

Operations  
management  
activities of small,  
high growth  
electronics firms  
assignme...



**ASSIGN  
BUSTER**

## OPERATIONS MANAGEMENT ACTIVITIES OF SMALL, HIGH GROWTH

ELECTRONICS FIRMS In a relatively short period of time the Japanese have been able to produce higher quality products that are more reliable and cost less than many competing products manufactured throughout the world.

Their ability to accomplish this task has been attributed to their precise utilization of various operations management activities, along with human resource development in the manufacturing segment of their organizations.

If the intensive level of global competition brought about by the Japanese has highlighted one thing for American manufacturers, it is the importance of operations management activities in the competitive success of the firm. A number of writers have indicated that systematic participation in typical operations management activities may enable a firm to produce a realible, quality product at a competitive price. 1, 2) However, most previous research in operations management has concerned itself with small-scale problems within the context of large firms. (3, 4) This unduly restrictive focus has not provided the data to develop the strong conceptual framework needed to identify the interrelationships and impact of operations management on the total organization. (5) Thus, there is a general lack of system-wide research in operations management.

The purpose of this article are: (1) to determine if systematic participation in commonly recognized operations management activities has an impact on a firm's performance; (2) to explore the extent of this participation in a dynamic small business manufacturing environment; and (3) to correct some of the methodological shortcomings of past system-wide research on operations management and financial performance. Thus, this research

<https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

attempts simultaneously to address three of the major deficiencies in the operations management body of knowledge.

Utilization of a small business environment allows a number of factors causing significant problems in undertaking meaningful empirical research in large organizations to be overcome. These factors include: 1. Frequent lack of uniformity with regard to process technology, organization structure, and strategy in large businesses in similar industries. 2. The inability to obtain meaningful financial and other performance data. 3. The nature and complexity of large organizations that make the conclusions of numerous research efforts difficult to validate and/or replicate. 4. Poor experimental design that has resulted in the use of weak or inappropriate statistical procedures to test hypothetical constructs. 5. Relatively non-robust statistical procedures that are generally required due to limited sample size.

(6) It appears that most of these factors exist primarily because of the heterogeneity of large businesses. To obtain a large number of homogeneous firms it seems logical to investigate the small business environment. (Approximately 95 percent of all business can be classified as small businesses. The process of identifying homogeneous firms may be facilitated by enlisting the aid of a professional business or trade association.

RESEARCH IN OPERATIONS MANAGEMENT Research in operations management addressed specifically to small business has been relatively sparse. Reuter investigated the utilization of specific operations management techniques in various size businesses, including small firms. (7)

Studies in inventory management and control have been undertaken by Davis and Whybark(8) and Fuerst. (9) The use of forecasting systems and

probabilistic forecasting in small businesses has been treated in a paper by Anderson. 10) Forecasting in the development of strategic plans for small business has been addressed by Robinson. (11) Covey identified the special set of problems encountered when implementing a manufacturing information system in small businesses. (12) Location decision criteria utilized by high technology firms were investigated by Galbraith and De-Noble. (13) Riggs and Bracker, in one of the very few studies that examines the impact of operations management activities on financial performance, found that small mature firms that utilized forecasting and aggregate planning activities outperformed non-users. 14) Research that has examined operations management in larger firms has overwhelmingly addressed small scale micro problems. Although there is an extensive body of knowledge on these specific techniques, there is little if any macro research that examines system-wide interrelationships and their impact on financial performance in large or small firms. (15) Thus, it appears that there is a fertile medium within small businesses to study operations management and system-wide relationships. FIRM OPERATIONS MANAGEMENT ACTIVITIES

Prior research has failed to develop and operationalize a procedure to categorize and measure operations management activities in small or large firms. A content analysis of the operations management literature and interviews with industry executives and academics revealed eleven distinct activities that compromise the area. (16) These are: (1) aggregate planning, (2) forecasting, (3) facilities layout, (4) facilities location, (5) job design, (6) inventory control, (7) product or service design, (8) quality and control, (9) maintenance, (10) production control, and (11) inventory control. See table

<https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

1. ) [Tabular Data Omitted] **METHODOLOGY** **Participants** The sample consisted of 217 owner/managers of electronics businesses who are members of the American Electronics Association (AEA). (17) Names and addresses were obtained from the AEA membership guide. Firms were included in the sample if they were privately held, had been in business at least five years, were owner-managed and had 100 or fewer employees. Thus, the process of identifying homogenous firms was facilitated by enlisting the aid of the AEA and investigating the small business environment.

