

2007 STUDY

PERFORMANCE AND
PRACTICES OF
WESTERN
PENNSYLVANIA'S
MANUFACTURING FIRMS



ALPERN ROSENTHAL

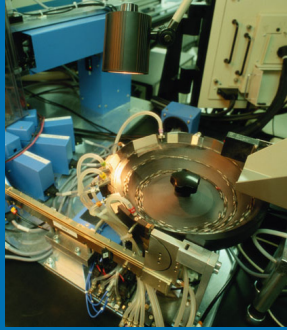
INSPIRING OPPORTUNITIES



IEE

Institute for Entrepreneurial Excellence
University of Pittsburgh
Joseph M. Katz Graduate School of Business

Survey Methodology



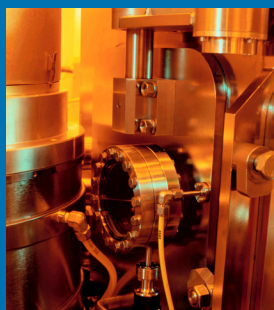
innovative

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dedicated



The following report is based on the results of a mail/email survey of manufacturing firms in Western Pennsylvania conducted by Alpern Rosenthal, one of the country's largest certified public accounting and business advisory firms, and the University of Pittsburgh Institute for Entrepreneurial Excellence at the Joseph M. Katz Graduate School of Business.

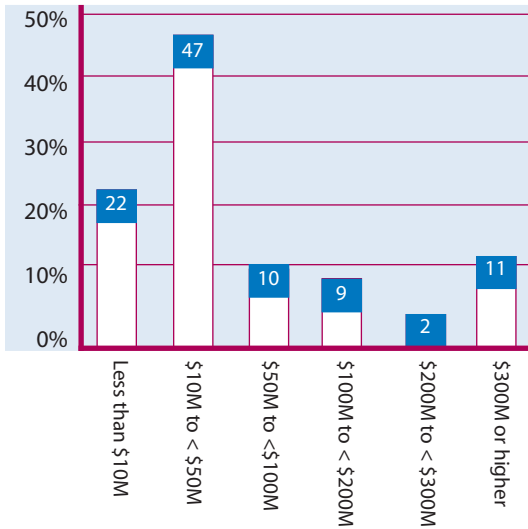
The survey instrument was a questionnaire developed by the Manufacturing Services Group of Alpern Rosenthal with the survey administered and the results analyzed by the Institute for Entrepreneurial Excellence.

During 2007, approximately 1,000 questionnaires were mailed to Western Pennsylvania manufacturing executives. A total of 98 surveys were returned - a 10 percent response rate. Statistical tests suggest that non-response bias is unlikely. Due to statistical variances in rounding, amounts may not always total 100%.

Industry Snapshot

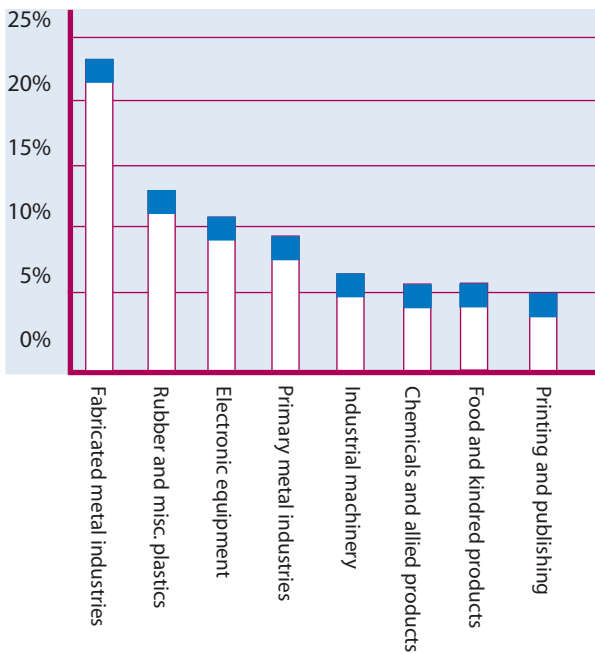
Twenty-two percent of those surveyed have annual revenues less than \$10 million. Fifty-seven percent of companies are between \$10 million and \$100 million in revenue [fig. 01].

01 Industry Breakdown by Revenue



The fabricated metal industry is the largest single sector of the manufacturing industry surveyed (22%), followed by rubber and plastics (13%) and electronic equipment (11%) [fig. 02].

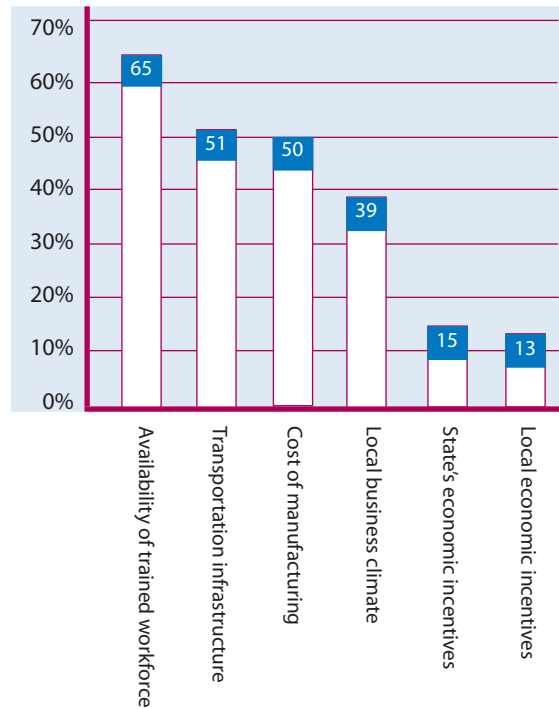
02 Industry Breakdown by Products



Western Pennsylvania As a Business Location

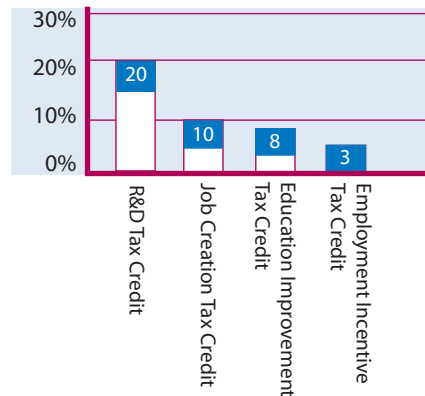
Western Pennsylvania's greatest assets as a manufacturing location, in terms of how many companies ranked the factor as a "top-three" asset, are availability of trained workforce, transportation infrastructure and cost of manufacturing [fig. 03].

03 Pennsylvania's Strengths



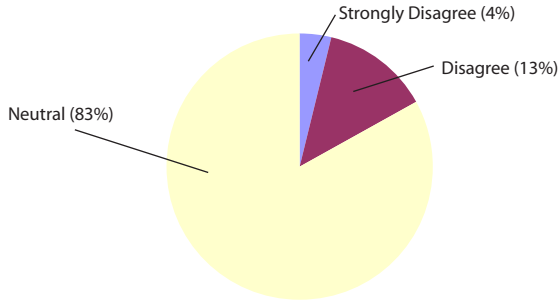
Many companies take advantage of credits provided by Western Pennsylvania. The most popular are the Research and Development Tax Credit and Job Creation Tax Credit. Few use the Employment Incentive Payment Credit [fig. 04].

04 Incentives of which Company Takes Advantage

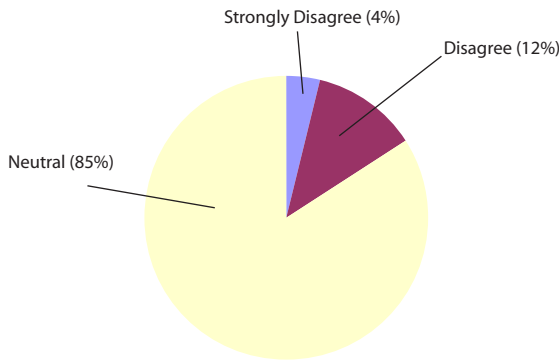


When asked if state and federal regulations impose significant costs on manufacturing, the majority of respondents were neutral in their response [fig. 05 & fig. 06]. Environmental regulations at the state and federal level were listed as most costly.

