PRODUCTION CAPACITY, COMPETITION AND PROFIT MARGIN AS PERCEIVED BY PRINCIPALS OF SMALL AND MATURE MANUFACTURING FIRMS

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ABSTRACT

This is an exploratory study which attempts to measure the owner's perception of the firm's production capacity, degree of competition in the marketplace and anticipated profit margin. Manufacturing firms in the mature stage of the business life cycle were surveyed.

INTRODUCTION

During the past decade, growth in U.S. manufacturing productivity has fallen sharply from the levels attained in the 1960's. The American manufacturer has lost a significant share of the world's export market, and nonunion labor along with foreign competition has made it harder to run a manufacturing plant at a profit. Many manufacturing jobs continue to be our most valuable and unwanted export.

This trend makes it appear that ingenuity no longer flourishes among today's manufacturers and leads to a decline in industrial innovation. We frequently hear the question asked, "Can the American manufacturer compete?"

This questions is justified after reviewing the employment growth in each of the six major business segments between the years 1960 and 1982: [1]

Business Segment	% Increase in Jobs
SERVICES	158%
FINANCE, INSURANCE and REAL ESTATE	104%
GOVERNMENT	89%
WHOLESALE & RETAIL	80%
TRANSPORTATION, UTILITIES & CONSTRUCTION	30%
MANUFACTURING	12%

In addition, The State of Small Business [2] reports data to show that manufacturing is small business. The 1984 report showed the following figures for the manufacturing industry:

"Distribution of Establishments by Employment Size"

Year	Number of Employees 1-19	20-99
1956	67.1%	23.2%
1962	65.7	24.4
1967	62.9	25.6
1972	61.1	26.5
1977	64.7	24.4
1980	60.73	26.84

Eighty-seven to ninety percent of all manufacturing firms have fewer than 100 employees. Clearly the question should be phased, "Can the smaller manufacturer compete?" This is an exploratory effort that intends to address this issue by asking the following four questions:

1. Do the owners perceive a need to improve the firm's production capacity?

2. Are the owners satisfied with the firm's profits and cash flow?

3. Do the owners perceive a highly competitive marketplace?

4. What are some significant correlations among the above variables and demographics of the firm and owner?

To answer these four questions we first need to examine the three key variables of production capacity, competition and profits and explain the method for measuring the owner's perception of these variables.

VARIABLES STUDIED

Production capabilities, competition and profit are three important elements of a firms' strategic choices and play a mediating role between the firm and its environment. In smaller firms, the owner determines how the firm will react to the environment and how the firm will implement the chosen decisions. Many times it is the owner's faith in progress, their sense of pioneering, optimism with respect to survival, profits and innovation that keeps a firm at the leading edge of competition.

Also, smaller businesses face great price and quality competition of a degree unknown by their predecessors, and manufacturers experience greater difficulties when obtaining adequate financing, adapting to the latest technologies, and improvising with substitutes of a highly competitive skills and scarce materials. Brittan and Freemand describes a firms' challenge when a firm attempts to introduce a new product:

> Occupying a niche within a newly established resource space is usually a very risky proposition: resource environments are often changing rapidly, there are significant liabilities of newness associated with any organizational innovations and both future innovation and future competition present significant threats to continued viability." [3]

The above quote addresses some major issues which face the firm, however, this research identifies the basic elements of each variable and queries the owner regarding that element. Following is a brief explanation of each variable.

PRODUCTION CAPACITY

The firms' production capacity is a component of its technological resource base. Even though this research does not intend to directly measure the degree of the firms' technological development, the production capacity variable is designed to be complementary with Hickson, Pugh and Pheysey [4] and Kilby's [5] view of technology.

The first reference breaks down the general concept of technology into three components: Operations technologies which include the techniques used in work flow activities ranging from automated equipment to pens and pencils. The second component is materials, knowledge about the materials processed in the work flow. The third component is knowledge technology referring to the knowledge used in the work flow.

Kilby operationalizes technology into the following four components: 1) acquiring and overseeing assembly of the factory, 2) industrial engineering to minimize inputs with a given production process, 3) upgrading processes and product quality and 4) introduction of new production techniques and products.

