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A COMPARISON OF SMALL AND LARGE BUSINESS MANAGERS' ATTITUDES TOWARD INNOVATION AND THE ROLE OF GOVERNMENT IN PROMOTING TECHNOLOGY[1]

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ABSTRACT

House Resolution 820 calls for the establishment of technology partnerships, funded by the federal government, designed specifically to improve small businesses access to technology. However, government-industry partnerships have been criticized for creating a government-assisted organization to compete with domestic private sector firms. The critics of such partnerships argue that market intervention by the government often results in competitive disadvantages for the very firms the partnership was intended to help. This study assessed the attitudes of small business owners and managers toward government directed market interventions such as that proposed in HR 820. The results suggest that there are some important differences between managers at large corporations and small businesses on the effectiveness of market intervention by the government, both in terms of job creation and technology enhancement. Within the subsample of small firms, however, there is sharp disagreement on the value of government programs such as those proposed in H.R. 820.

INTRODUCTION

Technological innovation is a critical factor in the competitive capabilities of many small firms (Lo Storto, 1994). Since small businesses are significant contributors to the overall strength of the U.S. economy (Butler, 1994), the federal government is concerned that inaccessibility to leading technologies may cause a competitive disadvantage to small U.S. businesses in the global marketplace. In response to this concern, the U.S. House of Representatives introduced House Resolution 820 {HR 820} which would establish technology centers to assist small businesses in understanding, acquiring, and implementing technological innovations to enhance their competitiveness.

Whether government intervention via programs such as the technology partnerships described in HR 820 is beneficial to U.S. corporations is open to debate. Government initiated technology partnerships directed at improving the technological capabilities of large corporations in the U.S. semiconductor industry met with very limited success and low

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participation rates among potential participants (Mills, 1993). Potential success of the small business technology partnership outlined in HR 820 is difficult to predict because little is known about how small business owners/managers' attitudes differ from the large business executives relating to the role of government in developing technology and innovation.

The purpose of the current research is to 1) investigate the attitudes of small business owners and managers regarding the importance of technological innovation, 2) compare these attitudes to those of large business executives, 3) describe the general opinions of small business owners on the effectiveness of governmental programs in spurring innovation and resulting job growth, and 4) provide insight on the potential impact of HR 820 in light of the research findings. This study will be presented in four parts. The first section will describe HR 820 and explore both sides of the debate over its potential for success. The second section will discuss the research methodology used to investigate business owners and mangers' opinions on the importance of technological innovation and the government's role in promoting it. The third section will report the findings of the research, followed by a final section outlining the potential impact of HR 820 given these findings.

HR 820: THE NATIONAL COMPETITIVENESS ACT OF 1993

House resolution 820 was introduced on May 24, 1993 as the "National Competitiveness Act of 1993" after being approved by the House Subcommittee on Technology, Environment and Aviation on March 30. The bill is also part of the administration's budget plan for 1994.

The introduction of H.R. 820 was based in part on the finding by Congress that "the cost of and difficulty in obtaining investment capital for small high technology companies are significant deterrents to their formation, development, and growth" (H.R. 820, Section 102, Article 6). The purpose of H.R. 820 is to improve the competitiveness of small businesses through a nationwide technology outreach program aimed at improving access to information, expertise, technology and management practices. One of the goals of the technology outreach program proposed in H.R. 820 is to assist small businesses in the U.S. in their efforts to expand and accelerate the use of cost effective, modern manufacturing technologies and practices. In particular, H.R. 820 is aimed at promoting agile manufacturing for 360,000 small and medium sized U.S. businesses in order to enhance their global competitiveness.

The outreach programs envisioned under H.R. 820 are to be established as a partnership between the Department of Commerce, the States, the private sector and other appropriate federal agencies providing technology extension centers and technical services across the U.S. Universities and small business development centers (among other organizations) will also be involved in the development and operation of the technology outreach centers. The outreach centers are to be funded through a composite of users' fees, industry support, and continued federal investment.