05 State Regulations Impose Significant Costs

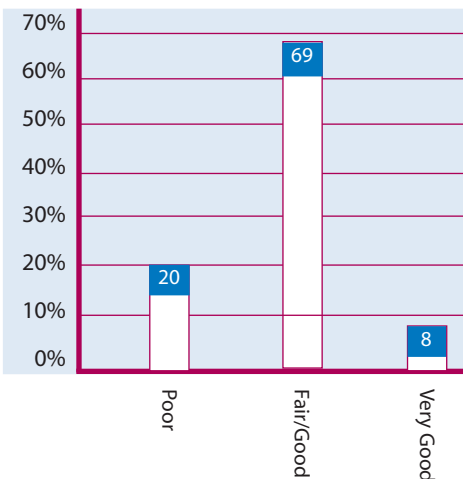


06 Federal Regulations Impose Significant Costs



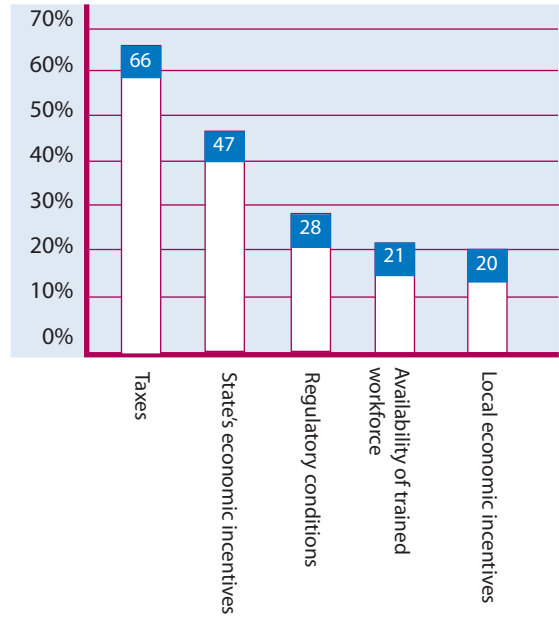
Overall, Western Pennsylvania received fair marks from the industry. Sixty-nine percent of the respondents rate the state as a “fair” or “good” place to do business. Eight percent rate the state as a “very good” location [fig. 07].

07 Pennsylvania Rated as a Business Location



The top areas of concern about doing business in Pennsylvania, when ranked as a “top-three” response, are taxes, state’s economic incentives and regulatory conditions [fig. 08].

08 Concerns Regarding Doing Business in PA

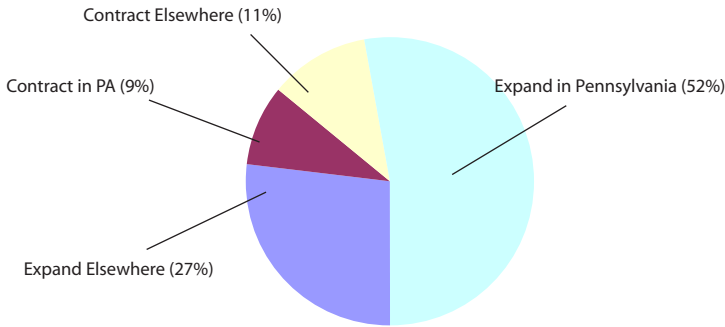


When given a choice for an appropriate model for Pennsylvania regarding taxes, infrastructure, incentives and regulations, most responded with Ohio in each circumstance.

Expansion and International Operations

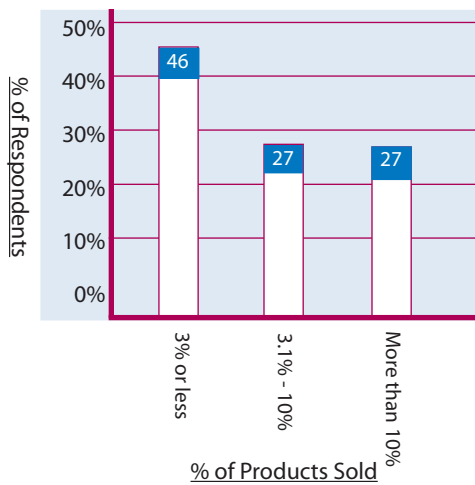
Many companies have a desire to expand [fig. 09]. Most stated they would expand (79%) and 52% said they plan on doing it in Pennsylvania.

09 Plans for Expansion in the Next Three Years



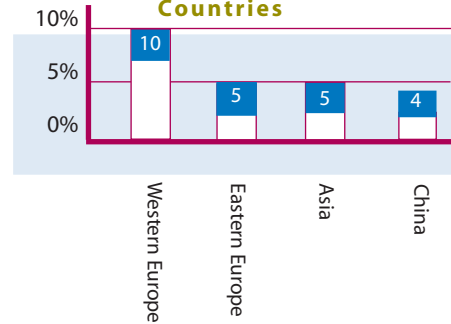
Western Pennsylvania's manufacturers, for the most part, have remained domestic. However, many are selling products to foreign customers [fig. 10]. The mean for foreign sales is 13%.

10 Percentage of Total Products Sold to Customers in Other Countries



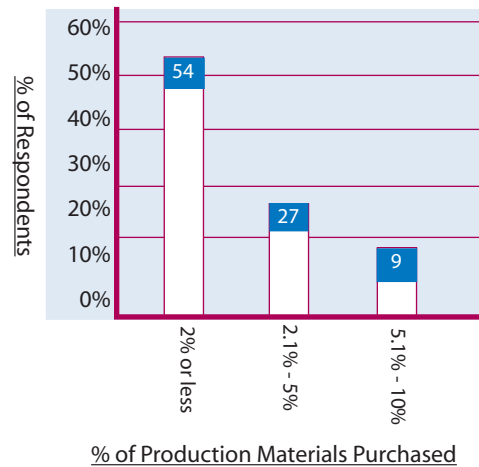
Most manufacturers who sell internationally, sell to Western Europe with Eastern Europe and Asia a close second [fig. 11]. The overall mean percentage of sales to another country is 8%. **Because of its economic impact, China is listed separately.**

11 Mean Percentage of Sales to Customers in Other Countries



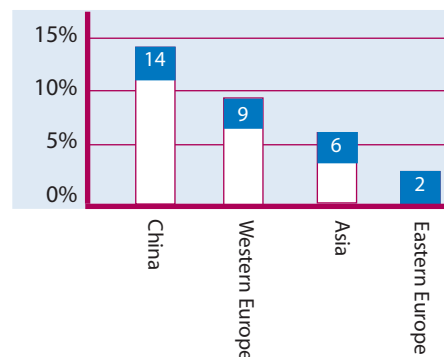
On the purchasing side, some manufacturers have bought international products, but it still remains largely domestic. [fig. 12]. The mean for purchasing is 5%.

12 Percentage of Total Production Materials Purchased from Another Country



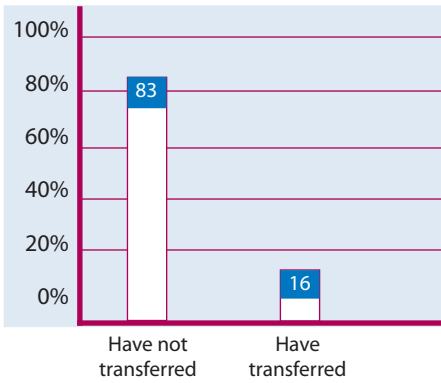
Most manufacturers purchase from Western Europe with Asia a close second [fig. 13]. **Because of its economic impact, China is listed separately.**

13 Mean Percentage of Production Materials Purchased from Another Country



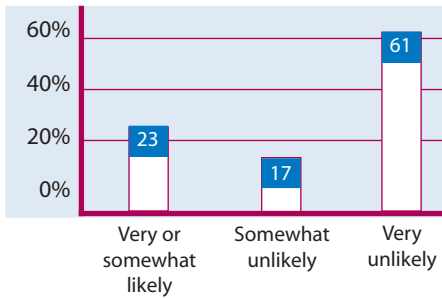
Global outsourcing has become a hot button issue in our economy. However, the majority of regional manufacturers have not recently shipped activities overseas [fig. 14]. Of those who answered yes, most have transferred operations to China (62%) and Eastern Europe (15%).

