasing concern that the capability of the United States to continue its historic successes in technology is in a serious decline. While astonishing achievements have occurred since World War II, there is now considerable evidence that product innovation has either leveled off or declined in many industries. Predictions of a weakened military posture and a less favorable economic position in world trade are associated with analyses showing that the U.S. is losing a significant part of its capability to invent new products essential for the country's defense and for its international sales market.

Analysis of technological capability is an exceptionally complex matter affected by many diverse factors involving individual and organizational motivations, economics, and governmental actions. Since the Federal Government is the biggest source of research and development (R&D) (\$26.3 billion proposed for expenditure in 1978), Government acquisition procedures have a large impact on the country's utilization of its best technical and management talents.* One part of this problem - the role and difficulties of the small firm in selling R&D to the Government - was given particular attention by an ad hoc interagency panel under Mr. Jacob Rabinow, nationally known inventor, lecturer and writer, in 1976. The Panel was composed of representatives from the National Science Foundation, Department of Defense, National Space and Aeronautics Administration, Energy Research and Development Administration, Small Business Administration, and the Office of Federal Procurement Policy.

To assist the Rabinow Panel in its inquiry, the services of Mr. William K. Scheirer, an economist, were obtained to perform a literature search and analysis of the role of small firms in fulfilling Government contractual requirements for research and development. Significant findings of Mr. Scheirer are summarized below. His report, with an extensive bibliography is available for inspection at the National Technical Information Service, Department of Commerce, as Report Number OMB/OFPP/CA-77/ and in the Office of Federal Procurement Policy.

* "A Government Takeover of R. and D.?"
Richard Morse, Pres., MIT Development
Foundation, N.Y. Times, Dec. 19, 1976.

SUMMARY OF REPORT OF WILLIAM K. SCHEIRER

Importance of Small R&D Firms

Many analysts believe that small firms have a better record for innovation than large firms. Richard Morse recently wrote that "a disproportionate number of innovative ideas emanate from our smaller technically based companies."* The reasons for this phenomenon are varied. Some believe that managers of small R&D firms have a greater incentive to innovate while conversely, in some cases, the marketing plans of large firms dictate that technical improvements to their products be held to a minimum. There also is a possibility that researchers in large firms tend to overspecialize to a greater extent than researchers in small firms. Mr. Rabinow has observed that, "when one narrows his specialization, he probably comes up with fewer ideas. If one loads the dice in favor of a certain art, one cuts off analogous arts, which I think are important. The more an inventor can pull out of related and unrelated arts, the more original his ideas are likely to be."

Empirical evidence indicates that in a comparison of firms with less than 1,000 employees and those with over 1,000 employees:

- ° Firms with less than 1,000 employees accounted for almost one-half of major U.S. innovations during 1953-73.
- ° The ratio of innovations to sales is about one-third greater in firms with less than 1,000 employees.
- ° Firms of less than 1,000 employees have a ratio of innovations to R&D employment which is approximately four times greater.
- ° The cost per R&D scientist or engineer is almost twice as great in firms of over 1,000 employees.

Federal Government Utilization of Small Firm Capabilities

A striking disparity appears to exist between the capabilities of small technology based firms and their utilization by Federal agencies. Data collected by the National Science Foundation and supplemented by the Office of Federal Procurement Policy shows that only eight percent of Federal R&D contract awards to industry and only about three and one-half percent of obligations to all R&D performers** were made to small firms in FY 1975; that

* Cp Cit

**Industry, in-house laboratories, educational institutions, and federally financed R&D centers.

Government R&D obligations to industrial firms vary from less than one-half of one percent for the Department of Agriculture to 62 percent for the Department of Defense; and that reliance on industry for Federal R&D has declined from 59.6% in 1966 to 50.7% in 1976 in current dollars.

The overwhelming percentage of the dollars in Federal R&D goes to development as opposed to research (basic and applied). Although the industry share of development is substantial, most of this goes to large businesses capable of performing very large development contracts. On the other hand, in the research area where its capability is high, small firms lose awards to colleges and universities, federally funded research and development centers (FFRDCs), as well as to large firms.

Summary conclusions reached are that (i) Federal agencies tend to use sources other than industrial firms for basic and applied research; (ii) a significant portion (64%) of Government R&D is for development normally involving large industrial firms; and (iii) the percentages of both total expenditures for R&D and R&D contract awards to small firms are very low.

Small Firm Impediments

As indicated above, large firms are favored in the award of development contracts on the basis that they are essential for the production phase of the program. However, this is not the only restriction to a greater use of small firms. Mr. Scheirer found that policies and procedures followed by Federal buying activities also restrict the use of small technology based firms. Following are some of the more significant impediments encountered by small companies:

- It is difficult to identify and respond to Government R&D requirements. On a competitive basis, large firms have a greater capability to determine what the Government is interested in researching and to unravel the complexities of "Requests for Proposals" for R&D work.
- Preparation of proposals is expensive and time-consuming to a point frequently exceeding the capabilities of small firms.
- A bias in favor of large firms can exist when awarding R&D contracts. The tendency is to consider awards to large well-established firms "safer" than to small firms.

