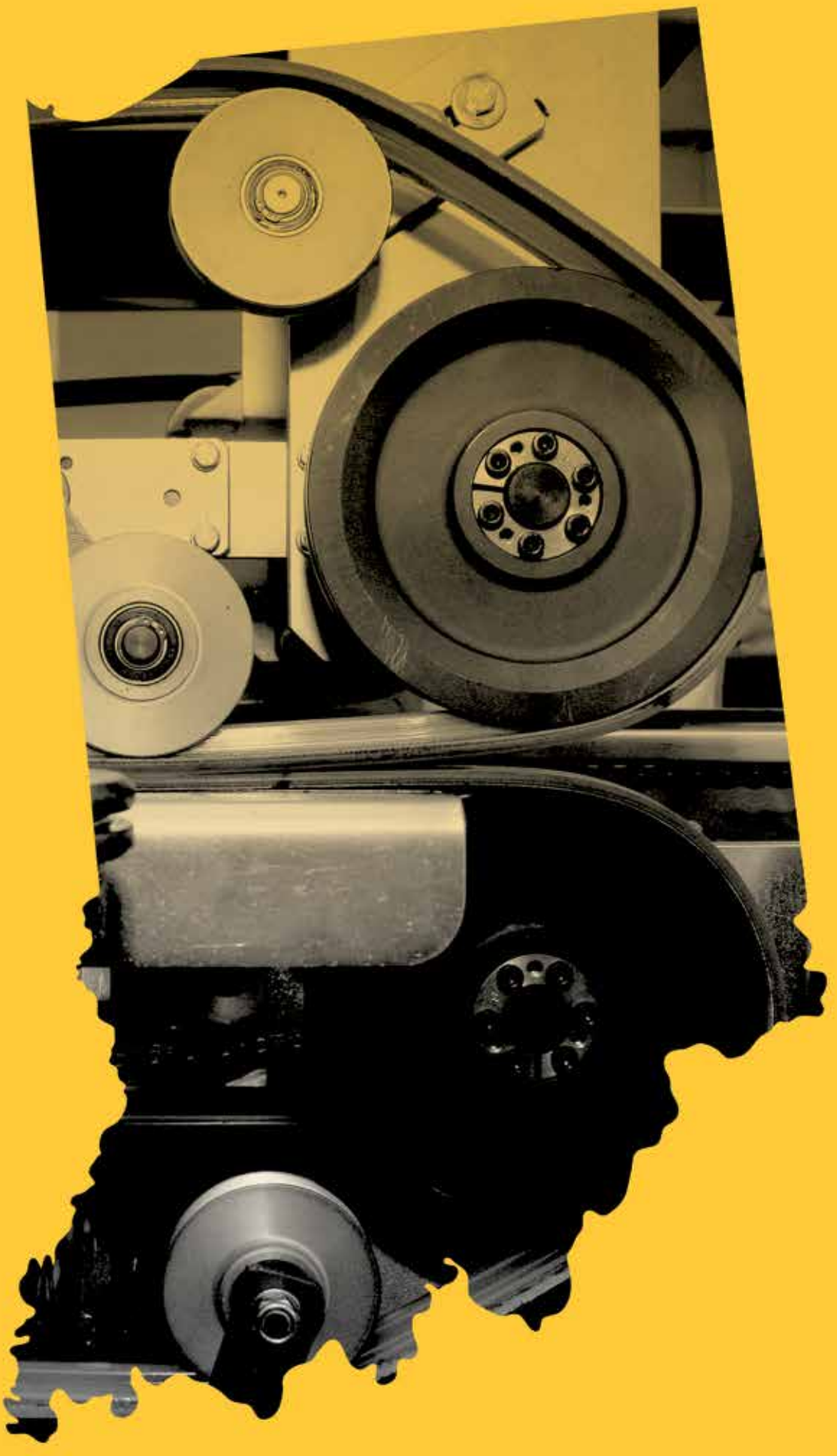
2012 INDIANA MANUFACTURING SURVEY:

"HALFTIME" FOR INDIANA MANUFACTURING

KSM KATZ SAPPER & MILLER



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FOREWORD

Now in its sixth year, this report has tracked Indiana manufacturing from the end of the economic boom through the Great Recession. While many Hoosier manufacturers have managed to survive the effects of the recession, challenges remain on the horizon.

This past year may be viewed as a "halftime" break for Indiana manufacturing after what proved to be an incredibly difficult first half. Since the financial crisis in 2008, manufacturers have faced challenges ranging from credit crunches and supplier bankruptcies to slumping consumer demand, soaring energy costs, and relentless foreign competition. Through it all, this important sector of Indiana's economy has done well to survive and, more recently, shows signs of recovery, albeit at a more gradual pace than what is normally associated with the end of recessions. Which brings us to the present – this is a good time for manufacturers and Indiana policy makers to think about what has and has not worked.

This is where Indiana's manufacturers are right now, but of course, the managerial dilemma is what to do next. These 2012 findings indicate that the past's relentless rounds of downsizing are over, and while that approach worked well when mere survival was paramount, it is hardly a winning strategy for the future. That is not to say that layoffs won't continue to happen here and there, but these will increasingly be part of targeted cost-cutting aimed at select markets rather than an across-the-board strategy. The same argument holds for simply staying the course with little, if any, ongoing investment. These 2012 findings also reveal that businesses are starting to invest for growth, including facilities and automation, with an eye toward providing customers ever-increasing quality at even lower prices.

The underlying tone in this year's report is that manufacturing's soon-to-be played second half, over the next five years, could well determine not only the fate of some firms, but also, in significant ways, the success of Indiana and that of our country in the global economy for years to come. This is not to suggest that manufacturing is a dying sector. Indeed, it can and should continue to thrive if the right policies and strategies are pursued. Real and fundamental changes are continuing to take place across manufacturing in all kinds of capabilities. Of course, not all manufacturers have found the perfect winning strategy, but many seem to be heading in the right direction, and some are even excelling during these challenging times.

The message is clear: Indiana (and American) manufacturing has survived a tough first half. Now it must move forward to remain competitive in the future.

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EXECUTIVE SUMMARY

The Manufacturing Landscape Is Changing

Across Indiana we are starting to see the shape of a new era of manufacturing come into view. In the face of rising global competition, the most serious economic downturn since the 1930s, and breathtaking technological change, today Hoosier optimism for manufacturing remains strong with almost three out of every four manufacturers investing for growth.

This is one of the most significant headlines of this year's study. In the course of these surveys and in conversations with Hoosier manufacturers, we have witnessed fundamental shifts since the Great Recession. In 2008-09, Indiana manufacturers were mainly focused on cost-cutting and economic survival. By 2010-11, targeted investments aimed at growth began to reappear on the agendas of many manufacturers. Now, four years out from the start of the Great Recession, investment for growth is a priority for many companies around the state. While Indiana's manufacturers still face strong global competition, their practices and products are beginning to permeate all elements of operations; opening up new markets and sources of demand; driving innovation; and even changing industry cost structures. In short, while it has been a tough journey over recent years getting to where it is today, Indiana's manufacturing sector is well positioned to compete in the future.

After the storm: It's time to rebuild. Findings from the 2012 Indiana Manufacturing Survey suggest that Hoosier manufacturers have largely shaken off the effects of the recent recession, and a significant majority now report that their business is either "healthy" or "stable," with tougher times behind them. Today, many Hoosier manufacturers are making investments aimed at growth. When asked about their financial priorities for the next two years, more than 70% of the survey respondents reported that their goals were to increase investment in areas either essential for revenue growth or across the entire business.

The drivers and approaches to manufacturing are changing. This year's findings also highlight what it takes for Hoosier manufacturing to remain competitive. While most Indiana manufacturers have survived the recent recession, to compete going forward, companies still need to focus on the value that their products provide customers in terms of quality and price.

The ways in which Hoosier manufacturers are evolving and addressing their operations are also changing. Our research reveals three key ways strategies are shifting as we move beyond the Great Recession toward a new era that is likely to be even more competitive:

1. **Keep focused on the customer.** The 2012 survey finds that manufacturing strategies increasingly feature superior quality and lower prices, along with superior product design and customer service. Accordingly, results indicate manufacturers that are able to give customers what they want realized improved financial performance.

2. **Don't underestimate the importance of technology.** Many Hoosier manufacturers are aware of the critical role that innovative, leading-edge technologies are playing in advancing their businesses in terms of new and improved products as well as opening new markets. To implement such changes, manufacturers are continuing to rely on tried and true process improvement programs such as Lean and Six Sigma, in addition to progressively taking advantage of advanced automation or smart manufacturing technologies to achieve competitive advantages.

3. **Collaboration remains critical.** Indiana's manufacturers realize that today's global challenges are too broad and too complex to go it alone. As with last year's study, many companies have once again reconfirmed that partnerships and collaboration with both customers and suppliers are critical elements of their approach to manufacturing. An important part of this approach is integration with up- and downstream customers in the supply chain. The greater the degree of collaboration, the better the performance seems to be for everyone including suppliers, manufacturers and customers – something that will be crucial for future growth.

Challenges to overcome: From strategy to execution. Underlying our study is a strong sense among Indiana's manufacturers that execution is now the challenge to bringing about the new era of manufacturing. Confidence among business leaders about their progress toward this new era is strong, and their companies are taking concrete steps towards improving manufacturing. At the same time, Hoosier manufacturers also acknowledge that there is still much work ahead. While today's business environment provides a multitude of new challenges to manage, it also offers significant opportunities for those who can master its dynamics.

A new manufacturing era is on the horizon. Our survey also found widespread agreement about what the next era of manufacturing will look like. It is one where manufacturing is not only a separate strategic initiative, but also something fully integrated into the strategy and operations of a company. For example, manufacturers will need to develop a broader sense of what value creation means to customers as a whole. As one manufacturing manager told us, "Refocus management on quality, throughput and working capital rather than profitability only." In short, Indiana's companies are forging ahead with a new era of manufacturing and steadily changing the face of competition.

But having said that manufacturing is alive and well in Indiana, in order for this to remain true, private businesses, government and academia must all work together. In today's economy, only the market leaders will truly prosper. Indiana's manufacturers are near the front, and growing stronger. Their best years should still be ahead, and it will be exciting to see what the future holds.

I. COMPANY DEMOGRAPHICS

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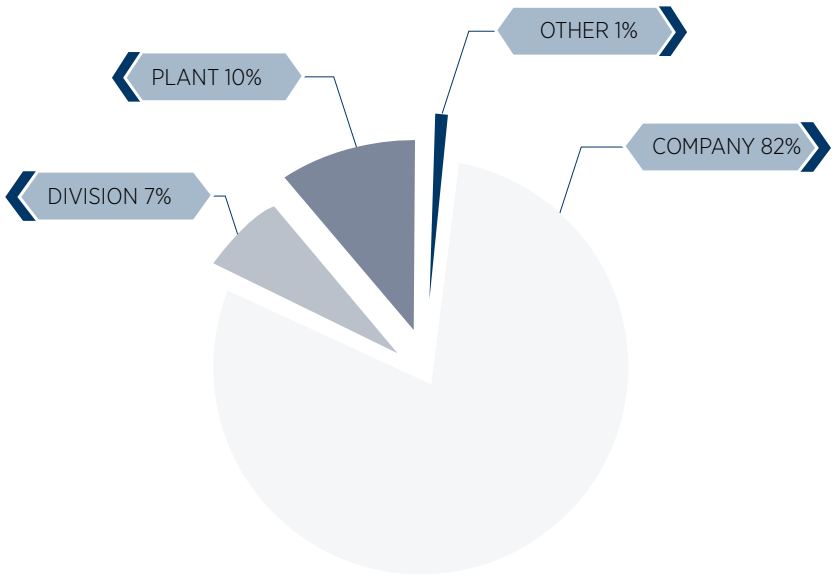
The vast majority of respondents to the 2012 Indiana Manufacturing Survey report at the company level (82%), while a small percentage are divisons of larger organizations (7%) or individual plants (10%). A small percentage (1%) identify themselves as some other organizational form. Overall, 87% of respondents are privately owned companies, and the other 13% are publicly traded companies. The average number of employees per respondent is 306, with the largest organization having 8,000 employees.