The plan outlined in H.R. 820, calling for 17 billion dollars in federal support over four years (Mills, 1993), has been embraced by President Clinton as part of his administration's overall technology policy. The Civilian Technology Development Act of 1993, which is part

of H.R. 820, is part of the Clinton administration plan to encourage investment in start-ups and other small enterprises (DeMott, 1993; Higgins, 1993). Part of the financing for technology development in small businesses will come through federally provided venture capital funds piggy-backed on the equity capital provided by private sector venture capital firms. Government subsidized technology programs such as this have yielded some breakthroughs such as Apple Computer's Newton portable, which uses a microprocessor developed in the U.K. with European Community funds. (Hudson, 1993) However, many venture capitalists believe that H.R. 820 is much too complex, overlaps existing SBA programs (Saddler, 1993), and comes with too many strings attached for the health of the venture capital firms and small businesses involved. (Rodgers, 1993)

The thrust of the technology policy outlined in H.R. 820 centers on electronics and automobile industries, specifically the development of the information super-highway and alternative-fuel cars, with a substantial amount of research funds diverted from Defense Department research programs. (Davis and Frissy, 1993) However, defense conversion plans, relaxation of export restrictions left over from the cold-war era, and investments in computer networks have not been forthcoming, leading many small business executives and technology industry leaders to criticize the President's administration for unkept promises and a failure to act (Nomani, 1993).

One of the hoped for effects of the increase in technology spending by the federal government is an increase in jobs (Healey, 1993). The effectiveness and competitive efficiency of government programs such as those proposed in H.R. 820 has been questioned. Many computer industry executives have voiced concern over the government subsidized venture capitalism, arguing that the government should not put tax dollars toward potentially bad investments nor should it insulate start-up companies from market forces. (Higgins, 1993) The presence of U.S. tax dollars may keep the market from operating efficiently, actually costing more long term jobs in the global marketplace than the programs provide in the short run.

Others have expressed concerns that the venture capital fund allocation process will become politicized, favoring firms in the districts of powerful members of Congress instead over those with higher likelihood of success (Davis and Frissy, 1993). Mills has argued that Sematech- the government and industry consortium aimed at spurring the U.S. semi-conductor industry- has been a failure because the majority of semiconductor makers decided not to join the consortium. This resulted in one organization (the government backed consortium) competing perhaps unfairly against other organizations (private U.S. chip makers) in the global marketplace. (Mills, 1993) This situation seems unlikely to result in job growth or increased global competitiveness.

There appears to be wide disagreement on the efficacy of government sponsored investment in innovations aimed at creating jobs in the U.S. The July survey by the National Federation of Independent Businesses reported high levels of confidence in the economy among small business leaders, but only 4% rated the President's policies as "good" or "excellent" and just 1% gave favorable ratings to Congress and its policies (Business Week, September 5, 1994). Our study was conducted to determine the attitudes small business leaders and how their opinions may differ from executives at large companies regarding government

sponsored assistance programs, the influence they may have on innovation, and how government backed innovation programs may affect jobs. The following section outlines the research methodology utilized to investigate these attitudes.

RESEARCH METHODOLOGY

Survey Instrument

Data for this project were collected using a survey questionnaire. The survey items were developed from the literature on innovation and public policy which identified five factors as important in the economic success of innovations (Strong, 1992). These factors are the attributes of the innovation itself, industry characteristics, organization capabilities, the attitudes of the society in which the innovation is being developed, and the definition of an innovation's success. Questions were solicited from a panel of management researchers relating to these five factors, and the survey was pilot tested on a sample of twenty three executives in an evening MBA program. Variance restrictions and question clarity concerns resulted in the elimination of several items. Confirmatory factor analysis of the pilot sample responses identified only four factors, as the innovation attribute and industry characteristics questions loaded on the same factor. This is perhaps because the attributes of the innovation (e.g. whether they involved intense capital investment or pilot plant construction) were very closely linked to industry characteristics. After condensing the survey from five factors to four and eliminating items based on pilot study response, 32 attribute items and 13 personal and firm demographic items remained. Each item asked the respondent to indicate level of agreement with statements related to innovation, such as "Innovations involve a great deal of financial risk." Responses were recorded on a five point Likert scale. Six items related to innovation/industry attributes (Factor 1), nine items measured organization attributes (Factor 2), ten items addressed societal attributes (Factor 3), and seven items related to innovation success measurement and attitudes about government involvement (Factor 4). The survey was distributed to a sample of business leaders as discussed in the following section.

