Research and Development, Technical Change and Innovation

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THE PENNSYLVANIA TECHNICAL ASSISTANCE PROGRAM (PENNTAP), a public service of the Pennsylvania State University and the Commonwealth of Pennsylvania, under a contract from the U.S. Small Business Administration's Office of Advocacy, has managed this economic project to analyze the past and current status of and to make recommendations for the future welfare of small businesses in Region III.
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"Research and Development, Technology Change and Innovation"

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He has written widely on the subjects of economics, energy, financial forecasting, technology assessment, and the economics of special fields, such as utilities, coal and steel. He was a president of the Pennsylvania Conference of Economists, a member of the Eastern Economic Association executive board and he has had innumerable special assignments on task forces and study committees in state government. He chaired many of these.

He had been a private financial and business consultant in New York City before becoming director, Bureau of Statistics, Research and Planning, Pennsylvania Department of Commerce. He was a special assistant in the Governor's Office of State Planning and Development before his present position. With a degree from Dickinson College, Carlisle, PA., he has done graduate work at Stanford, George Washington, Catholic University, and Washington and Jefferson in Pennsylvania.
CHAPTER G

THE ROLE OF SMALL BUSINESS IN RESEARCH AND DEVELOPMENT, TECHNICAL CHANGE, AND INNOVATION

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ABSTRACT

A fallacy or two about R & D's weight on the economic scale has been uncovered in a fresh examination of small business in technology-related endeavors.

This research effort is based on analysis of a new survey and conclusions are influenced entirely on the results. The authors said they were seeking a new approach, one that allows policy recommendations to emanate from "the bottom up" rather the usual practice of researching from "the top down."

A high ratio of response (about 40%) was attributed to the opportunity they offered for specific comments and, as shown in Section III, the small business owners and managers did not hesitate to cooperate.

One "fallacy" involved the concern of researchers and policy-makers that less than eight percent of total federal R & D money goes to small business, while it is acknowledged that small firms introduce nearly half of the total innovations. What is overlooked, they say, is that the small firms devoting 75 percent of their resources to R & D for the government do not by themselves introduce innovations and technological change. It is the small firm which emphasizes production that is actually innovating and introducing technological changes, depending primarily on their own "rather circumscribed" R & D facilities.

One of the factors which causes this separation of emphasis -- R & D vs. production -- is the government policy on patents. The fact that R & D firms in the Region are under contract to the government for about 75 percent of their effort means that once products and processes are taken over by the government they are "virtually lost" to the private entrepreneur. The authors conclude that no more than 25 percent of the total output of small R & D firms is available to the private sector. They agree, therefore, with assertions by others that under present conditions federally-funded civilian R & D does not have a significant impact on technological change in the private sector.

Revision of patent policies on government-funded research is one of the recommendations. Other suggestions, equally important, touch on pre-screening to control the numbers of respondents to RFPs; channel areas available for proposals from not-for-profit organizations; support for the Tax Relief Act of 1979 as it affects rollover of sale proceeds; establishment of a single policy on R & D contracts.
SECTION I: RATIONALE FOR THE APPROACH TAKEN IN THIS STUDY

During the design stage the authors decided that it would be a refreshing change if policy recommendations were to emanate from "the bottom up", rather than from "the top down", the usual practice. However, the validity of the proposed approach had to be confirmed a priori.

An interesting parallel came to mind -- that of the rules of evidence in law; specifically, what comprises the record? The judge and jury are allowed to consider only the evidence on the record. We decided, similarly, to consider only the evidence on our record -- the responses to our survey of small R & D firms. Nothing would be added and nothing subtracted.

Having decided to treat the survey results as the record, we had to validate the approach statistically. Can a small random sample accurately reflect an entire universe? We ran a statistical test which indicates that there is a 95% probability that the error would be about 4.8%, a highly acceptable figure.

There remained the question as to any statistical advantage of the census method compared with the sample technique. Our literature search persuaded us that the census provided no statistical advantage and that there were unacceptable time and dollar disadvantages to it. In a census "there are non-random errors which tend to remain more-or-less fixed and constitute a systematic error."¹ Also, "I believe we can develop good data from small samples if we have proper design, collection and calculation."²

By reason of the above, we feel our approach is statistically and conceptually sound. In addition, it is a fresh approach which permits the "little man" to have a voice in policy recommendations. It is important to note that "the top down" approach tends to offer a monolithic view; "the down up" approach permits more diversified views, an example of the parallax principle in operation.

INFORMAL DISCUSSION OF THE RESULTS

The 1978 Directory of Small Firms engaged in R & D in Region III, published by the U.S. Small Business Administration, lists 578 such firms which carry on scientific research and development work in 23 different areas. Most firms conduct R & D work in more than one field with the result that the 578 firms perform R & D work in 2,317 different areas -- each firm conducts research in the average range of four to five different fields. In order to study the characteristics of and contributions made by these firms, we selected a 10 percent random sample from each category, thus, our universe consisted of 2,317 elementary units instead of 578. On this basis a sample of 235 units was selected (See Appendix I) and questionnaires (See Appendix II) were mailed to them in early July 1979.

We received 102 responses which are tabulated below:

<table>
<thead>
<tr>
<th>Usable responses</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out-of-Business</td>
<td>10</td>
</tr>
<tr>
<td>Directory misclassification</td>
<td>4</td>
</tr>
<tr>
<td>Blank returns (no data provided)</td>
<td>11</td>
</tr>
<tr>
<td>Acquired by larger firms</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>102</td>
</tr>
</tbody>
</table>

An analysis of the data gathered from these responses follows:

1. EMPLOYMENT

Although the Directory breaks down the operations of the 578 firms into 23 different categories, ranging from Aeronautics to Space Technology, the real and the only product of these firms is research and development so we decided to analyze data by revenue classes rather than by areas of research. Table I below gives these results.

<table>
<thead>
<tr>
<th>TABLE I</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Revenue Class</th>
<th>n*</th>
<th>Average number employed per Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Professional</td>
</tr>
<tr>
<td>less than $100,000</td>
<td>8</td>
<td>2.38</td>
</tr>
<tr>
<td>$100,000 - $300,000</td>
<td>10</td>
<td>6.00</td>
</tr>
<tr>
<td>$300,000 - $500,000</td>
<td>12</td>
<td>7.83</td>
</tr>
<tr>
<td>$500,000 - $1,000,000</td>
<td>16</td>
<td>12.19</td>
</tr>
<tr>
<td>more than $1,000,000</td>
<td>28</td>
<td>82.29</td>
</tr>
<tr>
<td>Weighted Average</td>
<td>36.11</td>
<td>8.91</td>
</tr>
</tbody>
</table>

* n = number of firms in each class.
There is a direct correlation between the size of labor force and revenues generated by the firm. The smaller firms with less than $300,000 revenues, practically do no production at all. Their labor force consists almost entirely of professional, administrative and clerical workers. In revenue class $300,000 - $500,000, almost 25% of the total workers were engaged in production. Although 9 out of the 12 firms in this revenue class did not employ a single production worker, the proportion of firms employing production workers, too, is 25%, equal to the proportion of total production workers in this revenue class.

In revenue class $500,000 - $1,000,000, the proportion of production workers is approximately the same although 7 out of 16 firms (44% of the firms) in this class employ some production workers. This is explained by the fact that two of the 16 firms (12.5%) are engaged almost entirely in production work.