14 Transfer of Manufacturing Operations Overseas During the Past Five Years



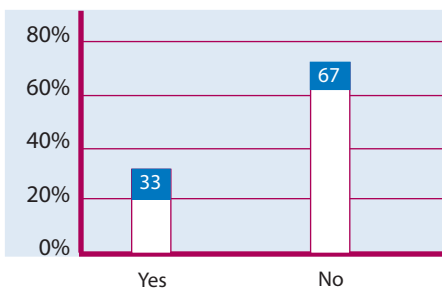
Most manufacturers believe they will not transfer some of their manufacturing operations to another country in the next five years [fig. 15].

15 Likelihood of Transferring Operations Overseas in the Next Five Years



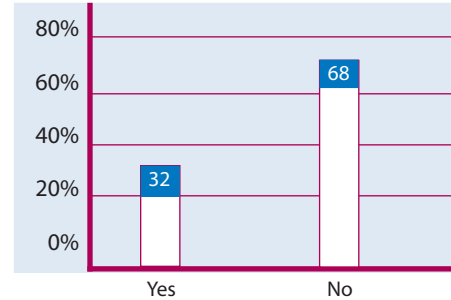
International trade has had an impact on our region's manufacturers. One-third of companies have lost business to offshore competitors in the past five years [fig. 16].

16 Companies Reporting Lost Sales to Offshore Competitors During the Past Five Years

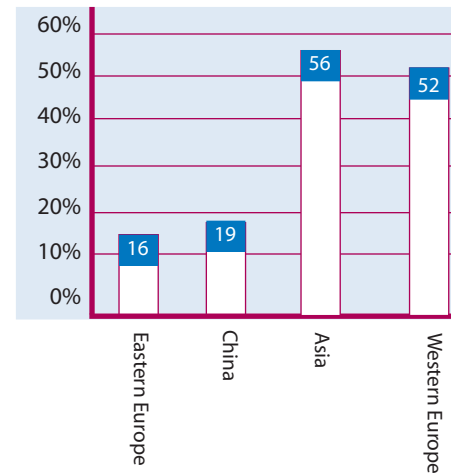


Thirty-two percent of respondents have offices in a foreign country [fig. 17]. Most of those responding yes had offices located in Asia and Western Europe [fig. 18]. **Because of its economic impact, China is listed separately.**

17 Sales Offices in Another Country

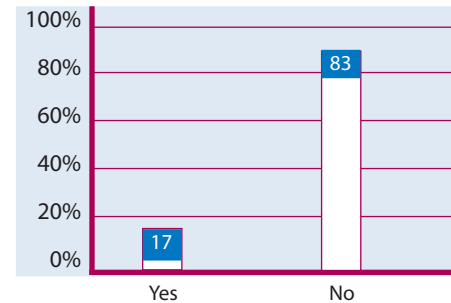


18 Location of Foreign Sales Offices



Seventeen percent of companies have ventured into the international market and actually own a foreign company [fig. 19]. Fourteen percent are owned by a foreign company.

19 Own a Foreign Company



Industry Performance and Practices

There may be talk about manufacturing revenue falling, but 92% of the respondents in this survey said they have seen revenue increase in the last three years. Seventeen percent saw profits jump by 50% or more. The mean revenue change is an increase of 35% [fig. 20]. In addition, companies are upbeat about revenues for the next three years. Ninety-six percent expect to see an increase in revenue with 76% hoping for an increase of more than 10% [fig. 21]. The mean for expected revenue growth is 30%.

20 Actual Revenue Changes - Past Three Years

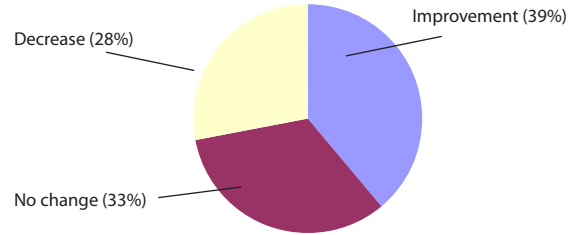


21 Expected Revenue Changes - Next Three Years

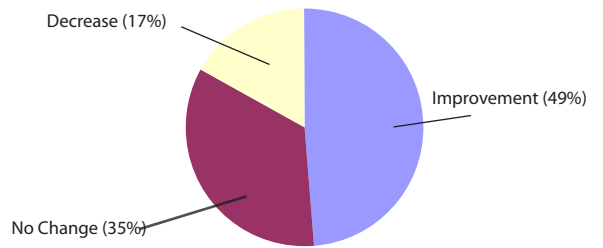


Net operating profits portray an industry that is on the mend and most are optimistic about their profits for next year. Thirty-nine percent expect improvement this year and that number increases to 49% for next year. [fig. 22a and 22b].

22 a. Net Operating Profits - This Year

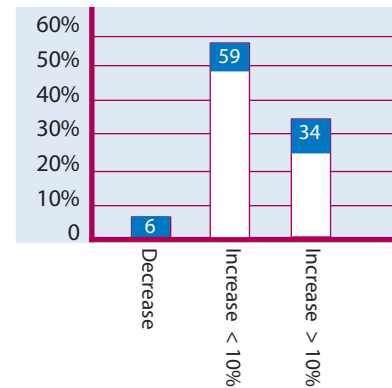


22 b. Net Operating Profits - Next Year

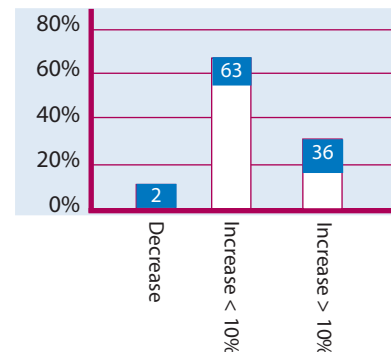


Companies expect net operating profits as a percentage of sales to grow this year and more expect increases next year. The mean increase this year is 8% and the expected mean increase next year is 9% [fig. 23a and 23b].

23 a. Net Operating Profits as a Percentage of Sales- This Year

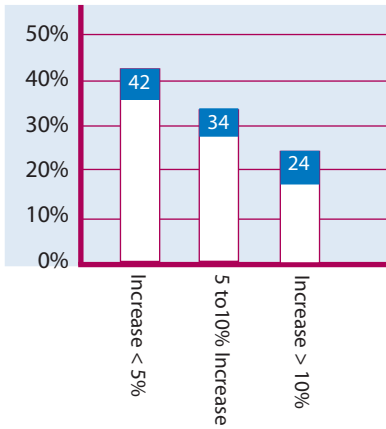


23 b. Net Operating Profits as a Percentage of Sales - Next Year

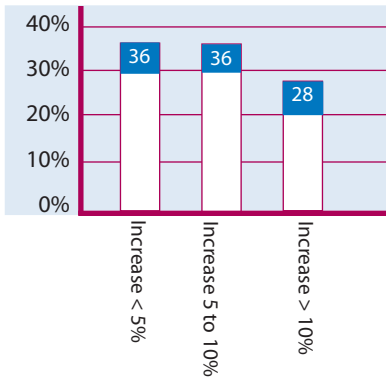


Inventory turnover has increased slightly the past year and next year suggests that almost all of the companies in the survey anticipate slight increases. [fig. 24a and 24b].

24 a. Inventory Turnover - This Year

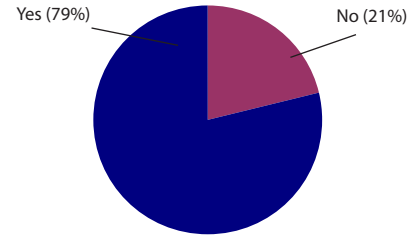


24 b. Inventory Turnover - Next Year

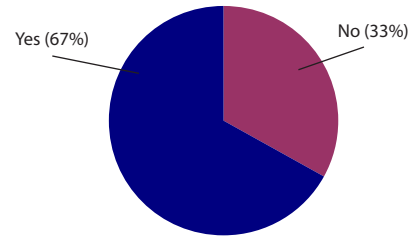


While profits have grown, providing good customer service remains a high priority [fig. 25 and 26]. Tracking the profitability of each product line is also important for operations [fig. 27 and 28].

