

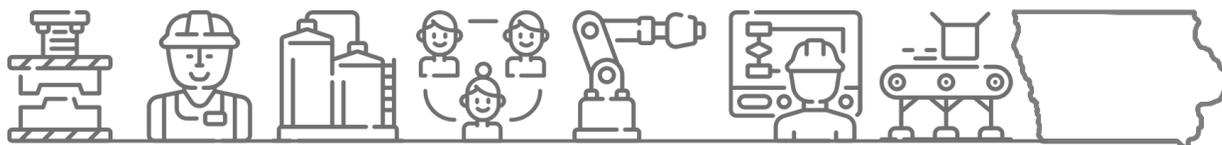
# Iowa Manufacturing Needs Assessment

2017–2018



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U.S. Manufacturing*



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# Executive Summary

CIRAS conducts a biennial needs assessment process to better understand the needs of manufacturers in Iowa. This report highlights the results of a survey of leaders at 228 manufacturers across Iowa and a set of six forums to discuss the data and its meaning with manufacturing and community leaders.

Key findings include the following:

- Most manufacturers operate with low margins, but one quarter of respondents reported return on sales of 15% or higher.
- Health care costs are the most significant expected growth inhibitor.
- Safety, 3D CAD, flexible scheduling, and social media marketing are the most common initiatives.
- Employee Stock Ownership Program (ESOP) and profit sharing was identified as the most valuable initiative compared to expectations.
- Despite continued expression of workforce availability issues, there is little evidence of widespread use of proven tools to ease those issues.

As a result of the analysis, CIRAS confirmed the below core items as the critical needs of Iowa manufacturers to remain competitive, and added two new needs related to workforce:

<h3>ENTERPRISE LEADERSHIP</h3> <p> NEED 1: Improved strategy &amp; planning capabilities.</p> <p> NEED 2: Support for small manufacturers in understanding and complying with local, state, and federal regulations.</p> <p> NEED 3: Assistance in creating and sustaining a competitive advantage through healthcare costs.</p>	<h3>GROWTH</h3> <p> Need 1: Exposure and coaching to pursue opportunities in new markets.</p> <p> Need 2: Support product development efforts.</p> <p> Need 3: Support growth efforts through next generation technology and productivity.</p>
<h3>PRODUCTIVITY</h3> <p> NEED 1: Improve implementation rates of proven initiatives to ease workforce constraints.</p> <p> NEED 2: Provide hands-on implementation assistance for small manufacturers.</p>	<h3>TECHNOLOGY</h3> <p> Need 1: Exposure to applications of next-generation technologies that can create sustained competitive advantage.</p> <p> Need 2: Deep technical support in advanced manufacturing engineering &amp; automation.</p> <p> Need 3: Take a significant leap forward in digital manufacturing technologies.</p>
<h3>Workforce</h3> <p><small>NEW</small> NEED 1: Support and grow manufacturing employee attraction programs.</p> <p><small>NEW</small> NEED 2: Improve and coordinate regional efforts to attract and retain workforce.</p>	

Arrows indicate increasing, constant, or decreasing importance

## The State of Iowa Manufacturing

Manufacturing is a core driver of Iowa’s economy. More than 6,100 manufacturers contribute in excess of \$28 billion to Iowa’s economy, making it the second-largest sector in Iowa. For detailed economic data on manufacturing in Iowa, please see the *CIRAS 2016 Manufacturing in Iowa* report.<sup>1</sup>

To better understand the underlying issues, risks, and opportunities that will define the future of manufacturing, CIRAS undertook a detailed needs assessment process of Iowa manufacturers. A total of 228 manufacturers of all shapes and sizes responded to an in-depth survey regarding their companies, limitations to growth, actions, and results. In addition, manufacturing needs forums were conducted in Ames, Mason City, Holstein, Dubuque, Davenport, and New Hampton. In total, over 100 manufacturing leaders, economic developers, elected officials, and other key stakeholders attended and provided input at the forums.

For detailed responses and statistics, please see the final section of this report, “Profile of Iowa Manufacturing.”

This section of the report provides the key findings and conclusions on the well-being of Iowa manufacturers and subdivisions within manufacturing. The following sections, provide additional insight into key issues for Iowa manufacturing, followed by our updated assessments on needs of Iowa manufacturers.

### Profitability

The majority (54%) of respondents to the survey report a return on sales (ROS) of less than 10%, furthering the notion of Iowa as a low-margin manufacturing state ( Figure 1). Of note in this survey is the change in results among companies with profitability under 5% (Table 1). Data indicates that manufacturers that were maintaining low levels of profitability in 2015 have fallen to a net loss position in 2017. All of the manufacturers reporting a loss were under 100 employees (Figure 2).

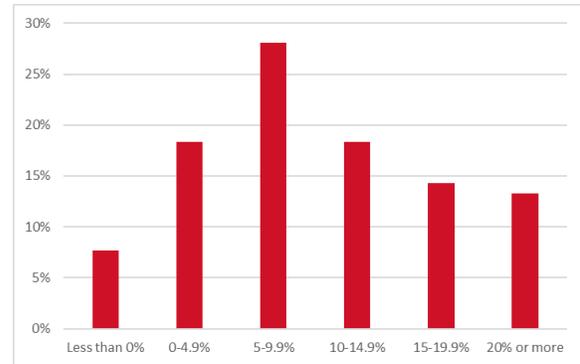


Figure 1: Return on sales for all respondents.

Table 1: Return on sales shift among low-profitability manufacturers

Return on Sales	2015	2017
0-4.9%	26%	18%
Less than 0%	2%	8%

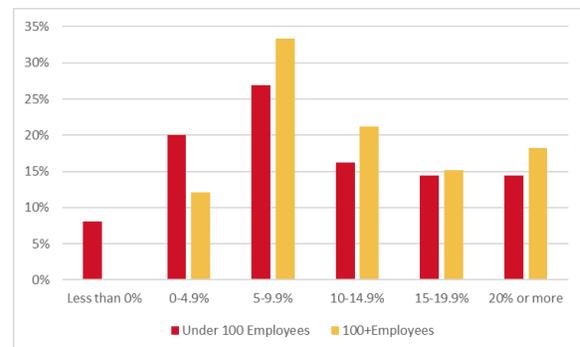


Figure 2: Return on Sales results separated by number of employees.

**This shift to a net loss may be an indicator of stress among small, low-margin manufacturers.** These businesses are much less likely to have implemented best practices that are critical in today’s global marketplace. These small manufacturers are critical to small communities, as part of larger supply chains, and make up 25% of manufacturing employment.

There is a sizeable minority of manufacturers (13%), however, reporting an ROS of 20% or higher. This demonstrates that there is a significant group of manufacturers that create and sell high-value products. There are no aggregate characteristics that effectively explain this group of high performers.

<sup>1</sup> [http://www.ciras.iastate.edu/Manufacturing\\_in\\_Iowa\\_2016.pdf](http://www.ciras.iastate.edu/Manufacturing_in_Iowa_2016.pdf)

Rather, this is a group of companies that have created a unique offering for their market, and are implementing the right solutions to maintain their competitive advantage.

A notable finding in this part of the analysis is the general lack of statistically significant variation in ROS by a number of factors. As we found in 2015, location, industry and other factors also did not show any statistically significant impact on ROS. Finally, company strategy did not show a statistically significant impact on ROS. Other studies, such as a similar survey in Georgia,<sup>2</sup> have consistently indicated higher ROS results for companies with strategies focused on innovation.

### Business Strategy

The ability to deliver products with higher quality than the competition is the most common strategy

among Iowa manufacturers (Figure 3), followed by superior customer service. There is very little change from 2015 in this data, and our assessment remains similar. The significant focus on quality as the core business strategy may be an indicator of risk for Iowa manufacturers. Whereas product quality was a differentiator that effectively stood up to competition from low-cost countries in the 2000s, effective quality systems and tools have become globalized and commoditized. As this has happened, quality has begun to transition from an approach to capture margin to a basic requirement for all manufacturers. As this transition continues, **companies that do not find new ways to create customer value will likely see profits decline.**

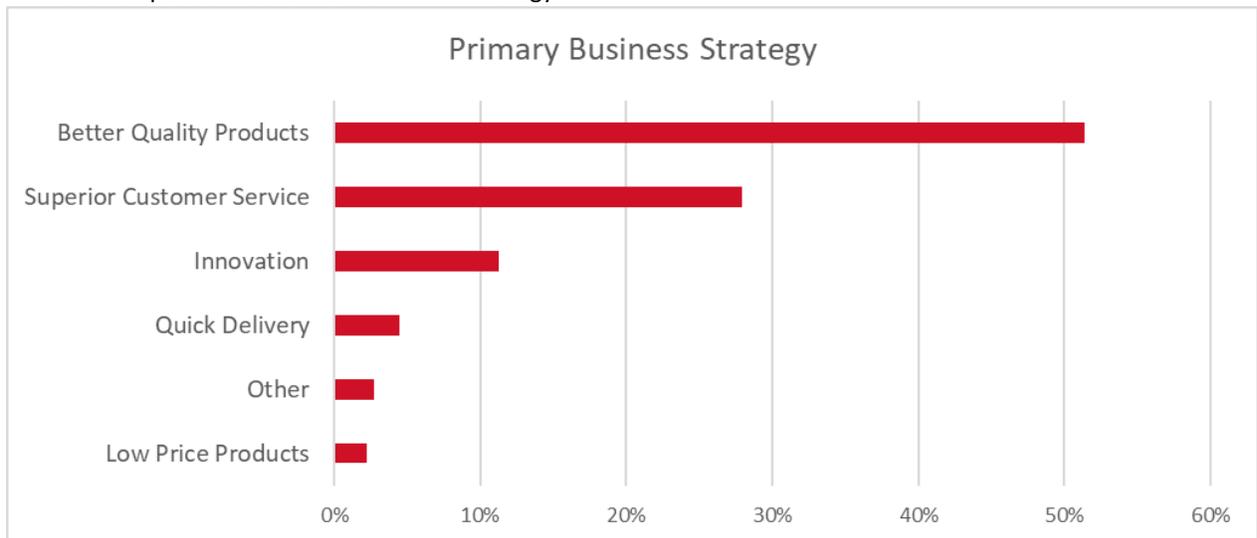


Figure 3: Primary business strategy of respondents.

<sup>2</sup> <http://gms-ei2.org/current-gms-results/>

## Growth Strategies

The survey asked a variety of questions related to strategy, including identification of the top three planned actions to grow the business (Figure 4). By a significant margin, the most frequently included planned source of sales growth in Iowa manufacturers is to increase sales through increasing market penetration in current markets. Creating new products was the second most-frequently stated goal and reducing production costs was third.

Forums indicated that there were two distinct types of companies who selected the strategy of “increase sales through increasing market penetration with current products”. The first group is aggressively growing in their current markets through clear strategies such as strategic partnerships, improved customer understanding, internet-driven sales, niche sub-markets, and others. Participants indicated that these strategies were generally successful in their business and had firm plans for growth. The second group within this category were manufacturers that stated that their growth plan was focused on doing what they do best, with a goal of increasing sales. These companies exhibited less indications of past success in growth. Future discussions with manufacturers and surveys will attempt to better separate action-oriented growth plans within this category. Creating more focused growth strategies within current markets may be an opportunity for Iowa manufacturers.

Only 19% of all respondents plan on increasing sales through new international markets, however this

strategy varies directly by size of the organization. Small manufacturers are unlikely to consider exporting as a growth strategy, and 67% of large manufacturers consider exporting to be one of their top growth strategies. Among mid-sized manufacturers (100-499 employees), 20% of companies consider export as a top strategy. During the forums, mid-sized companies that had pursued exporting reported that it required significant investment over a period of time, but that those investments generally paid off.

In central Iowa, nearly all forum participants were aware of the variety of public and private resources to support exporting. Many of the participants expressed satisfaction with their focus, availability, and quality. Further from central Iowa, especially in the Davenport forum, companies were much less aware of external support resources. Regardless of the level of awareness, many mid-sized manufacturers remained hesitant to pursue exporting since the uncertainties in foreign markets were too high.

Approaches to growth vary considerably by industry, as shown in Figure 5. For example, machinery manufacturers disproportionately focus on new products, expanding marketability of products, and international markets. Conversely, plastics and fabricated metals manufacturers have a larger focus on growth through reduced costs, likely due to their supply chain position as a supplier to major OEMs.

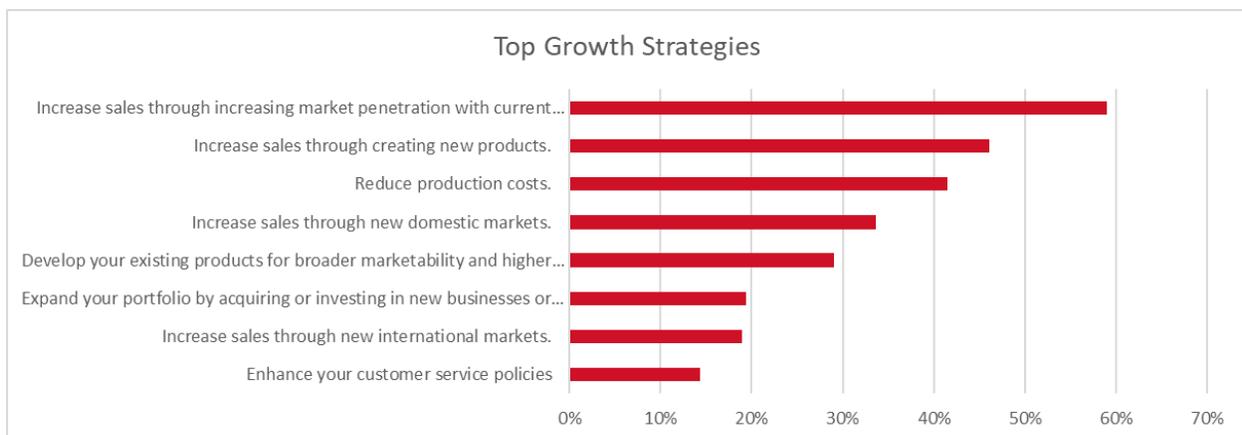


Figure 4: Percent of respondents identifying a given strategy among their top three approaches to growth.

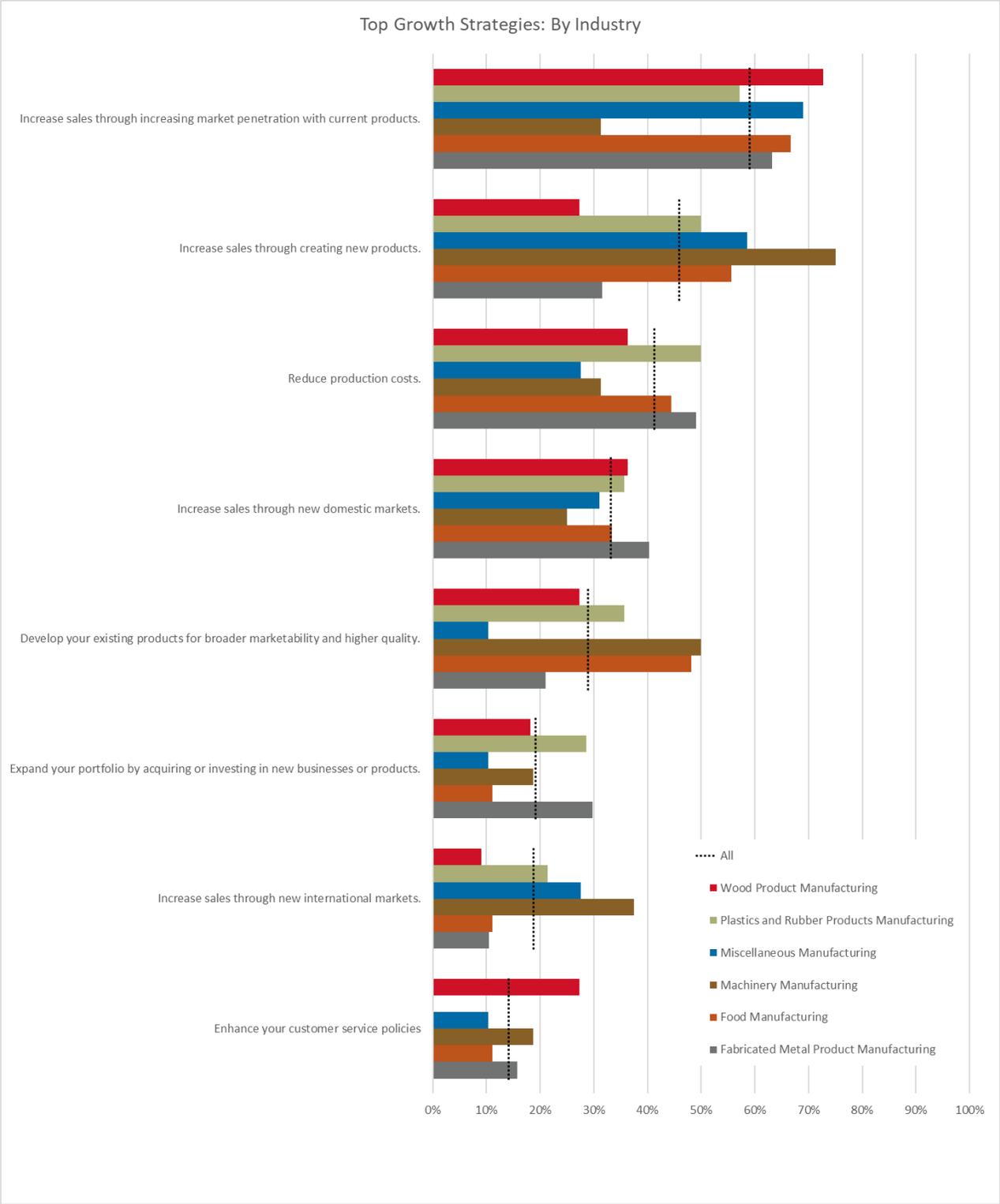


Figure 5: Growth strategies by industry.