In the highest revenue class (over $1,000,000) less than 5% of all workers are engaged in production, only one of the 28 firms in the class employs a significant number of production workers, and 19 out of 28 do not employ even a single production worker.

From Table I, we estimated the size of total labor force employed by the entire small firm industry and the results are given in Table II below.

<table>
<thead>
<tr>
<th>Revenue Class</th>
<th>Professional and Clerical</th>
<th>Production</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>%</td>
<td>no.</td>
</tr>
<tr>
<td>less than $100,000</td>
<td>148</td>
<td>0.71</td>
<td>54</td>
</tr>
<tr>
<td>$100,000 - 300,000</td>
<td>468</td>
<td>2.24</td>
<td>148</td>
</tr>
<tr>
<td>$300,000 - 500,000</td>
<td>736</td>
<td>3.53</td>
<td>259</td>
</tr>
<tr>
<td>$500,000 - 1,000,000</td>
<td>1524</td>
<td>7.29</td>
<td>680</td>
</tr>
<tr>
<td>over $1,000,000</td>
<td>18020</td>
<td>86.23</td>
<td>4012</td>
</tr>
<tr>
<td>Total: number</td>
<td>20896</td>
<td>100</td>
<td>5153</td>
</tr>
<tr>
<td>percent</td>
<td>73.50</td>
<td>18.20</td>
<td>8.30</td>
</tr>
</tbody>
</table>

The 578 small firms engaged exclusively in R & D in Region III employ over 28,400 workers, of whom about 21,000 (74%) are professional workers. A little over 5,000 (18%) are administrative and clerical and a little over 2,000 (8%) are production workers.
The above data persuades us to conclude that over 90% of the effort of the firms is utilized exclusively for R & D and that innovation is only minimally a part of their operations. Although their work could lead to technological change, if the results of their R & D were utilized by other entrepreneurs, these firms' ability and/or resources by themselves do not introduce or bring about technological changes to any appreciable extent.

2. WORK DONE FOR THE GOVERNMENT

(A) State and Local Government

We received usable data from 72 respondents, the breakdown of which is given in Table III below:

<table>
<thead>
<tr>
<th>Percentage of work done</th>
<th>Local Government</th>
<th>State Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>none at all</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>less than 25%</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>25% - 50%</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>50% - 75%</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>more than 75%</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

These data indicate that the state and local governments make very little use of the R & D services available from small firms in this region, although the local governments make a slightly greater use than the state governments. In terms of employment, these data translate into 377 workers, of which 274 are professional and 103 others. In relative terms, the state and local government demand for R & D accounts for only 1.3% of total employment.

(B) Federal Government

The same 72 firms furnished data on the proportion of their total operations geared to R & D work in the Federal Government. While 70% and 65% of the firms reported doing no R & D work for local and state government respectively, only 8% (6 out of 72 firms) reported doing no work for the Federal Government. Table IV below gives the detailed breakdown of these numbers.
TABLE IV

PERCENTAGE OF WORK DONE FOR THE FEDERAL GOVERNMENT

<table>
<thead>
<tr>
<th>Percentage of work done</th>
<th>Number of firms</th>
<th>Percent of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>none at all</td>
<td>6</td>
<td>8.5</td>
</tr>
<tr>
<td>less than 25%</td>
<td>11</td>
<td>15.5</td>
</tr>
<tr>
<td>25% - 50%</td>
<td>9</td>
<td>12.7</td>
</tr>
<tr>
<td>50% - 75%</td>
<td>13</td>
<td>18.3</td>
</tr>
<tr>
<td>over 75%</td>
<td>33</td>
<td>46.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong>*</td>
</tr>
</tbody>
</table>

* Total may not add up to 100% due to rounding of numbers.

The data indicate that 45% of all firms utilize more than 75% of their resources to R & D work for the federal government. When these data are converted into employment figures, we find that 76% of all professional workers, 69% of administrative and clerical workers, and 43% of all production workers are utilized for doing R & D work for the federal government. The details of these numbers are given in Table V.

Of the more than 28,400 workers employed by 578 R & D firms, nearly 21,000 (72%) are directly supported by contract awards from the federal government. We concluded our discussion of the employment picture (see page G8) by saying that the R & D firms, by themselves, do not have the ability and/or resources to introduce technological change and innovations, and that they could play a role in this direction only if the products and processes invented or developed by them could be made available to other entrepreneurs who are willing to take market risk with such products and processes.

The opportunity for this option is limited by reason of the nearly three-quarters of all R & D done by small firms in this region is for various government agencies, and the R & D firms are not allowed to obtain patents on such products and processes. Once these products and processes are taken over by the contracting government agencies, they are virtually lost to the private entrepreneur. We may, therefore, conclude that no more than 25 percent of the total output of the small R & D firms is
### TABLE V

**ESTIMATED NUMBER OF WORKERS UTILIZED FOR R & D WORK FOR FEDERAL GOVERNMENT**

<table>
<thead>
<tr>
<th>Revenue Class</th>
<th>Professional Total</th>
<th>G</th>
<th>%</th>
<th>Administrative &amp; Clerical Total</th>
<th>G</th>
<th>%</th>
<th>Production Total</th>
<th>G</th>
<th>%</th>
<th>Total Workers Total</th>
<th>G</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than $100,000</td>
<td>148</td>
<td>78</td>
<td>53%</td>
<td>54</td>
<td>7</td>
<td>13%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>202</td>
<td>85</td>
<td>42%</td>
</tr>
<tr>
<td>$100,000 - 300,000</td>
<td>468</td>
<td>392</td>
<td>84%</td>
<td>148</td>
<td>87</td>
<td>59%</td>
<td>31</td>
<td>4</td>
<td>13%</td>
<td>647</td>
<td>483</td>
<td>75%</td>
</tr>
<tr>
<td>$300,000 - 500,000</td>
<td>736</td>
<td>508</td>
<td>69%</td>
<td>259</td>
<td>175</td>
<td>68%</td>
<td>415</td>
<td>271</td>
<td>65%</td>
<td>1,040</td>
<td>952</td>
<td>82%</td>
</tr>
<tr>
<td>$500,000 - 1,000,000</td>
<td>1,524</td>
<td>787</td>
<td>52%</td>
<td>680</td>
<td>325</td>
<td>48%</td>
<td>828</td>
<td>311</td>
<td>37%</td>
<td>3,032</td>
<td>1,423</td>
<td>47%</td>
</tr>
<tr>
<td>over $1,000,000</td>
<td>18,020</td>
<td>14,138</td>
<td>78%</td>
<td>4,012</td>
<td>2,950</td>
<td>71%</td>
<td>1,080</td>
<td>429</td>
<td>39%</td>
<td>23,112</td>
<td>17,517</td>
<td>76%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,896</strong></td>
<td><strong>15,903</strong></td>
<td><strong>76%</strong></td>
<td><strong>5,153</strong></td>
<td><strong>3,544</strong></td>
<td><strong>69%</strong></td>
<td><strong>2,354</strong></td>
<td><strong>1,015</strong></td>
<td><strong>43%</strong></td>
<td><strong>20,462</strong></td>
<td><strong>28,403</strong></td>
<td><strong>72%</strong></td>
</tr>
</tbody>
</table>

*G = Workers employed on R & D work for federal government.*
available to private entrepreneurs for introducing technological changes and innovations in the economy.

Many writers, researchers, and policy makers, have expressed concern that less than 8% of the total federal money earmarked for R & D is allocated to small firms, while the small firms are responsible for introducing nearly half of total innovations.