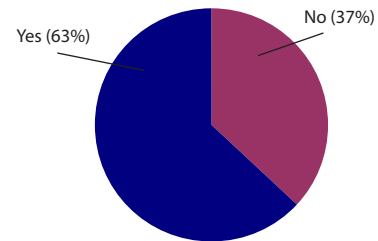
25 "My Company Measures On-Time Delivery"



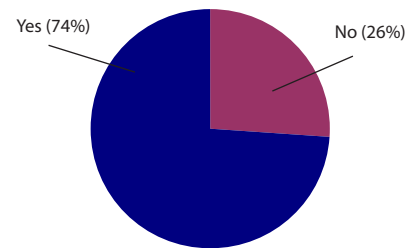
26 "My Company Measures Order Accuracy"



27 "My Company Measures the Profitability of Each Customer"



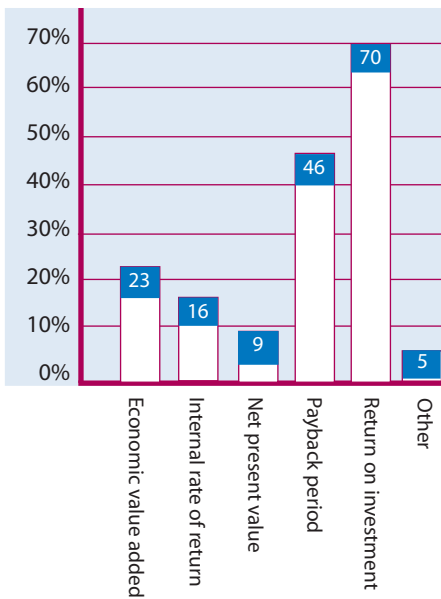
28 "My Company Measures the Profitability of Each Product Line"



Financing does not seem to be an obstacle for most Western Pennsylvania manufacturing firms, regardless of size. Eighty-seven percent of respondents were neutral in their response to access to sufficient capital to meet their financing needs. When evaluating capital projects, return on investment and payback period are the leading criteria for decision makers [fig. 29].

In addition, manufacturers spend an average of about 17% of sales on capital projects.

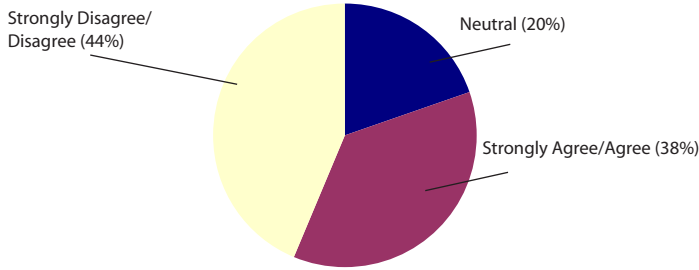
29 Usage of Capital Project Evaluation Criteria



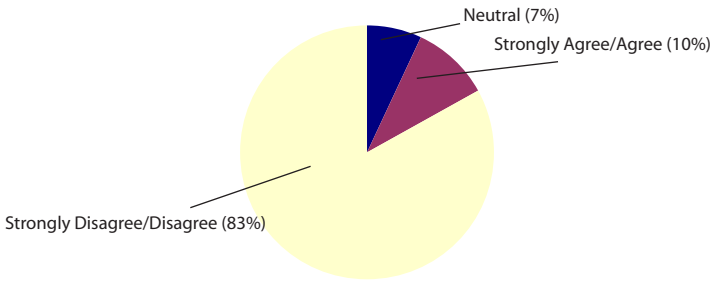
According to the survey's Executive Summary, higher selling and administrative expenditures are significantly linked to higher gross margin percentages.

When asked about products and customers, most companies state that their customers are becoming more demanding (78%). Companies also say that most of their customers are not primarily in Western Pennsylvania (83%). And most are concerned about competition from overseas suppliers (51%).

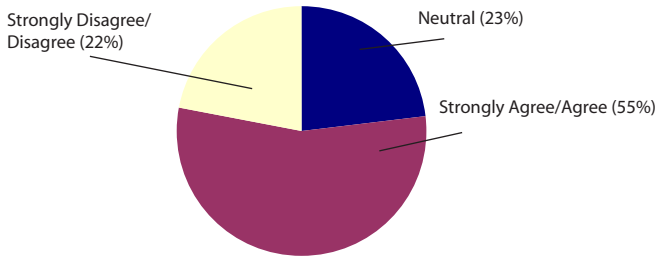
30 Our Major Products are Highly Commoditized



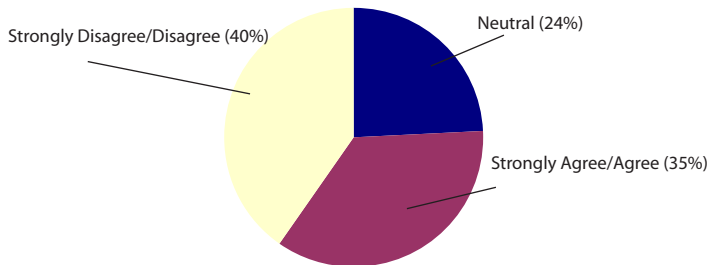
31 Our Customers are Primarily in Western PA



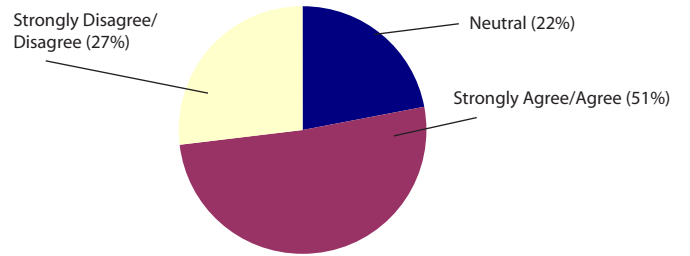
32 We Have a High Rate of Innovation



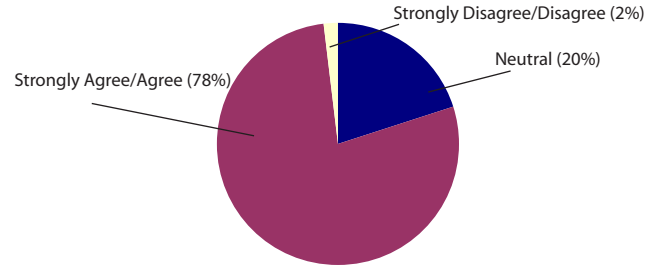
33 Our Customer Base is Highly Fragmented



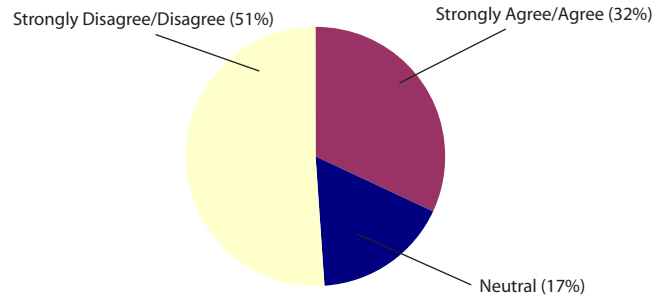
34 We Have a Growing Pool of Customers



35 Our Customers are Becoming More Demanding



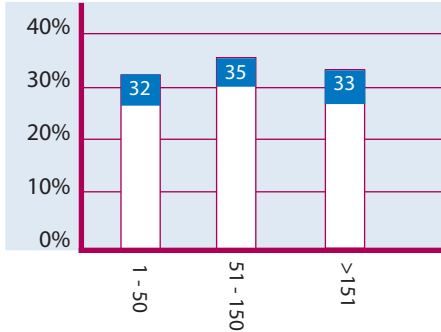
36 We are Not Concerned about Competition from Overseas Suppliers



Human Resources

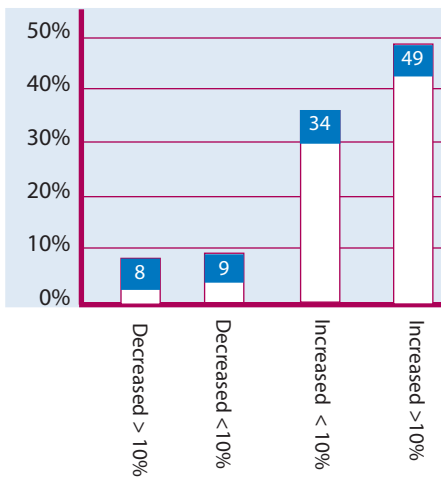
In employment terms, most of the survey respondents had more than 50 employees. [fig. 37].

