Disruptive Technologies: New Opportunities — and Risks — for Manufacturers

The MPI Group

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Introduction

Disruptive technologies — robotics, artificial intelligence, the Internet of Things (IoT), additive manufacturing, blockchain, business analytics — are dramatically changing the manufacturing landscape. They're automating day-to-day activities and boosting workforce productivity and quality; helping executives monitor operations and respond to operational problems; and improving collaboration among suppliers *and* customers.

Yet rapid change creates not only opportunity but risk — concerns that keep manufacturing leaders up at night with a mixture of hope and fear. But manufacturers navigating this new technological landscape can learn best practices from industry leaders already implementing disruptive technologies (see *Industry Leaders*) — and boost their bottom lines.

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INDUSTRY LEADERS

Approximately 28 percent of manufacturing executives identify their company's ability to leverage disruptive technologies as "industry leader." Two-thirds of executives (65 percent) describe their firm's ability as "competitive," and 8 percent described their organizations as "laggard" or no ability.[1]

Industry leaders are most likely to be found in the following groups:

- ***Region:*** Europe (32 percent) and North America (30 percent)
- ***Industry:*** Paper products (48 percent)
- ***Size:*** Companies with more than $1 billion in annual revenue (41 percent)

[1] Due to rounding of decimals, does not sum to 100 percent.

Disruptive Technologies Offer Profits — and Peril

According to the *MPI Disruptive Technologies in Manufacturing Study,* 88 percent of manufacturing executives believe that their industries and markets are vulnerable to disruptive technologies (29 percent "extremely vulnerable" and 59 percent "somewhat vulnerable").[2] The study examined the state of disruptive technologies at more than 400 manufacturers in two dozen countries and in 19 product sectors. Vulnerability is typically defined as exposure that results in negative outcomes (revenue or product loss, business failure, etc.).

Market vulnerability is highest in Europe (39 percent "extremely vulnerable"), followed by Asia (33 percent), North America (19 percent), and Latin/South America (18 percent). The industry with the highest percentage of market vulnerability is textile and textile products (54 percent "extremely vulnerable").[3]

These executives also worry about the impact of disruptive technologies on their own companies. A full 86 percent report that their companies are vulnerable to disruptive technologies (23 percent "extremely vulnerable" and 63 percent "somewhat vulnerable"). Company vulnerability is highest in Asia (32 percent "extremely vulnerable"), followed by Europe (28 percent), North America (15 percent), and Latin/South America (11 percent). The industry with the highest percentage of company vulnerability is furniture and wood products (41 percent "extremely vulnerable").

Even executives at companies that are "industry leaders" in leveraging new technologies fret about the impact of disruptive technologies. Roughly 75 percent of executives at industry leaders consider their markets and companies vulnerable, vs. about 90 percent of executives at "competitive" companies and almost all executives at "laggard" firms.

Even executives at companies that are "industry leaders" in leveraging new technologies fret about the impact of disruptive technologies.

[2] MPI Disruptive Technologies Study, The MPI Group, May 2019. Unless otherwise noted, all data in this report is from the study.

[3] All reported region and industry findings based on 30 or more responses.

The MPI study examined manufacturing technologies (those found primarily in a production setting) and enterprise technologies (those found primarily away from production). Some technologies are likely to benefit manufacturers more than others. *Manufacturing* technologies most likely to benefit manufacturers in the next three years are production automation, robotics, and smart devices/embedded intelligence/IoT sensors *(Figure 1)*. *Enterprise* technologies most likely to benefit manufacturers are artificial intelligence (AI), cloud technology, and big data/business analytics *(Figure 2)*. At the turn of the century, AI, cloud, and big data were

Figure 1. Manufacturing technologies most likely to benefit company in next three years (% of manufacturers)