Our analysis of field data shows that there is a serious fallacy in this argument. One thing which seems to have been overlooked is that the small firms which devote 75% of their resources to R & D for the government do not by themselves introduce innovations and technological changes, and it is the other small firms which are engaged in production for the market, who actually innovate and introduce technological changes. These small firms rely primarily on their own rather circumscribed research and development facilities.

According to National Science Foundation data (1975), the average company which had less than 1,000 employees and which performed R & D in 1973 had three R & D scientists and engineers. It appears that in computing this figure, the N.S.F. study did not distinguish between the figures whose sole or principle output is R & D on the one hand and those whose principle activity is production for the market.

Our analysis of the field data indicates that the average number of professional workers employed by the R & D firms is 36 (See Table II, above). Even after we make some allowance for the difference in the definitions of N.S.F.'s scientists and engineers and our "professional workers", the discrepancy between the two is too large that it is only reasonable to infer that in their computations they must have lumped together all firms doing R & D work. Therefore, if from their estimates, we subtract the number of professional workers employed by firms engaged exclusively in R & D, then the average number of "scientists and engineers" in other firms whose primary activity is production for the market would be appreciably less than three. Such firms would, therefore, not have suitable technical facilities to conduct research for the government. It is a safe conclusion that these firms rarely would bid for government contract awards and, at the same time, due to the only too familiar delays and difficulties in obtaining funding from government sources for their own innovations, they would rather rely on private financing.
Our research, therefore, confirms the assertion made in a research report by Arthur D. Little, Inc. (1976)\(^3\) written for the Experimental Technology Program of the National Bureau of Standards that "federally-funded civilian research and development is not sufficient to bring about technological change in the private sector to any significant extent."

Since the small firms which perform R & D work on government funded programs and those which introduct technological changes and innovations are clearly two different parties, it is ironic that any additional funding of R & D by the federal government would reduce the services of R & D firms available to the private sector even below the 25% level currently available to them. In other words, there will be a negative correlation between the level of federal funding and the rate of technological change and innovation generated by the R & D firms.

Conventional wisdom persuades us as to the validity of the following circularity argument:

A. Increased productivity produces more dollars which lead to increased technical innovation;
B. Increased technical innovation produces increased productivity which produces more dollars; finally
C. More dollars induce increased technical innovation which leads to greater productivity.

However, our findings lead us to believe that in the real-world situation, under existing policies, the dollars being poured into the above circular flow are actually creating a negative effect. Whereas they stimulate research and development, they appear to have a dampening effect on technological change and innovation.

From our research it is eminently clear that there is an evident contradiction of the currently held views and the policies which emanate therefrom. While more will be said about this in our policy recommendations, it may be mentioned here is passing that this conclusion does call for changes in current policies, inter alia, pertaining to:

A. patenting of products and processes developed by private R & D firms as a result of government contracts;

---

B. the treatment of unsolicited proposals; and
C. the granting of loans to firms which introduce innovations and technological changes even though their principal activity is production for the market.*

3. Constraints

In our questionnaire, we had asked the respondents to indicate the intensity of impact of eight different types of constraints on their current operations and expansion plans. A tabulated summary of their responses is given in Appendix III-A. A brief description of their responses is provided below:

(1) **Working Capital:** While only a little over 11% of the firms responding felt that working capital exerted a severe constraint on their current operation, 44% reported that it did have a severe constraint on their expansion plans.

(2) **Personnel:**
   (a) **Number:** Not many firms considered this a serious constraint either on their current operations or on their future plans.
   (b) **Technical Competence:** Less than 15% of the firms considered this of significance to their current operations and about 26% felt it impeded their future plans.

(3) **Technological Inadequacies:** Almost all firms felt that they were technologically adequate and that the concern of competence was not real.

(4) **Regulation:** 27% of the firms felt that government regulations had severe impact on their current operations and 38% indicated that they severely impeded their expansion plans. Some of the specific complaints of the respondents are given verbatim in Appendix III-B. These complaints are directed against the I.R.S.; the E.P.A.; the Equal Opportunity requirements; cost accounting standards; procurement regulations; "picky" (picayune) OSHA regulations; wage guidelines; U.S. Government receivables, etc.

* We recognize that the possibility for bias exists by reason of the fact that the respondents to the survey may be typical of a certain class of entrepreneurs, namely, small R & D firms which are primarily interested in government contracts.

We suggest, therefore, that further research would be productive in order to determine whether or not our results are biased in favor of this class.
Inadequate Return on Investment: This too was not considered a severe constraint by a majority of the firms; only 23% felt that it had a severe impact on their current operations and 31% felt it had a severe impact on their future plans. On the other hand, cash flow is conceived as a severe concern.

Marketing: Less than 6% felt that domestic marketing presented any serious problems for their operations, while 35% of them considered foreign competition providing a serious impact on their expansion plans. In view of the perceived hostile climate in this country and in view of the perceived restrictive regulatory policies, it is not surprising that some small (as well as large) high technology corporations have dried up. Furthermore, it is not surprising that some U.S. companies have established research and development facilities in other countries, thus diminishing employment opportunities within the United States.

Competition for R.F.P.'s: Of all the constraints listed, this one elicited the strongest response. Forty-two percent felt this to be a severe constraint on their current operations, and nearly 50% believed it severely affected their future plans.

Other: Of the 74 firms which furnished usable returns only 11 felt that there were other constraints which affected their current and future plans; eight of them indicated that such constraints had a severe impact on their operations. At least half of these firms complained about the delay in the receipt of U.S. Government receivables.

All in all, our study indicates that very few of the small R & D firms feel that there are any severe constraints on either their current operations or their future plans.

4. Other Characteristics:

Our study indicates that 10% of the small R & D firms went out of business during the year 1978-79, i.e. since the preparation of the 1978 Directory to the time of our survey. In addition, two percent of the firms were acquired by larger firms and ceased to be part of the small business population. Eight firms moved their location, one of which moved out of the region.
5. **Patents and Innovations:**

Our study reveals that patents and innovations do not necessarily flow from the R & D activities of small firms engaged solely in R & D. It can be stated that the providing of R & D services is not the end-all. However, it should be stressed that the recipient of these services, in most cases, is the government. The paucity of patents obtained confirms the analysis in Section 2 above.

In summary, small firms engaged primarily in R & D work do not have the ability and/or resources to effect technological change and innovation. This is confirmed by three separate findings:

A. the almost non-existence of adequate production facilities;
B. 75% available personnel engaged in R & D work for the government; and
C. the negligible number of patents obtained.
SECTION II

POLICY ANALYSIS

1. Introduction to "Policy"

The implications of policy discussions will result in inferences for future policy change. Any discussion first must ask the question: What is the intent? No one doubts that the Small Business Administration (SBA) wants to develop policies which are sensible and not arbitrary. However, even the most sensible policy may be perceived or interpreted as being arbitrary. When this occurs, the policy makers are faulted. But are they at fault? After all, they have developed a "sensible" policy. The answer unfortunately is, "yes." They were not mindful of the classical admonition that not only must Caesar's wife be virtuous, but she also must be perceived as being virtuous. Even if the SBA had done a good job in policy formulation, the perception of many is otherwise; ergo, it had not been a good job.

As students of logic, with no claim to being logicians or experts, we rebel at the apparent paradox. The syllogism is indispensable:

Major Premise:
A job well done is to be applauded

Minor Premise:
This is a job well done

Conclusion:
It should be applauded

Q.E.D.
What went wrong with our deductive logic? To find the answer we must turn to metaphysics. If a tree were to topple in the midst of an impene-trable forest, unseen and unheard by any living creature, has a tree really toppled? Says who?