Sample

The survey was mailed to strategic managers at 357 firms in an industrialized Midwestern state and 122 usable responses were received for a response rate of 34.2%. Both the response rate and the sample size of 122 appear adequate for survey research of this nature. Because of the relatively high response rate, no follow-up survey was generated. The high response rate reduces the likelihood of response bias, so no analytic comparison of respondents and nonrespondents was performed. However, observation of means, ranges, and variance statistics for both respondents and non-respondents did not reveal any systematic biases in terms of revenue or number of employees.

Respondents were asked to state their attitude regarding several innovation-related statements as measured using a five point Likert scale ranging from strongly agree to strongly disagree. A demographic and industrial profile of the respondents is provided in Table 1.

TABLE 1

Demographic and Industrial Profile of Respondents
(N=122)

PERSONAL DEMOGRAPHICS AND ATTITUDES
Age: Mean=44.27 SD=9.46 Range= 27, 80 (in years)
Experience: Mean=20.58 SD=8.40 Range= 3, 42 (in years)
Ind Tenure: Mean=14.19 SD=9.51 Range=0.5, 55 (in years)
Comp Tenure:Mean=10.42 SD=9.50 Range=0.5, 55 (in years)

Gender: Male=99 {82.5%}, Female=21 {17.5%}

Position/Title: General Manager=78 {64.5%}
Owner=21 {17.4%}
Other=20 {16.5%}
Educator=2 {1.6%}

Personal Conception of "Innovation"
New Product=52 {46.8%}
Other=21 {18.9%}
New Manufacturing Process=20 {18.0%}
New Markets=10 {9.0%}
New Management System=5 {4.5%}
New Distribution Method=2 {1.8%}
New Organization Form=1 {1.0%}

FIRM DEMOGRAPHICS
Size: LT 50 =19 {15.6%}
51-250 =1 { 9.0%}
251-500 =5 { 4.1%}
501-999 =14 {11.5%}
MT 1000 =73 {59.8%}

Revenue: **Mean**=$3.360 MM, **SD**=7.326 MM, **Range**=$110 K, $40.4 MM

Type of Business:
Manufacturing=43 {36.1%}
Other=38 {31.9%} (Primarily consulting)
Finance=14 {11.8%}
Healthcare=10 {8.4%}
Transportation=5 {4.2%}
Retail=4 {3.4%}
Education=4 {3.4%}
Government=1 {0.8%}

Type of Technology of Primary Importance in Industry:
Computer/Information=70 {59.8%}
Other=14 {12.0%}
Machine=14 {12.0%}
Energy=8 {6.8%}
Communication=6 {5.1%}
Medical=3 {2.5%)
Biologic/Genetic=1 {0.9%)
Transportation=1 {0.9%}

As can be seen in Table 1, the average age of respondents was slightly over 44 years, with more than 20 years work experience, 14 of them in their current industry and 10 with their current company. The sample was predominantly males (82.5%) holding a position of general manager (64.5%). Almost half the respondents thought of innovation in terms of product development (46.8%). Analysis of firm demographics reveal that about 60 percent of the firms in the sample employed more than 1000 people, while 40 employed less than 1000. Mean revenues were 3.36 million dollars annually. Over two-thirds of the sample firms were involved in either Manufacturing (36.1%) or "Other" {primarily consulting} (31.9%). Almost sixty percent of the firms were involved in either computer or information processing industries.

Statistical Techniques

The attitudes captured in the responses were analyzed using cross-tabs to examine differences across business sizes varying from very large (greater than 1000 employees), large (500-999) medium (251-499) small (51-250) and very small (50 or fewer employees). In addition, descriptive statistics were generated to further our understanding of the range of attitudes within each group. The results of these statistical analyses are presented in the next section.