37 Full-time Employees

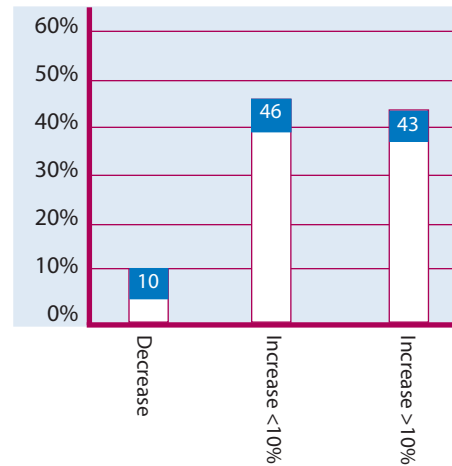


Eighty-eight percent of manufacturers added jobs over the past three years [fig. 38a]. The mean was an increase of 13%. Eighty-nine percent of manufacturers expect job growth in the next three years. Forty-nine percent expect the increase to be more than 10%. The mean expected increase is 13% [fig. 38b].

38 a. Actual Employment Changes - Past Three Years

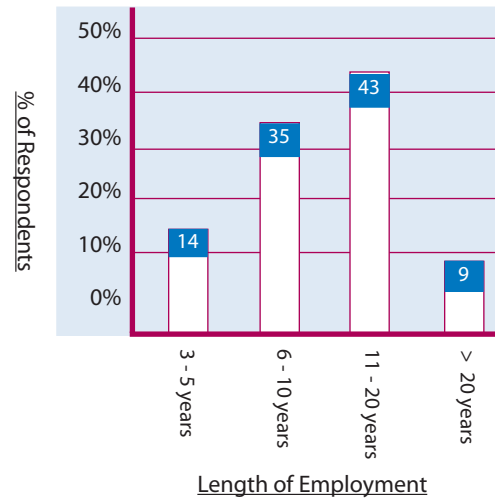


38 b. Expected Employment Changes - Next Three Years

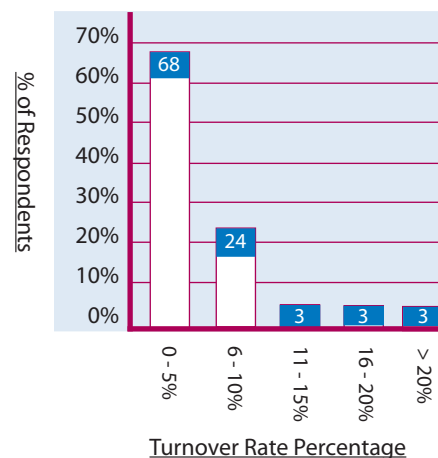


Most companies enjoy a long-term workforce as nearly 78% of companies have employees who have been with the company between six and 20 years [fig. 39]. The mean employee turnover rate for all companies per year is 6% [fig. 40].

39 Average Length of Employment

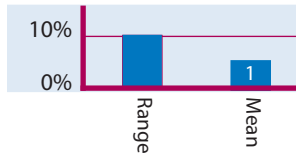


40 Average Employee Turnover Rate Per Year



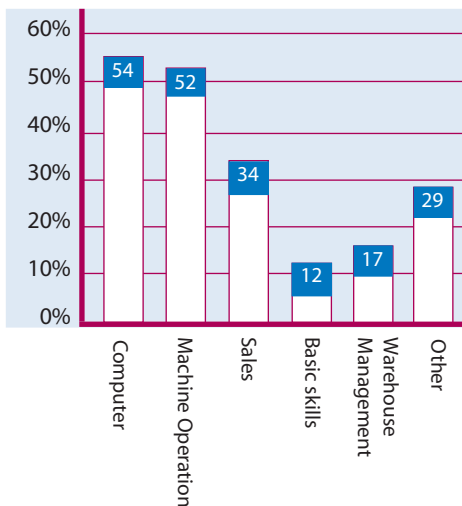
While Pennsylvania's manufacturing industry rates workforce quality as one of its greatest strengths, it spends a small amount of its own money to train and educate the workforce [fig. 41]. The range is 0 to 10% of sales and the mean is 1%.

41 Spending on Employee Training and Education (as percentage of sales)



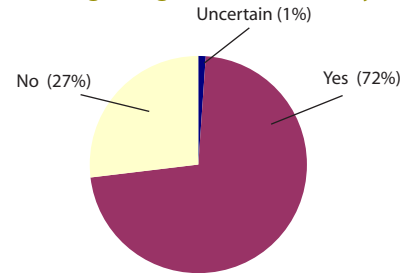
Employers are offering primarily three types of training -- computer, machine operation and sales -- to their employees [fig. 42]. The majority of companies, 66%, utilize both in-house and outside trainers for instruction.

42 Types of Training

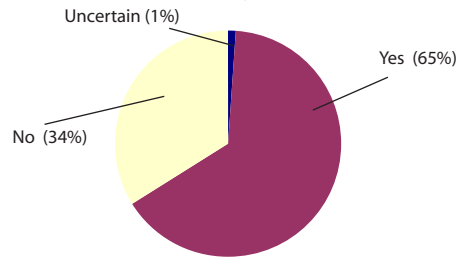


Formal training programs are prevalent in manufacturing companies. Seventy-two percent of companies have formal training programs for hourly employees and 65% have programs for salaried employees [fig. 43 and 44].

43 Formal Training Programs for Hourly Employees

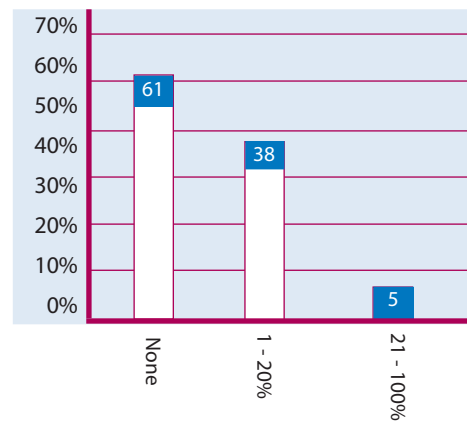


44 Formal Training Programs for Salaried Employees



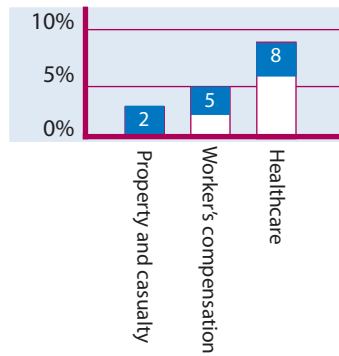
Many employers use workers whose families recently moved to America as 38% of companies have between 1 and 20% of workers whose primary language is not English [fig. 45].

45 English as a Second Language



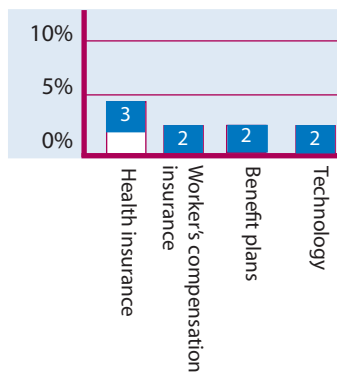
The most costly line of insurance continues to be healthcare. The annual rate of increase for healthcare, as a mean, is 8%. For property and casualty, it is 2% and for worker's compensation it is 5% [fig. 46].

46 Increase in Insurance (As a Mean)

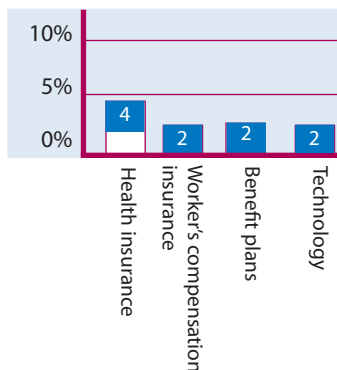


The following charts break down spending for several items. Health insurance remains the number one issue.