This suggests the minor premise in our syllogism may not be correct. The bold statement that "this is a job well done" must be validated. The receipient makes the value judgment as to the worthlessness of the policy.

A policy is not an end-all. It must be capable of being properly perceived, of being implemented and of being maintained. One is reminded of Machiavelli's advice, that no invasion can succeed without the ability to occupy and control. Our policies, analogously, must satisfy the Machiavellian criteria. A policy which is based on only government/small business nexus, necessarily ignores the dynamic forces at work within and between the two parties.

The foregoing discussion leads us inevitably to a revision of the definition of policy, "a governing principle, plan or course of action." In our judgment, one must add, "capable of being implemented, and maintained." Later on, in the section on policy recommendations we shall address this concern.

2. The Policy of Policy:

Every policy ever devised was intended to satisfy someone's "enlightened self-interest." The question is "Whose?" Up front it is necessary that we define the roles. The SBA is not the almover, the dispenser of charity, and the small businessman (a term which subsumes small businesswoman) is not the petitioner of alms. There are some in the federal bureaucracy, along with some in Big Business, who consider the granting of contracts to Small Business as a form of largesse -- a liberal gift to an inferior. A workable policy which is equitable must establish at the start that the relationship is between peers, not benefactor and beneficiary.

Let us raise a philosophical question: If each actor -- federal agency, SBA, Small Business and Big Business -- is looking after his own enlightened self-interest, who is looking after the common interest of business? By analogy, if every art curator in the world is looking after his own art collection in his own museum, who is looking after
the art culture as a whole? To quote Goethe: "Each one sees what he carries in his heart." The enlightened self-interest of individuals is not carried into factions, such as Small Business and Big Business. The factions need not be a formal organization, just as long as it embraces the common interests of a group. Not incidentally, these common interests exhibit opposition to the principles or goals of other factions.

By expanding this line of reasoning we get an appreciation of the policies of other factions. A rough diagram of the most elementary relationship will help explain.

![Diagram of contracts and policies]

The Contract Agency (e.g. DOE) will give contracts directly to Small Business and Big Business. In addition, it will set aside contracts for the SBA award. Further, Big Business will sub-contract to Small Business.

Are there not four different sets of policies? SBA cannot view the policies as discrete, that is to say, separate and unrelated. The important consideration is which policy of the four is operant? If, as is most likely, it is a combination of competing forces, which policy is the determinant?

There is historical precedent for this line of argument. Senator Russell B. Long, presiding at a meeting of the Subcommittee on Monopoly of the Select Committee on Small Business on December 8, 1959 said: "There is no government patent policy. Various Federal agencies and departments have sharply varying policies ..." We ask, therefore: is there a uniform, unified policy for Small Business? The answer must be NO. Is such a policy capable of being developed, implemented and maintained? The answer must be WE DON'T KNOW, BUT WE MUST TRY. But we have tried and are trying. Well, so far we have been unsuccessful.

3. Small Business Perceptions:

(1) The bureaucracy has been reluctant to make concessions to the

* Selections from written responses and oral communications. See Appendix IV for complete responses.
peculiarities and special requirements of the Small Business R & D community. It is recognized that Small Business firms cannot be equated with the very largest firms. For example, in 1979 General Electric, which maintains a staff of 1,500 Ph.D's, will spend more than a billion dollars for research and development.

(2) Small Business firms believe they get the "cold shoulder" from the bureaucrats with whom they negotiate. They believe that this is not just a recent phenomenon. One is reminded of the story about the two brothers who returned from the first day of school. The 8-year-old was repeating the third grade. The older brother asked: "Did you get a new teacher this year?" The younger brother responded: "New teacher, but the same old homework." (Different actors but the same act.) That is how many of the Small Business firms regard the SBA bureaucracy - the faces may change but the same policies remain. They feel they are being disadvantaged.

(3) The small R & D firms are receiving mixed signals. Some history: during the Korean War in 1952, President Truman signed an Executive Order which provided for preferential treatment to firms located in areas with high unemployment; this applied to all federal contracts. But one year later Senator Maybank of South Carolina was successful in amending an appropriation bill; it required that all Defense Department contracts for goods and services be awarded to the vendor with the lowest prices.

(4) Region III small R & D firms perceive a bias toward Sunbelt firms and away from Frostbelt firms. Being in the Frostbelt they have a lot to worry about. Defense Department figures show that in 1955 the Frostbelt received 54% of all prime contract awards; the Sunbelt 46%. Twenty-one years later, in 1976, the Frostbelt's share had declined to 36.8%; the Sunbelt had risen to 63.2%. Put another way, the Frostbelt's share dropped 32%; the Sunbelt rose 27%.

(5) Several disturbing questions have been raised. Is the United States government getting a dollar's worth of value for its R & D dollars? Does present federal policy (or policies) encourage a
disproportionate share of federal R & D contract awards to the larger firms, thereby strengthening the trend to monopoly and undermining the relative position of small R & D firms?

(6) The small R & D firm's role in industrial innovation has been played down. The media have tended to publicize the contributions of Big Business.

(7) R & D expenditures have not kept pace with our domestic spending or with R & D expenditures of many other industrial nations. The proportion of R & D spending to Gross National Product in the United States declined in the 15 year period from 1964 to 1979. In the same period the ratio in Japan and West Germany rose. To confirm a casual relationship, the U.S. Patent Office reports that foreign inventors now receive 37% of all U.S. patents, compared with 20% in 1960.

(8) An acceptable level of R & D and resultant successful innovations can be achieved only in an environment conducive to a good return on business investment. What is generally called an improved climate for business investment is in reality a lessening of the tax bite on business. It is customary to blame the bias against investment on Keynesian economics. Whatever the reasons, small and big business R & D firms agree on this point.

(9) The net profit on government contracts is too small to justify the high risks. The most usual complaint is the cost of "useless paper work." One is reminded of the diners at a restaurant who was asked by the owner: "How did you like your meal?" The response: "The food was practically uneatable and the portions were too small." Why keep on trying for this "bad" business? Because there isn't enough non-government business around.

(10) There is a policy failure in that the demarcation zone between basic and applied research is eliminated. Firms are being forced by economics to opt for the short-term profit as against the long-term profit; for the product and process innovation as against R & D. Admittedly, long-term, has been equated with high-risk, but U.S. entrepreneurship was built on long-term, high-risk programs. Small firms do not have the resources to
opt for long range, high risk ventures. Besides resources, it takes a certain amount of courage for innovating leadership: "an entrepreneur to Schumpeter is not just a businessman or manager; he is a unique individual who is by nature a taker of risk and who introduces innovating products and new technology into the economy." In the simple words of Jonathan Swift: "He was a bold man that first ate an oyster."

(11) Prospects for small R & D firms diminish as mergers increase. The small R & D firm could be more nearly competitive if it did not have to do all the attendant paper work. The merged entity can handle red tape with specialists who serve the subsumed companies. The small firm, however, must utilize the questionable paper-pushing talents of the man at the lab table or even of the boss himself. They may be great engineers, chemists or physicists and still be lacking in the skills needed to fill in little squares on a big form.

(12) Trying to get an SBA loan or contract reminds at least one small business R & D firm of "Catch 22." "You look too good for a loan, therefore, you don't qualify." Or, "You look too bad for a loan, therefore, you don't qualify." (You wouldn't be able to repay the loan.)