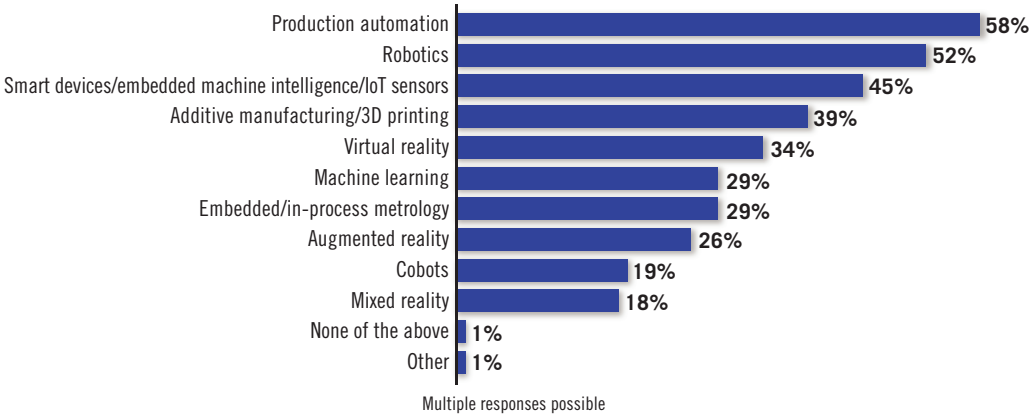
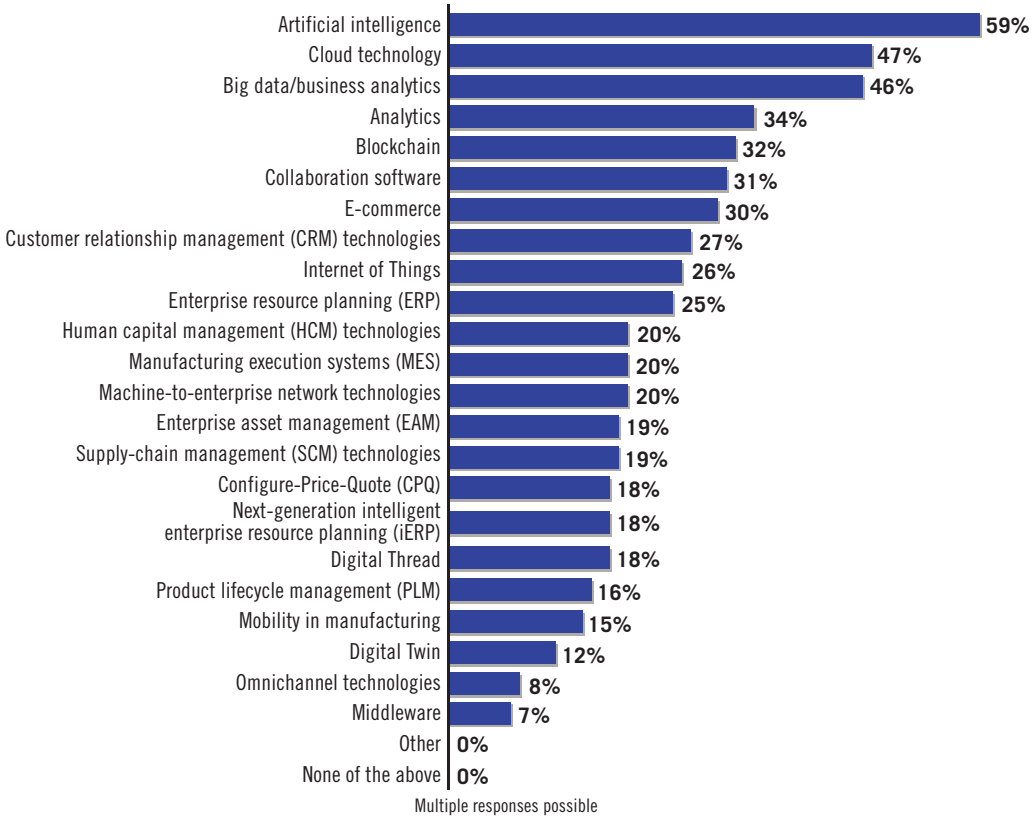


Figure 2. Enterprise technologies most likely to benefit company in next three years (% of manufacturers)



technologies on a distant horizon; they're now viewed by approximately half of manufacturers as likely to deliver business benefits to their organizations.