Members received a written questionnaire (available from the authors) at their place of business, and reported industry-specific financial business performance data over a five-year period. According to Bettis, Brawley, and Galbraith and Nathanson, five years is an adequate period to evaluate change and performance in small firms. (18) **Survey Instrument and Procedure** The questionnaire was adapted from a prior study by Bracker. (19) A select group of AEA members, experts in the electronics industry, and researchers were interviewed to assist in adapting the questionnaire.

Some items were rewritten and others eliminated, based on interview comments. In addition, unstructured and structured interviews of a select group of AEA members as to the applicability of the questionnaire were undertaken. A modified approach to Dillman's Total Design Method (TDM) was employed in the design and implementation of the survey. According to Dillman, in the 48 surveys employing the TDM, no survey has obtained a response rate of less than 50 percent. (20) However, the method has not been tested in larger metropolitan areas or in numerous nationwide studies. <https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

Nonetheless, it was determined that the TDM should assist in generating a sufficient response rate. Postcards were sent to each CEO one week before the initial mailing. All of the mailings were sent by certified mail. A second mailing was sent to non-respondents three weeks after the initial mailing. A third mailing was again sent to non-respondents three weeks after the second mailing. Follow-up phone calls were made to the remaining non-respondents after the third mailing. Ninety-seven firms responded to the questionnaire, for a total response rate of 45 percent. Of these 97 responses, 73 (34 percent) were usable.

According to Norton(21) a response rate of 20 to 25 percent is an acceptable rate of return for this industry subgroup. The response rate is less than prior studies that used the Dillman Total Design Method. However, the nature of the questionnaire, which asked for five years of confidential performance information (all firms were privately owned), and a second questionnaire used to measure the motivation of owner/managers probably accounted for a less than 50 percent response rate. No significant differences were found in the pattern of responses associated with each of the three mailings.

This result indicates that there is probably not a problem with non-response bias. The average age of the firms was 9.2 years, with a range of 6 to 27 years. Revenues ranged from less than \$500,000 to over \$12,000,000 per year. The average revenue per year was \$4,250,000 while the average net income before taxes was \$300,000. The number of employees ranged from 4 to 100 with an average of 71 employees. Although it was not possible to compare these demographics with those of the original 217 firms, the 45

percent response rate should have increased the probability of obtaining a representative sample.

**Dependent Variables** Few researchers have used industry-specific financial business performance data as dependent variables. (22) This gap may have affected the outcome of previous research. To overcome this problem, dependent variables were developed based on interviews with experts in the electronics industry, entrepreneurs who own and manage electronics firms, and published industry data sources. An accurate description of performance is essential to measuring success within organizations. A comparison of inter-industry performance is confounded by the utilization of generic performance measures.

Furthermore, inappropriate performance measures within an industry impede the assessment of firm success. The industry-specific financial performance data that served as dependent variables were: (1) average sales growth, (2) average net income growth, (3) average present value growth, and (4) average CEO compensation growth. Average sales growth was the average sales growth for the five-year time frame. Average net income growth was the average net income before taxes for the five-year time frame. Average present value growth of the firm was the average book value of the firm, patents, and goodwill for the five-year time frame.

Average CEO (cash) compensation growth was the average growth in CEO compensation for the five-year time frame. By subtracting the previous year's performance from that of the current year, and then dividing by the previous year's figure, we arrived at the annual percentage growth rate. The

five yearly figures were then added and divided by five to determine the average percentage growth rate during the five-year period. These dependent variables should provide an accurate assessment of the performance of AEA members. DATA ANALYSIS

A number of questions were asked concerning each operations management activity identified in table 1. From each group of questions a multiple cutoff classification system was used to determine firm usage or non-usage of operations management activities, while responses to other questions were used to provide descriptive data. (23) This research tested the hypothesis that there was no significant difference in operating system performance caused by the systematic application of recognized operations management activities (independent variables).

Operating system performance (dependent variables) was measured by the four industry-specific financial business performance measures over a five-year time frame. One-way analysis of variance (ANOVA) was employed to test the above hypothesis. RESULTS The results in table 2 indicate that the average usage among the eleven techniques is 56.4 percent, with a range of 30 percent (facilities location) to 74 percent (maintenance). Regarding sales growth, for seven of the eleven techniques the mean for users is higher than the mean for non-users.

For two of these seven the difference in means is statistically significant at the  $p$  is greater than or equal to .05 level (aggregate planning and maintenance). In average net income growth, users outperform non-users for ten (91 percent) of the techniques. None of these differences are significant.