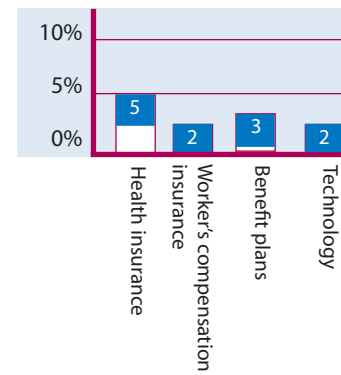
47 a. Last Year, (As a Mean) What Percentage of Sales Was Spent on...



47 b. This Year, (As a Mean) What Percentage of Sales Will be Spent on...

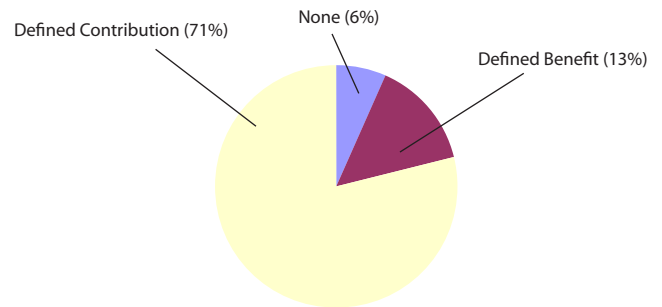


47 c. Next Year, (As a Mean) What Percentage of Sales Will be Spent on...

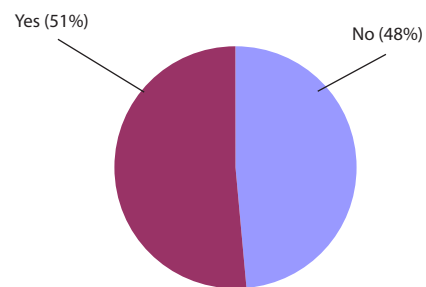


The most common type of retirement plan is the defined contribution plan [fig. 48]. Only a small percentage of firms do not offer a retirement plan. More companies are using the Internet for their employee benefit information [fig. 49].

48 Retirement Plans

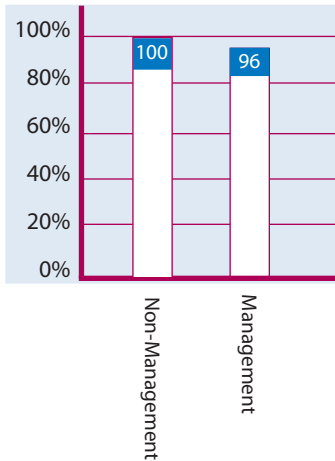


49 Internet Use for Employee Benefit Information

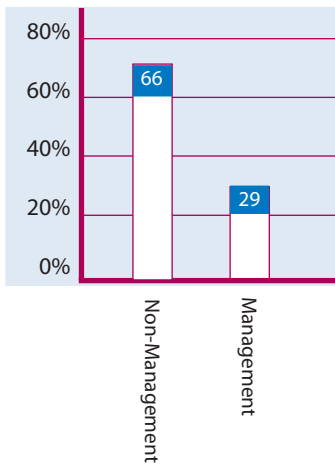


The majority of firms do have individual and company-based performance bonuses offering it to both management and non-management employees. About half have an individual-based performance for non-management. More than one response could be indicated [fig. 50 & 51].

50 Individual Performance-Based Bonus



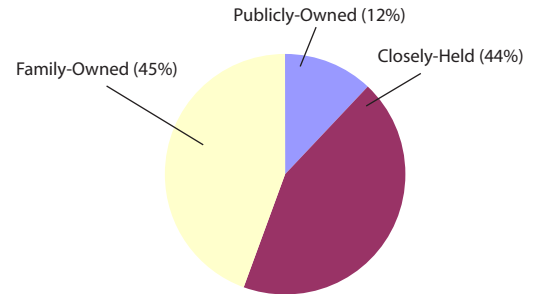
51 Company Performance-Based Bonus



Corporate Governance

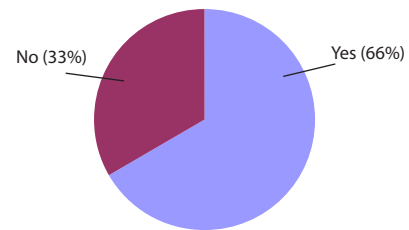
The majority of the respondents to the survey were privately-held businesses (89%) [fig. 52]. Of those that are family-owned, most are in their first (26%) or second (56%) generation of business.

52 Distribution of Companies by Ownership

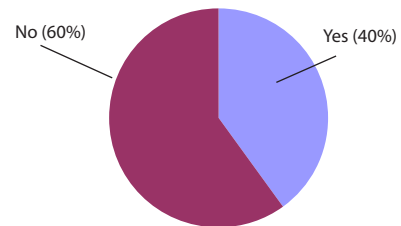


The majority of businesses had a written business plan [fig. 53]. Forty percent have a written disaster recovery plan [fig. 54]. Public companies were 27% more likely to have a written plan than private companies and 25% more likely to have a disaster plan.

53 Written or Strategic Plan

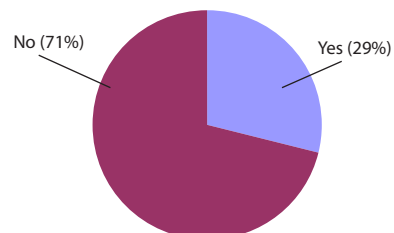


54 Written Disaster or Business Recovery Plan



Most companies have not changed internal operations or controls to comply with the Sarbanes-Oxley Act [fig. 55].

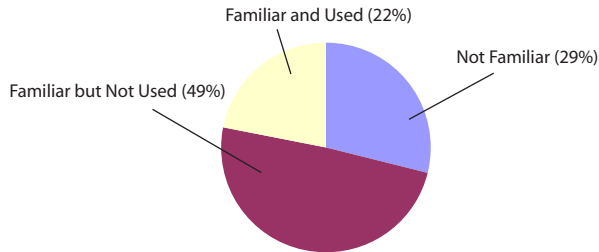
55 Changed Operations or Internal Controls to Comply with the Sarbanes-Oxley Act



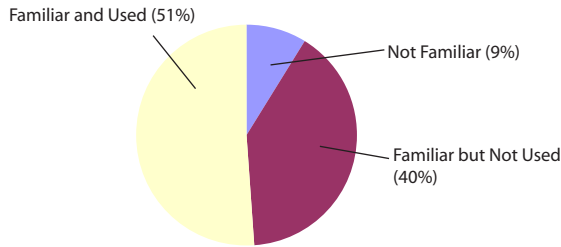
Management Techniques

Firms were surveyed on their familiarity and use of different management techniques. Most companies were familiar with and used Strategic Alliances and Total Quality Management while many were least familiar with Theory of Constraints [fig. 56]. Companies with more than \$10M in revenue were most likely to use lean manufacturing and strategic alliances. Companies with less than \$10M in revenue were most likely to use lean manufacturing. Theory of Constraints was least likely to be used by each range of company size.