## Developing New Products

One key factor in the long-term success of a manufacturing business is the ability to develop new products and services on a regular basis. This survey found that there are pockets of active product development throughout the state, but that the majority of product and service development is “new to the business” rather than “new to the market and not produced by competitors” (Figure 6).

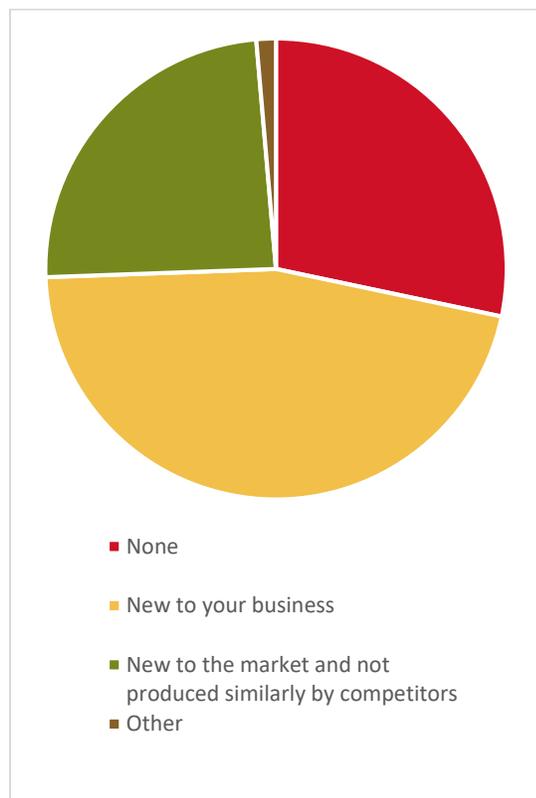


Figure 6: Portion of companies releasing new products and services in the past year.

Additional analysis produced several other findings:

- There was minimal variation in the portion of companies releasing new products and services among industries.
- **Only 23% of manufacturers with a strategy of innovation released a product or service last year that was new to the market.**
- There was no statistically significant difference in the release of new products and services by company size.

## Inhibitors of Growth

To best determine the needs of Iowa manufacturers, an understanding of what items business leaders perceive as the major impediments to growth is required. Respondents to the survey provided clear insights into what they were most concerned about (Figures 7 and 8). There was overall very little change in the results from 2015. Inadequate availability of hourly workforce increased by over 1%. Conversely, scores for U.S. Government Regulations and Energy costs dropped by 8% and 5% respectively, while several other items dropped between 1% and 4% from 2015 scores.

### **The rising cost of health care remains the most significant expected impediment to growth for Iowa manufacturers over the next five years.**

Throughout the forums, this was widely agreed upon as having a major impact on business decisions. There were multiple participants that indicated that healthcare expenses were diverting capital from investing in more strategic projects. Results from implementing Healthcare Savings Accounts (HSAs) were mixed. Many manufacturers in attendance had not taken any action to impact their healthcare costs.

There were positive notes in the health care discussions. Several manufacturers pointed out that while health care costs are a substantial cost, their competitors face similar challenges, and therefore it was not a factor in growth. Some indicated that comprehensive health care programs are creating a competitive advantage in the labor market. Many are trying a variety of strategies to reduce health care costs, with some positive impact. These include:

- Shift from activity-based incentives (i.e. joining a gym) to preventative-based incentives (i.e. routine physicals).
- Switch to self-funded insurance, coupled with strong wellness programs.
- Implementation of strategies to reduce acute and overuse injuries through a combination of stretching and automation.
- Education and assistance in creating end-of-life plans for employees.

Inadequate availability of workforce grew slightly from 2015 to 2017, while rising labor costs decreased slightly during the same period. Feedback during the forums indicated that both are still a major concern among manufacturers. While several manufacturers discussed a variety of actions and strategies to alleviate workforce constraints, equal amounts did not indicate any concrete actions to

reduce needs for workforce or proactively address labor costs.

Issues varied across sectors of Iowa manufacturing. Figure 8 breaks down top issues by a variety of factors. Items that are new to the top or bottom three from 2015 are in bold. Most items that are new for the bottom three are due to the elimination of low-ranking issues from the 2015 survey.

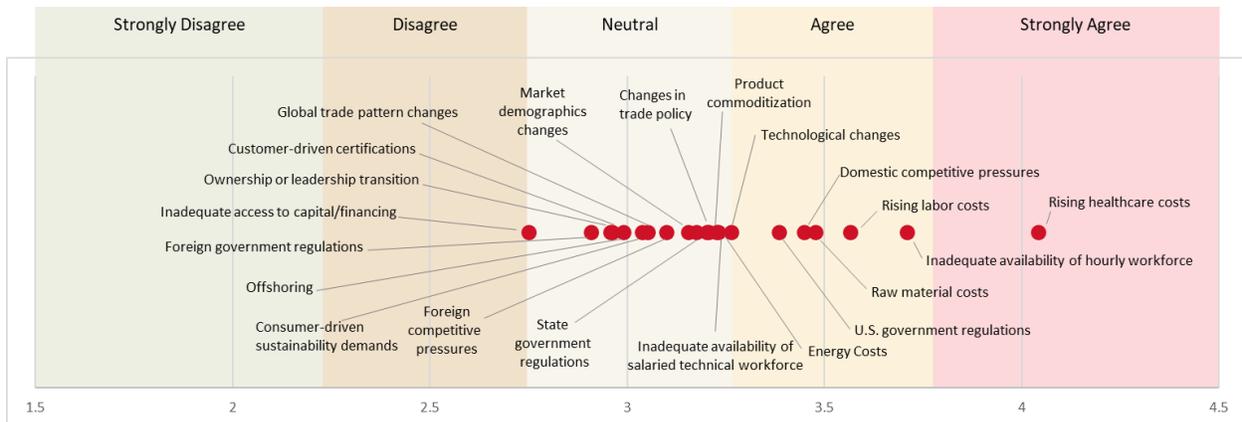


Figure 6: Average rating for company-reported inhibitors of growth.

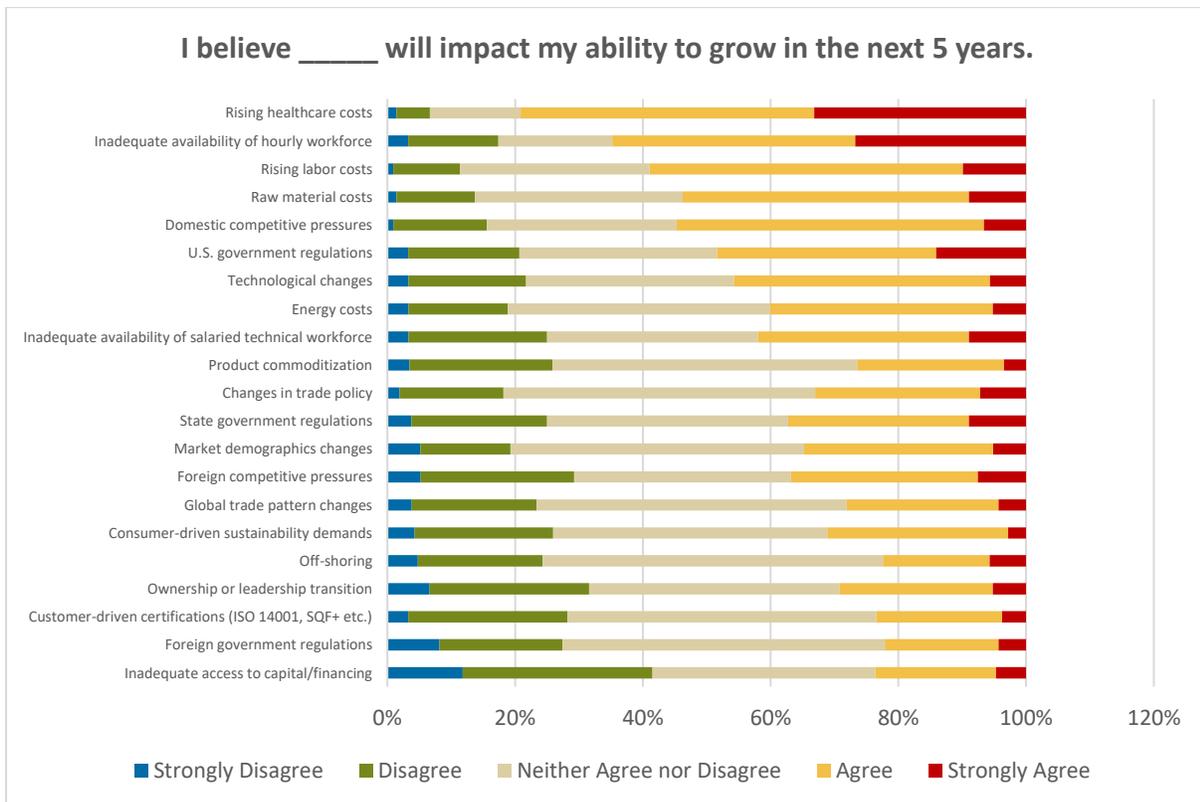


Figure 7: Detailed breakdown of company-reported inhibitors of growth.

		Top 3 Issues	Bottom 3 Issues
<b>Industry</b>	Fabricated Metal Product Manufacturing	Rising health care costs Inadequate availability of hourly workforce <b>Rising labor costs</b>	<b>Offshoring</b> <b>Foreign government regulations</b> Inadequate access to capital/financing
	Food Manufacturing	<b>U.S. government regulations</b> Raw material costs <b>Rising health care costs</b>	<b>Global trade pattern changes</b> Foreign government regulations Off-shoring
	Machinery Manufacturing	Rising health care costs Inadequate availability of hourly workforce <b>U.S. gov't regulations</b> , Inadequate avail of salaried tech. workforce, <b>Foreign comp/</b>	Inadequate access to capital/financing <b>Off-shoring</b> <b>Customer-driven certifications</b>
	Miscellaneous Manufacturing	Rising health care costs <b>Inadequate availability of hourly workforce</b> Raw material costs	<b>Off-shoring</b> <b>Customer-driven certifications</b> <b>Inadequate access to capital/financing</b>
	Plastics and Rubber Products Manufacturing	Rising health care costs Inadequate availability of hourly workforce <b>Raw material costs</b>	<b>Consumer-driven sustainability demands</b> <b>Customer-driven certifications</b> <b>Inadequate access to capital/financing</b>
	<b>Wood Products Manufacturing</b>	<b>Rising healthcare costs</b> <b>Inadequate availability of hourly workforce</b> <b>Domestic competitive pressures</b>	<b>Consumer-driven sustainability demands</b> <b>Ownership or leadership transition</b> <b>Customer-driven certifications</b>
<b>Strategy</b>	Better Quality Products	Rising health care costs Inadequate availability of hourly workforce Rising labor costs	<b>Ownership or leadership transition</b> <b>Customer-driven certifications</b> <b>Inadequate access to capital/financing</b>
	Innovation	Rising health care costs <b>Inadequate availability of hourly workforce</b> <b>Raw material costs</b>	<b>State government regulations</b> <b>Foreign government regulations</b> <b>Ownership or leadership transition</b>
	Superior Customer Service	Rising health care costs <b>Rising labor costs</b> Inadequate availability of hourly workforce	<b>Off-shoring</b> <b>Foreign government regulations</b> Inadequate access to capital/financing
<b># of Employees</b>	1-4	<b>Raw material costs</b> Rising health care costs <b>Domestic competitive pressures</b>	<b>Inadequate availability of hourly workforce</b> Inadequate availability of salaried technical workforce <b>Foreign government regulations</b>
	5-9	Rising health care costs Raw material costs <b>Rising labor costs</b>	<b>Global trade pattern changes</b> <b>Off-shoring</b> <b>Foreign competitive pressures</b>
	10-19	Rising health care costs Rising labor costs U.S. government regulations	<b>Inadequate availability of salaried technical workforce</b> <b>Global trade pattern changes</b> <b>Inadequate access to capital/financing</b>
	20-99	Rising health care costs Inadequate availability of hourly workforce <b>Rising labor costs</b>	<b>Customer-driven certifications</b> <b>Foreign government regulations</b> Inadequate access to capital/financing
	100-499	Inadequate availability of hourly workforce Rising health care costs Inadequate availability of salaried technical workforce	<b>Ownership or leadership transition</b> <b>Off-shoring</b> <b>Inadequate access to capital/financing</b>
	500+	Rising health care costs <b>U.S. government regulations</b> Foreign competitive pressures	<b>Customer-driven certifications</b> <b>Ownership or leadership transition</b> <b>Inadequate access to capital/financing</b>

Figure 8: Top and bottom three inhibitors of growth by industry, strategy, and company size. Items in **bold** indicate changes from the 2015-2016 list.

## Actions and Results

This survey asked two key questions regarding strategic initiative actions and results. First, for a list of 20 initiatives, the survey asked the extent to which the company has implemented each item (5 = Fully implemented, 4 = Full Implementation in Progress, 3 = Partial Implementation, 2 = Considered but Not Implemented, 1 = Not Considered). Then, for the same list, the survey asked the perceived benefits for the initiatives companies have implemented (5 = Significantly Above Expectations, 4 = Above Expectations, 3 = Met Expectations, 2 = Below Expectations, 1 = Significantly Below Expectations).

Pairing these two questions provides insight into implementation levels among Iowa manufacturers and potential benefits compared to expectations. Figure 10 compares the results from both questions. Of note is the generally low level of implementation

of initiatives despite positive results for those that have implemented similar programs.

For the 2017 survey, we added “Talent Pipeline Outreach” to measure the frequency and outcomes of companies formally engaged in long-term workforce development activities and “Cybersecurity” to gain a better understanding of the state of cybersecurity programs among Iowa manufacturers.

Safety programs are the most widely implemented initiatives among Iowa manufacturers, and they have shown strong results for companies that have implemented them. 3D CAD (computer-aided design) and advanced engineering tools, flexible scheduling, and social media marketing were the only other initiatives scoring above a 3.0, which is the level at which an initiative is considered to have strong penetration among Iowa manufacturers.

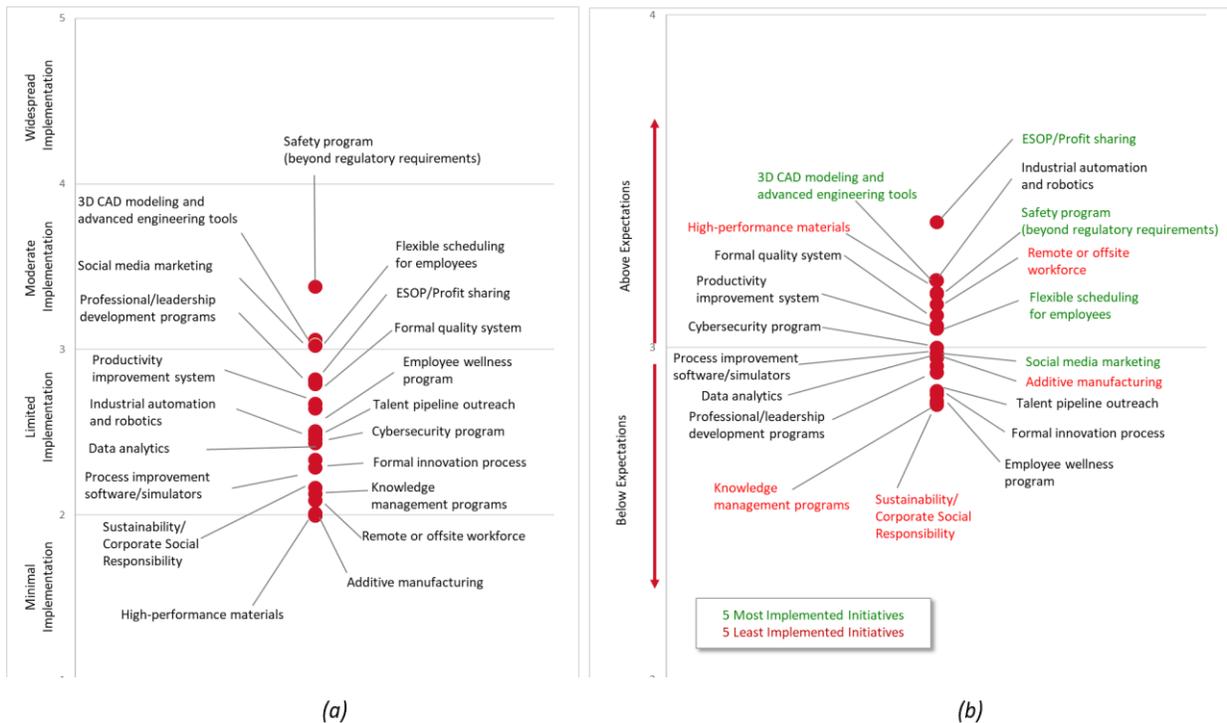


Figure 10: (a) Extent of initiative implementation among respondents; and (b) Perceived results of initiatives among those who implemented.

Compared to 2015, we saw implementation rates increase moderately for flexible scheduling and formal quality systems. Conversely, we saw implementation rates decrease moderately in ESOP/profit sharing, industrial automation, data analytics, process improvement systems. There were significant declines for remote or offsite workforce and sustainability.