(13) Government procurement policies impose excessive paper work on R & D firms.

(14) Government procurement policies are not consistent. There is little, if any, uniformity in requirements of an administrative nature.

(15) "Non-profit" organizations are squeezing out the small R & D firms, which allegedly are profit-making organizations.

(16) The Federal-Small Contractor relationship, in general, is an "adversary one;" the Federal-Big Business relationship is a "friendly one."

(17) The patent process is unwieldy, requiring the services of patent attorneys "and their idiotic diagrams." As a result, the cost is often prohibitive.

(18) Competition for Requests for Proposals (RFP's):
(a) The "locked" proposal - "If I don't know you or your company you can't do the job."
(b) Too many RFP's per contract are sent out. This results in a lot of wasted proposal writing time.
(c) Some contracts are "directed" toward certain big firms -- contract stipulations which can be met only by certain favorites.

(19) The 8(a) set-aside program either does too much or too little. Some large firms get small businesses to front for them.

(20) SBA personnel are either incompetent and don't know how to help or competent but with a strong bias for the big firms. The implied reason for this bias for the big firm is "courting" of SBA Division Directors and Administrators by the big firms.

(21) Government agencies do not provide follow-up or feed-back to contractors when there are undue delays which result in planning and cash flow problems.

RECOMMENDATIONS
1. Require a cost/benefit analysis and impact study before drafting new regulations, e.g. the costs must bear reasonable relationship to the public benefits that will result from compliance.
2. Examine existing regulations for effectiveness. Amend or vacate any regulations which appear to have deleterious effects, e.g. Federal Administrative Procedures Act.
3. Set up Pre-Screening Board to reduce the number of RFP's mailed for each contract, thus eliminating paper work and expense at both ends.
4. SBA agents and policy makers should be recruited from the ranks of small businesses as well as from the traditional sources.
5. Award contracts to non-profit and not-for-profit organizations only for those proposals which are conceived and developed within these organizations. All contracts for proposals which are conceived
and developed by government agencies should be awarded only to private R & D firms. This would serve a two-fold purpose:

(a) minimize competition of non-profit and not-for-profit firms, and
(b) stimulate them to come up with original proposals, which, in our judgment, is part of their mission.

It should be noted that these organizations compete with private firms because they are subsidized by the federal government.

6. Support the provisions of the Small Business Tax Relief Act of 1979 which would enable a business owner who sells his company and then re-invests within an 18 month period to "rollover" the proceeds without paying taxes; which would provide further tax relief by increasing the cost limitations on additional first-year depreciation to $25,000 ($50,000 on a joint return) and extending the deduction to buildings. The figures at present are $10,000 and $20,000 respectively.

7. Set up a single comprehensive policy on R & D contracts; provide for a one-stop operation within one agency; set up an information/communications office within the one-stop agency; simplify procedures and paperwork; reduce the proportion of large omnibus contracts which can be won only by large companies; make certain that all procedures connected with R & D contracts are consistent and uniform; provide for "open" contracts and not "directed" ones; develop procedures to speed up payments to contractors; invite companies to send non-participating representatives to sit in on government contractual proceedings concerning their RFP's; and an unsuccessful bidder should be extended the opportunity for a debriefing in addition to the simple notification "not qualified."

8. Efforts should be made to improve the "business climate" for small and large R & D firms. Some suggestions are:

(a) provide seed money for unsolicited proposals; and
(b) provide funding for small R & D firms which have good ideas but lack the resources to pursue them.

9. Patents should be assigned to the inventor(s) even though the work was funded in part or in whole by the federal government; use of the patent for government use should be without charge: if the government assigns the use of a patent to anyone other than itself, the original
inventor should receive royalties of a fair and reasonable amount. This should be done whenever and wherever possible as long as it does not impair the national interest and security. It should be noted that this action would stimulate private innovations. However, the time and expense of procuring a patent should be reduced.

10. In order to stimulate technological changes and innovations in the areas of management, process and product development, the government should provide funding for the small non-R & D firms.

SUGGESTED FUTURE RESEARCH

Our research has produced surprising results which have run counter to the accepted thinking of the majority of researchers and policy makers. In addition, as far as we are aware, the linkage among small and large R & D firms, small and large non-R & D firms, non-profit and not-for-profit organizations has never been studied.

For a portion of this problem (large firms), valuable contributions have been made by Mansfield, et al.\(^5\) at the University of Pennsylvania. We recommend that the entire problem with all its ramifications be examined in order to allow the development of better policies in the future.

As a start, we suggest that one approach might be:

(a) to follow an idea from its conception to ultimate translation into innovation,

(b) to examine the way in which a product or process developed by an R & D firm is ultimately utilized by a non-R & D firm; and

(c) to determine what shares are contributed to technological change and innovation by the R & D and non-R & D sectors.

### SECTION III - DATA CONSIDERATIONS

Number of units selected and number of responses received in each category

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These questions seek to gather important data and opinions on your firm's activities in research and development, innovation, and technological change. Your answers will form the basis of our policy recommendations to the White House Conference.

1. Category  
(See Cover Letter)  
2. Name of Firm  
3. Principal Business  
4. Number of Employees:  
   (a) Professional  
   (b) Administrative and Clerical  
   (c) Production  
5. Annual Revenues:  
   (a) Less than $100,000  
   (b) $100,000 - $300,000  
   (c) $300,000 - $500,000  
   (d) $500,000 - $1,000,000  
   (e) Over $1,000,000  
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<td>(b) Govt. sponsored</td>
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<td>(c) Sponsored by private firms</td>
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<td>(b) Sponsor of the project</td>
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<td>6. Nature of Invention</td>
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<td>(a) Consumer product</td>
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<tr>
<td>(a) Your firm</td>
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7. Constraints:

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<td>4. Regulation (Specify)</td>
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5. Inadequate Return on Investment
6. Marketing
   (a) Domestic
   (b) Foreign
7. Competition for RFP's
   (Request for Proposals)
8. Other (Specify)

Percentage of Work Done for the Government Annually:

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<th>Federal</th>
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<tr>
<td>Less than 25%</td>
<td></td>
<td></td>
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<tr>
<td>25% - 50%</td>
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<td></td>
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<tr>
<td>50% - 75%</td>
<td></td>
<td></td>
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<tr>
<td>Over 75%</td>
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<td></td>
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</tbody>
</table>

9. Policy Recommendations (i.e., If you had your way.)

Please return this completed questionnaire in the enclosed envelope by August 10 to:

Mr. Albert E. Smigel
440 Fargreen Road
Harrisburg, PA 17110
### Constraints By Revenue Classes

<table>
<thead>
<tr>
<th>Revenue Class</th>
<th>1</th>
<th>2-a</th>
<th>2-b</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6-a</th>
<th>6-b</th>
<th>7</th>
<th>8</th>
<th>n</th>
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<tr>
<td>Less than $100,000</td>
<td>C</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>8</td>
</tr>
<tr>
<td>$100,000 - $300,000</td>
<td>E</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>E</td>
<td>1</td>
<td>C</td>
<td>2</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>$300,000 - $500,000</td>
<td>C</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>12</td>
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<tr>
<td>$500,000 - $1,000,000</td>
<td>E</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>More than $1,000,000</td>
<td>C</td>
<td>7</td>
<td>5</td>
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<td>4</td>
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<td>1</td>
<td>5</td>
<td>6</td>
<td>18</td>
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<td>TOTAL</td>
<td>E</td>
<td>10</td>
<td>15</td>
<td>28</td>
<td>19</td>
<td>16</td>
<td>11</td>
<td>18</td>
<td>19</td>
<td>13</td>
<td>74</td>
</tr>
</tbody>
</table>