TYPES OF ORGANIZATIONAL UNITS

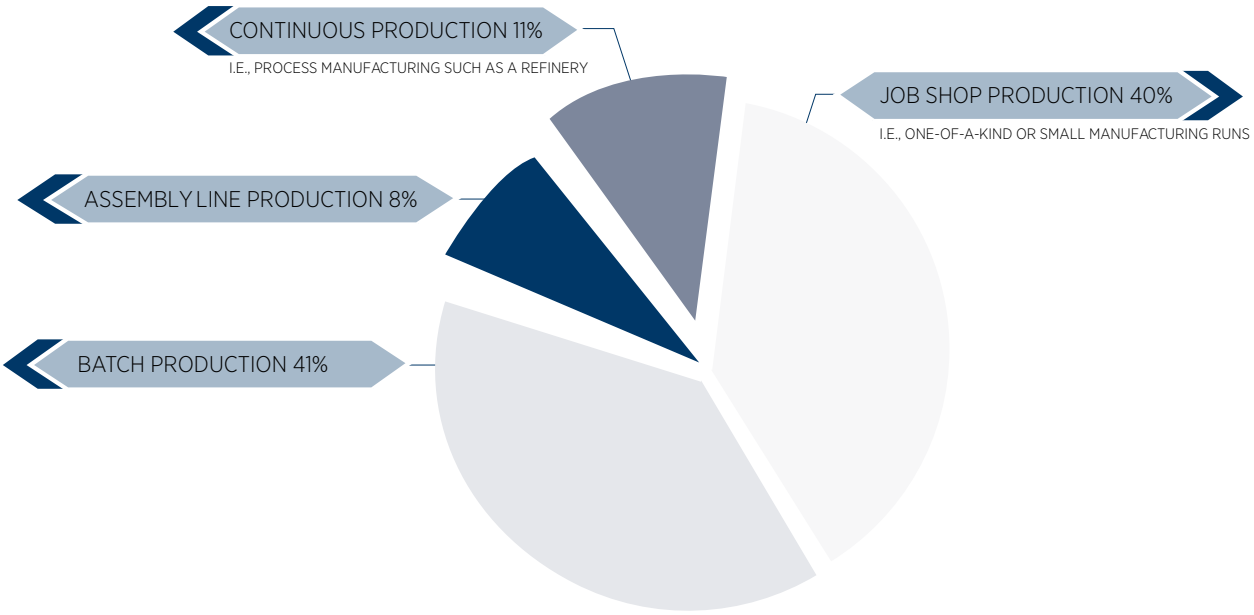


COMPANY OWNERSHIP	%
PUBLIC OWNERSHIP	13%
PRIVATE OWNERSHIP	87%
TOTAL	100%

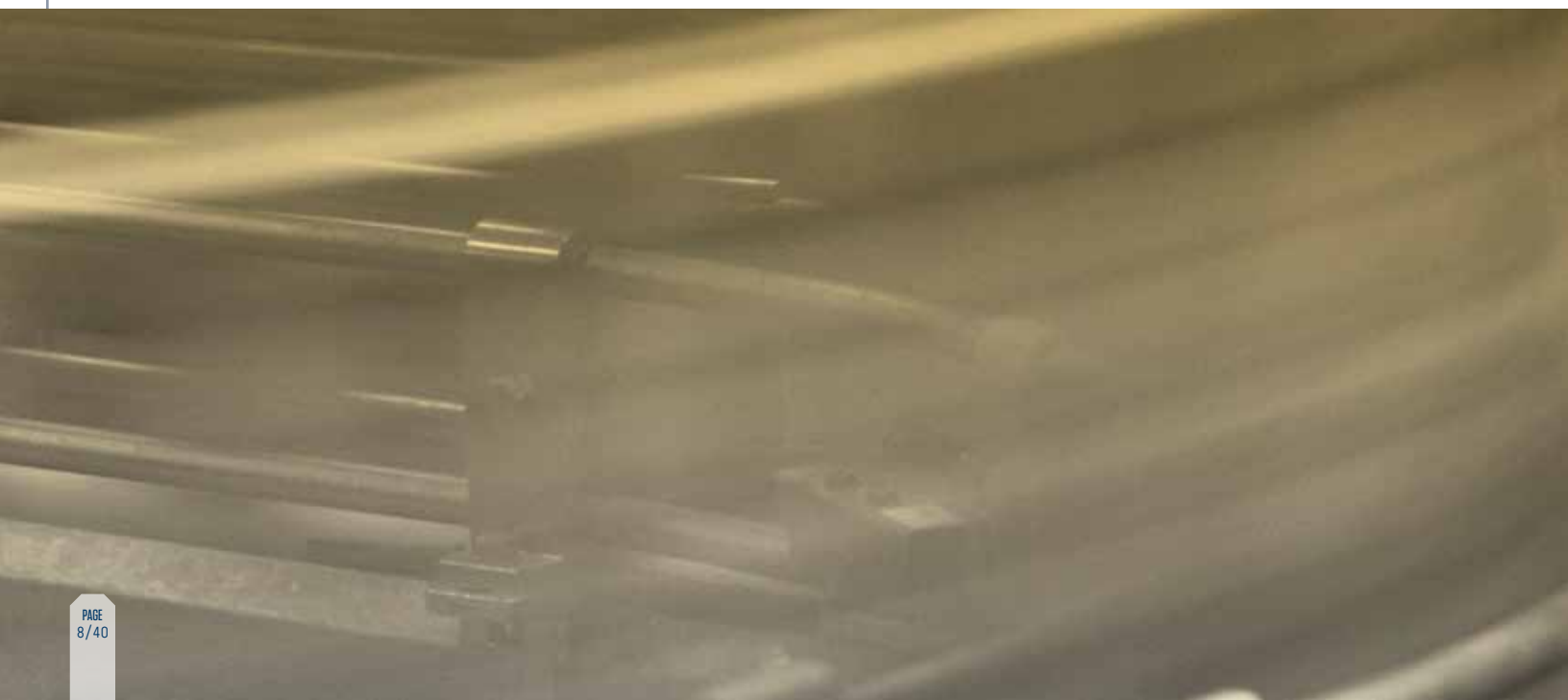
MEAN	306
MEDIAN	70
STD. DEVIATION	948
MAXIMUM	8,000

In terms of production processes, the 2012 survey respondents represent all four major types of manufacturing. Approximately 40% of respondents identified themselves as relying on job shop-type production, and 41% use batch manufacturing. As expected, fewer respondents operate assembly lines (8%) or continuous flow processes (11%), both capital intensive and used to produce relatively standardized, high-volume items.

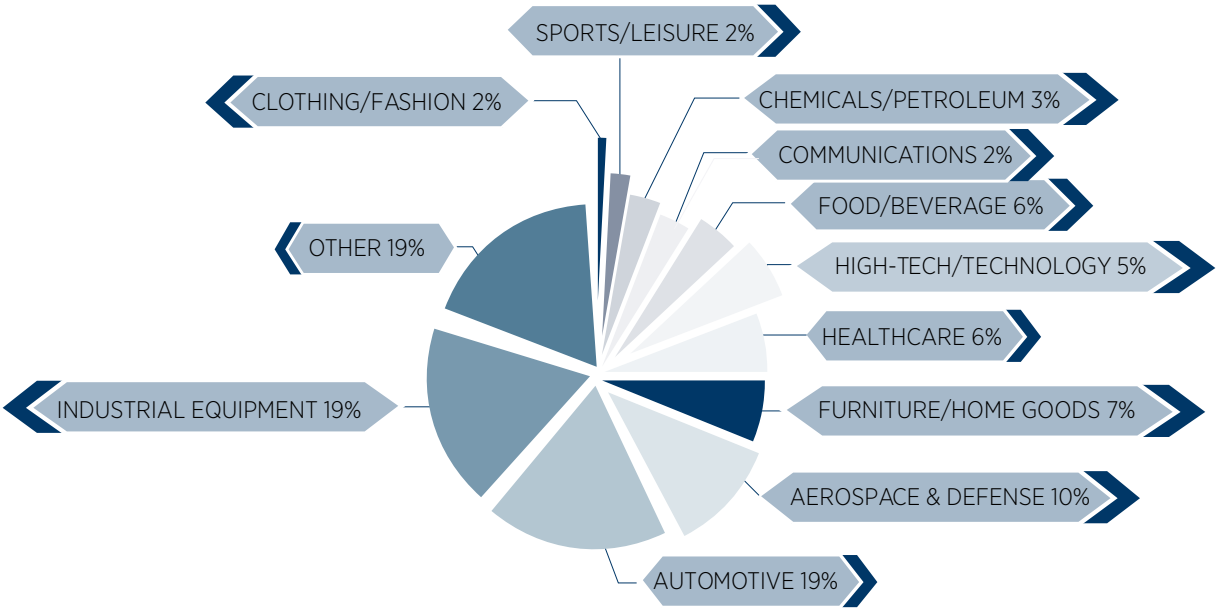
MAIN TYPES OF PRODUCTION USED



The three largest industry groups represented among the 2012 survey respondents are industrial equipment (19%), automotive (19%), and aerospace and defense (10%). Another 18% of respondents are almost evenly distributed between high-tech (5%), healthcare (6%), and furniture/home goods (7%). Companies in the "other" category include energy, construction and publishing.



INDUSTRY TYPES



These results suggest that Indiana has a healthy mix of industries within its manufacturing sector. This diversification serves to reduce the state's exposure to economic cycles, just as a diversified stock portfolio is less volatile than an undiversified portfolio.

II. FINANCIAL PERFORMANCE

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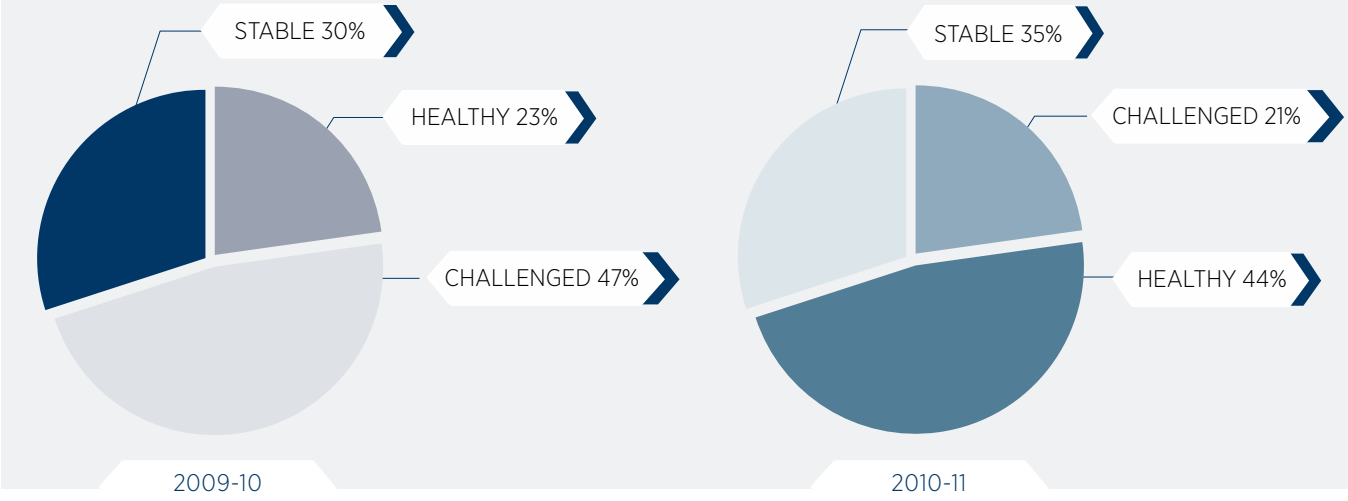
In describing their financial performance over 2009-10, in last year's survey, almost half of the respondents (47%) used the term "challenged," with 30% referring to themselves as "stable," and the remaining 23% viewing their situation as "healthy." This has improved noticeably in the 2012 survey findings, with 44% describing their 2010-11 performance as "healthy," 35% as "stable," and only 21% using the term "challenged."

In last year's survey results, these self-descriptions broke down largely by industry type, with firms from non-cyclical industries – such as healthcare and food/beverage – more likely to indicate they were financially healthy over 2009-10, while industrial equipment, furniture/home goods and automotive were some of the industries prominently represented in the "challenged" category. In the 2012 survey results, there are no such industry trends regarding "healthy," "stable," or "challenged," which suggests that all the manufacturing industries operating in Indiana experienced some degree of recovery during 2010-11.

We also analyzed financial performance based various characteristics. For 2010-11, just as before over 2009-10, we do not find that breaking the respondents down by public versus private ownership or company size produces significant differences in terms of the respondents' financial performance descriptions ("challenged," "stable," or "healthy"). Similarly, no significant differences in the prevalence of these descriptions exist across different manufacturing processes, including job shop, batch, assembly line and continuous flow operations.

FINANCIAL PERFORMANCE



Last year's survey findings showed general improvement in finances in 2010 over 2009. Revenues increased 13%, on average, with 75% of firms experiencing positive growth in revenues. The average growth in net profit margin in 2010 over 2009 was 15%, with 67% of the firms reporting positive growth in profits. Capital expenditures for 2010 were up 14%, on average, from 2009, with 80% of respondents indicating that they increased capital expenditures over 2009.

FINANCIAL METRICS - 2011 SURVEY

% CHANGE	MIN % VALUE	MAX % VALUE	AVERAGE % VALUE	% POSITIVE
REVENUE FOR 2010 OVER 2009	-37	100	13	75
NET PROFIT MARGIN FOR 2010 OVER 2009	-50	100	15	67
CAPITAL EXPENDITURES FOR 2010 OVER 2009	-81	100	14	80

The improvement observed over 2009-10 continued, on average, in 2011, with revenues again up over the prior year by an average of 12% and 82% of respondents reporting positive revenue growth. This contributed to an average growth in net profit margin in 2011 over 2010 of 14%, with 81% of respondents reporting positive growth in margins.

These higher profits helped to support an average increase in capital expenditures in 2011 over 2010 of 14%, with 73% of respondents reporting at least some increase in capital expenditures. Corroborating these signs of economic recovery, we observed that firms in pro-cyclical industries – such as automotive, aerospace and industrial equipment – displayed the strongest growth in revenues and profit margin, as well as the largest increase in capital expenditures.

FINANCIAL METRICS - 2012 SURVEY

% CHANGE	MIN % VALUE	MAX % VALUE	AVERAGE % VALUE	% POSITIVE
REVENUE FOR 2011 OVER 2010	-41	100	12	82
NET PROFIT MARGIN FOR 2011 OVER 2010	-100	100	14	81
CAPITAL EXPENDITURES FOR 2011 OVER 2010	-100	100	14	73

As was the case for the general financial-condition descriptors, changes in revenues, net profits and capital expenditures do not differ significantly based on company size, manufacturing processes, or between public versus privately owned firms. We did find, however, that net profit margins increased more for firms that introduced new products sometime in the two years prior. In the 2011 survey findings, the 38% of respondents that introduced at least one new product over 2009-10 experienced an average increase in profit margins of 26%. While in the 2012 survey findings, the proportion introducing new products increased to 44%, and they saw a similar 24% improvement in net profit margin, versus only an 8% increase for those firms without new products.