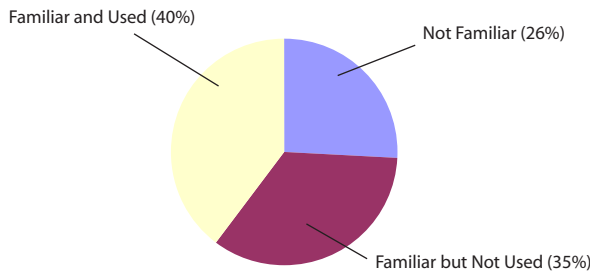
56 a. Activity-Based Costing



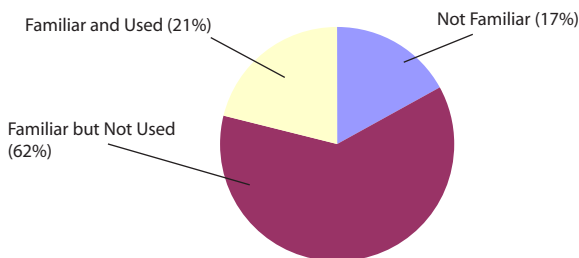
56 b. Lean Manufacturing



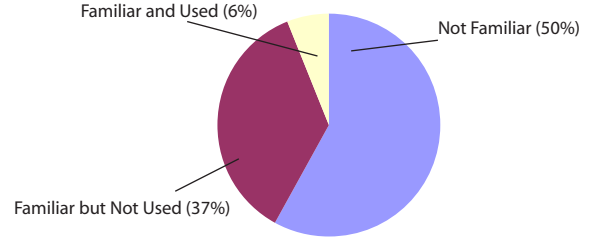
56 c. Participatory Management



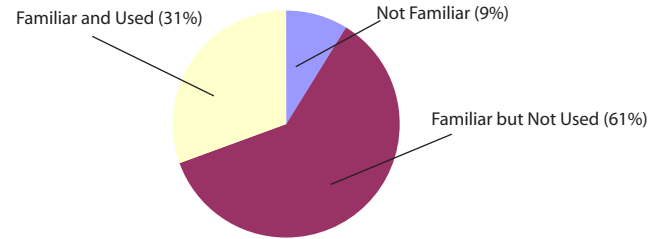
56 d. Six Sigma



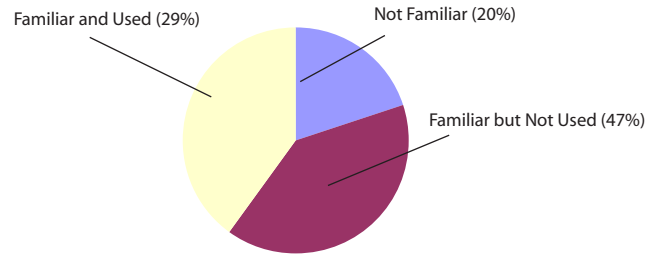
56 e. Theory of Constraints



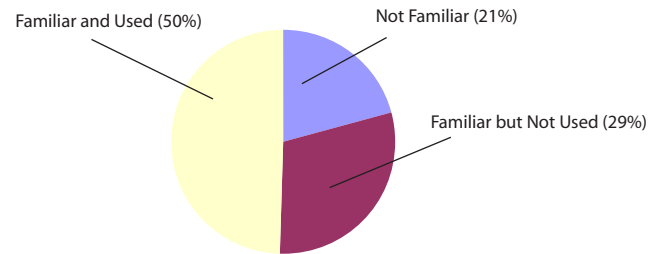
56 f. Total Quality Management



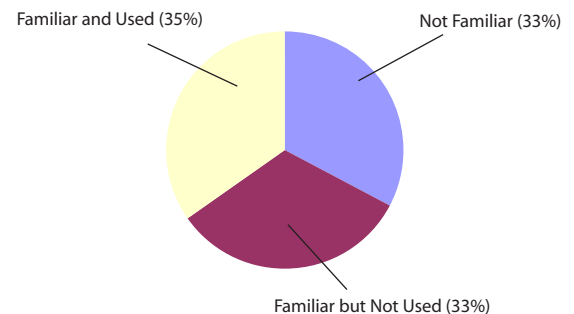
56 g. Customer Relations Management



56 h. Strategic Alliances



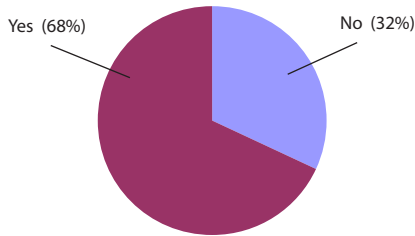
56 i. Value Pricing



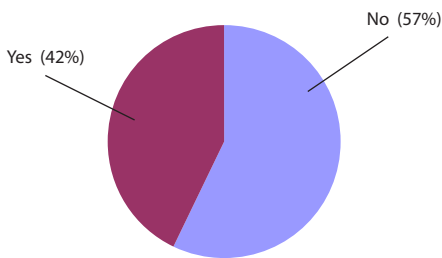
Internet Use

Internet technology is making progress for the majority of manufacturers. Sixty-eight percent stated that customers can purchase from them using the Internet [fig. 57]. In addition, 42% responded that they are using the Internet for procurement, such as buying materials through a “reverse auction” [fig. 58].

57 Customer Purchase Using the Internet



58 Procurement Using the Internet

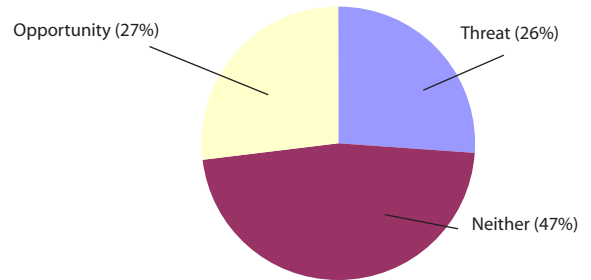


Ninety percent of public companies used the Internet for procurement and 82% of public companies' customers can purchase products via their website.

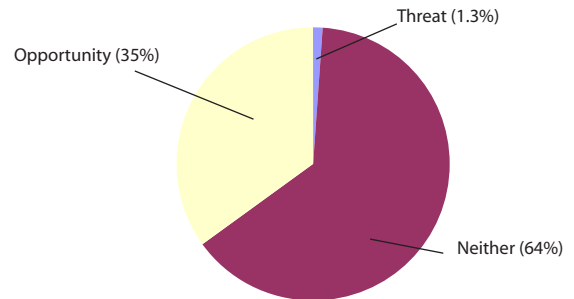
Opportunities/Threats

Most respondents see market growth trends as the biggest opportunity and the U.S. economic conditions as its largest threat [fig. 59].

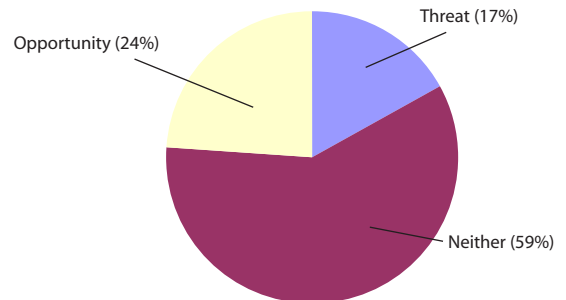
59 a. Globalization



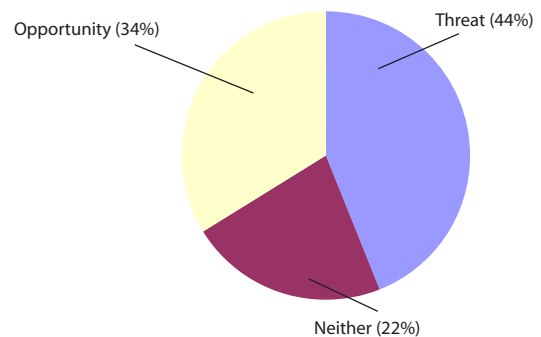
59 b. eCommerce



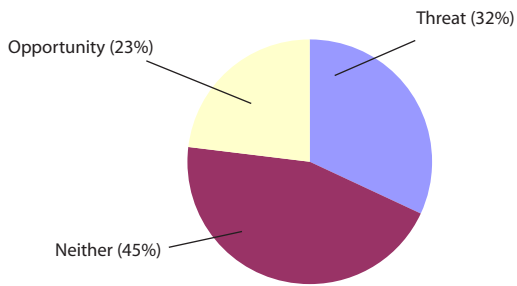
59 c. Regional Business Climate



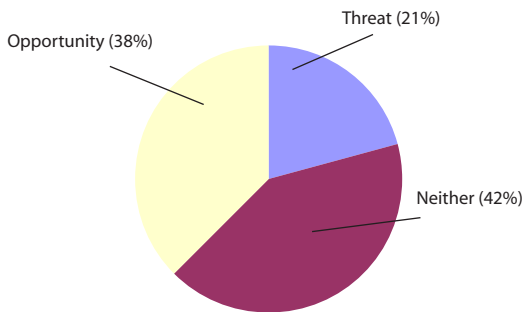
59 d. U.S. Economic Conditions



59 e. Outsourcing/Offshoring



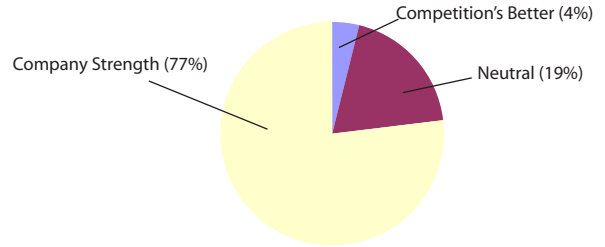
59 f. Market Growth Trends



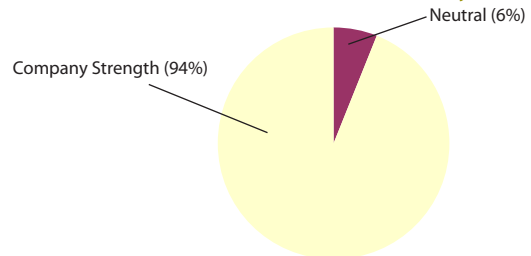
Self-Assessment

When asked to rate themselves against the competition in several categories, most companies believe they are doing very good with product quality and could probably improve on market share and their financial position. Overall, companies rate themselves very high [fig. 60].