Walton [6] found that the more operationally developed the task technology, the more the structure needs to emphasize control, efficiency, and structured problems solving rather than learning and unstructured problem solving. Further development of an established technology is relatively mechanistic with a master and stabilized technology.

Walton [7] also found that as one technology is replaced by another, the volume of production associated with the old technology becomes less and less attractive for large producers. When this is the case, the technology may be sold to a smaller producer to continue using it.

Argyris [8] suggests that there must be a "prime mover" when the adapting firm accepts a new technology:

> If the technology is imported into the organization from outside, then someone or some set of individuals within the organization must decide to import the technological change.

Argyris concludes that there must be a reason for change in technology, because established organizations normally tend to change slowly, and it would appear, that for established firms, technology would have to change before structure.

This research assumes the firm's principal as the prime mover for any technological change and measures the owner's attitude towards production capacity, efficiences and equipment with the three questions as shown in Table A.

COMPETITION

Research among size, technology and competition is not conclusive. Research in this area has come to contradictory conclusions and the remaining questions are based on how much competition an organization faces in the environment and whether its size and sophistication provides it any significant advantages.

Neganhi and Reiman [9] suggest that competitive market conditions make decentralization more important for a firm's success than do less competitive situations. Pfeffer and Leblebiri [10] found that a more competitive environment led to a greater demand for control and coordination; a more competitive environment produced a greater frequency of reporting, more emphasis on written communications, and greater communications of decision-making procedures. Whereas the less competitive environment produced more changes in product design, production and number of products.

DuBick [11] found that newspapers in a competitive environment reflected the complexity of the community, where in non-competitive environments newspapers did not pay attention to all community groups. While Fennell [12] found that in competitive situations, hospital services increased. She attributes the increase to the competition rather than to service needs.

How competitive is the small manufacturing firm? This study postulates that the owners will react to their perception of competition relative to the competitor's size, financial strength, management expertise and product quality. Consequently, six questions were developed to measure the owners perception of competition and the questions are shown in Table B.

PROFIT MARGIN EXPECTATIONS

The microeconomic theory of the firm assumes that the firm's single goal is profit. If this is a realistic assumption, the researchers would have little problem in determining the effectiveness of the firm; researcher could analyze the performance of smaller firms as a function of net income. By definition, firms with more profits would be considered more effective, successful and achieve their goals more completely than less profitable ones.

Some economists, most notably Milton Friedman [13] have argued that profit maximization should be the only long-run objective of the business firm. Other goals, such as social responsibility and employee welfare, should take care of themselves if profits are pursued without fiscal constraints and market imperfections. Through its purchasing power, the public will not allow socially irresponsible firms to remain in existence.

However, such a perspective does not adequately recognize the smaller firms are beset by numerous demands which require attention in the short-run. Smaller firms cannot ignore these demands or discount today's sense of urgency with long-run objectivity, and profit cannot be the sole measure for performance.

Pfeffer and Salancik [14] has shown that profit is a motive during modest growth periods, but that after a certain size, profits level off or even decline. Large corporations in the maturity stage are not any more profitable than firms in the birth and growth stages.

From standard accounting practices, we see that a firm's profitability is a function of more than its net income; a profitable firm also has a positive cash flow, sufficient cash reserves, and an adequate return on investment to meet the owner's expectations. In order to measure profitability in this manner, the questions as shown in Table C have been developed to measure the owner's perception of the firms' profitability.

RESEARCH DESIGN

The population used in this study met the following criteria:

1. manufacturing firms
2. located in the midwest
3. fewer than 115 employees
4. in business for at least 5 years
5. the respondent is a principal owner of the firm.

The use of this criteria is intended to identify a population of manufacturing firms who have a long history of survival yet remained small over their existence.