FIRMS INTRODUCING ONE OR MORE NEW PRODUCTS

2009-10

		%	NET PROFIT MARGIN FOR 2010 OVER 2009
NO		62%	8%
YES		38%	26%
TOTAL		100%	

2010-11

		%	NET PROFIT MARGIN FOR 2011 OVER 2010
NO		56%	8%
YES		44%	24%
TOTAL		100%	

Logically, profit margins are higher for more modern, state-of-the-art products because customers will typically pay a premium for the latest innovations. Responses to an open-ended question in the survey reinforces this point: “What was your best manufacturing decision in the past year?”

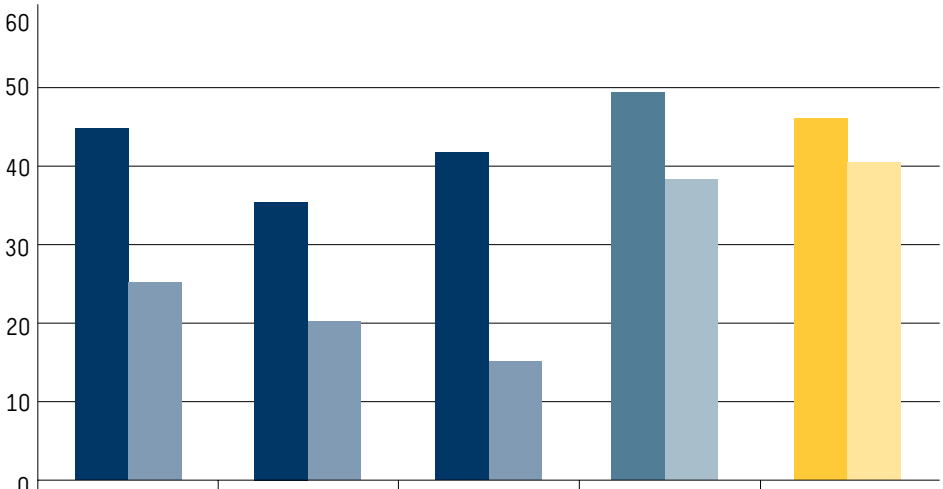
WHAT WAS YOUR BEST MANUFACTURING DECISION IN THE PAST YEAR?

“ADDITIONS TO THE PRODUCT LINE”
“DEVELOP AND MARKET NEW PRODUCTS”
“EXTENSIVE R&D TO DEVELOP NEW PRODUCTS”
“INCREASE R&D PROJECTS AND RUN MORE LINE TRIALS WHEN THE ECONOMY WAS SLOW. THIS ALLOWED US TO DEVELOP NEW PRODUCTS TO TAKE TO MARKET.”

In regards to working capital and expenses, last year's survey results found that the mean values for inventories, receivables and payables (in days) were skewed by some of the more challenged business sectors. Specifically, in 2010 mean (median) values for days inventory of raw materials, work-in-progress, and finished goods were 44 (25), 35 (20), and 41 (15), respectively. Similarly in 2010, mean (median) values for days sales outstanding and days payable were 49 (38) and 46 (40), respectively. These values yielded a mean (median) cash conversion cycle (i.e., days inventory + days receivable - days payable) for 2010 of roughly 45 (18) days.

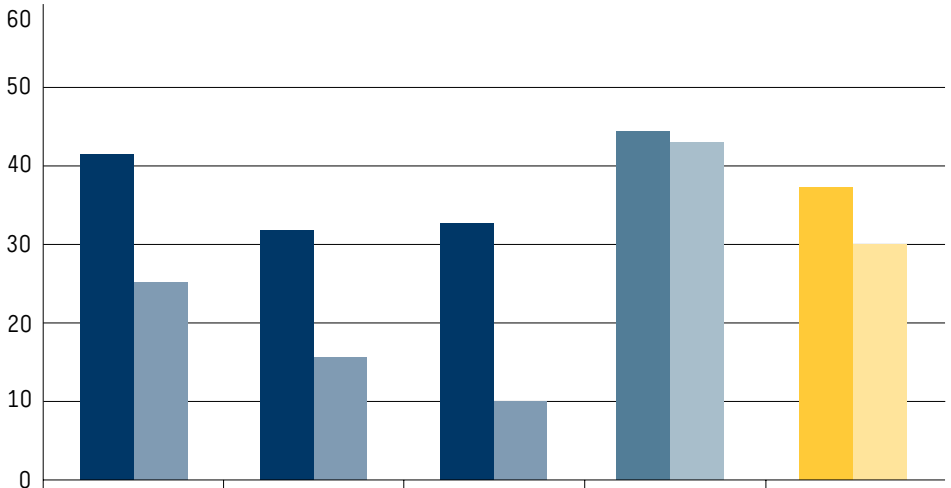
Days inventory were generally lower for Indiana manufacturers in 2011, with mean (median) days outstanding for raw materials, work-in-process, and finished goods inventories at 41 (26), 31 (15), and 32 (10), respectively. Additionally, while mean (median) days payable is much lower in 2011 versus 2010, at 37 (30) days, the picture for days sales outstanding is mixed at 45 (44). Consequently, the mean (median) cash conversion cycle actually grew longer in 2011, versus 2010, at 43 (31) days, mainly because receivables have not fallen as much as payables. This suggests that the typical Hoosier manufacturer may be financially healthier than its typical customer.

WORKING CAPITAL AND CASH FLOW METRICS, 2010



	RAW MATERIALS INVENTORY (DAYS)	WORK-IN-PROCESS INVENTORY (DAYS)	FINISHED GOODS INVENTORY (DAYS)	DAYS SALES OUTSTANDING (DSO)	DAYS PAYABLE OUTSTANDING (DPO)
MEAN	44	35	41	49	46
MEDIAN	25	20	15	38	40

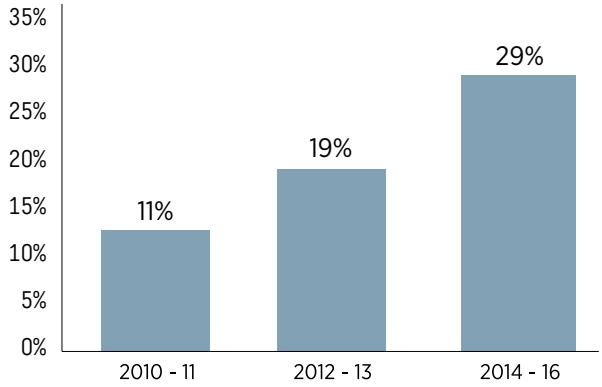
WORKING CAPITAL AND CASH FLOW METRICS, 2011

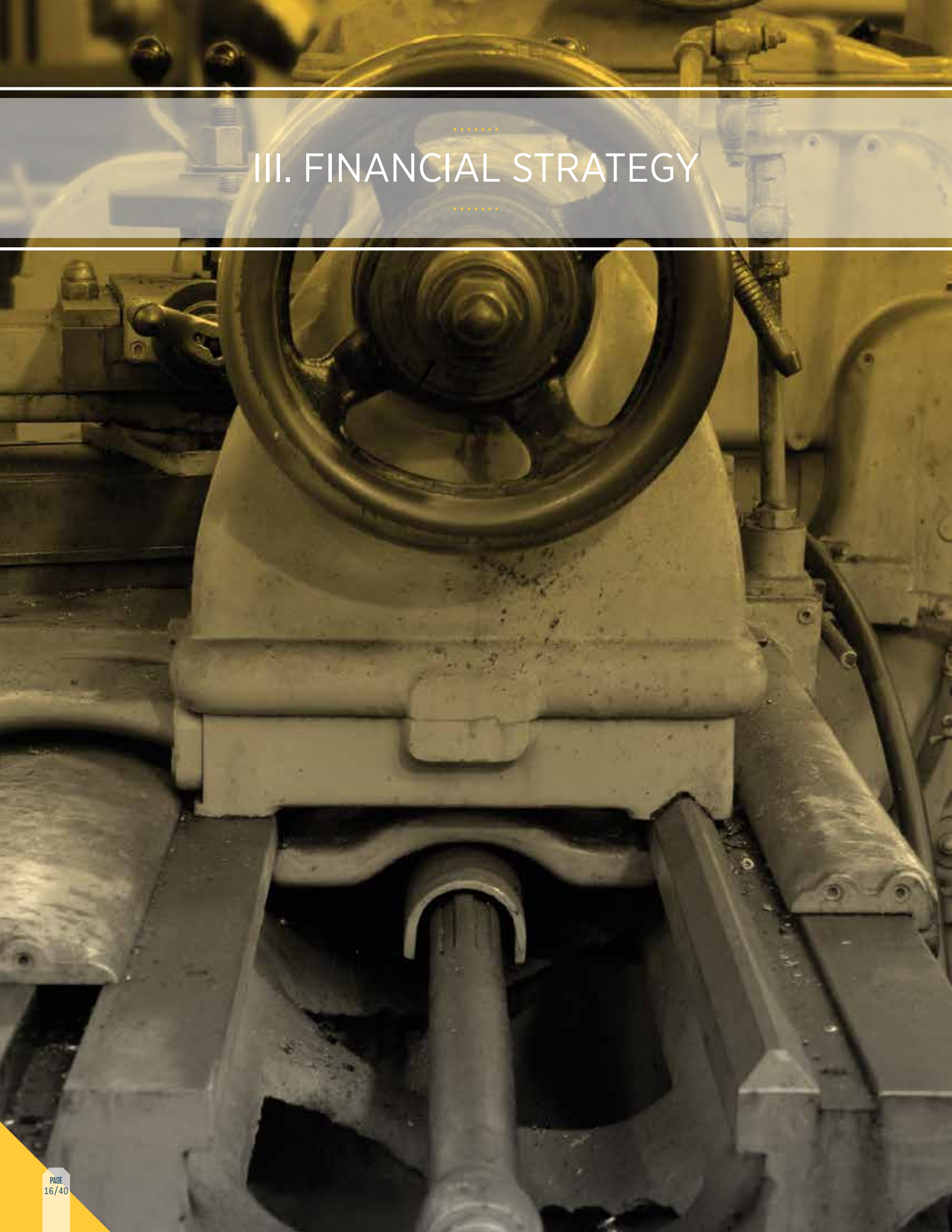


	RAW MATERIALS INVENTORY (DAYS)	WORK-IN-PROCESS INVENTORY (DAYS)	FINISHED GOODS INVENTORY (DAYS)	DAYS SALES OUTSTANDING (DSO)	DAYS PAYABLE OUTSTANDING (DPO)
MEAN	41	31	32	45	37
MEDIAN	26	15	10	44	30

In terms of product markets, 25% of respondents saw their markets shrink in 2010-11, while only about 5% expect their markets to shrink going forward. Just 11% of the respondents saw their markets grow rapidly in 2010-11, while 19% expect their markets to grow rapidly over 2012-13 and an encouraging 29% of respondents expect rapid growth over the 2014-16 period.

EXPECTING RAPID MARKET GROWTH





III. FINANCIAL STRATEGY

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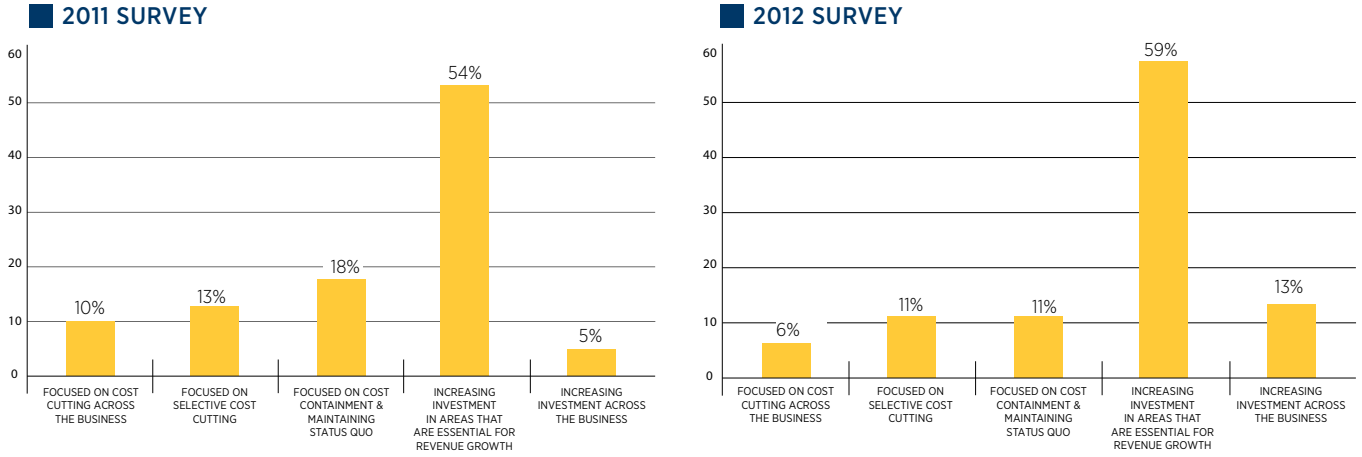
In terms of what best describes their business unit's strategy, 14% of respondents downsized in 2010-11, while less than 3% are downsizing currently (2012-13), or expect to downsize in the future (2014-16). Only 13% of the respondents describe their 2010-11 strategy as one of aggressive growth, while 20% are currently pursuing aggressive growth over 2012-13, and an impressive 26% of respondents are planning for aggressive growth in the 2014-16 period.