RESULTS OF THE RESEARCH

Results of the cross-tabs are summarized in Table 2. Cross tab matrices are shown in Table 3 for each of the statements demonstrating significant differences. The item numbers correspond to the question numbers on the survey.

The first six questions were related to innovation/industry attributes. Of these, only responses to questions 4 and 6 generated significant ($p<.10$) differences based on size of business. Both of these questions involved the importance of individuals in the innovation process. It appears that executives in larger firms are more likely to view creative individuals within the firm as critical to innovation activities. Employees with new ideas are perceived to be the primary drivers of innovation in large firms as contrasted to smaller businesses.

Questions 7 through 15 related to organization attributes. Of these items, only question 10 achieved statistically significant difference at the $p<.10$ level. This question addressed the role of current strategy in future innovation capabilities. Executives at small firms appear to view current strategy as a limiting factor in future innovation flexibility. Larger firms seem more comfortable within the strategic changes that may accompany innovation.

Questions 16 through 25 measured attitudes about social attributes. Only responses to question 23 were significantly ($p<.10$) different across business size. This question dealt with the importance of consumer judgements of desirability of innovations. Executives at larger firms seemed much more willing to leave judgements of innovation desirability in the hands of consumers than did their small business counterparts.

TABLE 2

Chi Square Likelihood Tests for Item Response Differences Across Business Size Classifications

ITEM #	CHI SQUARE VALUE	SIGNIFICANCE (p)
Innovation and Industry Attributes:		
1	16.76	.40
2	15.93	.46
3	18.40	.30
4	**36.15**	**.00**
5	11.86	.75
6	**25.77**	**.06**
Organization Attributes:		
7	18.34	.11
8	14.22	.58
9	12.92	.68
10	**26.22**	**.05**
11	16.30	.43
12	18.60	.29
13	11.92	.75
14	6.71	.98
15	20.08	.22
Social Attributes:		
16	21.01	.18
17	19.66	.24
18	18.52	.29
19	18.25	.30
20	20.53	.19
21	14.22	.58
22	12.36	.72
23	**26.86**	**.04**
24	19.75	.23
25	11.22	.79
Success Attributes:		
26	17.08	.65
27	**24.65**	**.07**
28	21.12	.17
29	8.92	.92
Personal Attitudes:		
30	22.95	.11
31	**25.46**	**.06**
32	**35.81**	**.00**

TABLE 3

Cross Tab Matrices For Statements Demonstrating Statistically Significant (p<.10) Differences
{SD= Strongly Disagree/ D= Disagree/ N=No opinion SA= Strongly Agree/ A=Agree}

ITEM 4

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	5	0	2	8	4	19
51-250	0	6	0	4	1	11
251-499	0	1	0	3	1	5
500-999	0	9	1	3	1	14
>1000	7	19	1	36	10	73
Column Total	12	35	4	54	17	122

ITEM 6

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	0	4	0	3	12	19
51-250	0	1	0	4	6	11
251-499	0	0	0	2	3	5
500-999	0	0	1	5	8	14
>1000	1	0	4	36	32	73
Column Total	1	5	5	50	61	122

ITEM 10

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	0	2	2	10	5	19
51-250	0	0	0	6	5	11
251-499	0	2	1	0	2	5
500-999	1	0	0	7	6	14
>1000	3	11	8	37	14	73
Column Total	4	15	11	60	32	122

ITEM 23

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	3	6	2	4	4	19
51-250	0	5	0	2	4	11
251-499	0	0	0	3	1	4
500-999	0	3	2	6	3	14
>1000	2	8	5	41	16	72
Column Total	5	22	9	56	28	120

ITEM 27

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	0	14	2	3	0	19
51-250	1	7	0	3	0	11
251-499	0	2	2	0	0	4
500-999	0	10	1	3	0	14
>1000	9	30	13	15	4	71
Column Total	10	63	18	24	4	119