- ° Funding for Federal R&D work frequently lacks stability. This condition strains the financial capabilities of small firms.
- ° Submittal of unsolicited proposals is frequently discouraged.
- ° Burdensome administrative requirements for contract solicitation, evaluation, award, and performance impair the ability and desire of small firms to compete for R&D contracts.

Conclusions

Though the responsibility for retention of a high technology capability in the United States is shared by both the private and public sectors, the large annual Federal expenditures for R&D places a unique responsibility on Federal agencies. New techniques must be devised to encourage innovation by all sources, with particular emphasis on small R&D firms. In the placement of R&D work, Government managers should carefully consider the ultimate beneficial effect of using small firms and not give undue consideration the immediate security that may appear to exist by awarding R&D contracts to large firms.

RECOMMENDATIONS OF AD HOC INTERAGENCY PANEL

The interagency panel chaired by Mr. Rabinow developed the following recommendations based on its analysis of this problem:

1. Federal agencies should develop formal programs which encourage the increase of Federal R&D awards to small technology based firms.

2. Large research and technology programs should be divided where feasible into discrete parts to permit solicitation of proposals and award of contracts to small technology based firms in lieu of making a limited number of awards with consolidated requirements that only large firms can accomplish.

3. Subcontracting to small firms should be encouraged in contract solicitations, source selection criteria, and negotiations for R&D work. A prime contractor's record in subcontracting to small technology based firms should be a factor in fee awarded in award fee and incentive type contracts.

4. Intensive efforts should be made by Federal agencies to reduce or compensate for impediments experienced by small technology based firms. These efforts may include but not be limited to the following:

- a. Early identification and publication of agency R&D requirements.
- b. Coordination of R&D requirements with Small Business representatives early in the acquisition process.
- c. Use of the Commerce Business Daily to provide advance information on anticipated contractual requirements for R&D.
- d. Providing methods for small technology based firms to obtain an understanding of requirements which may not be possible through the written solicitation. For example, some buying activities currently provide research and technology libraries, catalogs for technical requirements, and special briefings to explain their research and technology needs.
- e. Providing sufficient time for firms to prepare and submit proposals.
- f. Reducing to the extent feasible the time and supplemental data required between receipt of proposals and award of contracts.
- g. Providing agency R&D points of contact for small firms.

5. Agency policies and procedures should encourage unsolicited proposals. Contracts should be awarded for research and technology efforts based upon the merit of such proposals without converting the requirements to competitive solicitations.

6. The agencies, including the Small Business Administration, should use more technically trained personnel to serve as advocates for and advisors to small technology based firms. Special emphasis should be given by such persons to the advance procurement planning process for R&D requirements.

7. Profit-making firms should not be excluded from making proposals or receiving awards on R&D work that is not assigned to in-house laboratories.

8. Agencies should consider allowing greater amounts of independent research and development and bid and proposal costs than currently authorized when negotiating contracts with small technology based firms.

9. Methods should be developed for collecting and reporting data on small business share of R&D contract awards.

10. Establish small business set-aside programs (similar to those existing for supplies).

Executive Summary

Findings

1. Small firms have compiled a striking record of innovation in the private sector:
 - Firms with less than 1,000 employees accounted for almost 1/2 of major U.S. innovations during 1953-73.
 - The ratio of innovations to sales is about 1/3 greater in firms with less than 1,000 employees than in firms of over 1,000 employees.
 - Firms of less than 1,000 employees have a ratio of innovations to R&D employment which is approximately four times greater compared to firms with more than 1,000 employees.
 - The cost per R&D scientist or engineer is almost twice as great in firms of over 1,000 employees than in firms with less than 1,000 employees.
2. Small firms receive 8% of Federal R&D awards to industry and about 3 1/2% of obligations to all performers, including in-house performers of R&D. The share of companies with less than 1,000 employees in total company R&D funds, including subcontracts, is 1/3 greater than their share of Federal R&D funds.
3. Small firms face impediments in the Federal R&D procurement process, not found in the private sector, in the following areas:
 - stability and efficiency of R&D funding
 - administrative requirements
 - nature and timing of RFPs
 - treatment of proposals
 - contact with technical personnel.

Recommendations

1. Small firm participation in Federal R&D should be reported annually to SBA, using consistent definitions of R&D.
2. Responses to RFPs should be accepted for longer periods.
3. The statement of work in an RFP should be as precise as possible.
4. Advance notices of RFPs should be published as soon as possible.
5. Some of the Government interests in unsolicited proposals should be published.
6. Contact with technical personnel should be promoted by:
 - ° regular open workshops and
 - ° published announcements of lists of technical liaison personnel.
7. Small firms should be relieved of administrative requirements which are not cost-effective when applied to small business.
8. Restraints which discourage the acceptance of innovative ideas through unsolicited proposals should be eliminated.
9. Greater use should be made of contract provisions requiring the participation of key personnel.
10. Greater attention should be paid to overall expenditures (including in-house expenses) in determining the size of contracts.
11. Overall Federal R&D funding should be more stable.
12. If necessary, the advocacy and/or quotas for small firm participation in R&D procurement should be increased.