Whereas the survey found low implementation rates across many initiatives, companies that have taken action have found more value than initially expected in several areas. While the implementation rate has decreased, companies reported that ESOP/profit sharing activities have resulted in the most value compared to expectations. Forum participants indicated that the transition to an ESOP or other significant profit sharing structure was a more substantial effort than expected, but that the value was far greater than imagined, specifically in improving employee engagement.

Social media marketing saw a substantial change in value for companies from over the past two years. In the 2015 survey, it was identified as one of the lowest value activities compared to expectations, and the current survey shows it meeting expectations of manufacturers. During the needs forums, several manufacturers noted that social

media was being used effectively in employee communication, employee recruiting, and sales. Some noted that it's capabilities in business-to-business (B2B) sales were causing the companies to rethink sales strategies. This improved effectiveness matches research that shows millennials make up the majority of B2B buyers, and perform the majority of their buying decisions on line using search and social media tools as primary parts of their process.

### Rural vs. Urban Performance

A key discussion topic when analyzing the needs of Iowa manufacturers is the variation in needs between rural and urban manufacturers. Rural-urban commuting area (RUCA)<sup>3</sup> codes were used to categorize all respondents as either metropolitan (urbanized area of more than 50,000 people), micropolitan (urbanized area of 10,000–49,999 people), or rural (nonurban or urbanized area of less than 10,000 people). This analysis identified no significant variation among issues, initiative implementation, strategy, or profitability when controlling for level of urbanization. Although rural and urban regions of the state may face different long-term challenges and opportunities, there is no evidence to suggest that rural manufacturers in Iowa are facing a significantly different landscape than urban manufacturers.

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<sup>3</sup> <http://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx>

## What Do Companies Really Need?

In 2015, CIRAS used the results of the surveys and company forums to develop our first core list of needs among Iowa manufacturers. This initial list has driven operational and strategic decisions at CIRAS, and has helped inform statewide strategies in manufacturing.

In conducting our 2017 assessment, we have confirmed our 2015 findings, and believe that the core needs of manufacturers in Iowa have not substantially changed. Below, we will summarize these core needs and provide updates to the related data. In addition, given broader trends, we indicate whether each need is decreasing, remaining constant, or increasing. In recognition of the continued criticality of workforce issues in manufacturing, we have added a fifth category: workforce.

In the next sections, this report will highlight three linked themes that are hindering the ability of Iowa manufacturers to solve these critical issues: *The Action Gap*, *Celebrating Success*, and *The Workforce Problem*.

### ENTERPRISE LEADERSHIP

#### **Need 1: Improve strategy and planning capabilities.**

*(Importance: Constant)*

A key item noted throughout the survey was the disconnect between stated strategy, perceived growth impediments, and action. No strategy is sustainable unless a business's investments and actions fully align with that strategy. This will typically lead to decreasing profits over time, which is evident in the large number of companies reporting an ROS of less than 10%. Improved strategy development within manufacturers to identify true, long-term competitive advantages and

help identifying changes to align with that strategy are essential to the future of manufacturing in Iowa.

#### **Need 2: Support for small manufacturers in understanding and complying with local, state, and federal regulations.**

*(Importance: Decreasing)*

A variety of regulatory issues surfaced as growth inhibitors for small manufacturers, although they were comparatively of low concern to larger companies. This is simply a matter of scale with respect to financial, environmental, safety, and other regulations at all levels of the government. In the absence of significant changes and simplification of thousands of regulations, a resource to break down regulatory barriers for small manufacturers may free up resources to allow small manufacturer owners to focus on the key strategic issues needed to grow their businesses. While the 2017 survey revealed a reduction in concerns regarding regulation, possibly driven by the current presidential administration, there were still gaps among small manufacturers in understanding and complying with regulations.

#### **Need 3: Assistance in creating and sustaining a competitive advantage through health care costs.**

*(Importance: Increasing)*

Health care is a national issue. Health care costs have grown faster than inflation for 28 of the past 30 years.<sup>4</sup> A combination of health care costs reaching a critical level with uncertainty and change associated with the Affordable Care Act have created an environment in which Iowa manufacturers consider this the top issue impacting their ability to grow. There is good news, however—Iowa manufacturers are on the same playing field as all other manufacturers across the country. As a result, coordinated efforts within the state to help break

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<sup>4</sup> Source: Bureau of Labor Statistics, Consumer Price Index, 1985–2015. 2008 and 2011 were the exceptions.

down barriers, better understand health care costs, and help businesses control them can create a competitive advantage for Iowa manufacturers.

## GROWTH

### **Need 1: Exposure and coaching to pursue opportunities in new markets.**

*(Importance: Increasing)*

The primary growth strategy of respondents to this survey is to sell more of the same product to the same customers. There are clear opportunities to help Iowa manufacturers better identify potential growth markets, both domestic and international. This effort requires much more than simple market research. Companies need assistance with creating personal connections in supply-chain networks, understanding how their product performs with respect to market standards, and understanding regulatory issues in reaching new markets. External support to focus company efforts on higher-likelihood markets may create improved results for companies.

### **Need 2: Support product development efforts.**

*(Importance: Constant)*

Even among respondents who state that innovation is their primary strategy, a significant portion of Iowa manufacturers that release new products and services are not first to market. The first to market typically can capture and hold market share and price premiums better than followers. In addition, organizations that stated innovation was their primary strategy did not show a statistically significant difference in profitability, which indicates that many of those companies are not successfully delivering innovative products and services that create new value. Based on this, there is opportunity for improved customer understanding and for faster product development cycles. There are numerous proven approaches for both opportunities.

### **Need 3: Link growth efforts with complementary next-generation technology and productivity.**

*(Importance: Constant)*

Iowa's unemployment rate stands at 2.9% as of November 2017 and has the eighth-highest labor force participation rate in the nation. One of the key drivers of the workforce issue is that there simply aren't more people to take new jobs as they arise, regardless of industry or skill level. To effectively grow, Iowa manufacturers will need to couple market growth efforts with internal efforts to implement the right productivity and technology solutions to enable them to increase sales while maintaining employment near current levels. In many cases, traditional incremental improvements will not generate the needed change, and manufacturers will have to seek out leaps in capability driven by new automation and technology solutions.

## PRODUCTIVITY

### **Need 1: Improve implementation rates of proven initiatives to ease workforce constraints.**

*(Importance: Constant)*

The gap in workforce-related initiatives identified in 2015 remained in the 2017 survey. Lean manufacturing training has been a focused effort throughout Iowa for more than two decades, yet the rate that focused training and projects have transitioned to systematic adoption remains lower than expected. Coupled with significant concerns of labor availability and cost, improved implementation of lean manufacturing approaches and other productivity systems may create significant opportunities for Iowa manufacturers.

Iowa companies that have deployed sustaining Lean systems (such as members of the Iowa Lean Consortium<sup>5</sup>), along with leading Lean manufacturing experts (including the University of

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<sup>5</sup> [www.iowalean.org](http://www.iowalean.org)

Kentucky<sup>6</sup>), have made a significant shift over the last five years—from a tool-based to a culture-based program. Leading experts in Lean systems have begun to understand that “true” Lean is about creating a culture of engaged employees that are able to identify and solve problems within their area of influence. This survey and the forums reinforced that manufacturers that focus on using lean to develop talent are under less pressure than manufacturers that have tried and failed to implement standalone solutions to generate quick fixes.

**Need 2: Provide hands-on implementation assistance for small manufacturers.**  
(Importance: Increasing)

In parallel with revisiting general approaches to implementing Lean and other productivity programs among manufacturers, special attention needs to be paid to small manufacturers. Data in this study show that small manufacturers are less likely to have implemented productivity initiatives. When combined with the knowledge that a more rigorous approach is likely needed, long-term hands-on assistance from outside resources is likely necessary to ensure that productivity initiatives are implemented correctly and sustainably. There are potential opportunities for larger manufacturers to work together on improving capabilities among smaller suppliers benefiting common supply chains.

## TECHNOLOGY

**Need 1: Exposure to applications of next-generation technologies that can create sustained competitive advantage.**  
(Importance: Increasing)

In our 2017 survey and forums, we heard many of the same responses as in 2015: companies do not have sufficient awareness of how new technologies can be applied to their business to solve problems and create opportunities. Regardless of performance, size, and strategy, companies struggle

to see how emerging technologies can fit their needs. Additional focus on both exposure to new technology and sharing of industrial applications of that technology are critical for Iowa manufacturers to remain competitive.

**Need 2: Deep technical support in advanced manufacturing engineering and automation.**  
(Importance: Increasing)

While there has been a needed focus on the skilled trades associated with manufacturing, there has been less focus on the attraction and retention of technical talent required for manufacturers to succeed. Manufacturers in Iowa need assistance in redesigning and reimagining how their products are manufactured to grow in a labor-constrained market. Manufacturing engineers who understand the full spectrum of manufacturing technologies, from basic CNC through complex design for manufacturing activities are lacking in Iowa manufacturers. We see two key issues driving this. First, smaller manufacturers are hesitant to bring on the salary of an experienced manufacturing engineer. Second, those companies that want to hire and grow their manufacturing engineering talent have trouble finding the engineers to fill those roles.

**Need 3: Take a significant leap forward in digital manufacturing capabilities.**  
(Importance: Increasing)

The term “digital manufacturing” is a broad term meant to encompass technologies including CAD, computer-aided manufacturing, ERP, cybersecurity, and other tools. There are several key strategic factors that make now a critical time for Iowa manufacturers with respect to digital manufacturing: (1) stand-alone technologies have matured to the point that cost and expertise barriers are low enough that all manufacturers can achieve basic digital competency; (2) the ability to integrate individual technologies in custom applications allows manufacturers to gain a competitive edge through

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<sup>6</sup> [www.lean.uky.edu](http://www.lean.uky.edu)

“trade secrets” rather than off-the-shelf software systems; (3) major OEMs will likely begin to require certain digital capabilities in the next five years; and (4) the pace of change of digital manufacturing technology is accelerating, and those companies that aren’t participating in the digital world may be permanently left behind. This, combined with our findings that CAD and other advanced engineering technologies have high value but still relatively low implementation rates, supports a larger focus.

CIRAS has begun to launch services related to digital manufacturing in factory operations, engineering, supply chain, enterprise support and cybersecurity. However, these programs are in the early stages. While some manufacturers are making significant progress in digital manufacturing, the vast majority have made little progress.

## Workforce

### **Need 1: Support and grow manufacturing employee attraction programs.**

*(New)*

Several manufacturers participating in the needs forums indicated they are seeing signs that the various efforts to increase interest in manufacturing are making a difference. Specific programs that were mentioned by manufacturers included Elevate Advanced Manufacturing, Manufacturing Day, and company-specific efforts including outreach to local school districts and funding 2-year degrees for hourly employees. Increased identification and

communication of programs that work for companies would help increase participation.

### **Need 2: Improve and coordinate regional efforts to attract and retain workforce.**

*(New)*

The need for workforce spans location, business size, and skill level. With persistently low unemployment, there are two primary ways manufacturers can get the people they need: convince people to switch industries (shifting the workforce problem to another industry), or convince people to move from other regions. There is a general understanding among companies, economic developers, and other stakeholders that attracting workforce requires a team effort focused on “place”. There are signs that some activities are becoming common, such as housing initiatives and community amenities. Several manufacturers in attendance at the forums noted more work is needed in availability of entry level professional housing to meet their needs.

As the competition for talent and people grows throughout Iowa and the Midwest, communities that best meet the requirements of available talent will thrive, while others will continually struggle to attract people. The ability of a community to attract and retain people at all levels will become a major factor in the success of local manufacturers. Diversity and inclusiveness is a driver in both attracting and retaining people at all levels. In the needs forums, it was clear that meeting these expectations will require focused efforts from communities and manufacturers throughout Iowa.

## The Action Gap

In the late 1990s and early 2000s, manufacturing in Iowa and across the nation faced unprecedented global competition. Manufacturers that survived typically did so through a combination of finding a market niche, implementing new quality controls, and finding a cost structure that was sustainable within that niche. This defined a new normal for many manufacturers: high customization, minimizing excess capital investment, and hard work.

Companies that strayed from the proven model struggled. This approach carried many manufacturers through the 2009 recession. Now, far too many believe it will carry them into the future.

Through our surveys and company forums, we heard very clearly what manufacturers struggle with daily: healthcare and workforce. The primary topics within the workforce discussion include availability of labor (skilled and unskilled labor, salaried and hourly), employee retention, and rising wages. While we heard numerous specific examples of struggles related to cost increases and inability to find people in the forums, we did not see significant evidence of enough companies trying new approaches to solve these growing issues.

A handful of manufacturers shared outstanding successes in both healthcare and workforce (more on that later). Some even shared failures that showed they were trying to find a solution. However, the overwhelming sentiment was that companies were too busy to try different approaches to solve these growing problems. This is reflected very clearly in the data from the survey. While companies indicate significant long-term risks due to healthcare and workforce, implementation rates of wellness programs, productivity, automation and others are surprisingly low. The “heads down”, hard work approach that kept manufacturers in

business over the previous 15 years is an impediment to their ability to solve this problem.

Attendees were specifically asked about productivity initiatives in the forums. While some expressed satisfaction with continuous improvement programs (including some enthusiastic companies far along the lean journey), many admitted their continuous improvement programs were limited to short, sporadic attempts at lean or other programs as part of a training activity. In short, too many companies are failing to dedicate the resources needed to solve their most pressing long terms strategic issues.

Research has shown that organizations with strong structured, managed processes can thrive in times of incremental change. However, it also shows that those same organizations have lower performance in times of rapid change. The perfect storm of growing healthcare costs, a lack of people, and numerous technologies hitting the market has created conditions where process-driven organizations can struggle.

Leading experts suggest “dual operating system” – popularized by John Kotter in his 2014 book *XLR8* and implemented by companies like Alphabet (parent company of Google). However, small- to mid-sized manufacturers will likely not have the resources to effectively implement such structures.

If individual companies in Iowa can’t create their own individual networked organizations, it’s possible we can work together to create a network of organizations that can better respond to change. The next section proposes a general approach that can help move the needle on the action gap. The following section starts a dialog on how to advance the “workforce” discussion beyond the skills gap to address the “body gap”<sup>7</sup>.

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<sup>7</sup> <http://www.industryweek.com/education-training/jobs-everywhere-and-no-people-fill-them>

## Highlighting Success

Business surveys, including this one, frequently focus on gaps, shortcomings, and risks. As a result, companies and stakeholders fixate on the problems. One specific step we can take in Iowa to help alleviate some critical issues among manufacturers is to better highlight and celebrate successes.

Consider an example of two companies from the same town at a forum. Both companies clearly stated that health care is their biggest growth impediment, and that costs continue to grow. Company A has explored different insurance options and brings in their local health care provider for lunch and learns with no measurable results. Company B has implemented a wellness program focused on preventative care incentives, is self-funding their insurance, and has controlled their costs. While Company B still considers it a major cost and risk, they are also reporting that they see some easing of cost growth and their approach to healthcare is beginning to attract employees. There were several “Company B”s that attended the CIRAS forums, and these companies are well-positioned for the future.

Providing a way to help leading companies communicate their success can help struggling ones take their first steps. It can also help all companies get to solutions faster. We heard dozens of great successes during the needs forums, demonstrating that Iowa manufacturers are willing to share what works among their peers. Increased sharing of these successes can help break down barriers and begin to build a network of manufacturers that work together. There are two approaches to highlighting

success that we recommend be pursued more broadly: statewide communication and regional networks.

First, statewide communication should focus on increased awareness and celebration of major successes by Iowa manufacturers. This includes increased engagement in awards programs such as the Elevate Iowa Legends in Manufacturing awards, the Technology Association of Iowa Prometheus awards, and others. Similarly, there should be an increased focus on national and global recognition for excellence, such as the IndustryWeek Best Plants competition, the Shingo Prize, and OEM-driven major supplier awards. The message should be consistent and clear: Iowa manufacturers are world class.

The second approach, regional networks, recognizes the need for more formal regional networks among manufacturers. This is not intended to duplicate or replace local networking events, but to supplement with more focused peer-to-peer networking among functional leaders in a region of the state. The 2017 Governor’s Year of Manufacturing effort echoed this need, and CIRAS will be expanding communication and availability of various structured networking activities in early 2018.

We see three specific areas where structured, solution-oriented peer networking can provide some of the highest benefits: growing businesses, healthcare and wellness, and workforce solutions. The next section will focus on the workforce solution discussion.

## The “Workforce Problem”

Iowa has a target to increase the manufacturing GDP from \$29B to \$32B by 2022. The most significant hurdle to achieving this is people. CIRAS’s analysis finds that 1) Workforce is a major issue for Iowa manufacturers, 2) Manufacturers are struggling to implement productivity and automation, and 3) Iowa is among the best in the nation at workforce participation in nearly every category or subgroup.

We believe Iowa manufacturers must begin to take key steps to ensure long-term success in Iowa facing global competition for talent. Simply put, there are no more people in Iowa. The solution requires a two-pronged approach: first, become world class in output per person; and second, effectively attract people of all skill levels to Iowa communities.

Achieving world-class status in output per person is a major challenge, but one where every bit of progress will create returns for Iowa manufacturers. It will require people from all levels of organizations, public and private, to work together to rethink processes to identify both incremental change and capability leaps. We’ll need to better identify and elevate the best automation integration providers in the state, consider rethinking state incentive programs from job-driven to output-driven, and redefine the critical skills for employees at all levels. Increased peer networking and expansion of groups focused on organizational excellence such as the Iowa Lean Consortium are critical to progress towards world-class.