In the 2011 survey findings, more than 50% of respondents identified their strategy for financial success as increasing investment in areas that are essential for revenue growth. Just more than 30% were focused on cost containment (18%) or selective cost cutting (13%), and 10% of respondents cut across the board. As might be expected, this cost-cutting was concentrated among companies describing their financial position as "challenged."

Consistent with our previously reported evidence of plans for increased capital investment moving forward, we also find in our 2012 results that almost 60% of respondents now identify their financial strategy as increasing investment in areas that are essential for revenue growth, and 13% are planning increased investment across the business. At the other end of the spectrum, 22% of Hoosier manufacturers are currently focusing on either cost containment (11%) or selective cost-cutting (11%), with another approximately 6% still cutting costs across the board.

STRATEGIES FOR FINANCIAL SUCCESS



Looking forward, improving cash flow and working capital management, along with short- and long-term operational efficiency, ranked as top priorities in both the 2011 and 2012 survey results. Access to credit for working capital is of particular concern to companies that see their financial positions as "challenged," while access to credit to fund new capital investment is important to companies that view their financial position as "stable" or "healthy."

2011 SURVEY	ACCESSING CREDIT FOR WORKING CAPITAL	ACCESSING CREDIT FOR WORKING CAPITAL INVESTMENT	CASH FLOW AND WORKING CAPITAL MANAGEMENT	IMPROVING SHORT-AND LONG-TERM OPERATIONAL EFFICIENCY	REGULATORY CHANGE	SUPPLIER STABILITY
MEAN	3.49	4.26	2.21*	2.42	4.36	4.24
STANDARD DEVIATION	1.66	1.38	1.32	1.36	1.51	1.55

*Respondents ranked these items in priority from 1 to 6; thus, the lowest average was ranked the most important.

2012 SURVEY	ACCESSING CREDIT FOR WORKING CAPITAL	ACCESSING CREDIT FOR WORKING CAPITAL INVESTMENT	CASH FLOW AND WORKING CAPITAL MANAGEMENT	IMPROVING SHORT-AND LONG-TERM OPERATIONAL EFFICIENCY	REGULATORY CHANGE	SUPPLIER STABILITY
MEAN	4.22	4.46	2.54	1.98*	3.88	3.93
STANDARD DEVIATION	1.59	1.35	1.37	1.14	1.65	1.54

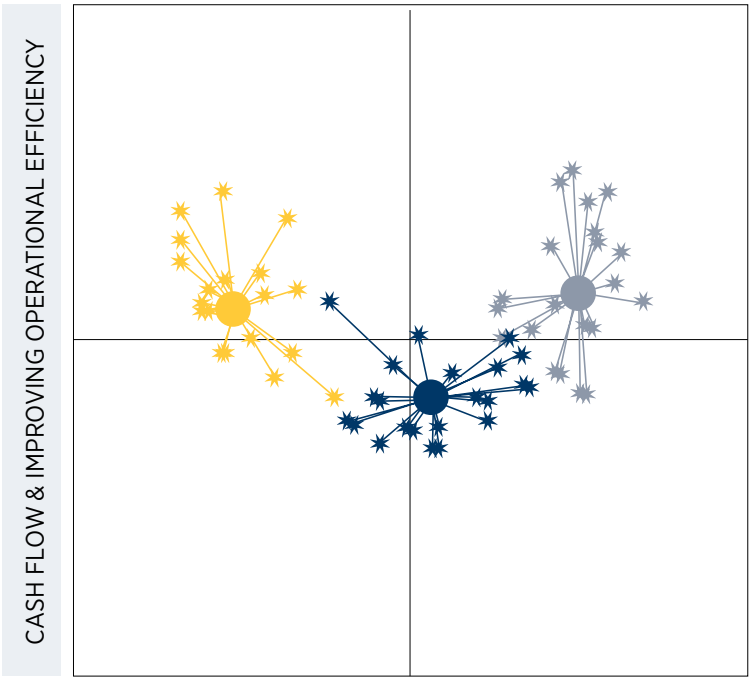
*Respondents ranked these items in priority from 1 to 6; thus, the lowest average was ranked the most important.

Building on this analysis of strategy, we next use two powerful statistical techniques called cluster and discriminant analysis to group the responses based upon financial priorities and concerns.

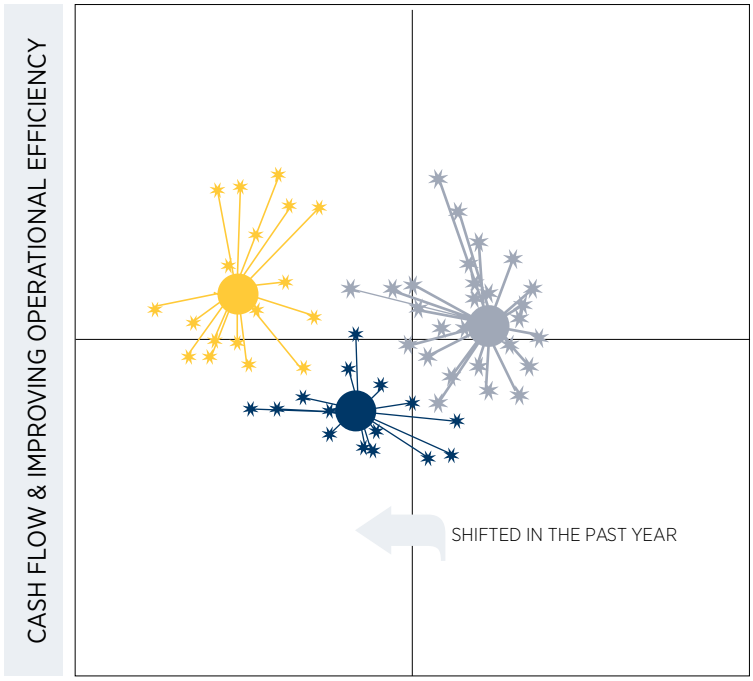
In the 2011 survey results, three strategies emerged from the data along two dominant underlying dimensions: cash flow and improving operational efficiency, and accessing credit for working capital and investment. An interesting picture emerged when these three strategies were plotted on what is called a "combined group plot." In total for 2011, 27% of respondents were concerned for the future about both working capital and improved operational efficiency, as well as accessing credit for working capital and investment. Alternatively, 40% were most concerned about accessing credit, while the remaining 32% were focused on cash flows and improved operational efficiency. Problems in all of those areas have, of course, led to countless bankruptcies during the recent recession.

In the 2012 survey results, these same clusters emerged, although more than twice as many Indiana manufacturers (57%) are now concerned with both working capital and improved operational efficiency, as well as accessing credit for working capital and future investment. And now only 25% are worried about accessing credit. Surprisingly, the remaining 18% of respondents are neither concerned about cash flow and improved neither operational efficiency nor accessing credit for working capital and investment. This may indicate those manufacturers have now resolved many of the operational and financial problems that plagued many companies in recent years.

FINANCIAL PRIORITIES AND CONCERNS

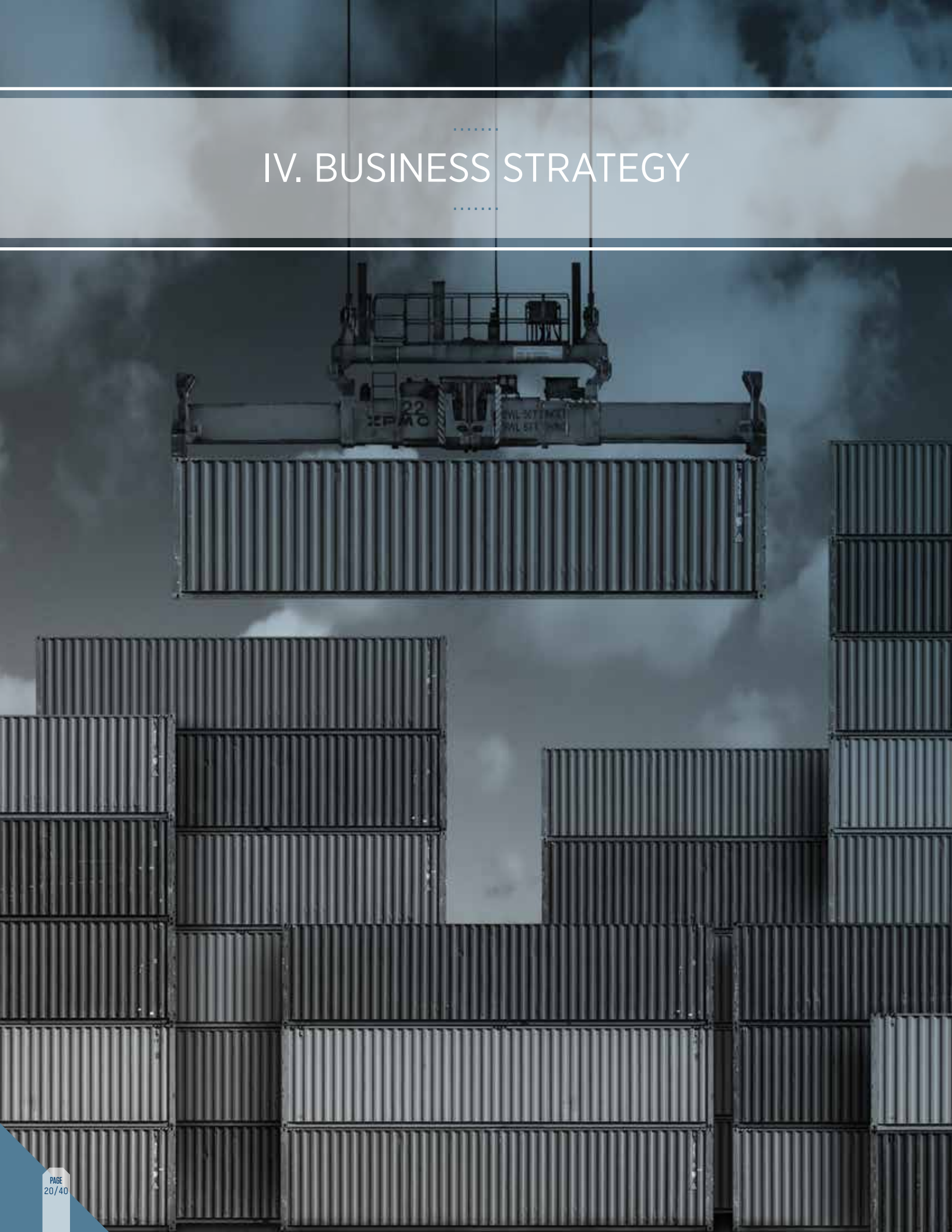


2011



2012

IV. BUSINESS STRATEGY



IV. BUSINESS STRATEGY

Perhaps one of the most important strategic business decisions that a manufacturer can make is how to win orders from major customers based upon the traditional competitive priorities of delivery, price, service, design and quality. Business strategies are largely consistent from the 2011 survey results to this year's results. Overall, superior customer service, fast and reliable delivery, and superior quality rank most important. Similarly, lower selling prices and superior product design also remained relatively important capabilities over the past two years.

HOW TO WIN ORDERS: COMPETITIVE PRIORITIES

2011 SURVEY	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	EXTREMELY IMPORTANT	MEAN
FAST & RELIABLE DELIVERY	1	6	18	31	43	4.10
LOWER SELLING PRICES	2	15	30	29	23	3.57
SUPERIOR CUSTOMER SERVICE	2	4	18	29	46	4.14
SUPERIOR PRODUCT DESIGN	11	11	19	32	26	3.52
SUPERIOR QUALITY	3	4	12	41	39	4.10

2012 SURVEY	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	EXTREMELY IMPORTANT	MEAN
FAST & RELIABLE DELIVERY	3	2	20	39	50	4.15
LOWER SELLING PRICES	7	17	31	36	23	3.45
SUPERIOR CUSTOMER SERVICE	3	1	21	50	39	4.06
SUPERIOR PRODUCT DESIGN	13	11	41	32	17	3.25
SUPERIOR QUALITY	4	4	18	43	45	4.06

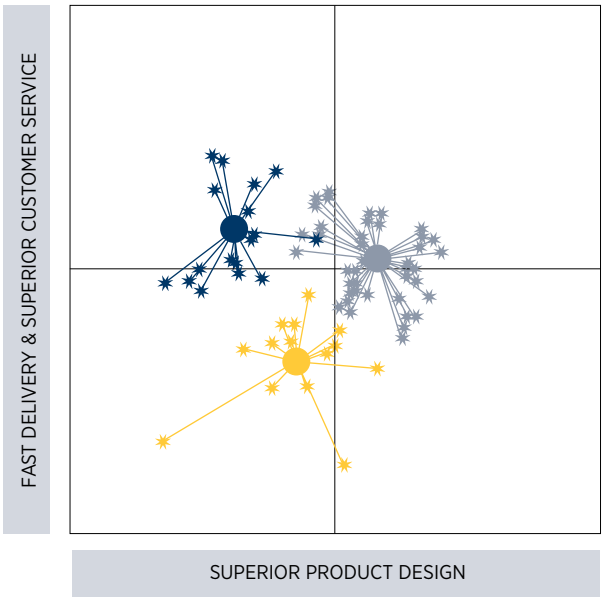
In order to understand the underlying business strategies in play, we once again rely on cluster and discriminant analysis to group the respondents based upon the five most common ways to win customers' orders. For 2011, three distinct business strategies emerged among the Indiana manufacturers surveyed, and the two most important underlying dimensions were superior product design and fast and reliable delivery along with superior customer service. The largest group, including 63% of manufacturers, featured design and delivery plus customer service as cornerstones of their business strategy. A different strategic group (21%) mainly concentrated on delivery with superior customer service. It is also worth noting that the smallest cluster (16%) was not focused on superior product design, fast and reliable delivery, or superior customer service.