- **n** = number of responses in each revenue class
- **C** = current operations
- **E** = expansion plans
- **A** = minimal
- **B** = moderate
- **C** = severe

1. Working Capital
2. Personnel
   - (a) Number
   - (b) Technical Competence
3. Technological Inadequacies
4. Regulation (Specify)
5. Inadequate Return on Investment
6. Marketing
   - (a) Domestic
   - (b) Foreign
7. Competition for R.F.P.'s (Request for Proposals)
8. Other (Specify)
RESPONSES TO CONSTRAINT NO. 4 (REGULATION)

1. Cost accounting standards
   ERISA
   Procurement regulations
2. Securities regulations
   Cost accounting standards
3. Equal opportunity pendulum swinging too far
4. Internal revenue
5. Concerning use of human volunteers
6. Regulations governing personnel and methodology as well as "picky" OSHA regulations
   Amount of paperwork
7. Excessive delays on part of D.C. Audit Agency in processing (two and three year old!) submittals of overhead costs—they have no time for us
8. Working with DOD - the initial contract takes 1-2 years to obtain; this is one of the hardest milestones to pass
9. Restrictions on patents for research done on government contracts; export license requirements
10. Small business size standards (too high)
11. Federal procurement regulations--impossible to meet for small business concerns
12. GSA's constraints on procurement of computer services and procurement regulations
13. Just too many
14. Wage guidelines
   EEO
   Profit guidelines
15. EPA regulations consume too many dollars; none left for efficiency

RESPONSES TO CONSTRAINT NO. 8 (OTHER)

1. Competition from minority firms and large firms is severe
2. Excessive delays in awarding of work which technically has been "approved"
3. Small business standards, i.e. (DOD) 2 MIL or 500 people
4. Problem of "locked" proposals
5. Transportation
6. Unfair competition for non-profit and not-for-profit organizations
7. U.S. Government receivables
8. Poor quality of contract offices' work
9. Confiscatory taxation
### Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Aeronautics</td>
<td>None</td>
</tr>
<tr>
<td>2. Agriculture</td>
<td>None</td>
</tr>
<tr>
<td>3. Astronomy</td>
<td>An SBA Loan for 500,000 dollars was obtained 2 yrs. ago. It was very difficult to get. Without it we would certainly have gone under. We have made all of our payments - met all of our payrolls and will show a net profit this year of $500,000 on $3 million sales. I was overwhelmed by the negativism we encountered in trying to get this loan. A classic &quot;Catch 22 situation&quot;. You look too good for a loan therefore you don't qualify. &quot;You look too bad for a loan therefore you don't qualify.&quot; Only when they saw we would stop hounding them would they help us. Policy Rec: Do Something To Clearify Whose Eligible and Speed Up Processing. I wonder how many die waiting?!</td>
</tr>
<tr>
<td>4. Atmospheric Sciences</td>
<td>SBA involvement in government procurements under the small Business Act of 1972 often delays award of contracts that are on a sole source basis.</td>
</tr>
<tr>
<td>5. Behavioral and Social Sciences</td>
<td>None</td>
</tr>
<tr>
<td>6. Biological and Medical Sciences</td>
<td>A policy is needed which would require government agencies to make payment of invoices from small business firms upon receipt, with adjustments made after subsequent audits if necessary.</td>
</tr>
<tr>
<td>7. Chemistry</td>
<td>None</td>
</tr>
<tr>
<td>8. Earth Science and Oceanography</td>
<td>Govt. procurement policies for economic research are ridiculous; they result in much economic waste and should be revised (1) to eliminate excessive paper work and (2) to provide for uniformity in requirements of administrative nature among the several agencies.</td>
</tr>
<tr>
<td>9. Electronic and Electrical Engineering</td>
<td>(1) Minimize aml. of red tape for sm. businesses in areas of RFP/Proposal efforts for sm. contracts (2) Encourage use of sm. bus. firms as subcontractors for lg. procurements - especially where sm. bus. is</td>
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<tr>
<td>10. Energy Conservation</td>
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<td>11. Materials</td>
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<tr>
<td>12. Mathematical Sciences</td>
<td></td>
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<tr>
<td>13. Mechanical, Industrial, Civil and Marine Engineering</td>
<td></td>
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<tr>
<td>14. Methods and Equipment</td>
<td></td>
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<tr>
<td>15. Military Sciences</td>
<td></td>
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<tr>
<td>16. Rocket and Missile Technology</td>
<td></td>
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<tr>
<td>17. Navigation, Communications Detection and Countermeasure</td>
<td></td>
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<tr>
<td>18. Nuclear Science and Technology</td>
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<tr>
<td>19. Ordnance</td>
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<tr>
<td>20. Physics</td>
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<tr>
<td>21. Propulsion and Fuels</td>
<td></td>
</tr>
<tr>
<td>22. Space Technology</td>
<td></td>
</tr>
<tr>
<td>23. Architects and Engineers</td>
<td></td>
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</tbody>
</table>
highly technically qualified (3) Force govt. to publish and adhere to anticipatory award dates for all contracts - especially where key personnel must be proposed by firms.

1. Exclusion of non profit organizations from a given percentage of sm. bus. set asides. (2) Elimination of technically exhaustive and overly elaborate RFP's where award considerations are based primarily of past experience and personnel. Perhaps this might be accomplished by a pre-selection board thus eliminating time consuming efforts which prove fruitless.

1. Decrease the amt. of Federal forms and regulations that we have to fill out, read, understand, etc. (2) Get the SBA to help sm. businesses like us, rather than concentrating almost exclusively on minority firms. (3) Change the tax structure so that entrepreneurs who own small companies can reap the rewards for their labor. Last year's profits went 25% to the stockholders (after all corporate and personal taxes) and 75% to Federal and State Govt. (incorporate and personal taxes). However, the stockholders took 100% of the risk!

I recommend that the entire 8A program be stopped.

Greater attention and emphasis needed to limit regulation only to those areas and firms where there is a compelling, cost-benefit justifiable need to protect the public interest. Greatest impediment to growth and innovation is the amount and complexity of regulations which impact upon the firm as it grows. In order to grow, a firm must be able and willing to incur more and more nonproductive, indirect costs associated with increased regulation. These added costs are oppressive and tend to take away any competitive advantages a firm may have.

1. More sm. business set asided for RFP's.

2. Make sure universities and so-called non-profits do not compete unfairly against private business - this has been a severe problem for us.

Loans and loan guarantees to small businesses seem to be available to those who can demonstrate good credit rating rather to those who need them most -- the businessman with debts who can't get a chunk of working capital together. Shouldn't SBA operate like the student loan program in college, giving the sm. bus. a chance to get on its feet before repayment, and possibly forgiving a portion to selected categories as student loans are partially forgiven to those entering the teaching profession.

1. Competitiveness of RFP system precludes us from going after many Federal contracts. Paper work is overly expensive (2) Federal-contractor relationship is in general, an adversary one (ej. "Beltway Bianders"; "The Feds"). It's become a very unpleasant process - for us - to do business with "The Feds" and something needs to be done to break down this "Us vs. Them" situation.
Administration should give companies who test new drugs a better image. On one hand the administration seeks us out to do testing for them for antimalarial drugs and on the other hand they constantly harp on companies who do this kind of work as though they had no interest or no involvement in it themselves.