The second strategy of improving our ability to attract and retain talent to Iowa can have significant

payoffs in addressing the body gap. Iowa’s population has grown at half the rate of the U.S. average since the year 2000. Iowa would have an additional 160,000 additional workers<sup>8</sup> if Iowa had grown at the same rate as the rest of the nation. Similarly, we could see an additional 170,000 workers<sup>9</sup> if Iowa attracted a similar proportion of foreign-born residents as the U.S. average.

Statewide, Iowa has the fundamentals in place: world class education at the K-12, community college, and university level; extensive workforce training programs; low unemployment; and strong quality of life fundamentals. To move the needle, communities and their businesses will have to work together in new ways at the local level.

We see evidence of progress on the fundamental amenities such as main street improvements, housing, recreational opportunities and others. Beyond capital infrastructure amenities, communities need to create a culture that welcomes and accepts others. Inclusive communities that accept and engage people of diverse backgrounds will win the war for talent. While we see some evidence of progress in some areas, we also see opportunities for improvement. Specifically, several communities and the companies in the forums expressed struggles with retention of employees that have moved to the region for employment. While some of the solutions can be programmatic, many of them require long-term leadership and cultural change to create inclusive communities.

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<sup>8</sup> Source: U.S. Census Bureau, Iowa Workforce Development, based on current labor participation rates and 2016 population estimates.

<sup>9</sup> Source: U.S. Census Bureau, U.S. Bureau of Labor Statistics, based on current foreign-born labor participation rates and 2016 population estimates.

## Appendix: Profile of Iowa Manufacturing

### Survey Respondents

This survey was conducted during June through August 2017. Initial survey outreach was to Iowa manufacturing leaders through email. In order to reach more small manufacturers, an additional mailing was sent to a sampling of manufacturers with less than 20 employees.

The final response rate was 12.7%, totaling 251 manufacturing leaders representing a broad array of company types, sizes, industries, and geographical locations. The charts that follow summarize the raw data received during the survey process. When there were sufficient respondents in a given industry, strategy, or other relevant grouping, those groupings are also provided.

### Needs Forums

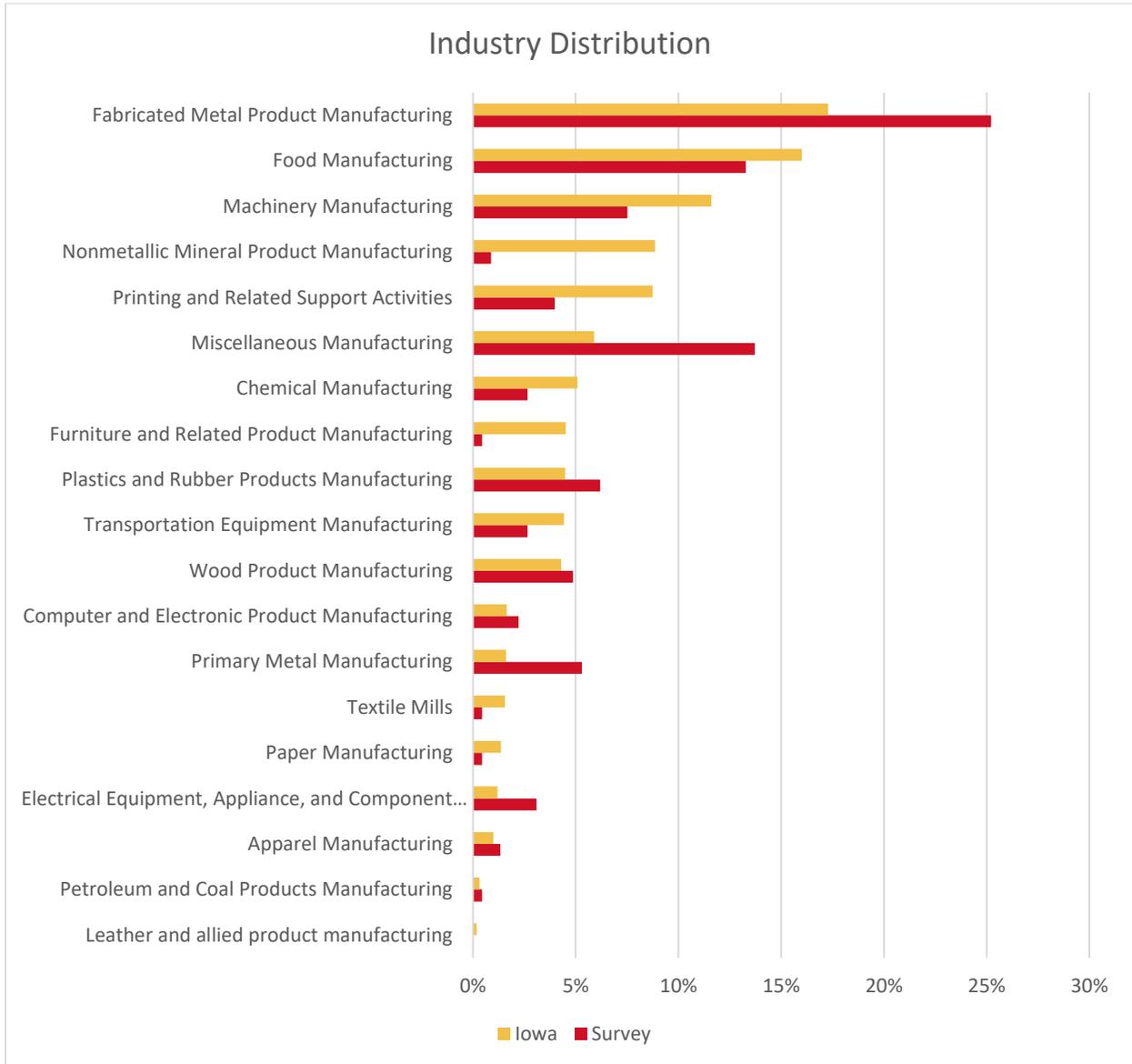
In addition to the survey, a series of six facilitated forums (Table 2) were held to get additional input and perspective on the survey results. Attendees at the forums included manufacturing leaders, educators, elected officials, economic developers, and other stakeholders. The forums were approximately one hour in length, and consisted of a brief overview of the purpose of the survey, followed by providing selected data for input from participants.

*Table 2: Regional Needs Forums.*

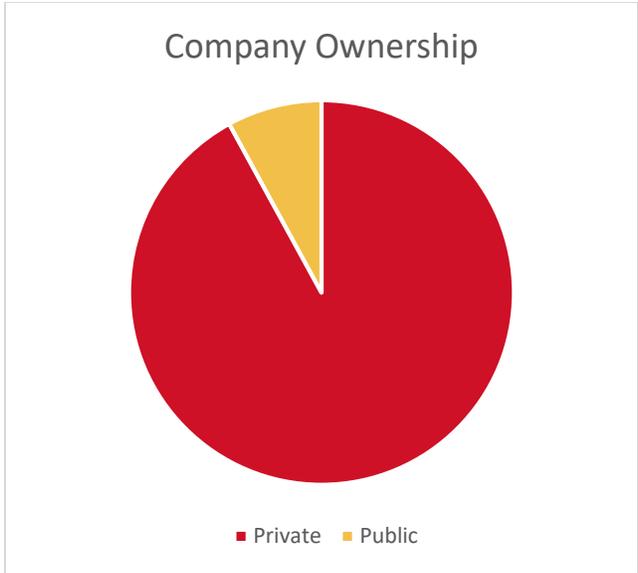
Date	City	Host
9/12/2017	Mason City	North Iowa Area Community College JPEC
9/15/2017	Dubuque	Northeast Iowa Community College
10/2/2017	Davenport	Quad Cities Chamber
10/3/2017	Ames	Iowa State University CIRAS
10/10/2017	Holstein	Ida County Economic Development
10/12/2017	New Hampton	Milkhouse Candles

## Company Size and Industry

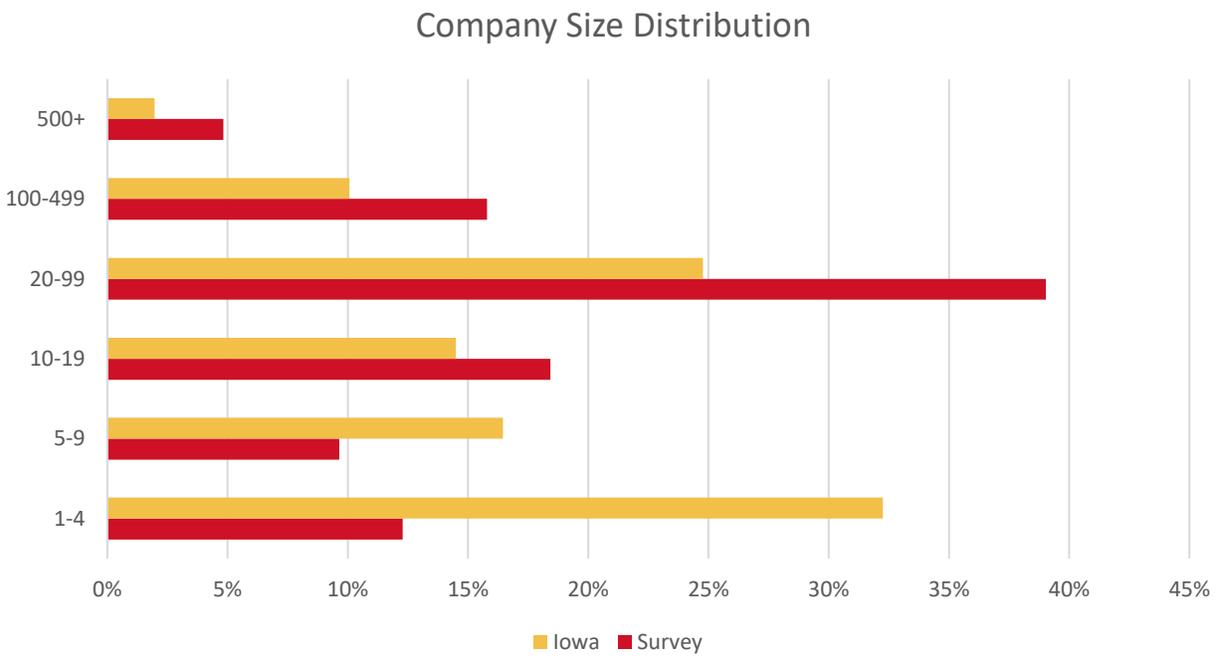
Which category best represents your primary industry?



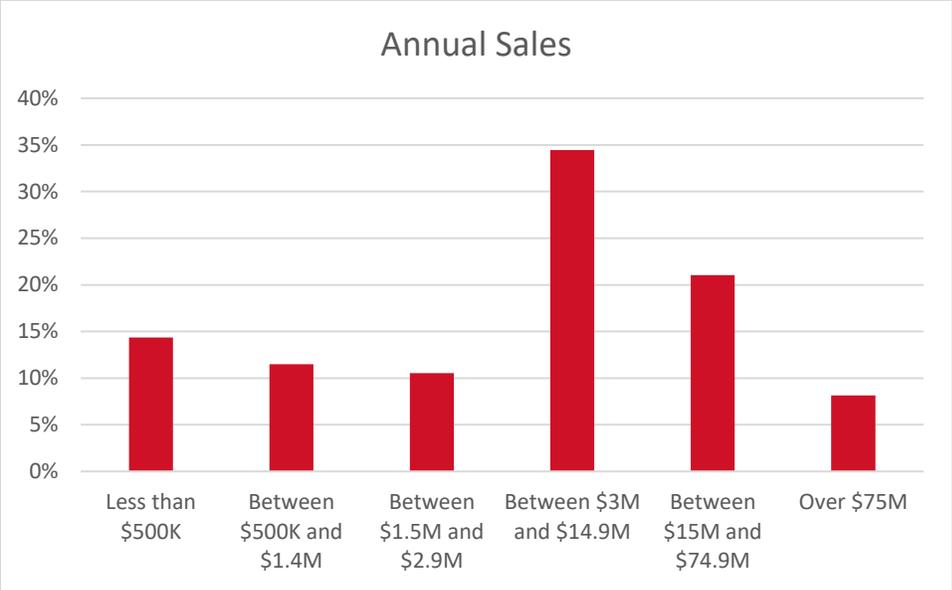
Is your business publicly or privately owned?



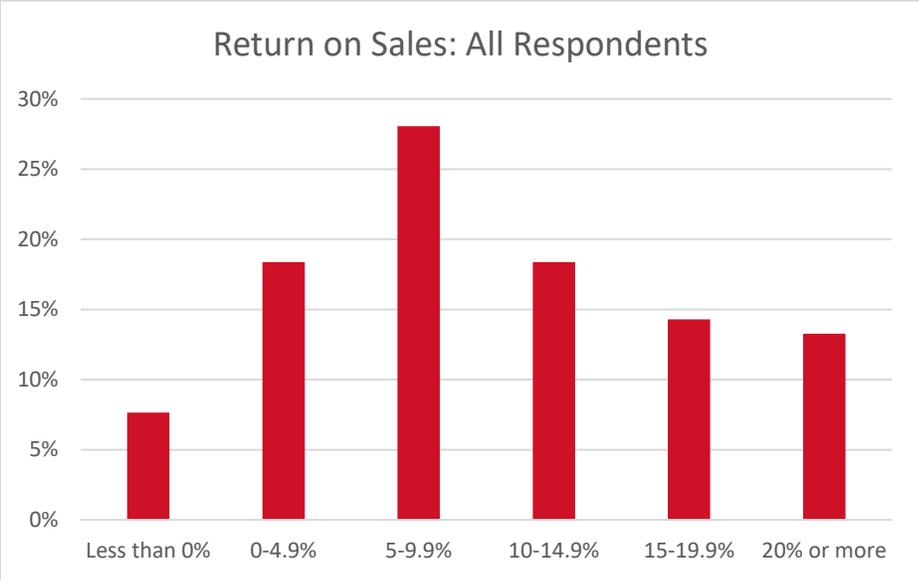
Average Number of Full Time Equivalent (FTE) Employees

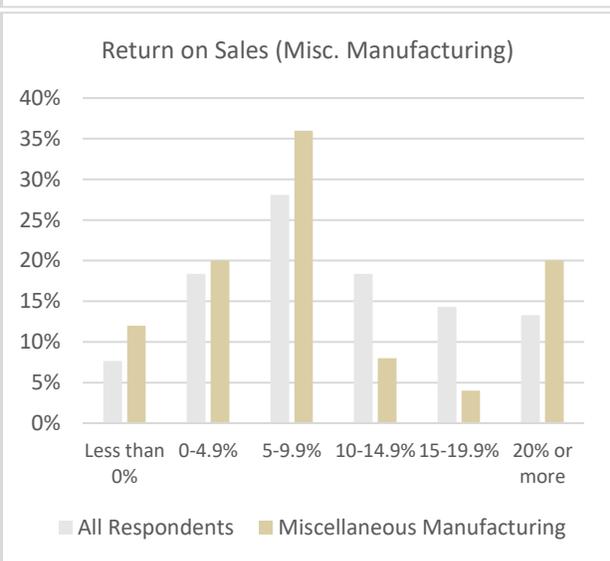
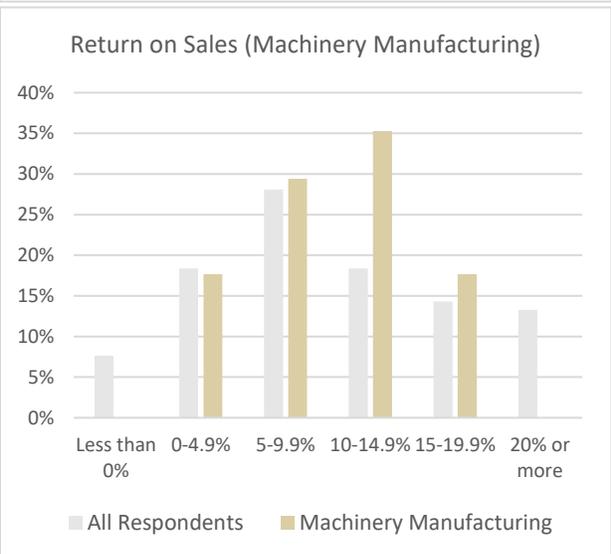
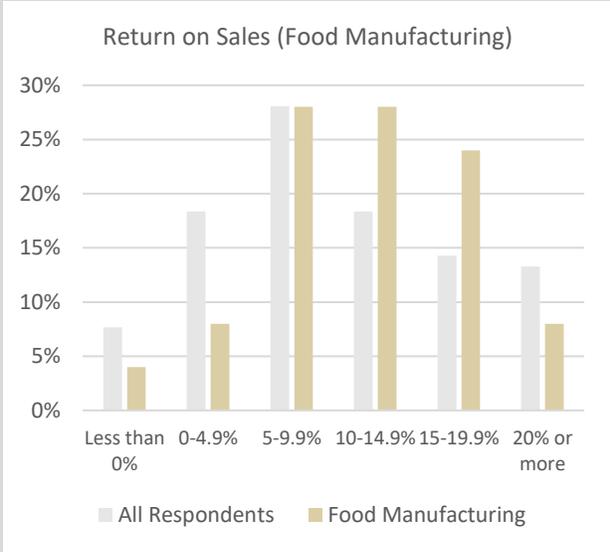
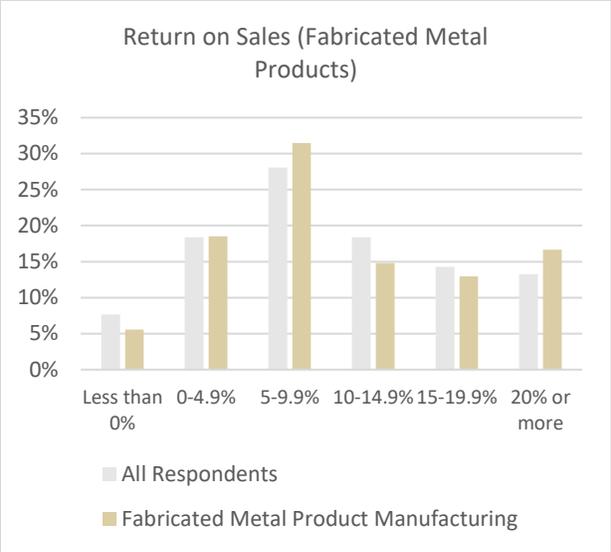