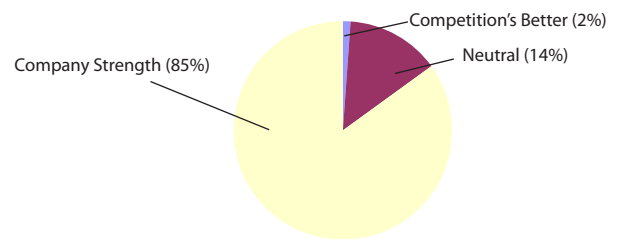
60 a. Manufacturing Efficiency



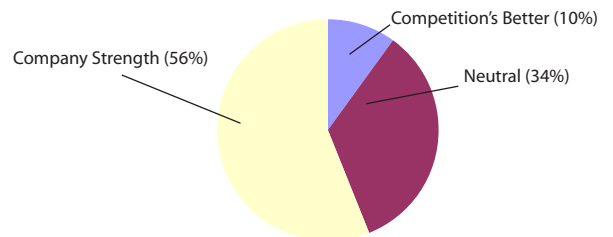
60 b. Product Quality



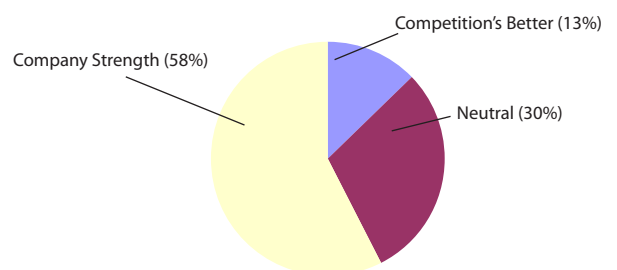
60 c. Customer Relations



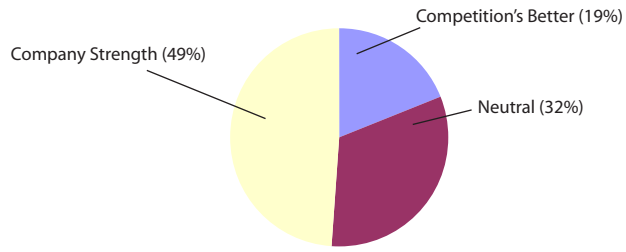
60 d. Logistics



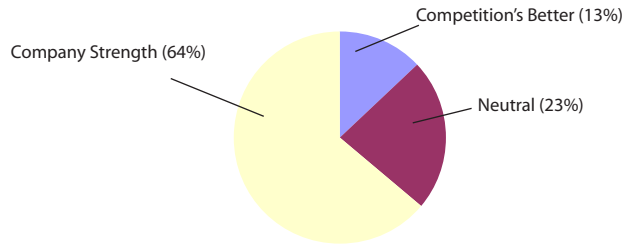
60 e. Financial Position



60 f. Market Share



60g. Innovation



Executive Summary

In our analysis of the data, we focused on the Pennsylvania Business Environment, Leading Business Practices, Internet Usage, and Factors Affecting Performance. Each of these topics is discussed in greater detail below.

The Pennsylvania Business Environment

Manufacturers responding to the survey indicated three major positive reasons for operating a business in Pennsylvania: (1) a superior, trained workforce (50% noted this as an asset), (2) transportation advantages (39%), and (3) a relatively low cost of manufacturing (38%).

On the other hand, three major negatives were listed by many respondents: (1) high taxes (65%), (2) the state's weak economic incentives (46%), and (3) its regulatory environment (28%). Furthermore, a majority (60%) of the respondents indicated that their overall view of the business environment in Western Pennsylvania is only "fair" or even "poor." (It is worth emphasizing that the survey respondents included in these numbers represent firms currently operating in Pennsylvania, so these responses likely underestimate the true impact of the negative factors.)

We also looked at whether firms citing more of these disadvantages were more likely to be considering shifting some of their manufacturing operations outside of the U.S. Although 19% of the responding firms indicated that they are seriously considering such a shift, this decision is not related to the disadvantages noted above. (It is also not related to firm size.)

Leading Business Practices

Four leading business practices were used by at least a third of the surveyed manufacturers: (1) lean manufacturing (45% of the responding firms use this practice), (2) strategic alliances (44%), (3) participatory management (34%), and (4) customer relationship management (CRM; 34%). Many of the firms that employ lean manufacturing also make use of many other leading practices, including "six sigma," TQM, and value pricing, as well as those practices already noted above. Similarly, use of value pricing tends to be associated with firm use of other leading business practices.

Internet Use

Overall, 30% of the responding firms have made it possible for their customers to make purchases via the Internet, while 43% make online procurements. Thus, firms are using the Internet more to buy than sell goods. Somewhat surprisingly, there is no difference between larger and smaller firms in terms of their use of the Internet to buy or sell goods.

Factors Affecting Performance

Based on questions asked in the survey, we focused on three measures of firm performance: (1) inventory turnover, (2) gross margin percentage, and (3) net operating profit percentage. Firms that do well on one of these performance dimensions tend to do well on that dimension in subsequent years. In contrast, strong performance on one dimension does not necessarily imply strong performance on the others (although gross margin percentage and net operating profit percentage are somewhat inter-related). Thus, it is important to look separately at the factors influencing each of the three performance indicators. The results that follow focus on those factors that significantly affect the outcome measure; potential predictors that do not significantly affect the outcome are not discussed.

Inventory Turnover

Only two factors significantly affect a firm's inventory turnover. First, higher inventory turnover is negatively related to the Selling and General Administrative Expenses (SGAE) percentage. Thus, more effective management of inventory significantly reduces SGAE costs. Second, firms that allow for Internet orders have significantly lower inventory turnover than other firms. It appears that using the Internet to facilitate sales also requires firms to invest in (and carry) more inventory.

Gross Margin Percentage

Two factors significantly affect gross margin percentage. First, the extent to which the firm's products are commoditized is negatively related to

(continued on next page...)

¹We use regression analysis, a technique that allows one to simultaneously examine the potential effects of multiple factors on a specific outcome. The potential influencers (also known as "predictors") we use are as follows: firm size, whether or not the firm has ISO certification, nature of the firm's ownership (public versus private), the firm's Selling and General Administrative Expenses (as a percentage of sales), whether or not the firm allows for purchases via the Internet, the extent to which the firm's products are commoditized, the extent to which the firm's customers are fragmented, whether or not the firm uses lean manufacturing techniques, whether or not the firm engages in strategic alliances, the percentage of the firm's sales that are made within the US, and the firm's overall perception of the Pennsylvania business climate.

its gross margins. That is, the more the firm relies on commodity products, the thinner its margin. Second, the Selling and General Administrative Expenses percentage is positively linked to higher margins. While this may initially seem counter-intuitive, we believe that it reflects the fact that firms with higher margins tend to invest in advertising and sales force in order to maintain those margins. In turn, higher margins provide funds that can be invested in advertising and sales.

Net Operating Profit Percentage

Only the degree of commoditization of the firm's products has a significant impact on net operating profits, and this effect is negative. Thus, an over-reliance on commodity products has a negative effect on both margins and net profits.

Are there steps that firms can take to overcome an emphasis on commodity products? Additional analysis reveals that firms selling commoditized products tend to cater predominantly to local customers, have a customer base that is not growing, and tend to be less innovative. Thus, firms wanting to escape the "commodity trap" need to look for ways to broaden their business base (both in terms of growth in customer numbers and in terms of geographic diversity). One way to do this may be through the use of eCommerce. Although the evidence here suggests that using the Internet to complete sales does not directly affect margins or profits, by reducing a firm's reliance on commodity products it will indirectly do so.



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