SAMPLE: Questionnaires were sent to 469 firms in a large midwestern city; 120 responded (25.6% response rate); 101 instruments were usable. Following are the demographics of the sample:

Characteristic	Average
Respondent's Age	48.8 years
Respondent's Education	15.5 years
Firm's Start-up Date	1939
Respondent's % of Ownership	52.1%
Employment:	
Full-Time	39.8 employees
Part-Time	8.1 employees
Journal Subscriptions	5.2 journals
Price Markup	41.1%
Experience Required for Employment	0.7 years

Employee Education:	Number of Employees
Master's Degree	1.1
Engineering, Undergraduate	0.4
Science, Undergraduate	0.8
Technical Degree, Two-Year	0.6
Technical Diploma, High School	7.2
Certified Training	2.0
Non-Certified Training	1.1

Computer Usage: (See Note A)	Yes	No
Bookkeeping	42.6%	57.4%
Accounts Payable	40.6%	59.4%
Accounts Receivable	47.5%	52.5%
Scheduling	8.9%	91.1%
Quality Control	1.0%	99.0%
Inventory Control	31.7%	68.3%
Word Processing	14.9%	85.1%
Mailing Labels	23.8%	76.2%
Other Computer Applications	34.7%	65.3%

Sales Volume:	Percentage
under $20,000	0.0%
$20,000 to $500,000	10.9%
$500,000 to $1 million	19.8%
$1 to 3 million	36.9%
over $3 million	32.7%

Form of Business:	
Sole Proprietor	19.8%
Partnership	5.0%
Subchapter S	25.7%
Corporation	49.5%

(Note A: "Computer usage" is considered a variable and is intended to define the degree of computer utilization employed by the firm. The degree of computer utilization is measured by the number of applications used by the firm of the nine possible usages shown above.)

ANALYSIS OF RESULTS

The questions shown in tables A, B and C were analyzed using SPSS-X and found to be a reliable measure of the owner's response regarding each of the variables under investigation. The response was measured on a nine-point scale and exhibited the following mean values:

Variable	Mean	Scale Interpretation
Production Capacity	7.1	"9" indicates the owner feels current capacity meets demand

Competition in the Marketplace	3.0	"9" indicates the owner perceives a strong competition
Profit Margin	5.4	"9" indicates the owner expects high profit margins

The abovementioned mean values are a relative measure and could include elements which may bias the results, however they do suggest some general tendencies of the owners' as they perceive the variables under study.

The mean value of 7.1 for production capacity implies the following answer to question of whether the owners perceive a need to improve the firm's production capacity: The owners appear to have a positive attitude towards their current production capacity indicating that their present equipment is adequate to meet demand even though they could purchase more cost efficient equipment.

The mean value of 3.0 for perceived competition in the marketplace may indicate that the owners of these small and mature manufacturing firms do not see an intensely competitive environment. The mean value may indicate that the owners may not see their competitors as having more experienced management, better products or greater financial strength. This phenomenon, if verified by future studies, could be explained by the extraordinarily mature age of the firm. As shown in the demographics of the sample, 1939 was the average start-up date of the firms, and may indicate that firms with a long history of survival do eventually attain a superior competitive position, or at least are lead to believe that they have attained a uniquely competitive position in the marketplace for their products. Which firms the owners see as their competitors remains unanswered by this research.

The mean value of 5.4 for profit margin may indicate that profitability does not play a dynamic role in there strategic planning although the firms have adequate profitability. Given the firm's longevity, it appears they no longer have to deal with many of the financial issues which are commonly faced by young start-up ventures. This finding appears to coincide with Pfeffer and Salancik findings that the profit motive is significant during only certain periods in a firm's growth. We could conclude that the firms in this sample experience neither exceptionally weak nor strong financial performance as measured by their cash flow, cash reserves and return on investment.

The fourth and final question asked at the outset of this exploratory research searchs for possible correlations which could be identified among the variables under investigating and the demographics of the firm and the owner. This additional research effort is intended to identify other significant relationships which may not be obvious to the casual observer and may suggest possibilities for future research. Table D summarizes the significant relationships which have been found among the variables.