ITEM 31

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	3	6	3	4	3	19
51-250	4	1	0	6	0	11
251-499	1	3	0	1	0	5
500-999	2	1	1	6	4	14
>1000	18	22	8	20	3	71
Column Total	28	33	12	37	10	120

ITEM 32

Firm Size (# of EMP)	Responses SD	D	N	A	SA	Row Total
LT50	4	6	3	2	4	19
51-250	0	5	0	3	2	10
251-499	0	0	1	3	1	5
500-999	1	9	3	0	1	14
>1000	4	16	6	24	21	71
Column Total	9	36	13	32	29	119

Questions 26 through 29 measured attitudes about innovation success. Question 27 dealing with returns on R&D investments yielded differences across business size distributions significant at the $p<.10$ level. Executives at small businesses were less inclined to measure an innovation's success in terms of economic returns on R&D expenditures than were executives at larger firms.

Questions 30, 31, and 32 dealt specifically with the role of government in job creation and innovation by businesses. Responses to questions 31 and 32 were significantly different ($p<.10$) across business sizes and responses to question 30 approached significance ($p=.115$). Taken together, responses to these three questions suggest that executive at larger companies view government intervention in markets less favorably than do executives at smaller companies. In addition, large company managers do not appear to view government programs as an effective means of innovation development or job creation, at least when compared to managers at smaller firms.

The results of the data analysis suggest that there are some important differences between the attitudes of executives depending on company size. Implications of these findings, with an emphasis on the potential impact on HR 820, will be discussed in the following section.

IMPLICATIONS FOR THE SUCCESS OF HR 820

The results seem to suggest that executives at larger firms look to creativity of their employees for innovations, are more likely to consider innovations which extend beyond the firm's current strategies, and are comfortable allowing the invisible hand of the marketplace to "choose" legitimate innovations. They are also more likely to internally measure the success of an innovation in returns on Research and Development dollars expended.

Compositely, these results may reflect the munificent resource environment faced by large firms compared to smaller firms. In other words, large firms have more employees to rely on for creative ideas, more administrative slack to direct at strategic change, and more capital to invest in coordinated Research and Development programs. These circumstances are likely to create some level of competitive advantage in the marketplace, which may explain why large firms are more inclined to rely on classic market operation to determine the fate of an innovation. In addition, large firms would typically exert greater control over the distribution channels and bring other scale-economy pressures to bear on market actions. Therefore, they may be able to influence markets to their advantage more so than small businesses can.

The perceived market influence and competitive advantage accruing to firms in larger size ranges may also explain why these firms do not support government intervention in promoting innovation or job enhancement. Attempts by the government to make resources (either capital or technology) more readily available to small businesses could diminish some of the competitive advantages currently enjoyed by larger organizations.

Because small businesses appear to be more favorably disposed to government involvement than larger businesses, small businesses' response to a technology assistance program such as that outlined in H.R. 820 may be different than large businesses' response to similar programs (e.g. Sematech). The reasoning behind the programs proposed in H.R. 820

appears sound, but of course, final judgement must be suspended until the tricky details of implementation are resolved.

Indeed, even though the opinions of small business executives are different than their large company counterparts, there appears to be much disagreement among small business leaders on the role of government. The range of responses to the questions about government programs aimed at promoting innovation, the effectiveness of such government programs, and the ability of these programs to create jobs demonstrate that a substantial number of small business leaders remain unconvinced of the government's ability to deliver on promised assistance.

For instance, 43% of respondents in companies of fewer than 250 employees responded either disagree or strongly disagree to question 30 on the appropriateness of government involvement in innovation development. Similarly, 47% disagreed either strongly or somewhat with the statement that government should be involved in job creation programs. Over one-third of small business leaders believe that government involvement reduces the effective operation of markets. As a group, small business managers are more likely to view government programs favorably than are large company managers, but there remains a large portion of skeptical small business leaders. Whether or not H.R. 820 can prove beneficial to small businesses in the face of such skepticism remains to be seen.

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