Based on the 2012 survey results, business strategies have changed from 2011. Now superior quality and lower selling prices have emerged as the two most important underlying dimensions on which Hoosier manufacturers are differentiating their businesses. It is worth emphasizing, however, that these findings do not mean that the two most important drivers of business strategy in the 2011 survey (i.e., superior product design and fast and reliable delivery along with superior customer service) are no longer important. Instead, quality and price have taken on a renewed significance as a business strategy in these 2012 results. Interestingly, the consensus is almost evenly split right now, with 38% of manufacturers most interested in superior quality, while 37% believe that lower selling prices are more important.

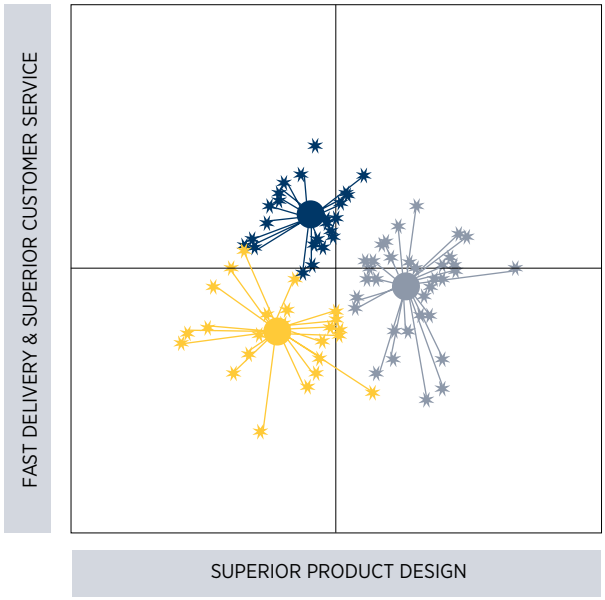
Finally, it is important to note that while the majority of manufacturers are most interested in either superior quality or lower selling prices, there are some companies "on the fringe" and interested in capitalizing on both of these strategic clusters. Although we will have to wait until next year's 2013 survey to see, it is entirely likely that more companies will evolve capabilities in superior quality or lower selling prices camps in order to develop a more balanced one-two quality and price "punch" as part of their overall business strategy.

COMPETITIVE PRIORITIES: DELIVERY AND SERVICE VERSUS PRODUCT DESIGN

2011 SURVEY
YESTERDAY'S DOMINANT STRATEGY

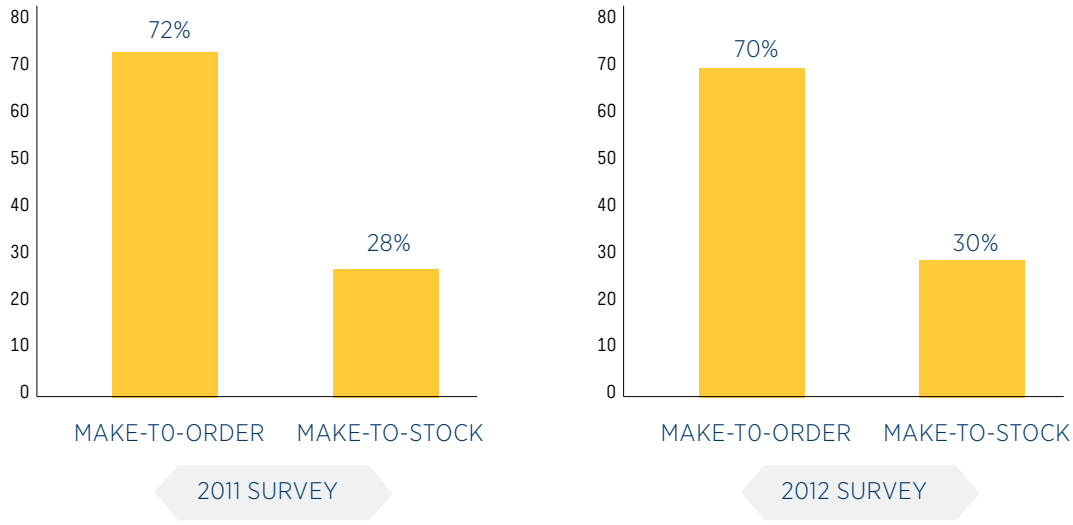


2012 SURVEY
TOMORROW'S EMERGING STRATEGY



Many of the above findings were also reflected in the types of orders that Indiana manufacturers typically receive. In the 2011 survey results, 72% of respondents reported that their business was make-to-order, while only 28% rely on make-to-stock. For 2012, those numbers were almost identical, with 70% featuring make-to-order and 30% featuring make-to-stock. As we noted in last year's report, these percentages are the inverse of what is commonly reported, with make-to-stock commonly in the range of 65-75% and make-to-order accounting for 25-35%. No doubt, Indiana's much greater percentage of make-to-order manufacturing is a reflection of the kinds of businesses located here and highlighted above, including the three largest industry groups represented from industrial equipment (19%), automotive (19%), and aerospace and defense (10%). In manufacturing industries such as these, Indiana companies play an important role in terms of producing parts and other subcomponents. Classic examples of make-to-order manufacturing versus the more common use of make-to-stock are consumer-product oriented sectors like clothing (2% of Indiana's manufacturing) and food and beverage (6% of companies) production.

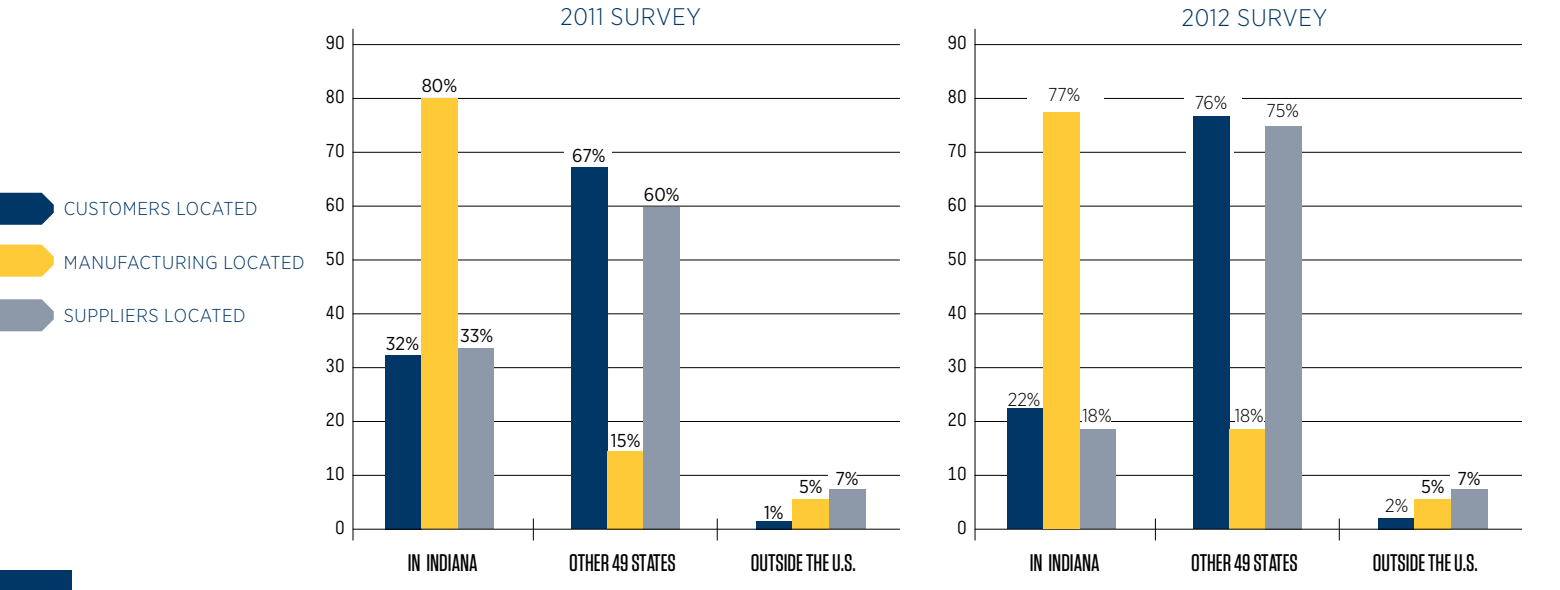
TYPES OF CUSTOMER ORDERS



Predictably, the vast majority (80% in 2011 and 77% in 2012) of the manufacturers surveyed have most of their facilities located in Indiana, with only 15% in 2011 and 18% in 2012 located in the other 49 states and 5% abroad, in both years. Alternatively, suppliers to Hoosier manufacturers appear to be shifting outside the state. In the 2011 survey results, 35% of suppliers were located in Indiana, and 60% were located in the other 49 states. In this year's survey results, just 18% of Hoosier manufacturers are sourcing from mainly inside the state. At least this business is staying in the United States, with just 7% going abroad in both 2011 and 2012.

Regarding customers, the bulk are, not surprisingly, located outside the state of Indiana. The number of Hoosier manufacturing companies reporting that the majority of their sales come from outside the United States only rose from 1% in 2011 to 2% in 2012.

KEY CUSTOMER, FACILITY AND SUPPLIER LOCATIONS



V. ADVANCED MANUFACTURING STRATEGY

2011 SURVEY

	NO USE				VERY HIGH USE	
ADVANCED MANUFACTURING TECHNOLOGIES	**1**	**2**	**3**	**4**	**5**	MEAN
AUTOMATED GUIDED VEHICLES (AGVs)	94%	2%	2%	0%	2%	1.14
AUTOMATIC STORAGE/RETRIEVAL SYSTEMS (AS/RS)	90%	5%	2%	0%	3%	1.21
BIO OR GENE-TECHNOLOGY (E.G., CATALYSTS OR BIO REACTORS)	92%	2%	2%	2%	2%	1.20
CNC MACHINES	**45%**	**8%**	**9%**	**17%**	**20%**	**2.59**
COMPUTER-AIDED DESIGN/ENGINEERING (CAD-CAE)	**27%**	**13%**	**16%**	**25%**	**18%**	**2.94**
COMPUTERIZED/VIDEO ASSEMBLY INSTRUCTIONS	72%	14%	8%	3%	3%	1.52
COORDINATE-MEASURING MACHINE (CMM) INSPECTION	**61%**	**6%**	**13%**	**8%**	**12%**	**2.05**
DRY ICE BLASTING (I.E., CO2 OR CRYOGENIC CLEANING)	90%	4%	3%	2%	1%	1.20
DRY PROCESSING/MINIMUM QUANTITY LUBRICATION SYSTEM	87%	7%	3%	2%	1%	1.23
FLEXIBLE MANUFACTURING SYSTEMS (FMS)	65%	11%	7%	8%	9%	1.86
LASER AS A TOOL (E.G., CUTTING, WELDING, FORMING)	**61%**	**11%**	**13%**	**9%**	**6%**	**1.89**
NOVEL MATERIALS (E.G., COMPOSITE OR RENEWABLE RAW)	69%	16%	8%	5%	2%	1.56
RAPID PROTOTYPING OR TOOLING (E.G., STEREO LITHOGRAPHY)	68%	13%	11%	5%	3%	1.63
RFID PRODUCT/PART TRACKING	73%	12%	7%	5%	3%	1.54
RFID TOOL CONTROL	83%	9%	5%	1%	2%	1.30
ADVANCED MANUFACTURING PROGRAMS						
APPRENTICESHIP PROGRAMS FOR TRAINING NEW WORKERS	33%	35%	17%	9%	5%	2.17
LEAN MANUFACTURING	**20%**	**19%**	**27%**	**20%**	**13%**	**2.87**
SIX SIGMA	**58%**	**21%**	**11%**	**5%**	**5%**	**1.79**
WORK CELLS/CELLULAR MANUFACTURING	36%	19%	18%	14%	12%	2.46

V. ADVANCED MANUFACTURING STRATEGY

The survey included questions on a wide variety of advanced manufacturing technologies and programs. Respondents reported on their use of each on a scale of 1 to 5, 1 being "No Use" and 5 being "Very High Use." Comparing the results from the 2011 and 2012 surveys shows that automation such as CNC machines, computer-aided design/engineering (CAD-CAE) and coordinate-measuring machine (CMM) inspection are continuing to grow in popularity. In 2011, approximately 20% of Indiana's manufacturers made very high use of CNC machines. In 2012, that number increased to 28%. Likewise, CAD-CAE grew from 18% in 2011 to 24% in 2012, while leading-edge technologies, such as laser as a tool, almost doubled from 6% in 2011 to 11% in 2012. In a similar way, Indiana companies increasingly rely on the manufacturing philosophy known as Lean manufacturing. It is also interesting to note that the percentage of companies using Six Sigma has now increased to more than 50% in 2012. This rise in use may in part be attributable to the shift in business strategies, noted above, towards superior quality and lower prices, which are two capabilities (among others) that Six Sigma methods have long excelled at improving.