Following is an analysis of some of the important relationships which the findings in Table D suggest:

1) Production Capacity:

   a. Positive correlation with percent of ownership

indicates that the higher the percent of ownership or the higher the controlling influence of the respondent, the more likely the owner or respondent is satisfied with the current production capacity.

b. Negative correlation with computer usage (see note A) suggests that owners who are satisfied with their current production capacity are less likley to introduce and/or use computer technology.

c. Full-time employment shows a positive correlation with production capacity which suggests that the older equipment which is more labor-intensive produces a greater overall demand for labor. This also reinforces one of the positive economic benefits of encouraging the growth and development of smaller businesses: job creation and the job creation could be attributed to the more common use of older, more labor-intensive equipment and processes.

d. The positive relationship between the owner's perception of competition in the marketplace and the firm's current production capacity suggests that the owners are not likely to upgrade their production capacity if they perceive a highly competitive marketplace. In a competitive marketplace, it appears that the smaller manufacturer will tend to utilize current equipment more efficiently rather than purchase new equipment. This finding coincides with Pfeffer and Leblebiri who found that the less competitive environments produced more changes in product design, production and number of products. The following relationship coincides with this finding.

e. Profit margin expectations are negatively correlated with production capacity. This relationship implies that the owners who do not believe that their equipment is adequate and do not perceive a need to upgrade their present equipment also believe they have less than adequate cash flow, cash reserves and return on investment. If profit is a primary motive for these owners, as some economists maintain, then it is unlikely that these owners will voluntarily invest in new equipment and they are even less likely to do so in a very competitive marketplace. Another interpretation from this finding implies that firms who kept using the older technologies rather than investing in the latest production equipment also tended to experience significantly lower profits. Consequently, when these smaller manufacturing firms face competitive markets, they may delay new equipment purchases because they see the purchases as drain on their cash during the time of greatest demand, i.e., when the firm faces strong price competition.

2. Perceived Competition in the Marketplace:

a. Profit margin expectations are negatively correlated with perceived competition. This finding along with the

aforementioned relationships in 1.d and 1.e, suggest that owners of small and mature manufacturing firms may take a reactive posture rather than a proactive posture in response to strong competition.

b. The negative relationship with the owner's age suggests that the older owners perceive less competition in the marketplace. This correlation does coincide with the previous analysis regarding the mean value: "firms with a long history of survival do eventually attain a superior competitive position, or at least are lead to believe that they have attained a uniquely competitive position in the marketplace for their products." Age of the owner or firm does appear to lessen the fear of competition in the marketplace.

c. A positive correlation with part-time employment suggests that owners of established manufacturing firms do tend to use more part-time workers when faced with competitive market situations. This may represent a more frequently used strategic response to competition then the purchase of new production equipment. Part-time labor will help to keep overhead and marginal labor costs low while trying to maximize margin under the pressure of competitive pricing.

3. Profit Margin Expectations: The conclusions drawn above in 2.c appear to be reinforced by the positive relationship between part-time employment and profit margin expectations. The owners who are most satisfied with their cash flow, cash reserve and return on investment also frequently employ part-time workers.

RESEARCH OPPORTUNITIES

The research findings and implications lead to the following opportunities for further study:

1) Can research identify the key managerial issues involved in equipment replacement assuming the following relationships identified in this study?
   a. The principal owner tends to have a controlling influence.
   b. Production capacity is related to the owner's perception of competition.
   c. Expected profit margin is related with perceived competition.
2) Will capital investment by smaller manufacturers significantly reduce employment opportunities with these firms or will the increased production capacity cause these firms to expand their market share and at least maintain current employment levels?
3) To what degree are the owners' decisions affected by their perception of variables such as competitiveness in the marketplace and desired profit margins?
4) Does the extent and quality of information lead smaller manufacturers to replace, upgrade or use currently equipment more efficiently?
5) Does the perceived uncertainties in a dynamic and competitive marketplace increase or decrease the owner's profit expectations?
6) Can the complexity of new equipment and technologies be a predictor for assimilation of the technology by the smaller manufacturer? Is the smaller manufacturer reluctant to invest in new production equipment?
7) Does the smaller manufacturer tend to hire more employees with a high school diploma than other types of graduates and require less work experience?