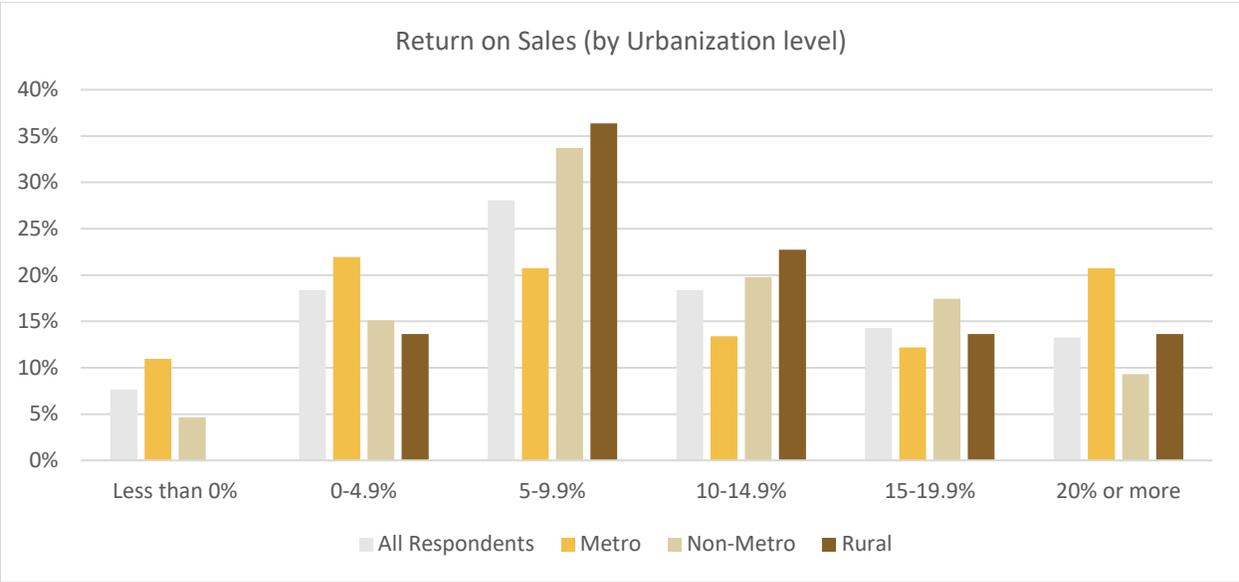
Total Annual Sales (Most recent fiscal year)

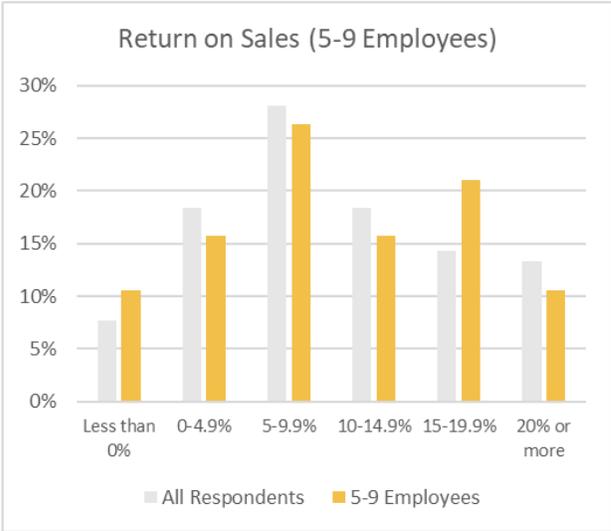


Return on Sales (Most recent fiscal year)



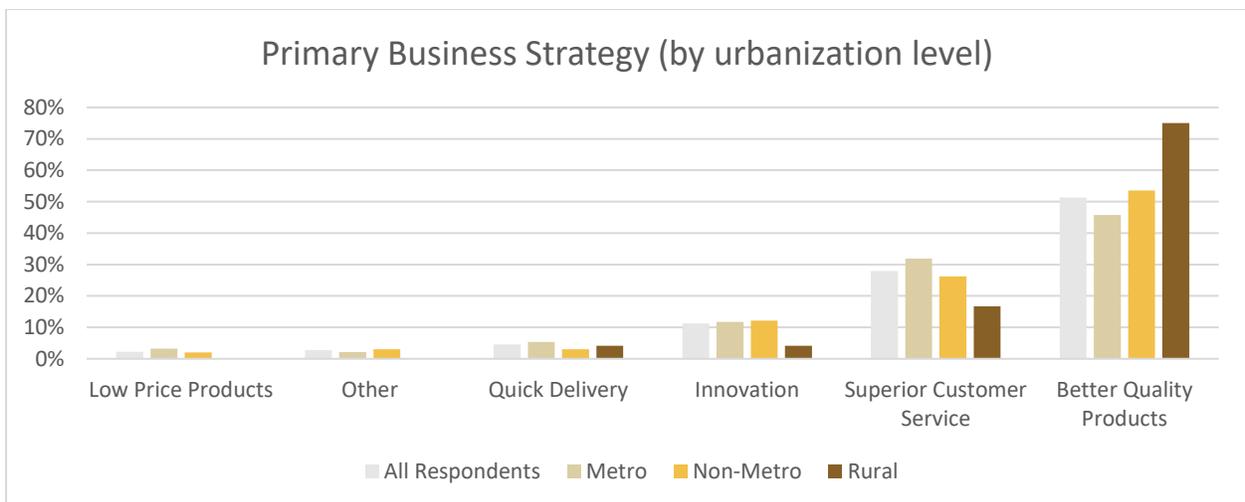
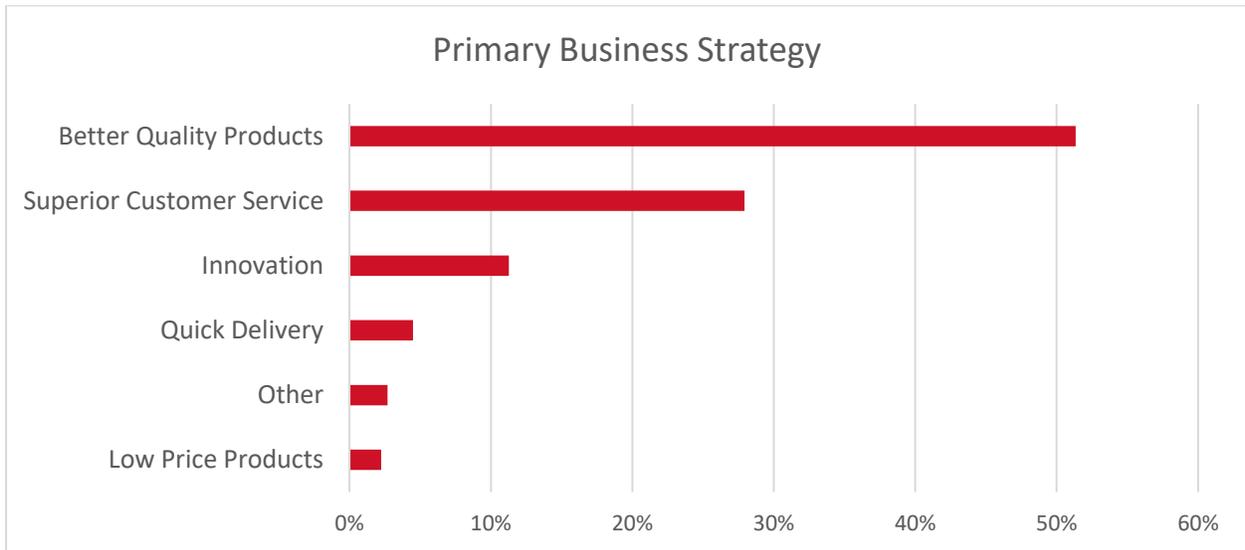




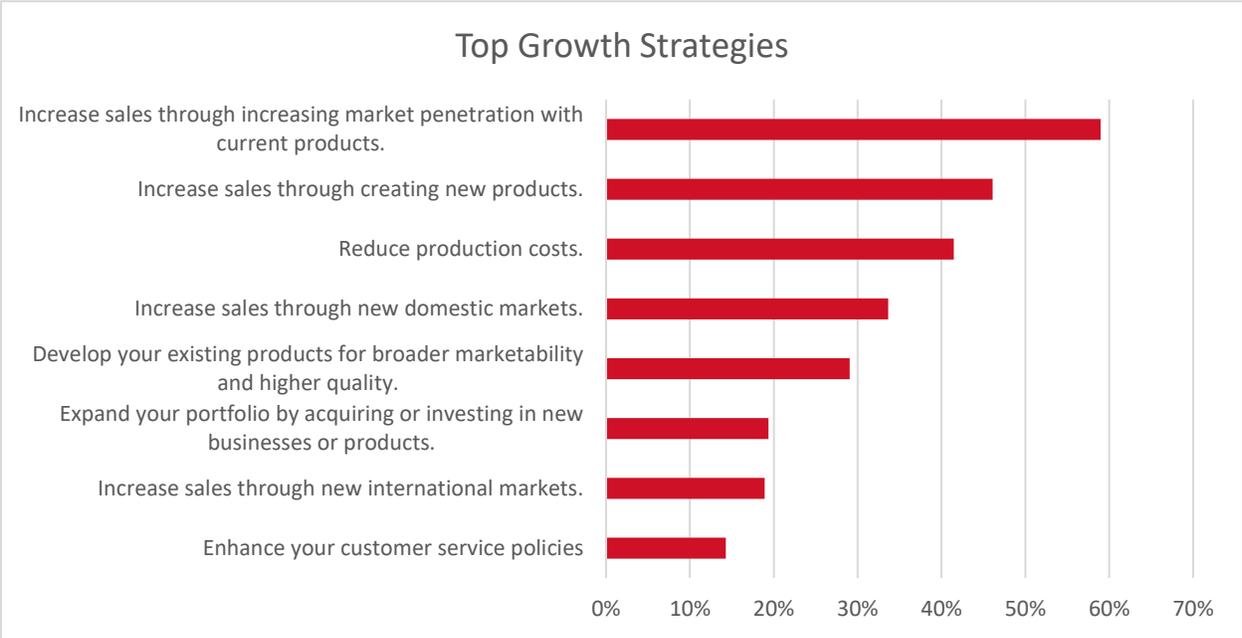


## Strategy

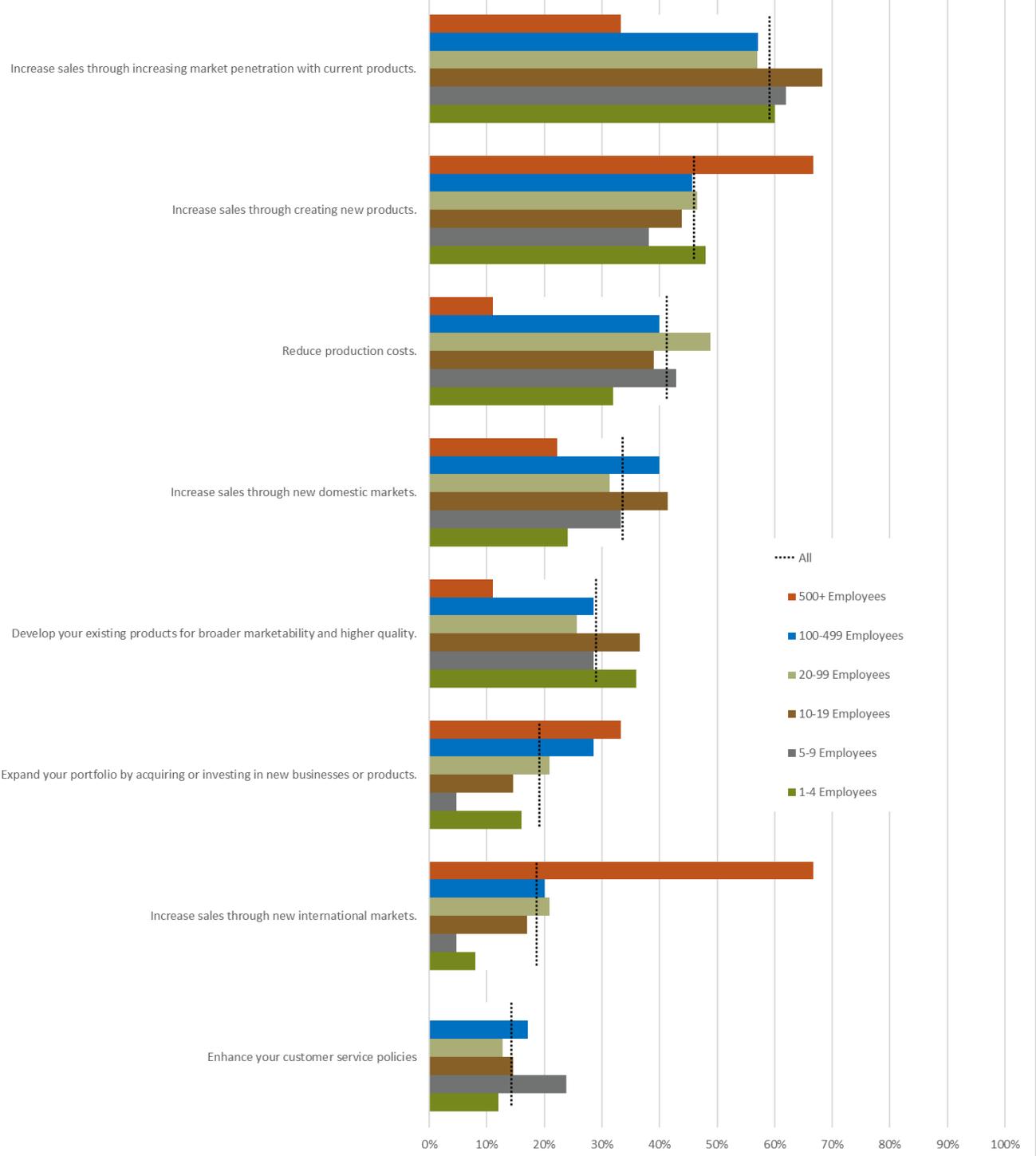
What is your primary business strategy? (Select One)



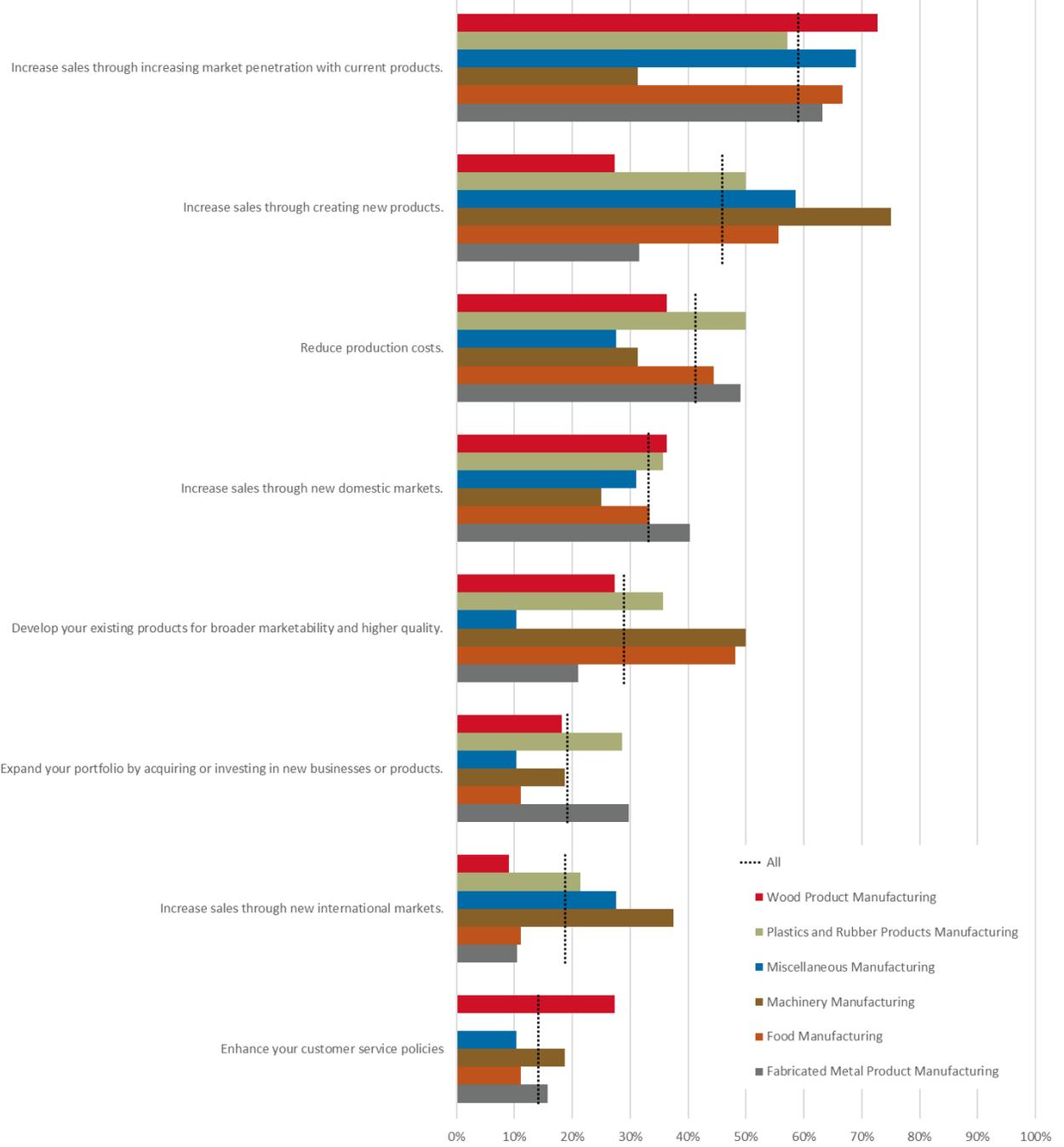
What do you expect will be your top three drivers for increased profits in the next five years?