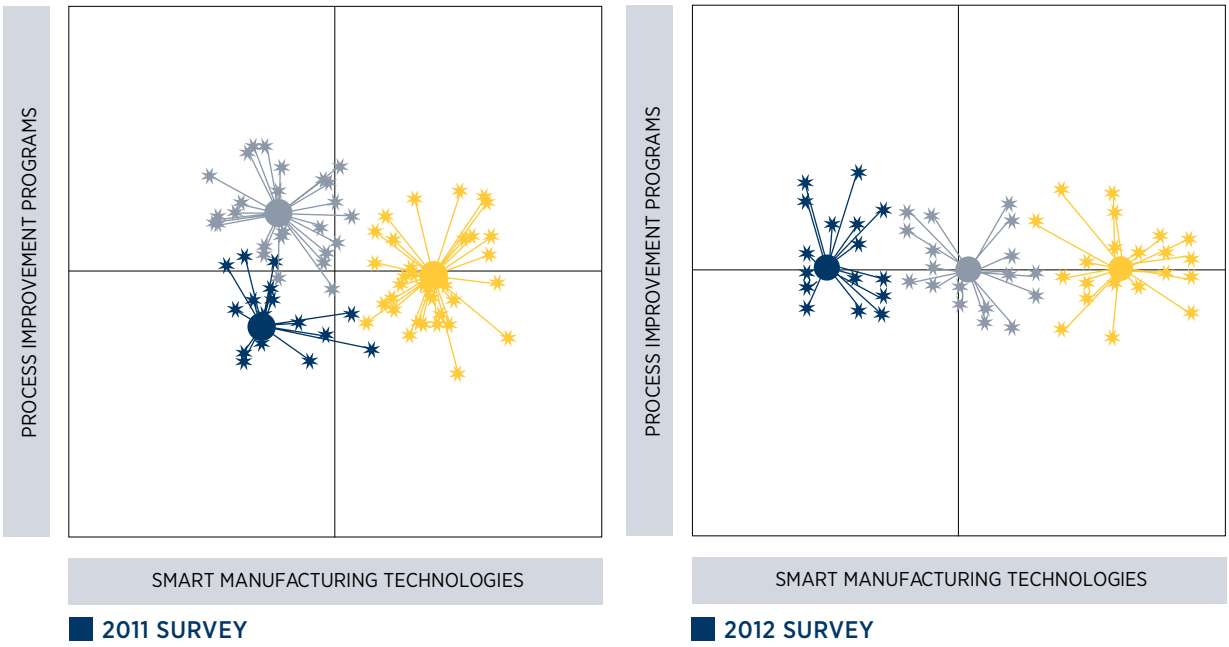
2012 SURVEY

	NO USE				VERY HIGH USE	
ADVANCED MANUFACTURING TECHNOLOGIES	**1**	**2**	**3**	**4**	**5**	MEAN
AUTOMATED GUIDED VEHICLES (AGVs)	95%	3%	1%	1%	0%	1.08
AUTOMATIC STORAGE/RETRIEVAL SYSTEMS (AS/RS)	90%	6%	3%	0%	1%	1.16
BIO OR GENE-TECHNOLOGY (E.G., CATALYSTS OR BIO REACTORS)	99%	1%	0%	0%	0%	1.01
CNC MACHINES	**39%**	**5%**	**15%**	**14%**	**28%**	**2.87**
COMPUTER-AIDED DESIGN/ENGINEERING (CAD-CAE)	**32%**	**5%**	**20%**	**18%**	**24%**	**2.98**
COMPUTERIZED/VIDEO ASSEMBLY INSTRUCTIONS	74%	9%	10%	6%	2%	1.53
COORDINATE-MEASURING MACHINE (CMM) INSPECTION	**56%**	**8%**	**10%**	**16%**	**11%**	**2.17**
DRY ICE BLASTING (I.E., CO2 OR CRYOGENIC CLEANING)	89%	5%	3%	2%	1%	1.2
DRY PROCESSING/MINIMUM QUANTITY LUBRICATION SYSTEM	88%	4%	4%	3%	1%	1.24
FLEXIBLE MANUFACTURING SYSTEMS (FMS)	57%	16%	14%	8%	6%	1.89
LASER AS A TOOL (E.G., CUTTING, WELDING, FORMING)	**68%**	**7%**	**5%**	**10%**	**11%**	**1.88**
NOVEL MATERIALS (E.G., COMPOSITE OR RENEWABLE RAW)	71%	16%	10%	3%	1%	1.48
RAPID PROTOTYPING OR TOOLING (E.G., STEREO LITHOGRAPHY)	73%	12%	12%	2%	2%	1.49
RFID PRODUCT/PART TRACKING	76%	10%	6%	6%	3%	1.5
RFID TOOL CONTROL	81%	9%	9%	2%	0%	1.32
ADVANCED MANUFACTURING PROGRAMS						
APPRENTICESHIP PROGRAMS FOR TRAINING NEW WORKERS	40%	27%	19%	12%	2%	2.09
LEAN MANUFACTURING	**22%**	**15%**	**28%**	**21%**	**14%**	**2.89**
SIX SIGMA	**48%**	**17%**	**20%**	**10%**	**5%**	**2.07**
WORK CELLS/CELLULAR MANUFACTURING	38%	7%	24%	22%	9%	2.57

We use an analytic technique called "factor analysis,"[1] to distill or pare those 19 items down to a subset of measurements representing the "essence" or "core" of advanced manufacturing and programs. In the 2011 survey results, the four critical technologies that emerged from this analysis were CNC machines, CAD-CAE, CMM inspection, and the use of lasers. Similarly, of the four advanced manufacturing programs, both Lean manufacturing and Six Sigma emerged as having the most effect.

In the 2012 survey results, three groupings of advanced manufacturing strategies emerged from this analysis based upon two underlying dimensions. The four advanced manufacturing technologies formed one dimension. These represent, in essence, what is increasingly known as "smart manufacturing technologies." Smart manufacturing largely relies on information technologies and data sharing throughout businesses and factories to connect and synchronize all the stages of production from product design and fabrication to final assembly and testing. Similarly, a second dimension strongly formed around Lean manufacturing and Six Sigma, and we labeled those "process improvement programs."

PRIORITIES IN MANUFACTURING STRATEGY: PROCESS IMPROVEMENT VERSUS SMART MANUFACTURING



Clearly, over the past several years, smart manufacturing technologies have become the key differentiator in terms of manufacturing strategies among Indiana companies. In the 2011 survey results, 31% of the respondents focused on process improvement programs as the centerpiece of their manufacturing strategy. Conversely, 38% of the companies were, in general, concentrating on smart manufacturing technologies. The remaining Indiana manufacturers in this study had no identifiable strategy in 2011 other than that they did not, to any material degree, emphasize either smart manufacturing technologies or process improvement programs.

[1]Factor analysis identifies underlying variables, or factors, that explain the pattern of correlations within a set of observed variables, and it is commonly used in data reduction to identify a small number of factors that explain most of the variance that is observed in a much larger number of variables.

In the 2012 survey results, there is no longer a subset of Indiana manufacturers mainly focused on process improvement programs. In fact, today all three clusters of manufacturing strategy almost equally emphasize process improvement programs. Conversely, the critical differentiator is the degree to which Indiana manufacturers are concentrating on smart manufacturing technologies. Along these lines, 31% of the respondents are making heavy use of smart manufacturing technologies, while another 28% are making moderate to heavy use of automation.

This means 41% of Indiana manufacturers are making no or low use of smart manufacturing technologies. While there is no doubt that the process technologies vary based upon industries and products, it is difficult to decide within each industry and product line how much automation is needed. Perhaps the 41% of Hoosier manufacturers making no or low use of smart manufacturing technologies have made the right decision based upon their business. On the other hand, given that 59% of Indiana companies (31% plus 28% with a moderate to heavy) are moving ahead in terms of smart manufacturing technologies, perhaps the 41% are taking a risk in terms of falling behind, especially relative to global competition.

Responses in the 2012 survey results regarding the best manufacturing decision made in the past year are also very revealing regarding smart manufacturing technologies.

WHAT WAS YOUR BEST MANUFACTURING DECISION IN THE PAST YEAR?

"INSTALLING NEW MANUFACTURING LINE WITH INCREASED AUTOMATION"
"CAPITAL INVESTMENT IN TWO PIECES OF EQUIPMENT"
"UPGRADING OUR MACHINE CONTROL TECHNOLOGY"
"INVEST IN NEW TECHNOLOGY"
"PUT IN NEW EQUIPMENT"
"UPGRADE TO A NEWER AND FASTER PICK AND PLACE MACHINE FOR SURFACE MOUNT ASSEMBLY"
"USE OF CNC MACHINES"
"IMPLEMENTING CAD/CAM PROCESSING ON THE SHOP FLOOR"

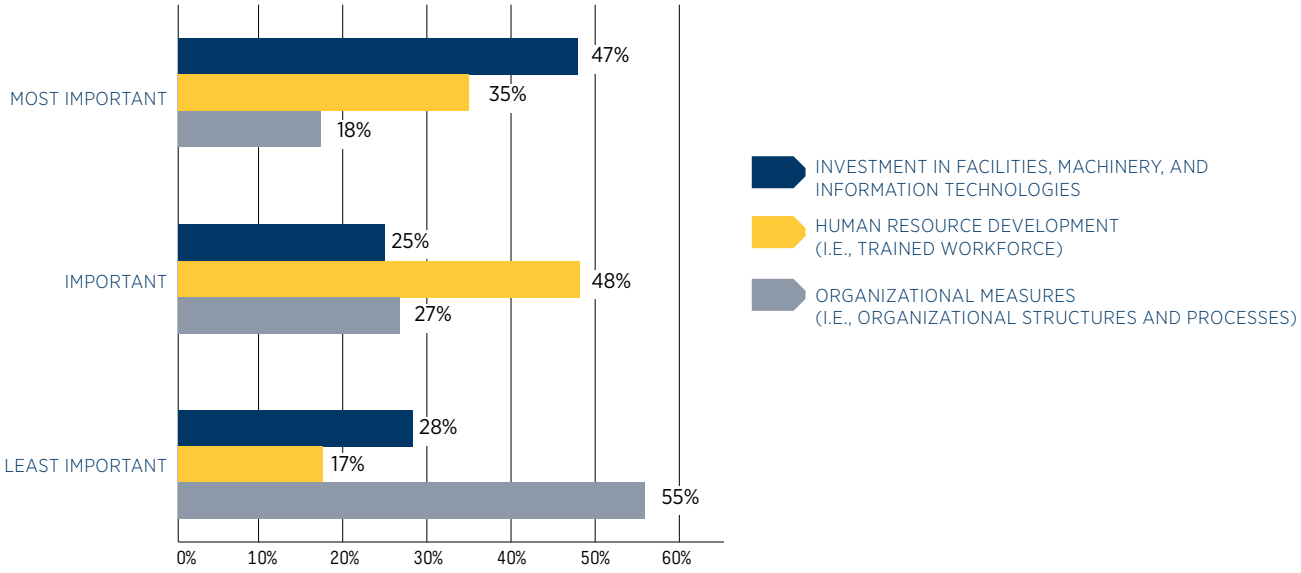
As with the 2011 survey findings, we analyzed all three strategic groups based upon their financial performance and manufacturing strategy. The cluster with heavy use of smart manufacturing technologies reported that their average revenue increase from 2010 to 2011 was 17%, while the improvement in net profit margin was even higher at 22%. The cluster with moderate to heavy use of smart manufacturing technologies reported revenues up by 14% and net profits up by a robust 21%. In contrast, the group making no or low use of smart manufacturing technologies saw revenues and net profit margins increase by only 9% and 4%, respectively. Interestingly, this group making no or low use of smart manufacturing technologies reported a large 14% percent increase in capital expenditures from 2010 to 2011. Given their relatively poor revenue and profit margin performance, it is likely that those making no or low use smart manufacturing technologies are now attempting to catch up in their use of advance automation.

FINANCIAL PERFORMANCE BASED ON MANUFACTURING STRATEGY

	AVERAGE	STANDARD DEVIATION
% CHANGE IN REVENUE FOR 2011 OVER 2010		
HEAVY USE OF SMART MANUFACTURING TECHNOLOGIES	17%	28%
MODERATE TO HEAVY USE OF SMART MANUFACTURING TECHNOLOGIES	14%	20%
NO OR LOW USE OF SMART MANUFACTURING TECHNOLOGIES	9%	21%
% CHANGE IN NET PROFIT MARGIN FOR 2011 OVER 2010		
HEAVY USE OF SMART MANUFACTURING TECHNOLOGIES	22%	32%
MODERATE TO HEAVY USE OF SMART MANUFACTURING TECHNOLOGIES	21%	32%
NO OR LOW USE OF SMART MANUFACTURING TECHNOLOGIES	4%	39%
% CHANGE IN CAPITAL EXPENDITURES FOR 2011 OVER 2010		
HEAVY USE OF SMART MANUFACTURING TECHNOLOGIES	17%	36%
MODERATE TO HEAVY USE OF SMART MANUFACTURING TECHNOLOGIES	8%	26%
NO OR LOW USE OF SMART MANUFACTURING TECHNOLOGIES	14%	29%

We also investigated the major areas of concern for manufacturing modernization. Investment in facilities, machinery and information technologies ranked most important, followed closely by human resource development (i.e., trained workforce). Alternatively, relatively few firms ranked human resource development as least important. These results clearly indicate a growing concern about access to an adequately trained Hoosier workforce, more so than in past years. To a lesser extent, organizational measures (i.e., organizational structures and processes) were considered important concerns regarding modernization of manufacturing.

MANUFACTURING MODERNIZATION PRIORITIES



As part of this study, we asked Indiana manufacturers what they determined to be their worst manufacturing decision in the past year. Many of their comments reflect not only technological difficulties with modernizing manufacturing operations, but also many of the human resource-related issues.

WHAT WAS YOUR WORST MANUFACTURING DECISION IN THE PAST YEAR?