Industry leaders see the most gains in *manufacturing* technologies from robotics (57 percent) and in *enterprise* technologies from artificial intelligence (62 percent).

Specific benefits from disruptive technologies vary based on the technology type. New *manufacturing* technologies are most likely to improve customer satisfaction, security of systems and information, and service innovation *(Figure 3)*. New *enterprise* technologies are most likely to improve equipment reliability, supply-chain performance, and sales/revenue *(Figure 4)*.

Figure 3. Effect of implementation of new manufacturing technologies on company performance measures (% of manufacturers with some or significant performance improvement)

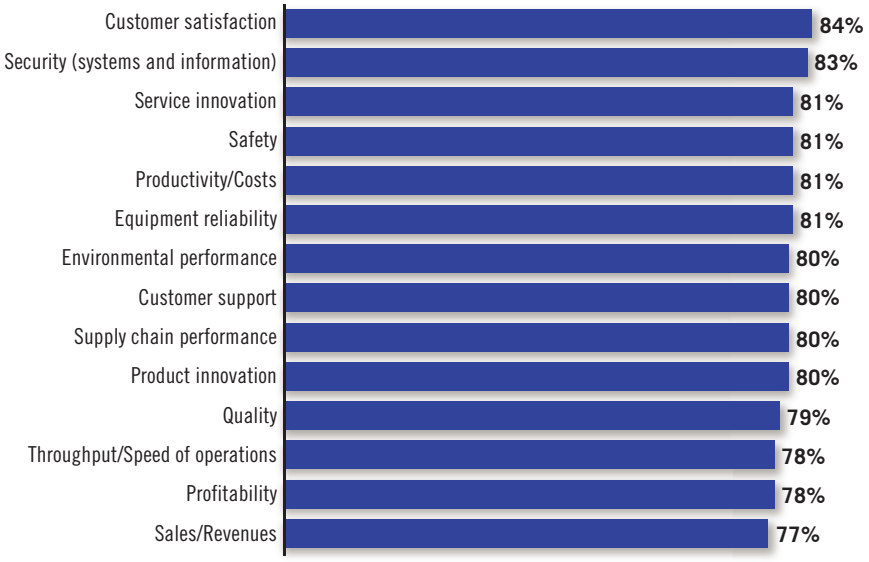
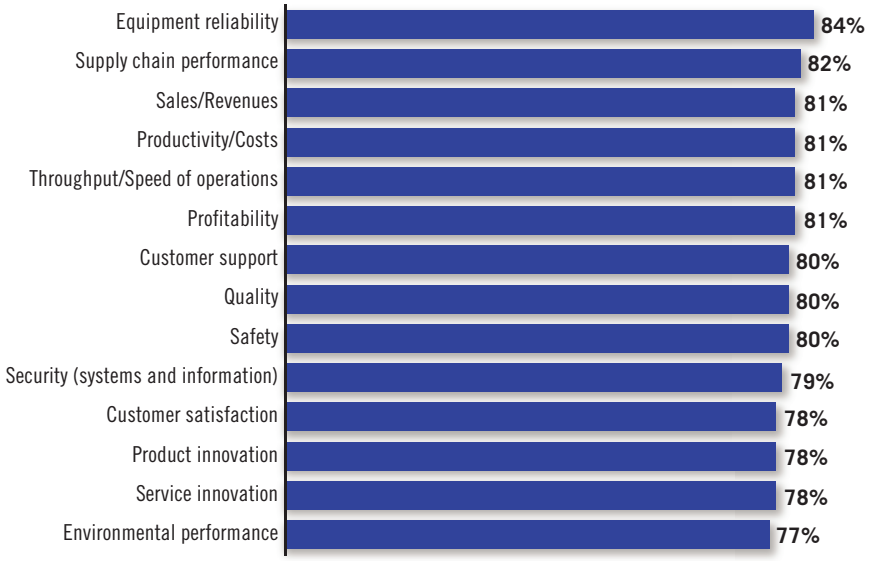