Similarly, for ten techniques the mean for users is higher than for non-users in average present value growth of the firm. Three differences are significant, aggregate planning at the  $p$  is greater than or equal to .01 level, and facilities and maintenance at the  $p$  is greater than or equal to .5 level. Three user firms (27 percent) outperform non-users in average CEO compensation growth. Interestingly, non-users outperform users on the remaining activities, with non-users of aggregate planning significantly outperforming users at the  $p$  is greater than or equal to .01 level. Overall, the results suggest that in terms of average sales, net income, and present value growth, users outperform non-users of operations management activities. Out of a possible 33 relationships, users outperform non-users 27, or 82 percent of the time.

However, a relatively small percentage of users outperform non-users at the significance level of  $p$  [is less than or equal to] .05 or better, only five out of a possible 33 (15 percent). Unfortunately, none of the operations management activities establish a clear pattern of users outperforming non-users in terms of statistical significance. However, both aggregate planning and maintenance are significant in terms of average sales and present value growth. Riggs and Bracker found that mature firms that utilized forecasting and aggregate planning activities financially outperformed non-users. 24) It is interesting to note that 8 out of 11 non-users of operations management activities outperform users in average CEO compensation growth, one (aggregate planning) at the  $p$ [less than or equal to].01 significance level. This may suggest that the CEO extraction of money may foster a short-term drain on cash, while their counterparts are keeping cash in their business,

thus making their firms more adaptable to future change. IMPLICATIONS AND CONCLUSIONS It is important to note that during the time of this study the sample firms were experiencing significant growth.

They did not have to deal with a constant demand situation or a dramatic restructuring of the industry. Because of this, many of the firms' owners may have been reluctant to invest in operations management activities. In addition, many of the owner-managers entered business because of a patentable product or proprietary production technique. Thus, some of the primary reasons for utilizing operations management activities – reducing cost and improving quality to remain competitive – may not be of prime importance at their current stage of development.

Furthermore, the cost of instituting operations management activities would decrease cash flows, and hence limit the CEO's ability to withdraw funds from the firm. Having been in business an average of 9.2 years, these businesses may be experiencing a natural harvesting of accumulated assets. The results may not be overly encouraging from the perspective of statistical significance; however, those firms that utilize operations management activities do display better performance. What may need to occur in these firms is not only increased utilization of these activities, but, more importantly, greater sophistication in their application.

The high rate of growth in CEO compensation (32.16 percent) may be preventing the firms from developing sophisticated operations management activities, thereby contributing to the lack of statistical significance between users and non-users on the various performance measures. Future research

should investigate this phenomenon, i. e. , the relationship between the level of sophistication of operations management activities and financial performance. In a study that investigated planning usage and sophistication, level of sophistication was significantly related to financial performance among small mature firms. 25) An earlier study of this sample, which examined the relationship between the sophistication of the strategic planning process and financial performance(26) found that firms whose owner/managers implemented sophisticated strategic planning processes financially outperformed other firms which were less sophisticated in their planning pursuits. One interesting finding in this study was that two or three iterations of the planning process were necessary before a firm was able to fine-tune that process and develop its level of sophistication.

Given recent emphasis on the importance of operations management activities, the firms in this study may be in the process of understanding and developing their activities. The identification of specific techniques within the various activities, i. e. , EOQs, MRP, and Statistical Quality Control, may prove more successful in finding significant results. Investigation of these techniques and their level of utilization may provide greater insights into the relationship between operations management activities and financial performance. From a competitive vantage point, the results are encouraging, users outperforming non-users.

The current level of global competition in the electronics industry suggests that American companies utilize the tools at their disposal to compete as efficiently and as effectively as possible. It appears that although they are utilizing these tools, there is significant room for improvement in terms of <https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

sophisticated implementation. Reuter, in a previous study of operations management techniques, found that smaller firms tended to utilize operations management techniques to a lesser extent than larger firms (having over 100 employees). 27) There may be some justification to the idea that as firms grow larger, the sophistication with which they implement operations management activities and techniques increases. However, this study found that use and performance among smaller firms (fewer than 50 employees) did not differ from that of larger firms (between 51 and 100 employees). It appears that the importance of operations management activities has permeated even the smallest electronics firms and may be a prerequisite for successful performance.

The results of this study may or may not be representative of other growth industries. We hypothesize that highly regulated industries such as the medical products or biotechnology industries may experience different results than the electronics industry. In these two industries, the product is usually patented and the Food and Drug Administration (FDA) must approve a product before it enters the marketplace. Furthermore, firms must comply with Good Manufacturing Practices (GMPs) or face potential product recall and/or civil/criminal liabilities.