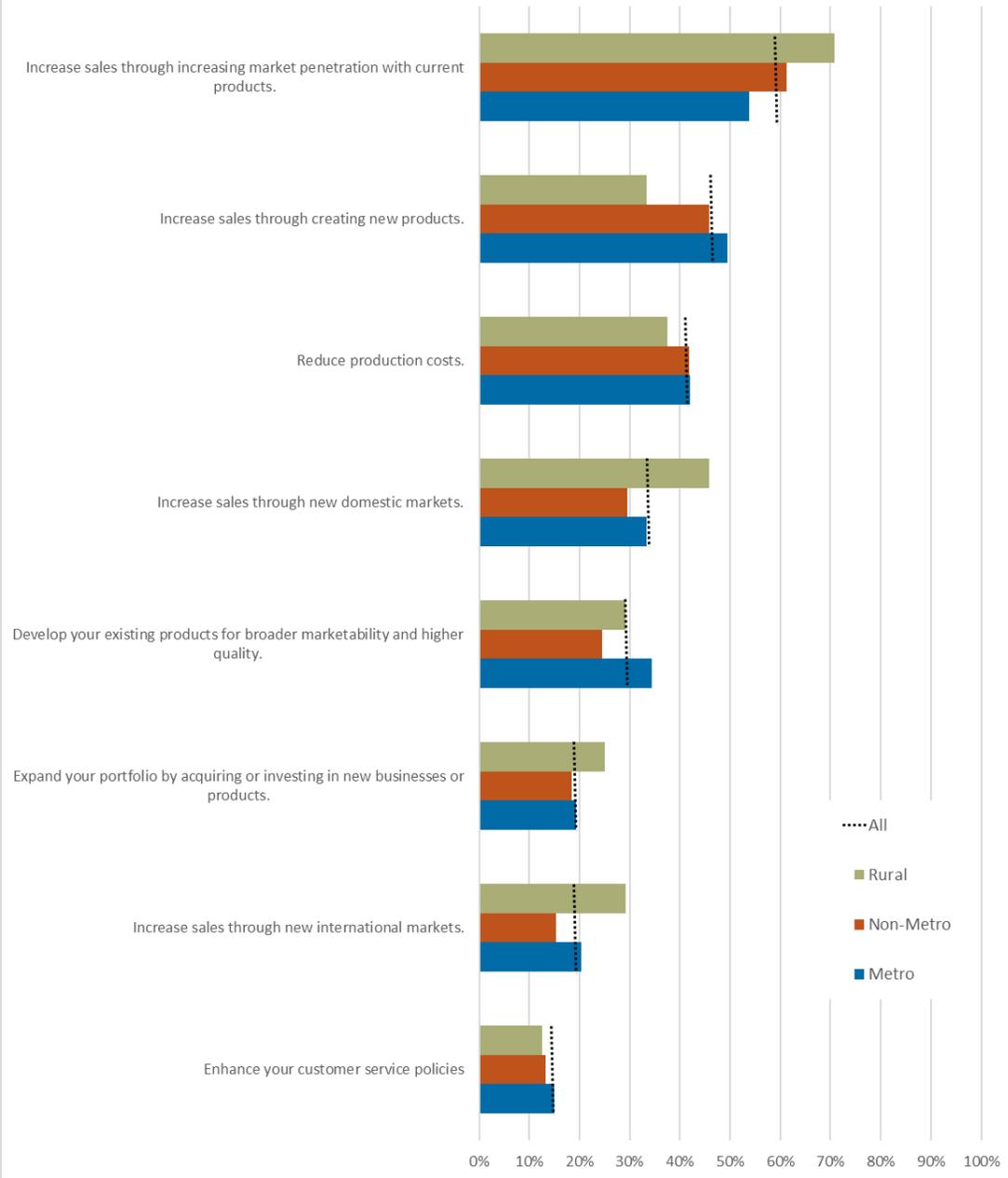
Top Growth Strategies: By Company Size



### Top Growth Strategies: By Industry



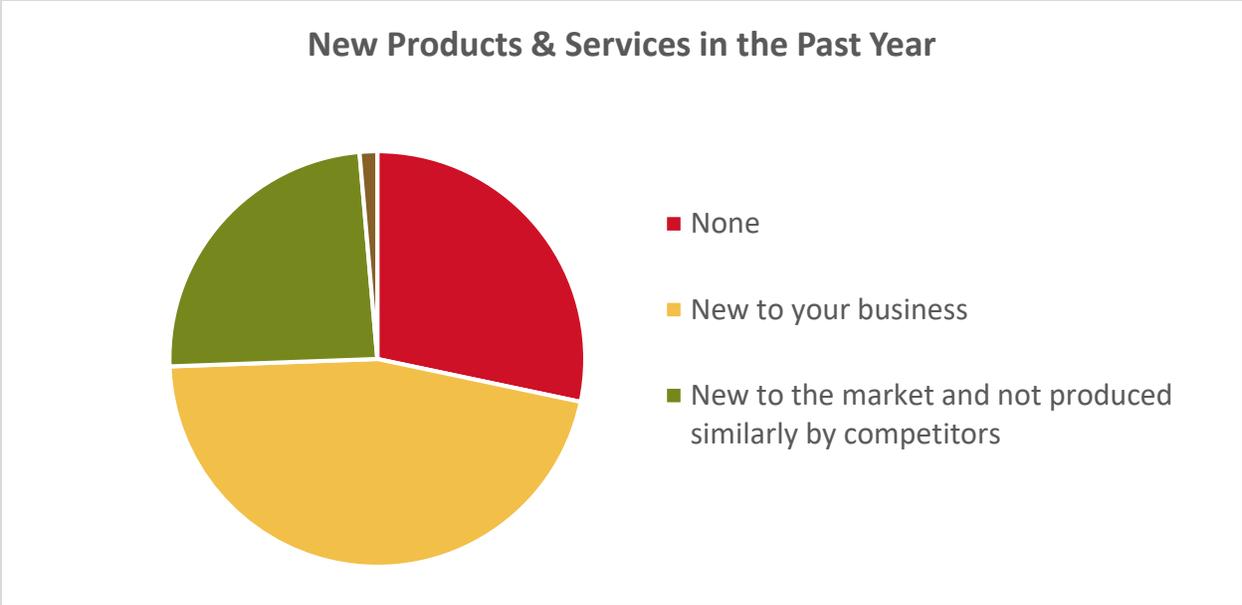
### Top Growth Strategies: By Urbanization



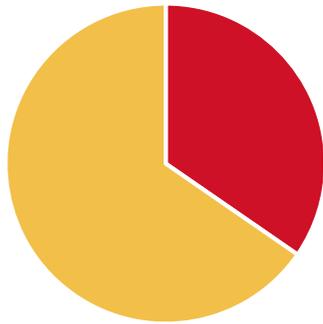
**Product Development**

Has your company introduced new products or services in the last year?

If your company introduced new products or services in the last year, were these products/services new to the market and not produced similarly by competitors or new to your business?

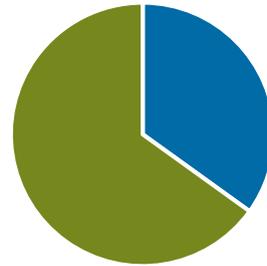


Introduced New Products in the past year (1-4 Employees)



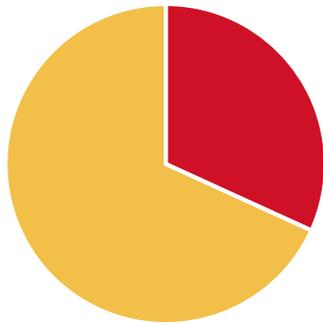
■ No ■ Yes

If Yes, were the products (1-4 Employees):



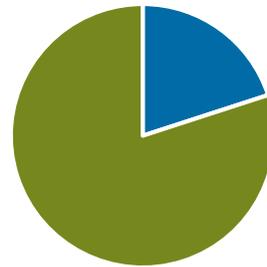
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (5-9 Employees)



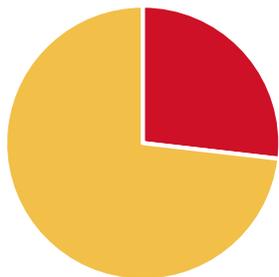
■ No ■ Yes

If Yes, were the products (5-9 Employees):



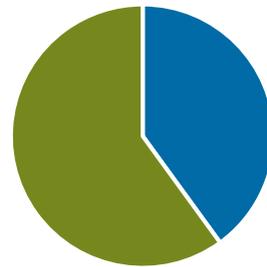
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (10-19 Employees)



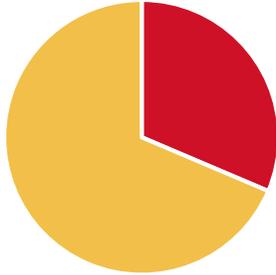
■ No ■ Yes

If Yes, were the products (10-19 Employees):



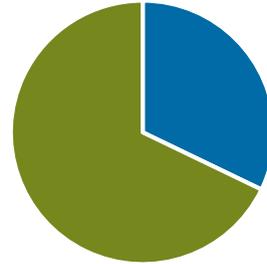
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (20-99 Employees)



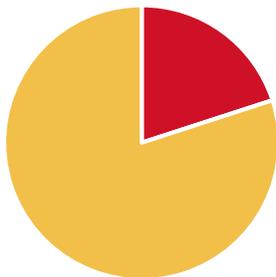
■ No ■ Yes

If Yes, were the products (20-99 Employees):



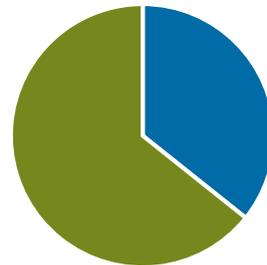
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (100-499 Employees)



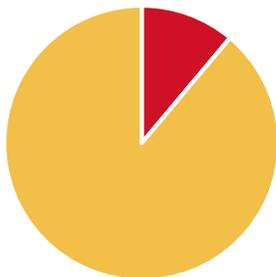
■ No ■ Yes

If Yes, were the products (100-499 Employees):



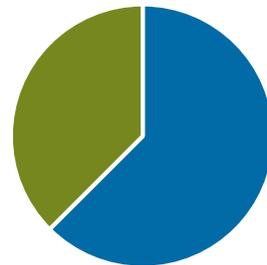
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (500+ Employees)



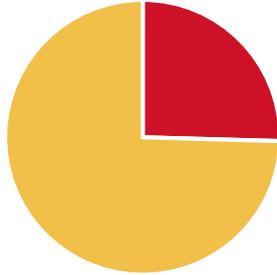
■ No ■ Yes

If Yes, were the products (500+ Employees):



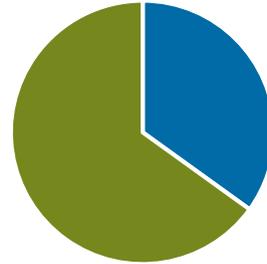
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Strategy = Better Quality Products)



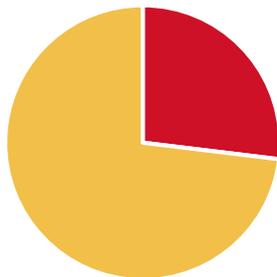
■ No ■ Yes

If Yes, were the products (Strategy = Better Quality Products):



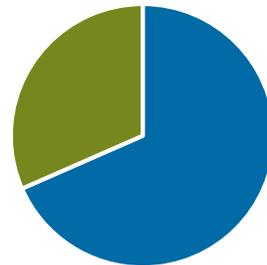
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Strategy = Innovation)



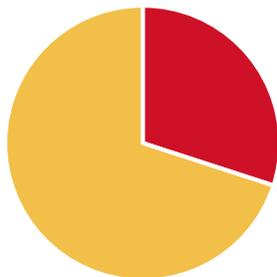
■ No ■ Yes

If Yes, were the products (Strategy = Innovation):



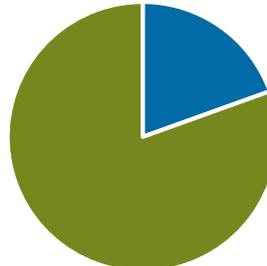
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Strategy = Superior Customer Service)



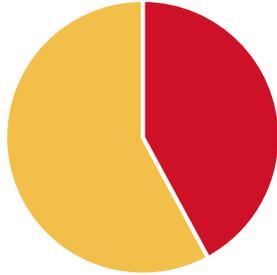
■ No ■ Yes

If Yes, were the products (Strategy = Superior Customer Service):



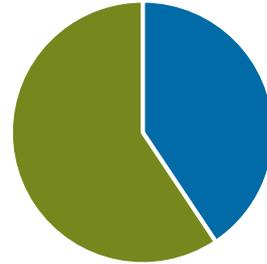
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Fabricated Metal Products)



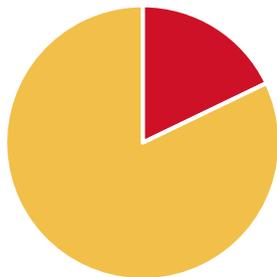
■ No ■ Yes

If Yes, were the products (Fabricated Metal Products):



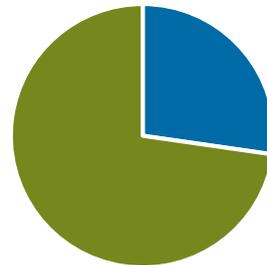
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Food Manufacturing)



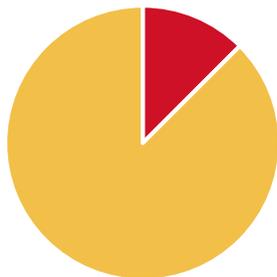
■ No ■ Yes

If Yes, were the products (Food Manufacturing):



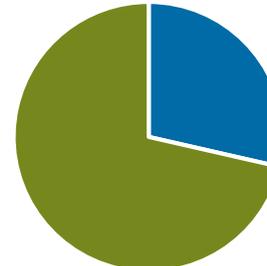
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Machinery Manufacturing)



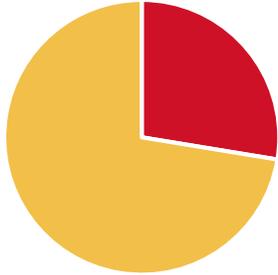
■ No ■ Yes

If Yes, were the products (Machinery Manufacturing):



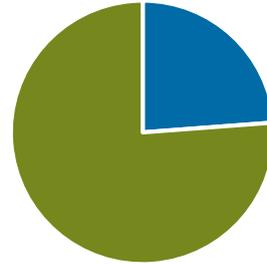
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Misc. Manufacturing)



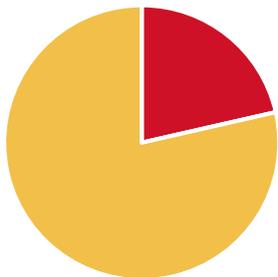
■ No ■ Yes

If Yes, were the products (Misc. Manufacturing):



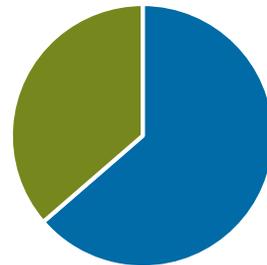
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Plastics and Rubber Products )



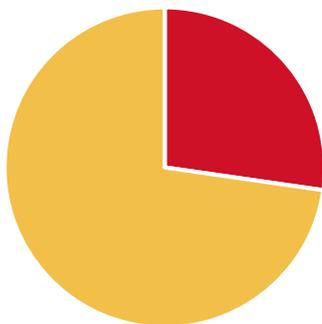
■ No ■ Yes

If Yes, were the products (Plastics and Rubber Products):



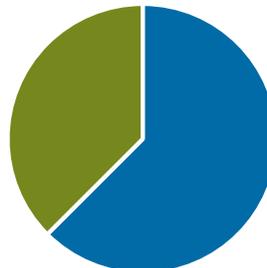
■ New to the market and not produced similarly by competitors?  
■ New to your business?

Introduced New Products in the past year (Wood Products)



■ No ■ Yes

If Yes, were the products (Wood Products):



■ New to the market and not produced similarly by competitors?  
■ New to your business?

## KEY ISSUES AND ACTIONS

I believe that \_\_\_\_\_ will limit growth in the next five years.