Revise, eliminate, coordinate and/or modify the multiplicity of regulations from different state and federal agencies - many of which contradict each other. Each regulatory agency has their own inspectors and rules and regulations which often overlap and create a burden, both financially and timewise, on us in trying to comply with all. Govt. regs governing personnel requirements are way out of line. Some regs require college degrees for performance of work that can be adequately, accurately and competently performed by high school grads. In fact, regulations prohibit the hiring of good people because of insistence of unnecessary academic background. Basically, there appears to be too much gov't. regulation and interference which adversely affects the sm. businesses. Suggested policy recommendation would be to eliminate or markedly decrease gov't. regs to businesses with less than 51 million annual gross revenues and/or less than 25-30 employees.

(1) We had ideas which should have been patented, but the cost is prohibitive, need to make it very much less expensive to file patents and simpler, paperwork in preliminary stages should be minimal. Style of patent writing should be completely modernized and changed to simple English, not the damn nonsense that it is now, requiring the strange language of patent attorneys and their idiotic diagrams. (2) Small companies like ours are repeatedly told, "If you only had an 8A classification, we could process your unsolicited proposal through immediately." Otherwise we end up in a bottleneck at the purchasing offices, lasting many months after the technical people have approved the idea. We have lost a number of good people who got tired of waiting for the award, which sometimes comes 9 months to 1 year later than it should. (3) Too many awards, especially DOD awards, are advertised as open but are really meant for some specific firm. PACD is especially guilty of this. More honesty would save everyone effort.

Recommend that small business loans be made more readily available to businesses with a proven track record, but where product mix has not led to the accumulation of large physical assets. SBA seems to be interested only in loan applications where substantial collateral can be put up as security, a policy which precludes labor intensive service industries like our own and slows our potential growth considerably.
None

(1) Eliminate or reduce double taxation of profits of small business, which are owner/employee managed (i.e. taxation of corporate profits and distributed dividends). (2) Provide for ability to transfer corporate and/or small business interest at death without burdensome estate taxes.

Problem - competition forces fee levels down. If we don't accept 8% someone else will. This low return does not generate sufficient investment capital (retained earnings) to allow small business to exploit research. Large companies recognize this and acquire rights or level a share of return for sponsorship. Frequently the small company with an idea, unique capability, or patent becomes a takeover target, weakening the base of remaining small companies, promoting industrial concentration and serving as a general disincentive to the innovation process.

We as a sm. firm can't afford to become interested in trying to obtain government work. Big firms apparently have the where with all to handle the silly requirements. We had a small Navy contract once - when we finished with the government silly audits, the profit was gone - who needs this. In fact we still haven't clearly got it settled after three years. Recommendation: Get the people that know from experience running these govt. programs. Qualification - 15 years of running their own business. Why have people that spent all their life with govt. services or you have it. Most don't know where babies come from and are trying to administer to business - a joke.

By registering with the sm. Bus. firms at a number of govt. facilities, we have obtained no business. They are a waste. The emphasis on sm. bus. is at the large end of the definition. I have coined the phrase that we as a company of 16 people are not sm. bus. yet - we are a teenie business - therefore we get no help from SBA or others. We sm. Businessmen succeed in spite of the help of bueracrats.

(1) Most Federal Agencies are not interested in dealing with sm. Bus., and rowr, reg, NASA, Goddard, will even state that openly. The SBA agent is often chosen by the Procurement Dept. as someone who is of no value otherwise, their giving him a position where he can do no harm until retirement. (2) The man of paperwork to respond to Federal and State reporting requirements is overwhelming.

None

For patents, main development needed is to make the writing of patents same as the writing of a good technical paper - in clear modern english, not jargon, with simple diagrams, not a lot of puffed up claims. And it should be possible for a good engineer to write up his ideas like he would a technical paper, and have them evaluated at the patent office in the same way as we now refer a new technical paper submitted to a journal.
(1) Competitive Contracts - Problem of "Locked" proposal. Contracts "directed" even though they could be competitive. Companies should be allowed or invited to have a non-participating representative sit in on all govt. contractual proceedings concerning their RFP or be given a more thorough debrief rather than a card stating not qualified. (2) Eliminate the large omnibus contracts which only can be won by large companies. Multi-million dollar contracts virtually eliminate sm. Bus. even though they could perform well in their area. Subcontracting is not the answer. (3) Insist the Office of Naval Research "open" their contracts. Reference, any Commerce Daily Bulletin all contracts are "directed". (4) Govt. contracting and paying agencies administratively have no "follow up" or feed back to contractors concerning undue delays causing undue planning and cash flow problems.

Open R&D at prime contractors to move small bus.; restrict R&D to sm. bus.; force SBA to canvas sm. R&D firms in area; cut R&D "in house" in govt. labs - they always keep upping in house budget, much that is dare is "tijke" and it is more costly than having sm. outside R&D groups do it; expand NSF contracts; expand N.I.H. contracts; invite more unsolicited proposal; R&D at DOD is unfairly slanted to big companies who have a scene of reps for each govt. institution and facility. Need more "sunshine" in RFP.

We manufacture and supply research materials to the world research community. We do not ordinarily manufacture those materials for which there exists a commercial source. Consequently, we deal in small quantities; i.e. from milligrams to several thousands of pounds. From a transportation standpoint, most of these materials are restricted articles. Furthermore, for many, the physical and chemical characteristics are unknown. There should be a blanket exemption of sorts from the DOT Regulations for very small quantities. There should be requirements that truckers and airlines not arbitrarily refuse shipments.

Small Science/Technology based firms find themselves encountering competition from non-profit and not-for-profit organizations to an ever increasing degree. No one in govt., even the sm. bus. administration, seems to care. For example, when the SBA set up the SBDC, the SBA seemed to be more interested in how due universities would help sm. firms rather than how sm. firms could be helped best by whatever method. With the
advent of SBDC's at universities, the SBA is giving a cloak of legitimacy to a university to provide services which are already being provided by other sm. firms. Specifical sm. science based firms need immediate help because of bus. by policies of the U.S. Govt. which encourage the use of tax dollars in ways that end up competing with existing small firms.

Recommendation for improvement(s) in Federal policy regarding relationships with sm. Bus. offering consulting services in mathematical sciences. It is recommended that administrative contractual requirements and dollar limitations be amended so as to allow for more direct technical effort applied to the job and less purely legalistic contractual effort. The use of relatively sophisticated computers is inferred in most mathematical consulting services today and costs are increasing accordingly.

SBA involvement in govt. procurements under the Small Business Act of 1972 often delays award of contracts that are on a sole basis.

Reduce duplication in responding to RFP's. Reduce the govt. taking private enterprise innovations then forbidding private industry from participating.

Would like to see a larger percentage of govt. contracts required to be awarded to sm. businesses specifically.

(1) Change in sm. bus. designation. Current definition does not adequately help small business. (2) Modification in Fed. Govt. audit procedures whereby help can be given sm. companies. (3) More effective information and data dissemination. (4) Better technology transfer programs. (5) Improved Loan Programs for sm. bus.

The U.S. Govt. should finally realize that the sm. technical firms are considerably more efficient than the large corporations where the customer ends up paying substantial ants. to support the corporate bureaucracy. At a time when the dollar is rapidly shrinking, the U.S. Govt. should expand its programs to enhance the participation of sm. Bus. in govt. funded technology development efforts aimed at satisfying our critical national needs.