INVESTMENT-RELATED COMMENTS:

"NOT BUYING MORE EQUIPMENT"
"TRYING TO RETROFIT AN OLD MACHINE TO A NEW FACILITY"
"NOT TAKING ADVANTAGE OF THE USED MACHINE MARKET AND UPGRADING IN CERTAIN AREAS"
"WE DID NOT SPEND TO IMPROVE A BUILDING LAYOUT WHICH WOULD HAVE MADE US MORE EFFICIENT"
"FAILURE TO INVEST IN CAPITAL EXPENDITURES"

HUMAN RESOURCE-RELATED COMMENTS:

"NOT TAKE ENOUGH TIME TO TRAIN NEW EMPLOYEES"
"RETAINING SOME WORKERS WHO HAVE NOT EMBRACED THE NEWEST MANUFACTURING TECHNIQUES"
"WORKING EXTENSIVE OVERTIME"
"NOT INVESTING INTO TRAINING"
"NOT TRAINING NEW EMPLOYEES WELL ENOUGH"

VI. SUPPLY CHAIN STRATEGY

VI. SUPPLY CHAIN STRATEGY

We also use cluster and discriminant analysis to investigate the supply chain strategies of the respondents in terms of up- and downstream integration with suppliers and customers. Not surprisingly, the supply chain strategies do not change much from 2011 to 2012. The two strategies that emerge from the data reflect the two most powerful underlying dimensions, sharing forecasts and production plans with suppliers and customers, as well as using transportation planning systems (TPS) to coordinate inbound deliveries from supplier and outbound logistics with customers.

2011 SURVEY

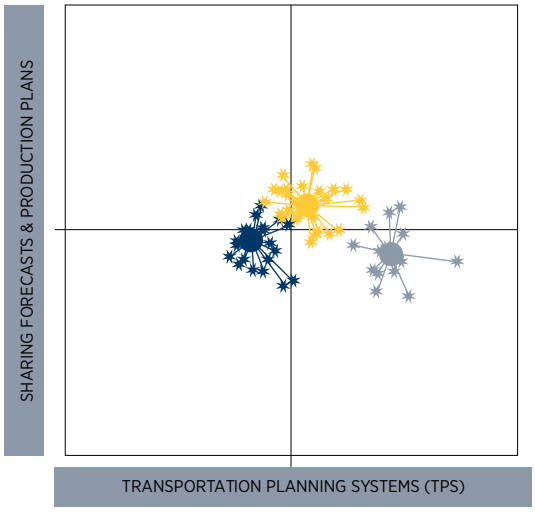
INTEGRATION WITH SUPPLIERS AND CUSTOMERS	NONE	SOME	EXTENSIVE	MEAN
INTEGRATION WITH SUPPLIERS				
FORECASTS AND PRODUCTION PLANS	34%	47%	18%	1.84
REVERSE LOGISTICS/RECYCLING	69%	28%	3%	1.34
TRANSPORTATION PLANNING SYSTEMS (TPS)	70%	19%	11%	1.41
VENDOR MANAGED INVENTORY (VMI)	63%	31%	6%	1.43
WAREHOUSE MANAGEMENT SYSTEMS (WMS)	72%	26%	2%	1.30
INTEGRATION WITH CUSTOMERS				
FORECASTS AND PRODUCTION PLANS	27%	49%	23%	1.96
REVERSE LOGISTICS/RECYCLING	75%	21%	4%	1.29
TRANSPORTATION PLANNING SYSTEMS (TPS)	65%	20%	15%	1.51
VENDOR MANAGED INVENTORY (VMI)	68%	24%	8%	1.40
WAREHOUSE MANAGEMENT SYSTEMS (WMS)	73%	21%	6%	1.33

2012 SURVEY

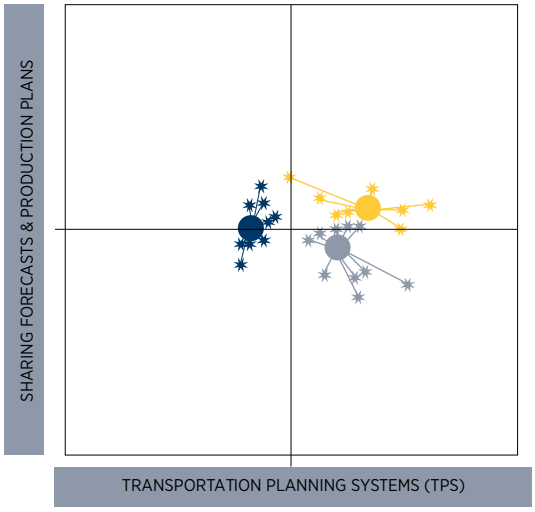
INTEGRATION WITH SUPPLIERS AND CUSTOMERS	NONE	SOME	EXTENSIVE	MEAN
INTEGRATION WITH SUPPLIERS				
FORECASTS AND PRODUCTION PLANS	26%	58%	16%	1.68
REVERSE LOGISTICS/RECYCLING	60%	35%	5%	1.45
TRANSPORTATION PLANNING SYSTEMS (TPS)	64%	30%	6%	1.42
VENDOR MANAGED INVENTORY (VMI)	61%	33%	6%	1.45
WAREHOUSE MANAGEMENT SYSTEMS (WMS)	74%	22%	4%	1.3
INTEGRATION WITH CUSTOMERS				
FORECASTS AND PRODUCTION PLANS	23%	51%	25%	2.02
REVERSE LOGISTICS/RECYCLING	70%	26%	4%	1.34
TRANSPORTATION PLANNING SYSTEMS (TPS)	61%	29%	10%	1.49
VENDOR MANAGED INVENTORY (VMI)	65%	31%	4%	1.39
WAREHOUSE MANAGEMENT SYSTEMS (WMS)	71%	25%	4%	1.33

As with the 2011 survey results, the largest cluster in 2012 is comprised of companies that are neither sharing forecasts and production plans nor using transportation planning systems. In other words, their supply chains appear to be relatively isolated from up- and downstream suppliers and customers, as well as transportation providers. The other two clusters are approximately of equal size. For the cluster in the upper-right quadrant, the respondents have more integrated supply chains in terms of these dimensions of sharing and transportation planning. In the third cluster, respondents make extensive use of transportation planning systems but do not share forecasts and plans to any material extent.

SUPPLY CHAIN STRATEGIES: SHARING PLANS WITH SUPPLIERS AND CUSTOMERS VERSUS TRANSPORTATION PLANNING SYSTEMS



2011 SURVEY



2012 SURVEY

Analyzing these three strategies based upon customer complaints and finished goods inventory indicates that the manufacturers with the more integrated supply chains report better overall performance.

SUPPLY CHAIN STRATEGIES AND PERFORMANCE

CUSTOMER COMPLAINTS (AS A PERCENTAGE OF ORDERS DELIVERED)	AVERAGE	STANDARD DEVIATION
NO STRATEGY	4%	7%
USING TRANSPORTATION PLANNING SYSTEMS	3%	2%
SHARING FORECASTS AND PRODUCTION PLANS WITH SUPPLIERS AND CUSTOMERS AND USING TRANSPORTATION PLANNING SYSTEMS	2%	3%
FINISHED GOODS (DAYS)	AVERAGE	STANDARD DEVIATION
NO STRATEGY	37	55
USING TRANSPORTATION PLANNING SYSTEMS	26	59
SHARING FORECASTS AND PRODUCTION PLANS WITH SUPPLIERS AND CUSTOMERS AND USING TRANSPORTATION PLANNING SYSTEMS	21	28

VII. EXPANDING INDIANA'S MANUFACTURING BASE

VII. EXPANDING INDIANA'S MANUFACTURING BASE

While Indiana's current manufacturing is critical to the economic health of our state, it is also worthwhile to consider the future. When asked about the plans in the next few years to open a new manufacturing facility in Indiana, 11% responded "yes."

PLAN TO OPEN NEW MANUFACTURING FACILITY IN INDIANA 2012-13

ANSWER	%
NO	89%
YES	11%
TOTAL	100%

These new plants can be expected to open with at least 50 new workers, on average.

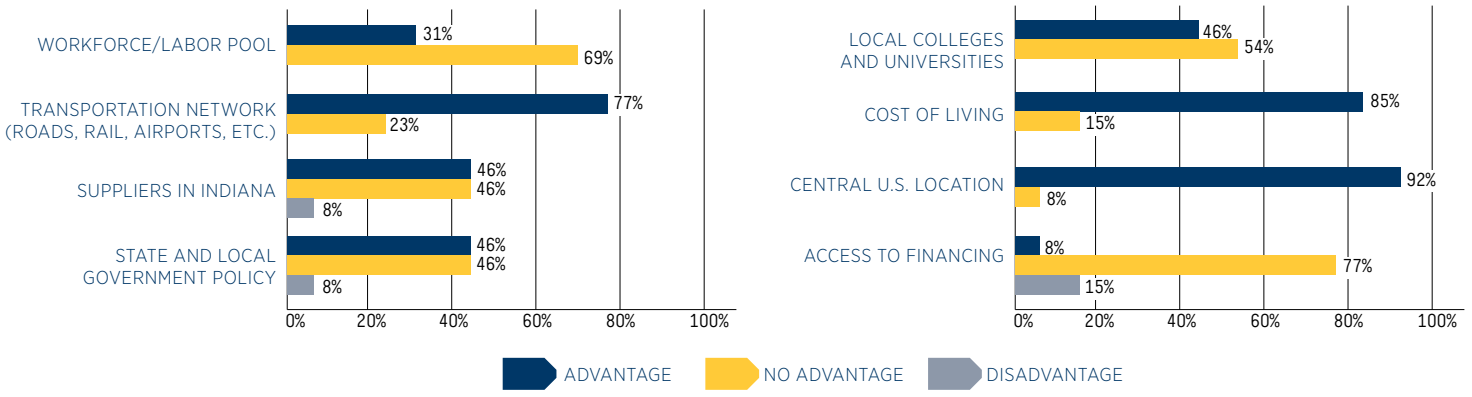
When asked will these new manufacturing plants make existing or new products, 77% of respondents reported "both."

PRODUCTION IN NEW FACILITIES

ANSWER	%
EXISTING PRODUCTS	8%
NEW PRODUCTS	15%
BOTH EXISTING AND NEW PRODUCTS	77%
TOTAL	100%

We explored this topic more in-depth by asking those respondents planning to open a new manufacturing facility in Indiana a series of questions regarding why they selected the state. The responses indicate that Indiana's primary advantages are its transportation network, access to suppliers, the central U.S. location, and cost of living. Consistent with the previous results indicating growing concerns about worker training, only 30% of respondents view Indiana's workforce as a competitive advantage for the state. In terms of good news, only 8% considered Indiana's state and local government policies a disadvantage, while just 15% noted more difficult access to financing.

REASONS FOR SELECTING INDIANA

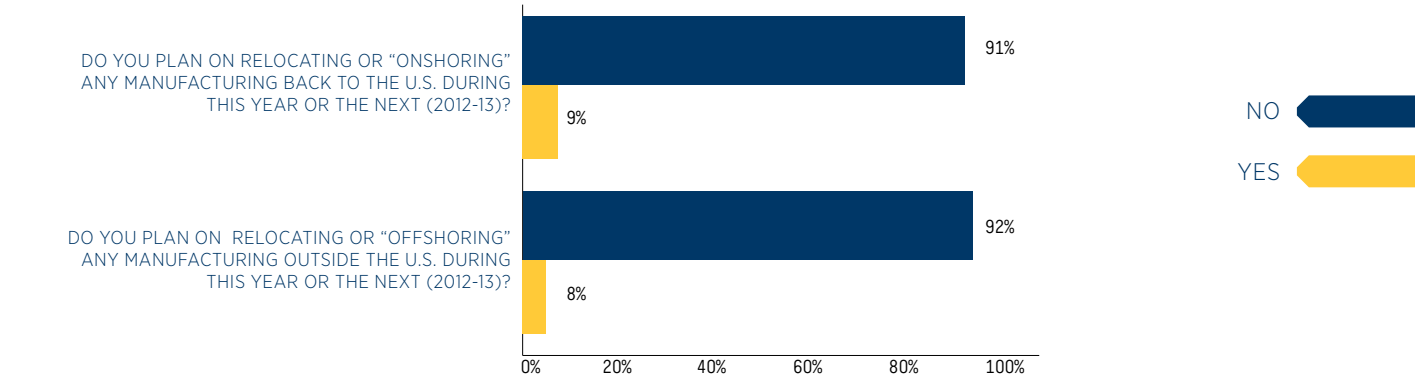


VIII. ONSHORING AND OFFSHORING MANUFACTURING

VIII. ONSHORING AND OFFSHORING MANUFACTURING

Similar to the previous topic, we also asked respondents if they expect to relocate or onshore any manufacturing back to the United States during 2012-13, or alternatively, do they plan on relocating, or offshoring, any production outside the United States during 2012-2013. The responses are roughly offsetting, with 9% indicating they intend to onshore and 8% intend to offshore.

PLANS TO RELOCATE ON- OR OFF-SHORE



When asked how important the following are in terms of relocating or onshoring any manufacturing back to the United States, better control over production was the top answer (60%), closely followed by proximity to customers and main markets (50%). Notably, better access to new technologies and skilled U.S. labor were relatively low concerns. Such findings may provide insights for policy makers interested in attracting manufacturing back to our shores.