Scale:

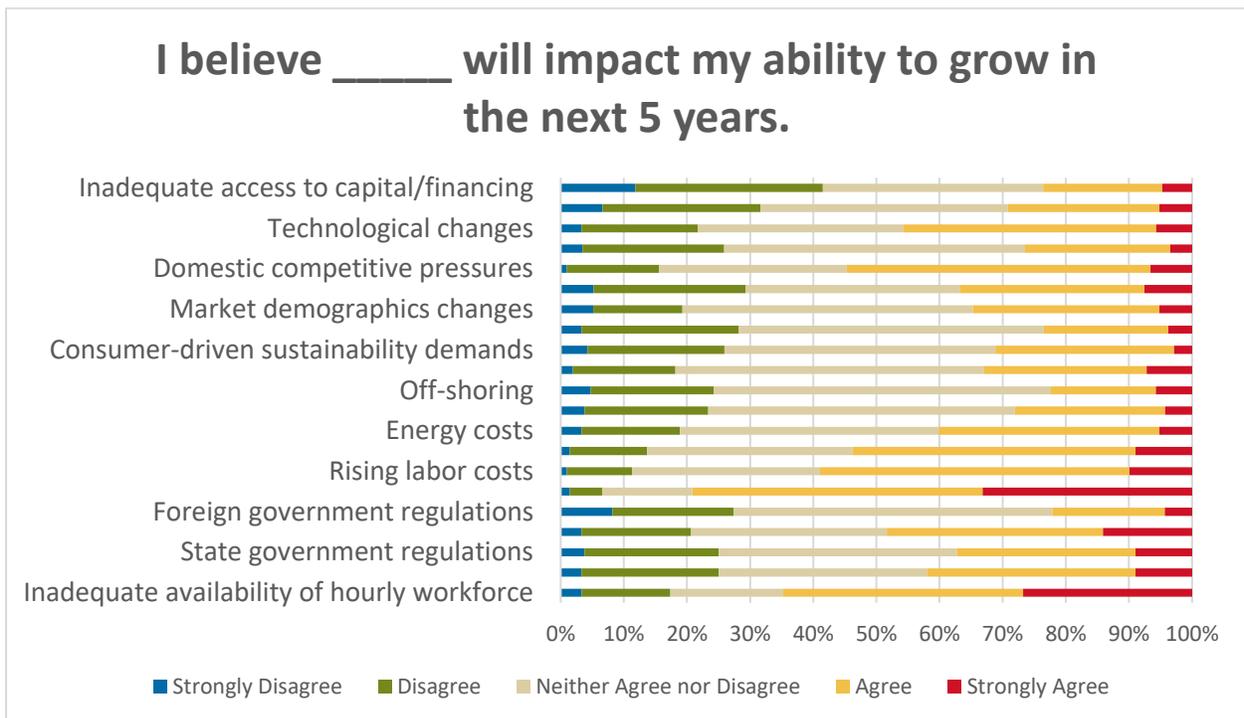
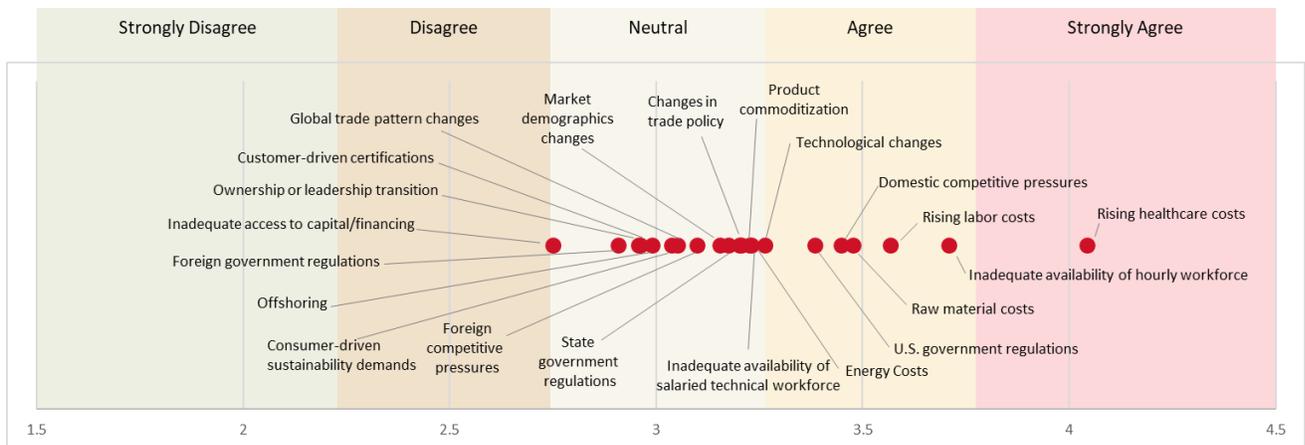
Strongly Disagree (1)

Disagree (2)

Neither Agree nor Disagree (3)

Agree (4)

Strongly Agree (5)



I am confident that I have resources to respond to \_\_\_\_\_.

Scale:

Strongly Disagree (1)

Disagree (2)

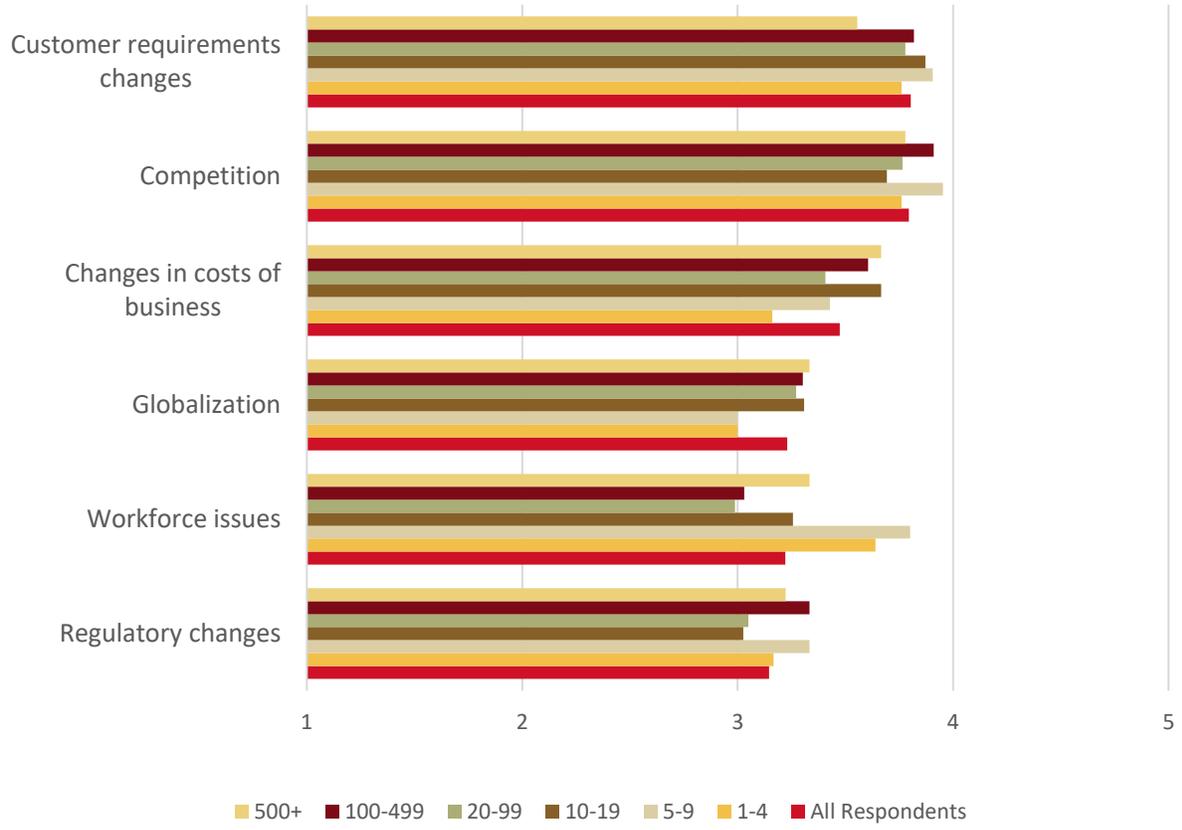
Neither Agree nor Disagree (3)

Agree (4)

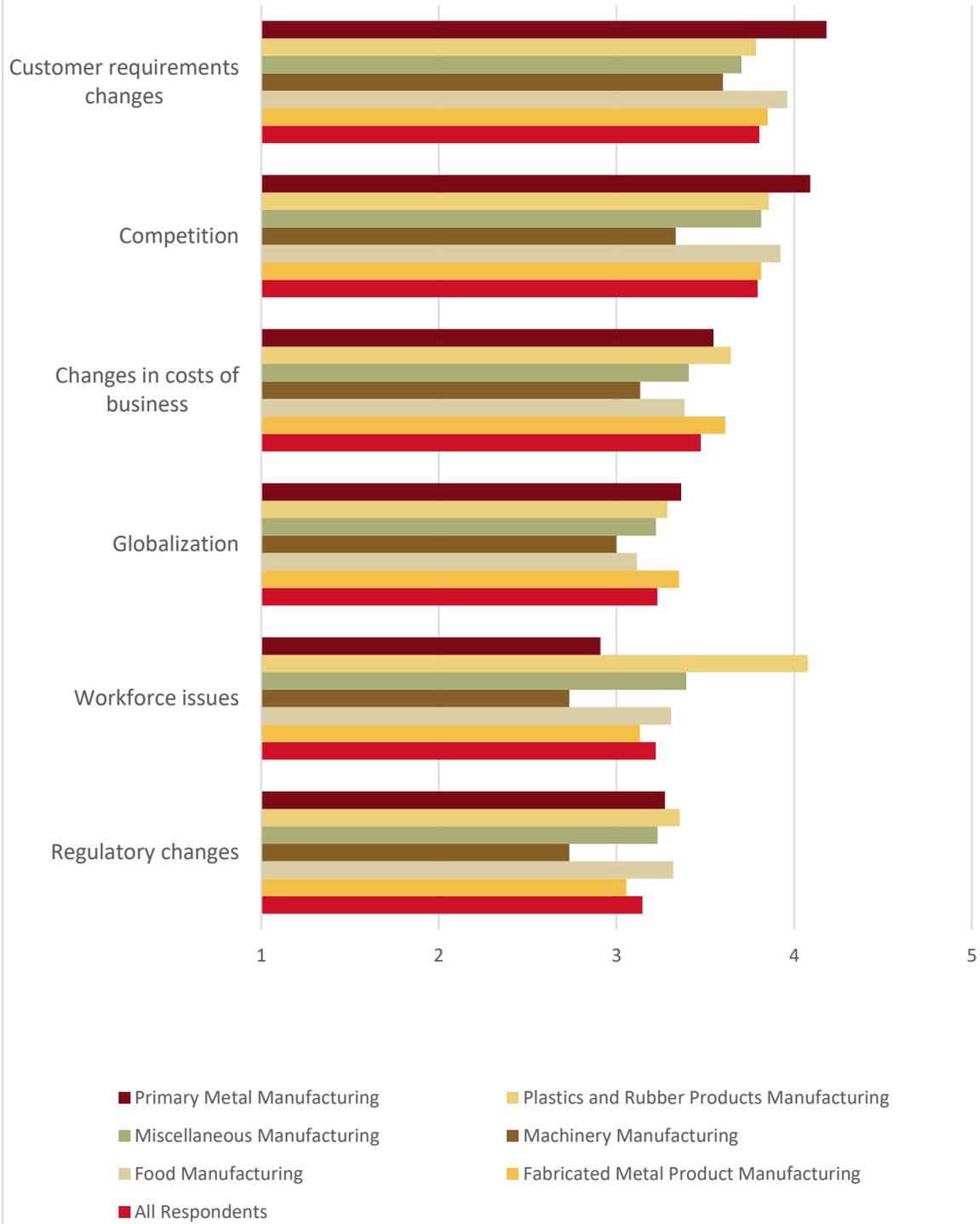
Strongly Agree (5)



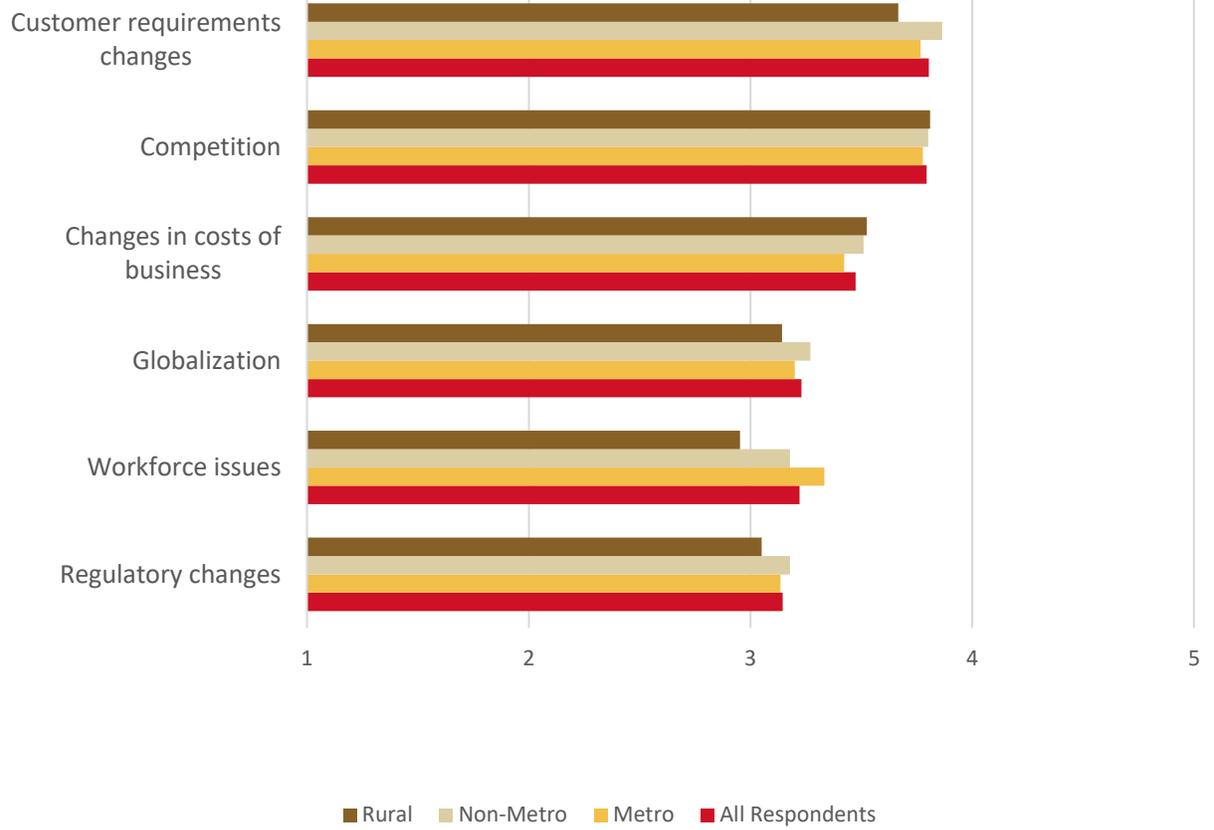
I am confident I have the ability to respond to...  
(by number of employees)



I am confident I have the ability to respond to...  
(by industry)



I am confident I have the ability to respond to...  
(by urbanization)



To what extent have you implemented the following in your business?

Scale:

Have not considered (1)

Considered, not implemented (2)

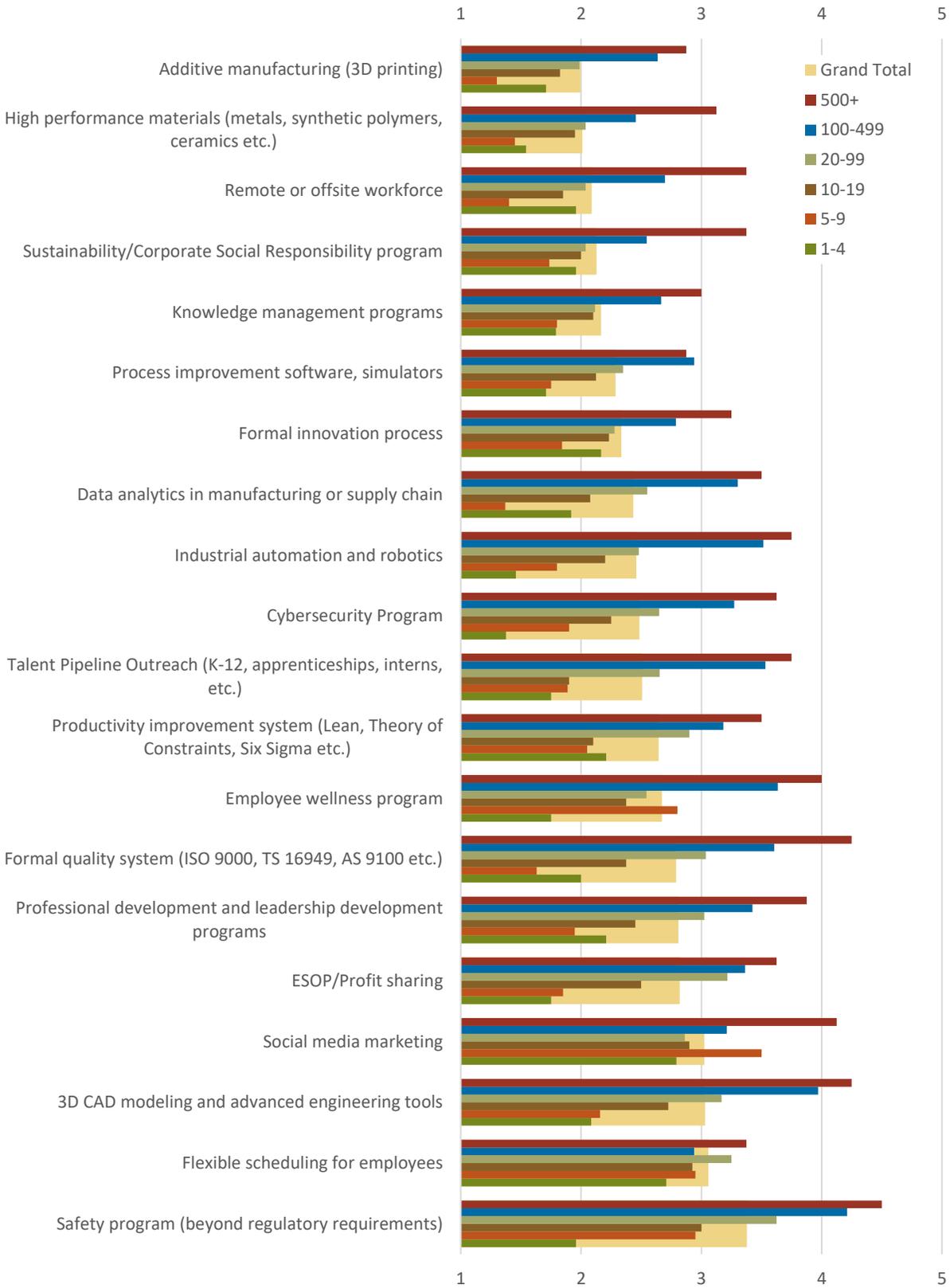
Partial Implementation (3)