(1) Sm. Bus. set asided should be restricted so that a large bus. could not get a sm. bus. to front for them. For example under existing rules a large bus. could do 99% of the work as a subcontractor. Proposal evaluators can say that the sm. Bus. does not have control under such an arrangement, however they seldom do. This is an example of obvious violation of the intent of the law and should be banned.
(1) The 3 year coverage earning limit for sm. bus. set aside work should be increased because of inflation. (2) In order to reduce the number of proposals submitted for govt. work, the govt. should reduce the number of competitors with a pre RFP screening. This could cut down on wasted proposal writing time.

None

The whole federal procurement policy is biased against sm. bus. The RFP selection and evaluation process is unfair. 30% of the Best R&D entry level contracts are awarded on a sole source basis to large corporations. SBA is a zero contributor. The contraction process is dismal. We have been waiting 10 months for a contract to be signed by DOE. Payment for services may lag by six months. The procurement regulations make it almost mandatory to have a full-time contract administrator regardless of the size of the contract. The sm. govt. fee (6-8%) with the high risk of after the fact disallowables makes contracting with the govt. a poor management decision.

(1) Increase scope of applicability for expedited purchase procedures (purchase orders) for items to $25,000. (2) Increase Federal support of R&D in industry.

(1) Eliminate or reduce double taxation of profits of sm. Bus., which are owner/employee managed (i.e. taxation of corporate profits and distributed dividends). (2) Provide for ability to transfer corporate and/or sm. bus. interest at death without burdensome estate taxes.

Inflation and the considerable lengthening of the review process has made the $100,000 limit on proposal funding before mandatory review an anachronism which negatively impacts the quality of methods that can be applied in management consulting research. More elegant and useful research methods, which are more costly in terms of personnel, equipment, and time, could be attempted if the ceiling were raised to be on a par with the real dollar value of $100,000 when it was originally introduced—probably about $250,000.

None

Govt. support for high technology firms rather than discouraging them during periods of concern. Gov't support was great during periods of demonstrated and recognized success but dissappeared when difficulties appeared.

Sm Bus. must compete with large bus. for Federal contracts (e.g. proposals comparable facilities). This severely handicaps sm. bus. and provides unfair advantage to large firms - the sm. bus. "set aside" contracts are limited in nature and represent "crumbs". Policy should be set to encourage sm. bus. by (1) providing more"set aside" contracts, (2) making more sole source contracts available to sm. bus., (3) reduce RED time
by GSA for sm. bus., (4) develop proposal evaluation
criteria that gives sm. bus. special consideration
(extra points) in a competitive procurement.

(1) Speed up procurement cycles. (2) I am willing
to have some 8A set asides for sole source, but the
policies in DOE and HEW for us sole source except to
8A's and non profits is extremely disruptive and un-
professional. (3) Given the hazards and non-allowable
(such as interest) costs of doing business, it is very
expensive that a target profit rate of 9% is necessary
for a healtht company. This typically ends up as only
5% pre tax, or 3½% after-tax. HEW and Labor's policy
of allowing only a 7% fee is Gresham – bad driving out
the good.

(1) Reduce the number of certification. (2) Reduce
the paperwork and reputis requotes. (3) Reduce the long
chain of checks and checkers on the checking.(4)
Simplify all the necessary paperwork and reporting
requests.

We find our firm being treated by contracting
officers (Fed) by the same standards they use for
IBM, Burroughs, etc. However, we cannot afford the
overhead of courting Division Directors and Administra-
tors. It is not worth our time to bid on RFPs in the
Commerce Business Daily - too much overhead for the
risk of award.

A code should be developed covering "capabilities
in research and development", which would be referenced
in govt. proposals, thus saving enomous time for sm.
firms to locate projects within their scope.

(1) Increase dollar limits of purchase authority
by pruchase orders, which has been $10,000 for many
years. (2) Reduce red-tape associated with inclusion of
IR&D efforts in allowable Govt. costs. (3) Eliminate
FCRC's in favor of public sources. (4) Allow reasonable
ROE to Govt. Contractors. (5) Make interest a contract
allowable expense.

The Federal Govt. persits in trying to secure
library and information services by invitations for
bids and by firm fixed price contracts, but cannot
define the units it wished to purchase. The bid
schedule and work specifications of two solicitations
we bid on recently were simply wrong mathematically,
and no demonstration suffices to convince the contract
people of that fact. The contract people fail to
communicate adequately with the technical people in
telling them the effect of the choice of solicitation
and contract forms on the bidders and on the quality
of work the Govt. receives. Instead they choose the
forms which give them the least work. The performance
of the contracts people has deteriorated during the
ten years this company has been in business.
Negotiated fees must be raised generally to stimulate internal formation of investment capital.

(1) Award 50% of every R&D dollar in every govt. agency to sm bus. with a sharply reduced demand for paperwork. Further, all paperwork to be written in common language on 1 sheet of paper. (2) Award 50% of every education dollar at every level of Govt. to vocational training for all occupations. (3) Right Now-The U.S. is in an economical war of survival unless our govt. changes direction 180 degrees our govt. will completely destroy the free enterprise system and make us a second class country. Our most important goal should be to strengthen our competitives in all basic industries. This requires dramatic constructive change away from unless Govt. paperwork and into new competitive hardware; new CAls, new trans., new buses, resolution of nuclear waste problems, solar energy, etc. No OSHA, no EPA, no DDE, no DOT!!!

(1) Do away with minority business (8A). (2) Encourage construction & installation & operation of nuclear power plants. (2) Revise procurement procedures to eliminate low bidders with no competency. (4) Encourage sm. Businesses to develop production capabilities via pilot projects and develop financing. (5) No taxes on capital assest, i.e., personnel property tax. (6) Revise unemployment compensation laws to protect sm. businesses from high tax rates due to employees leaving subsequent jobs.

Competition for RFP's (1) Problem of "locked" proposal. The "if I don't know you or your company" you can't do it syndrome. Problem of overcoming favorite corporations - proof of syndrome is almost impossible to prove but it does exist. (2) Another problem is the so called omnibus contracts that are so large only large businesses can fill the requirements - sm. businesses can fill the requirements - sm. bus. is virtually eliminated even though segments or tasks could be performed by one or more small businesses. Recommend break large contracts into smaller ones which allow sm. bus. participation. Govt. contracting and paying procedures in the administrative handling areas put undue burden on sm. bus. causing severe cash flow problems - recommend a system to "follow up" and know why the delays and contact the cognizant company to inform them of delays.
The selection procedure of the Federal Govt. in determining the recipient of an engineering service contract definitely favors the large engineering firms. The selection boards are usually made up of personnel from large govt. bureaus or organizations and appear not to have experience with, or knowledge of, the operations and capabilities of small engineering firms. Most seem to be of the opinion that a firm, without redundant in-house capabilities in practically all engineering fields, is unable to satisfactorily complete a project, despite the fact that the firm may have a proven record of many successfully completed projects of the type being advertised. Also, classification of an engineering firm with average annual receipts of less than $7,000,000, $5,000,000 or even $4,000,000, as a small business is a misnomer in the engineering field. Think you will find that 80%–90% of the firms fit into these groups. A small engineering firm, relatively speaking, is one with less than 25-30 persons and annual receipts of less than $500,000 to $1,000,000. This classification would cut the small business group to roughly one-quarter of the total.
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