REASONS FOR ONSHORING	NOT IMPORTANT	IMPORTANT	VERY IMPORTANT	MEAN
BETTER ACCESS TO NEW TECHNOLOGIES	50%	30%	20%	1.70
BETTER CONTROL OVER PRODUCTION	10%	30%	**60%**	**2.50**
CLOSER TO CUSTOMERS AND MAIN MARKETS	10%	40%	**50%**	**2.40**
CLOSER TO KEY SUPPLIERS	30%	30%	40%	2.10
GREATER ACCOUNTING AND AUDIT OVERSIGHT	70%	10%	20%	1.50
PROTECTING INTELLECTUAL PROPERTY RIGHTS/PATENTS	40%	40%	20%	1.80
RISING OVERSEAS LABOR COSTS	20%	50%	30%	2.10
REDUCED TOTAL "LANDED" COSTS (I.E., CUSTOMS/DUTIES, TRANSPORTATION, WAREHOUSING, ETC.)	20%	40%	40%	2.20
REDUCED SUPPLY CHAIN SECURITY RISKS/THREATS	10%	60%	30%	2.20
SKILLED U.S. LABOR	20%	70%	10%	1.90

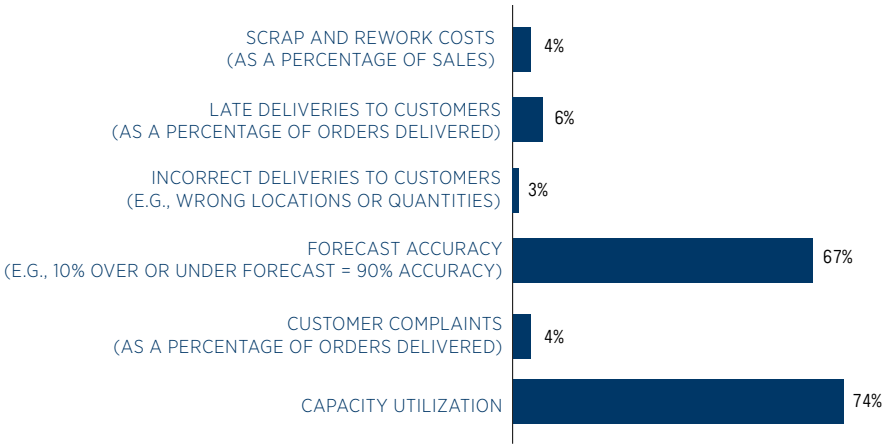
In terms of relocating or offshoring manufacturing out of the United States, not unexpectedly, the biggest drivers are lower offshore labor costs and proximity to customers in new markets. Alternatively, less accounting and audit oversight was the least important motive for companies planning to offshore manufacturing in the near future.

REASONS FOR OFFSHORING	NOT IMPORTANT	IMPORTANT	VERY IMPORTANT	MEAN
BETTER ACCESS TO NEW TECHNOLOGIES	71%	14%	14%	1.43
CLOSER TO CUSTOMERS IN NEW MARKETS	43%	14%	**43%**	2.00
CLOSER TO KEY SUPPLIERS	57%	43%	0%	1.43
FEWER OFFSHORE GOVERNMENT REGULATIONS	29%	43%	29%	2.00
INCREASED SUPPLY CHAIN SECURITY RISKS/THREATS	29%	57%	14%	1.86
LESS ACCOUNTING AND AUDIT OVERSIGHT	100%	0%	0%	1.00
LESS CONTROL OVER OFFSHORE PRODUCTION	57%	29%	14%	1.57
LOWER OFFSHORE LABOR COSTS	0%	29%	**71%**	**2.71**
PROTECTING INTELLECTUAL PROPERTY RIGHTS/PATENTS	14%	86%	0%	1.86
SKILLED OVERSEAS LABOR	14%	71%	14%	2.00

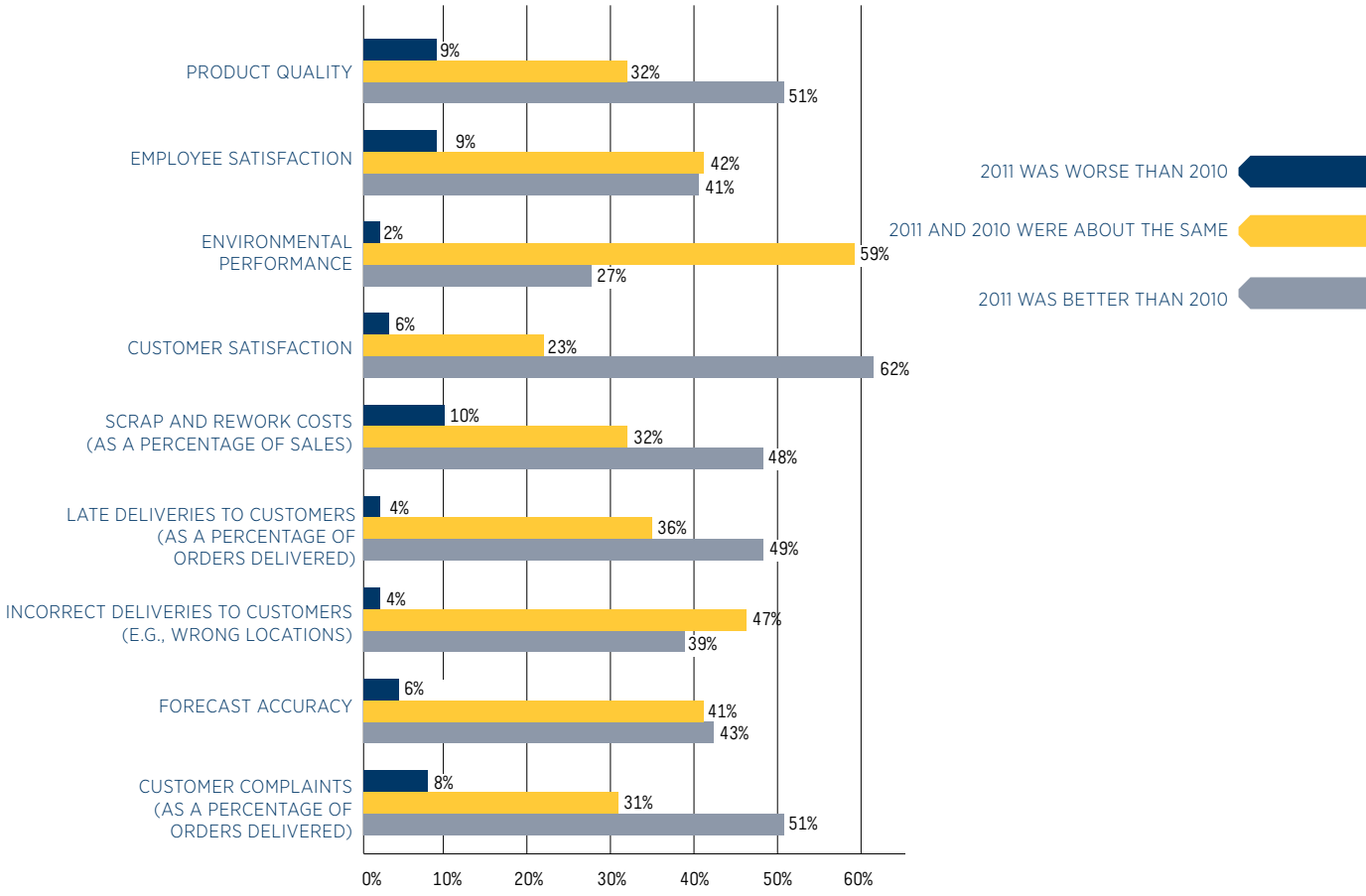
APPENDIX: BENCHMARKING INDIANA'S MANUFACTURING

The following are averages for an array of performance metrics in this year's study.

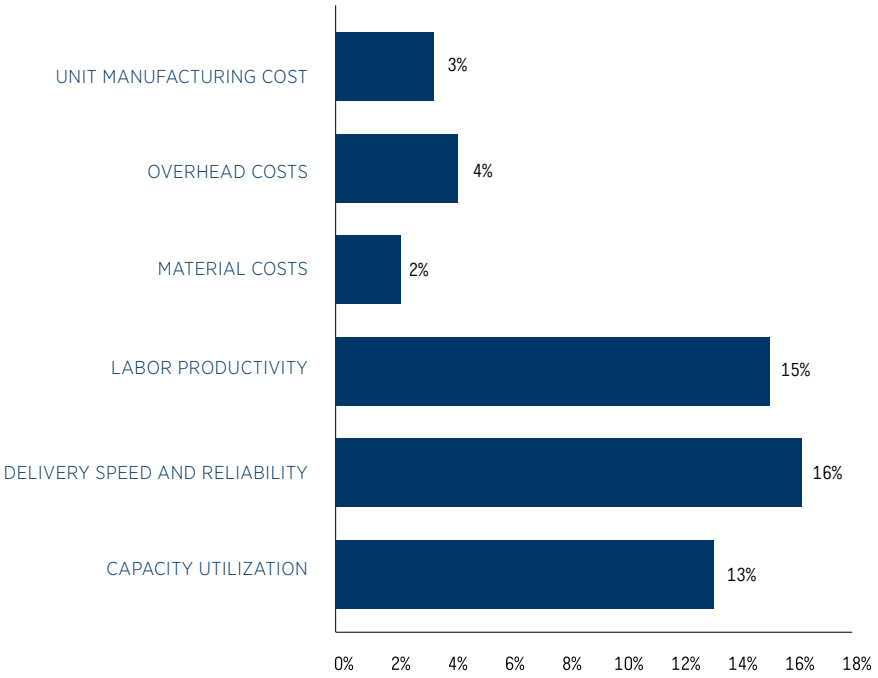
WHAT WAS YOUR BUSINESS UNIT'S APPROXIMATE PERFORMANCE LEVEL FOR THE FOLLOWING IN 2011?



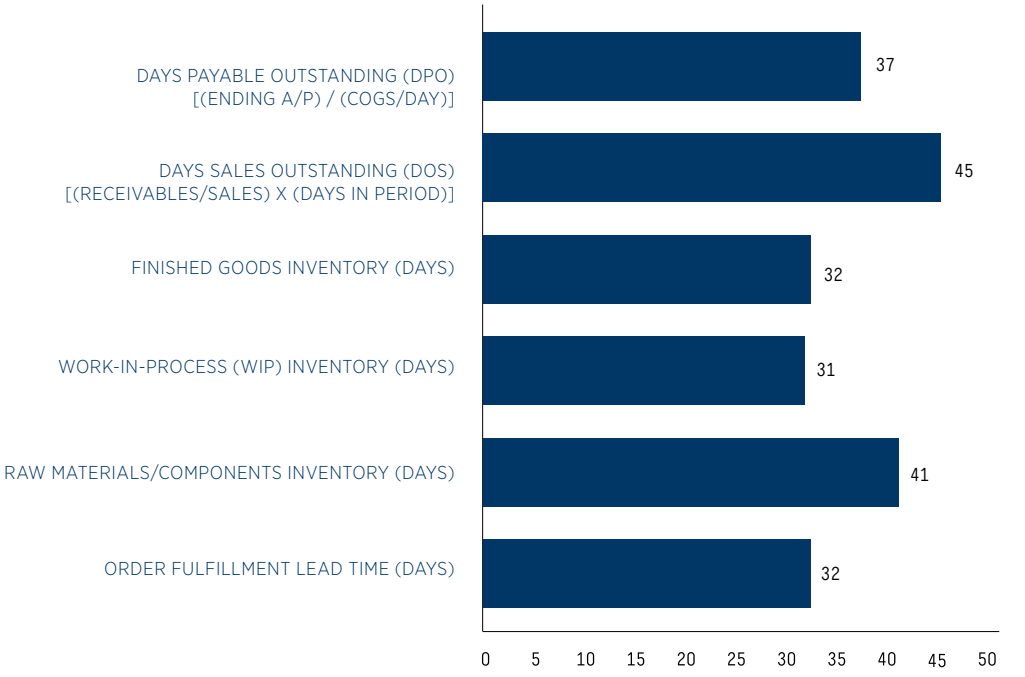
FOR THE FOLLOWING METRICS, HOW DID YOUR BUSINESS UNIT'S APPROXIMATE PERFORMANCE LEVEL COMPARE BETWEEN 2010 AND 2011?



BY WHAT PERCENTAGE HAS YOUR BUSINESS UNIT'S OPERATIONAL PERFORMANCE IMPROVED, STAYED THE SAME, OR DECLINED IN THE PAST YEAR (2011) FOR THE FOLLOWING?



HOW MANY DAYS (ON AVERAGE) WERE THE FOLLOWING?



ABOUT KATZ, SAPPER & MILLER

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ABOUT THE RESEARCHERS

The research study was conducted in conjunction with faculty from Indiana University's Kelley School of Business – Indianapolis.

Associate Professor Mark Frohlich
D.B.A. Boston University 1998

Dr. Frohlich's research interests are in manufacturing strategy, process improvement, and supply chain integration, and he has published in a wide variety of scholarly journals including the *Journal of Operations Management*, *Decision Sciences*, and *Production and Operations Management*. His research has won numerous awards including best papers of the year in 2001 and 2005, and best operations management case study in 2010. He was recently identified as one of the most cited authors in the field by the *Journal of Operations Management*. His teaching spans the range from supply chain management and Six-Sigma process improvement to the basics of operations. Through executive education, he has had the opportunity to teach on four continents in over a dozen countries.

Associate Professor Steve Jones
Ph.D. Purdue University 1989

Dr. Jones' research interests are in financial management and strategy, including how financial decision making interacts with capital market conditions. He has been published in the top scholarly journals in finance, including the *Journal of Financial Economics*, the *Journal of Finance*, the *Journal of Business*, *Financial Management*, and the *Journal of Corporate Finance*. He also serves as director of the school's Finance Education Enterprise, and formerly, he was faculty chair of Kelley's Evening MBA Program. He currently teaches courses in financial management, financial markets and investment analysis, and he is a four-time winner of a Kelley School teaching excellence award.

For more information regarding the Kelley School of Business, you may visit its website at www.kelley.iupui.edu.

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