Thus, the impact of operations management activities on financial performance may be dramatically reduced in comparison to that for electronics firms. On the other hand, growth industries such as metal fabricating or office and supply equipment may display more significant relationships between operations management activities and financial performance because of the lack of patentable products and proprietary

<https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

production techniques. In these industries there is a highly competitive environment where cost control and efficiency may be of the utmost importance.

Replication of this study should occur in mature industries. The volatility associated with the electronics industry might lead one to expect that adaptation issues (planning) have greater importance than efficiency (operations) issues. The average sales growth rate (33.1 percent) exhibited by firms in this study is fairly good evidence that adaptation is probably of paramount importance in the decision making of the CEOs. Once the growth rate of these firms slows down, the emphasis previously placed on responding to environmental change (adaptation) may shift to efficiency of operations and cost control.

Thus, one would expect that as these firms mature, the utilization as well as the impact of operations management activities may increase. (28) Do associations such as AEA attract entrepreneurs who are concerned with external growth, and utilize operations management activities, or does being a member of the association foster this behavior? It is suggested that associations such as the AEA may play a vital role in the growth and development of firms. From a pragmatic standpoint, it may make good sense for a firm to belong to such an association.

The AEA may indeed provide much of the operational and strategic information that assists a firm in gaining management sophistication through the implementation of operations management procedures. Thus, associations such as the AEA may create a moderating effect on firm

performance. Another explanation for the lack of significant findings may relate to competitive marketing or niche strategies. It was felt that the small size of sample firms might indicate a lack of marketing or niche strategies, since successful achievement of these strategies may propel firms into a size range that was beyond the scope of this study. Another possibility may be that some of the firms had less than desirable results when they attempted more sophisticated marketing techniques. This could be true because: (1) the owner/managers for the most part had advanced degrees and training in engineering, not marketing, and (2) a previous study of this sample found that outsiders (consultants) did not play a significant role in improving financial performance. (29) This study has examined the impact of operations management activities on the financial performance of small, high growth electronics firms.

The results indicate that the utilization of various activities improves the financial performance of the firms under investigation. The lack of significant results in this study may be hypothesized to be a function of the failure of firms to utilize the various operation management activities on a systemwide basis. It is suggested that for firms to significantly improve their financial performance requires utilization of most, if not all, of the operations management activities. It appears that forecasting, aggregate planning, and the other activities are closely related.

If a firm undertakes forecasting, but then fails to do aggregate planning, it seems obvious that this would have an effect on system-wide financial performance. Thus, future efforts should investigate the system-wide

utilization of various operations management activities and their impact on <https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

organizational financial performance. If American manufacturers are to maintain or create a competitive advantage, it seems imperative that they use the ideas, tools, activities, and techniques at their disposal to improve their competitive stance.

This study demonstrates that utilization of operations management activities may assist small electronics firms in the achievement of this objective.

[Tabular Data Ommitted] (1) Robert H. Hayes and Steven C. Wheelwright, *Restoring Our Competitive Edge: Competing Through Manufacturing* (New York: Wiley, 1984). (2) N L. Hyer and U. Wemmerlov, "Group Technology and Productivity,": *Harvard Business Review*, vol. 62, no. 4, 1984, pp. 140-149. (3) Richard B. Chase, "A Classification and Evaluation of Research in Operations Management," *Journal of Operations Management*, vol. 1, 1980, pp. 9-14. (4) G. K. Groff, T.

B. Clark, and W. E. Riggs, "An Evolving Paradigm for Operations Management," paper presented at the Annual Meeting of the Academy of Management, San Diego, Ca. , 1981. (5) E. Buffa, "Research Perspective in Operations Management," *Journal of Operations Management*, vol. 1, no. 1, August 1980, pp. 1-8. (6) W. E. Riggs and J. S. Bracker, "Operations Management and Financial Performance," *American Journal of Small Business*, vol. 10, no. 3, 1986, pp. 17-23. (7) V. G. Reuter, "Becoming Competitive with Value Engineering/Value Analysis," *Journal of Systems Management*, vol. 36, no. 10, 1985A, pp. 24-31. 8) E. W. Davis and D. C. Whybark, "Small Business Inventory Management," *Production and Inventory Management*, vol. 17, no. 3, 1976, pp. 83-94. (9) W. L. Fuerst, "Small Businesses Get a New Look at ABC Analysis for Inventory Control," <https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>