Full Implementation in Progress (4)

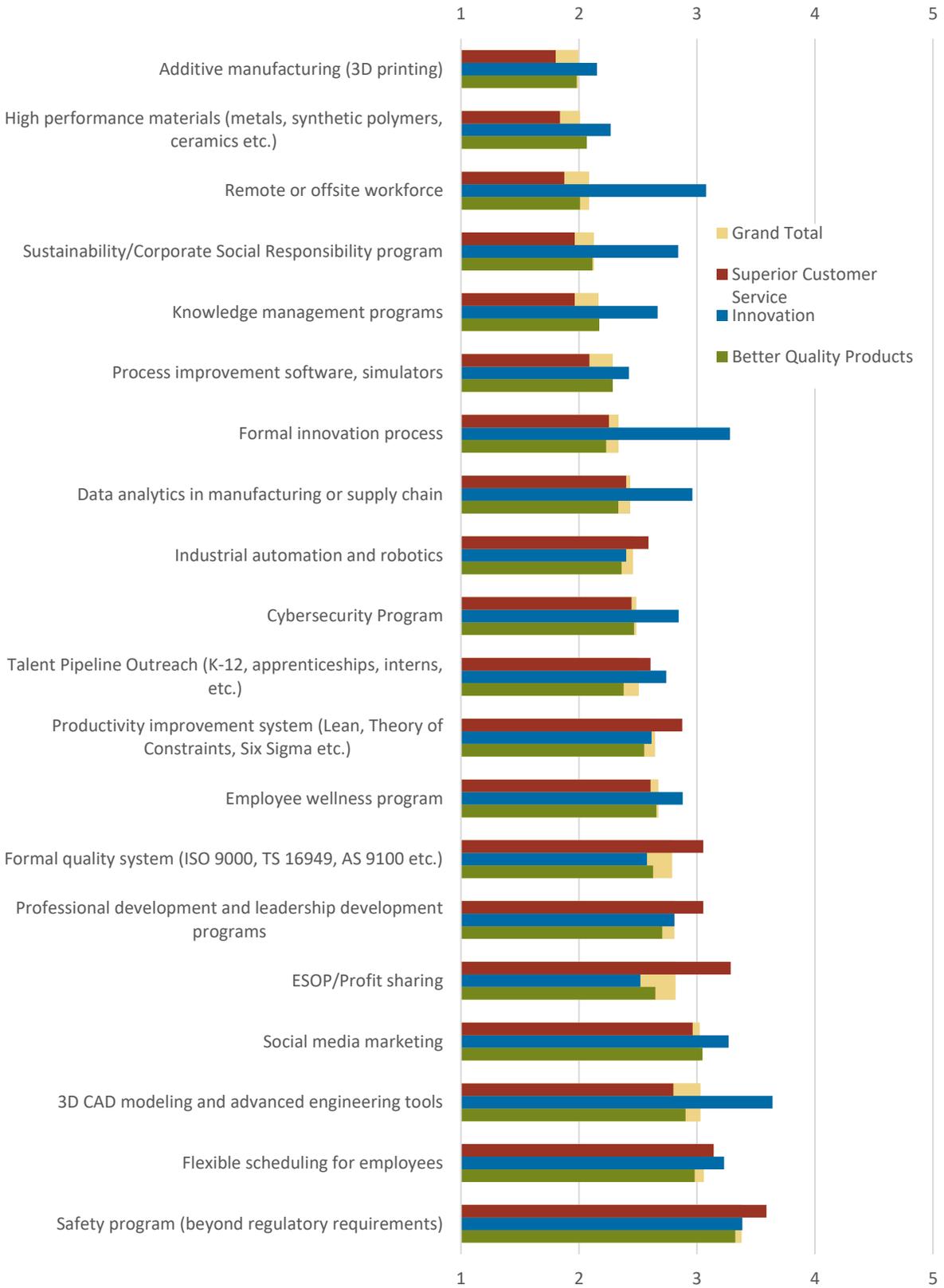
Implemented (5)

Industry	Fabricated Metal Product Mfg.	Food Manufacturing	Machinery Manufacturing	Miscellaneous Manufacturing	Plastics and Rubber Products Mfg.	Wood Product Manufacturing	Grand Total
Safety program (beyond regulatory requirements)	3.5	2.9	3.6	3.1	3.4	3.9	3.4
Flexible scheduling for employees	2.7	2.7	3.3	3.2	3.4	3.1	3.1
3D CAD modeling and advanced engineering tools	3.5	1.6	4.1	3.1	3.8	2.7	3
Social media marketing	2.8	3.3	3.5	3.3	2.4	3.2	3
ESOP/Profit sharing	3	2.1	3.1	2.6	3.6	3.2	2.8
Professional development and leadership development programs	2.5	2.6	2.9	2.7	3.2	3.4	2.8
Formal quality system (ISO 9000, TS 16949, AS 9100 etc.)	3	2.2	2.8	2.5	4	2.1	2.8
Employee wellness program	2.6	2.4	2.7	2.4	2.9	2.9	2.7
Productivity improvement system (Lean, Theory of Constraints, Six Sigma etc.)	2.6	2	2.9	2.7	3.1	3.3	2.6
Talent Pipeline Outreach (K-12, apprenticeships, interns, etc.)	2.6	2.3	3.1	2.3	3.2	3.1	2.5
Cybersecurity Program	2.4	2.3	3.2	2.8	2.5	2.5	2.5
Industrial automation and robotics	2.5	2.2	2.9	2.5	2.6	2.7	2.5
Data analytics in manufacturing or supply chain	2.3	2	3.1	2.3	2.9	2.6	2.4
Formal innovation process	2.2	2.2	2.5	2.3	2.4	2.8	2.3
Process improvement software, simulators	2.2	1.8	2.9	2.4	2.6	2.7	2.3
Knowledge management programs	2	2.2	2.1	2.1	2.7	2.6	2.2
Sustainability/Corporate Social Responsibility program	1.8	2.3	1.9	2.5	2.3	3.2	2.1
Remote or offsite workforce	1.8	1.9	2.5	2.3	2.1	2.7	2.1
High performance materials (metals, synthetic polymers, ceramics etc.)	2	1.3	2.2	2.3	2.8	1.7	2
Additive manufacturing (3D printing)	2	1.4	2.6	2.1	2.8	1.7	2

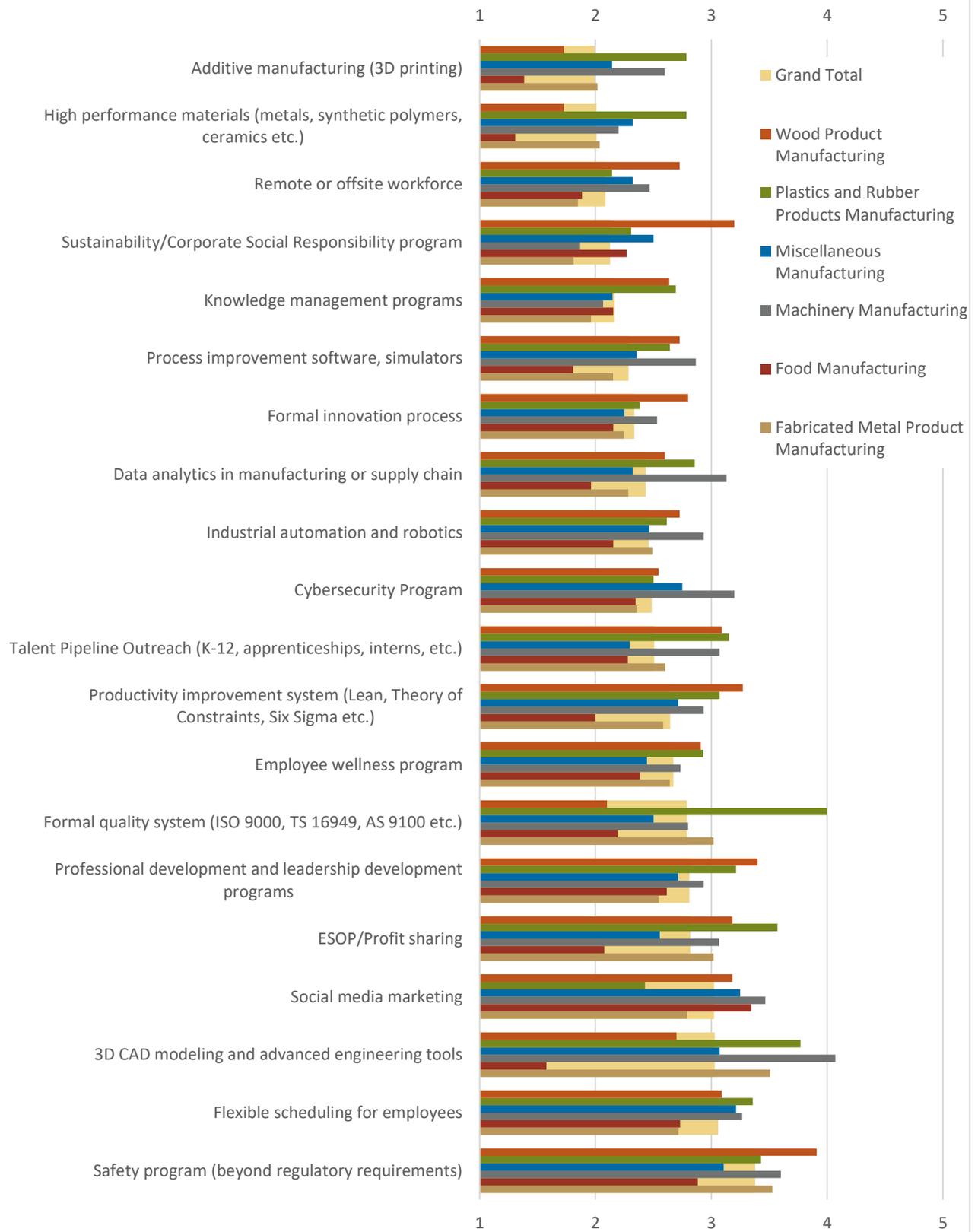
## Extent of Implementation by Size



## Extent of Implementation by Strategy



## Extent of Implementation by Industry



How much benefit have you seen from implementing the following in your business?

Scale:

Significantly below expectations (1)

Did not meet expectations (2)

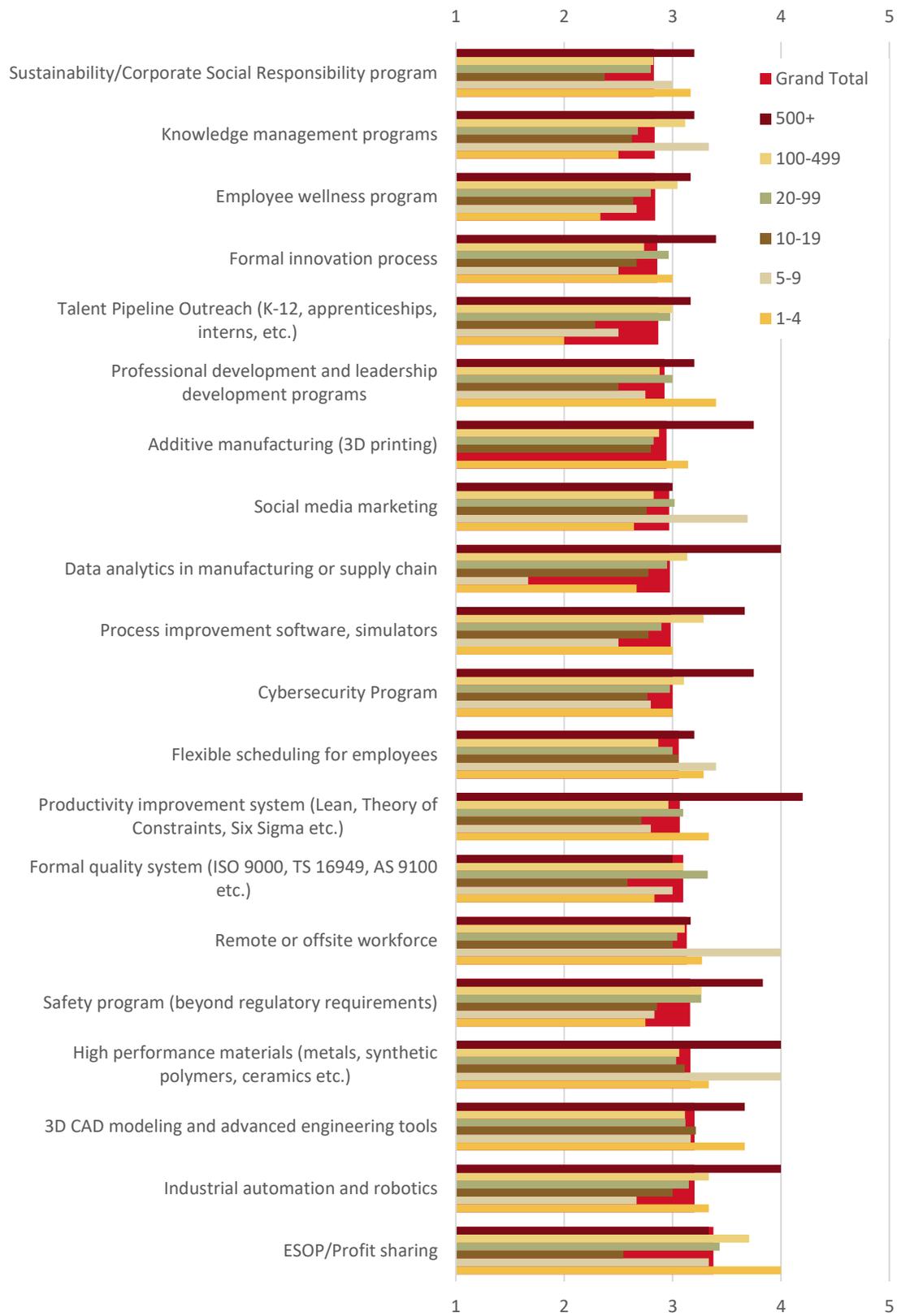
Met expectations (3)

Exceeded expectations (4)

Significantly exceeded expectations (5)

Industry	Fabricated Metal Product Manufacturing	Food Manufacturing	Machinery Manufacturing	Miscellaneous Manufacturing	Plastics and Rubber Products Manufacturing	Wood Product Manufacturing	Grand Total
ESOP/Profit sharing	3.4	3.5	3.6	3.6	3	3.6	3.4
Industrial automation and robotics	3.5	3	3	3.1	3.3	3.2	3.2
3D CAD modeling and advanced engineering tools	3.2	3.5	3.3	3.3	3.6	2.7	3.2
High performance materials (metals, synthetic polymers, ceramics etc.)	3	3	3.5	3.2	3.5	3	3.2
Safety program (beyond regulatory requirements)	3.1	3	3.4	3	3.4	3.7	3.2
Remote or offsite workforce	2.8	3.1	3.2	3.2	3.2	3.6	3.1
Formal quality system (ISO 9000, TS 16949, AS 9100 etc.)	3	2.9	3	3.1	3.6	3.3	3.1
Productivity improvement system (Lean, Theory of Constraints, Six Sigma etc.)	2.8	2.8	3.4	2.9	3.1	3.4	3.1
Flexible scheduling for employees	2.8	3.5	3	2.8	3.1	3.4	3.1
Cybersecurity Program	3	2.9	3.3	3	3	3.5	3
Process improvement software, simulators	3.1	3.3	3.1	2.6	3	2.8	3
Data analytics in manufacturing or supply chain	3.2	2.7	2.8	2.7	3.1	3.2	3
Social media marketing	2.7	3.1	2.8	3.1	3	3.6	3
Additive manufacturing (3D printing)	2.9	3	3.6	2.9	3.3	2.7	2.9
Professional development and leadership development programs	2.8	3.1	3	2.5	3.1	3.4	2.9
Talent Pipeline Outreach (K-12, apprenticeships, interns, etc.)	2.7	3	3	2.8	3.6	2.7	2.9
Formal innovation process	2.8	3	3.4	2.6	2.8	2.6	2.9
Employee wellness program	2.9	3.2	3.3	2.8	2.3	3.2	2.8
Knowledge management programs	2.9	3	2.8	2.3	2.9	3.2	2.8
Sustainability/Corporate Social Responsibility program	2.4	3.7	2.6	2.9	2.7	3	2.8

## Value of Implementation by Size



EXTERNAL ASSISTANCE

Do you currently work with external providers?