8) Among manufacturing firms with fewer than 100 employees, what is the relationship among sales, employment, capital investment and new job creation? How does this relationship compare with firms having 100 to 500 employees?

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TABLE A
PRODUCTION CAPACITY

This variable is designed to measure the anticipated degree of change in the operations technology as perceived or effected by the principal owner of the firm. The following questions were found to have an alpha coefficient of 0.970:

1) Our firm's efficiency has remained about the same over the last few years.
2) Our firm could purchase new equipment that could cut our costs significantly.
3) Our present equipment will be sufficient to meet our need for the next two years.

TABLE B
PERCEIVED COMPETITION IN THE MARKETPLACE

This variable is designed to measure the respondent's perception of other similar firms as to their competitive nature. The following questions were found to have an alpha coefficient of 0.784:

1) Our competitors provide better service.
2) Our competitors have more sales outlets.
3. Our competitors have greater financial strength.
4. Our competitors sell a better product.
5. Our competitors are very professional.
6. Our competitors have more experienced management.

TABLE C
PROFIT MARGIN EXPECTATIONS

This variable is designed to measure the degree of profit margin, cash flow, and financial reserves that the firm's principal owner anticipates from the business operation. The following five questions were found to have an alpha coefficient of 0.854:

1) Our cash flow always exceeds our expenses.
2) Our firm never runs short of cash.
3) Our firm always has enough cash on hand to carry us through the "dry times."
4) Our firm always shows a profit.
5) I am pleased with the return from the time and money that we invest in this business.

TABLE D
CORRELATIONS

I. Production Capacity

Full-time employment	+0.1843 (*)
Percent of ownership	+0.2355 (**)
Jounral subscription	+0.2081 (*)
Employment of people with:	
Masters Degree	+0.1678 (*)
Technical, Two Year College	+0.2305 (**)
Technical, High School	+0.2345 (**)
Certified Training	+0.2774 (**)
Non-Certified Training	+0.2974 (***)
Computer usage	-0.2049 (*)
Competition in the Marketplace	+0.2927 (***)
Profit margin Expectations	-0.2037 (*)

II. Perceived Competition in the Marketplace

Respondent's Age	-0.2195 (*)
Part-Time Employment	+0.2462 (**)
Profit Margin Expectations	-0.2037 (*)

III. Profit Margin Expectations

Price mark-up	+0.1660 (*)
Part-Time Employment	+0.1481 (*)

Level of Significance:
(*) = 0.05
(**) = 0.01
(***) = 0.0001

Proceedings

Great Lakes Small Business Institute Directors' Association

1986 Annual Conference

O'Hare Plaza Hotel
Chicago, Illinois
October 16, 17, 1986

Lowell E. Stockstill, J.D., Editor

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PREFACE

These Proceedings represent the written record of the 1986 Annual Great Lakes Small Business Institute Directors' Association Conference held at the O'Hare Plaza Hotel in Chicago, Illinois, October 16, 17, 1986.

Special credit should go to Les Brozman, Assistant Regional Administrator, Region V, U. S. Small Business Administration for his assistance with disseminating information and local accommodations.

I am also grateful to the many authors, workshop coordinators, chairpersons, discussants, and paper reviewers who contributed to the program and conference. It is these people who compose the program, and who make our organization a success.

As Vice President of Programs, my thanks goes to my fellow officers, Sherm Timmins and Mike Broida, for their assistance and encouragement. My sincere appreciation also extends to Jim Thomson, Regional Administrator, Region V, U. S. Small Business Administration and Jack Brothers, SBIDA President for their willingness to open the conference with current management assistance news.

Finally, I give credit for assistance with the agenda and the Proceedings to Norma Kettler, Office Administrator, and Susette Rosalina, Faculty Assistant, at Wittenberg University for their conscientiousness and patience.

I wish all of you an informative and enjoyable conference. I shall look forward to your suggestions to further advance our programs and association.

Lowell

Lowell E. Stockstill
Vice President - Programs

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