Journal of Small Business Management, vol. 19, no. 3, 1981, pp. 39-43. (10) E. H. Anderson, " Probabilistic Forecasting New Small Business," Journal of Small Business Management, vol. 17, no. 3, 1970, pp. 9-13. (11) R. B. Robinson, " Forecasting and Small Business: A Study of the Strategic Planning Process," Journal of Small Business Management, vol. 17, no. 3, 1979, pp. 7-19. (12) R. E. Covey, " MRP for Smaller Manufacturing Businesses," Proceedings of The American Production and Inventory Control Society, 1980, pp. 102-104. (13) C. Galbraith, and Alex F. DeNoble, " Location Decisions by High Technology Firms: A Comparison of Firm Size, Industry Type and Institutional Form," Entrepreneurship Theory and Practice, vol. 13, no. 2, 1988, pp. 31-48. (14) Riggs and Bracker, " Operations Management and Financial Performance," pp. 17-23. (15) Groff, Clark, and Riggs, " An Evolving Paradigm. " (16) Riggs and Bracker, " Operations Management and Financial Performance," pp. 17-23. 17) Total sales of electronics products and services of U. S. -based companies was \$229 billion in the United States and over \$300 billion worldwide in 1987. Of that total, AEA member companies accounted for more than \$200 billion. Thus, AEA members represent 87 percent of U. S. sales and 67 percent of worldwide sales. (18) R. A. Bettis, " Risks and Industry Effects in Large Diversified Firms," Proceedings of the 41st Academy of Management National Meeting, San Diego, 1981, pp. 17-20; D. E. Brawley, " Strategy, Structure, and Performance Among the Stars," unpublished doctoral dissertation, Georgia State University, 1982; J.

R. Galbraith and D. A. Nathanson, Strategy Implementation: The Role of Structure and Process, St. Paul, Minn. : West, 1978. (19) J. S. Bracker, "

<https://assignbuster.com/operations-management-activities-of-small-high-growth-electronics-firms-assignment/>



Planning and Financial Performance Among Small Entrepreneurial Firms: An Industry Study,” unpublished doctoral dissertation, Georgia State University, 1982. (20) D. A. Dillman, *Mail and Telephone Surveys: The Total Design Method*, New York: Wiley, 1978. (21) J. Norton, personal communication, April 10, 1986. (22) J. S. Bracker and J. N. Pearson, “ Planning and Financial Performance of Small, Mature Firms, “ *Strategic Management Journal*, vol. , no. 6, 1986, pp. 503-522; L. W. Rue, “ Theoretical and Operational Implications of Long-Range Planning on Selected Measures of Financial Performance in U. S. Industry,” unpublished doctoral dissertation, Georgia State University, 1973; P. R. Wood, Jr. and R. L. LaForge, “ The Impact of Comprehensive Planning on Financial Performance,” *Academy of Management Journal*, vol. 22, 1979, pp. 516-526; H. J. Sapienza, E. G. Smith, and M. J. Gannon, “ Using Subjective Evaluations of Organizational Performance in Small Business Research,” *American Journal of Small Business*, vol. 2, no. 3, 1988, pp. 45-54. (23) Norton, personal communication; Bracker, “ Planning and Financial Performance,” pp. 503-522. (24) Riggs and Bracker, “ Operations Management and Financial Performance,” pp. 17-23. (25) Bracker and Pearson, “ Planning and Financial Performance,” pp. 503-522. (26) J. S. Bracker, B. W. Keats, and J. N. Pearson, “ Planning and Financial Performance Among Small Firms in a Growth Industry,” *Strategic Management Journal*, vol. 9, no. 6, 1988, pp. 591-603. (27) Reuter, “ Becoming Competitive with Value Engineering/Value Analysis,” pp. 24-31. (28) V. G.

Reuter, “ Small Businesses Really Do Manage,” *American Journal of Small Business Management*, vol. 2, no. 3, 1978, pp. 23-32; idem, “ Selected

Management Controls, Audits, Budgets, and Capital Funds Justification,”  
Journal of Systems Management, vol. 36, no. 8, 1985B, pp. 14-21. (29) J. S.  
Bracker, “ The Impact of Consultants on Small Entrepreneurial Firm Strategic  
Planning,” paper presented at the Sixth Annual Strategic Management  
Society Meeting, 1986 Dr. John N. Pearson is an associate professor of  
operations at Arizona State University. He has published articles in strategic  
and operations management. Dr. Jeffrey S. Bracker is an associate