Figure 4. Effect of implementation of new enterprise technologies on company performance measures (% of manufacturers with some or significant performance improvement)



Disruptive Technologies: Who's Implementing What?

With so many performance measures likely to improve via disruptive technologies, it's no wonder that manufacturers are implementing them aggressively. The top *manufacturing* technologies to be adopted (some or extensive implementation) in the past year are:

- Production automation — 78 percent of manufacturers
- Smart devices/embedded machine intelligence/IoT sensors — 74 percent
- Machine learning — 73 percent
- Embedded/in-process metrology — 70 percent
- Robotics — 68 percent.

Production automation was adopted (some or extensive implementation) by a high of 84 percent of manufacturers in Asia, followed by Latin/South America (83 percent), Europe (76 percent), and North America (73 percent). The industry with the highest percentage of production-automation adoption is fabricated metals (86 percent).

The top *enterprise* technologies to be adopted (some or extensive implementation) in the past year are:

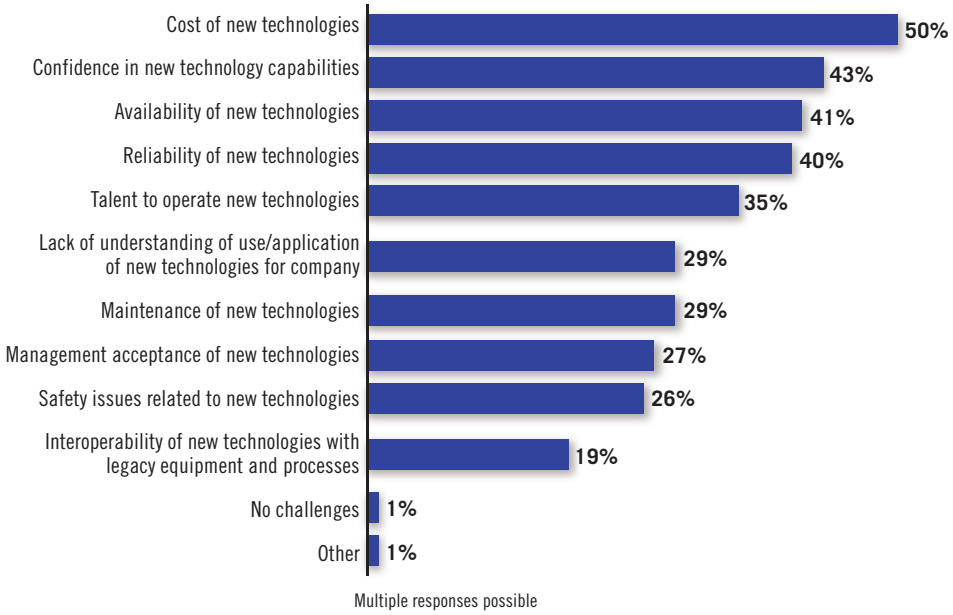
- Enterprise resource planning (ERP) — 78 percent of manufacturers
- Cloud technology — 77 percent
- Customer relationship management (CRM) technologies — 77 percent
- Analytics — 77 percent
- E-commerce — 75 percent.

ERP was adopted (some or extensive implementation) by a high of 86 percent of manufacturers in Europe, followed by Latin/South America (81 percent), Asia (80 percent), and North America (74 percent). The industry with the highest percentage of ERP adoption is food and beverage products (81 percent).

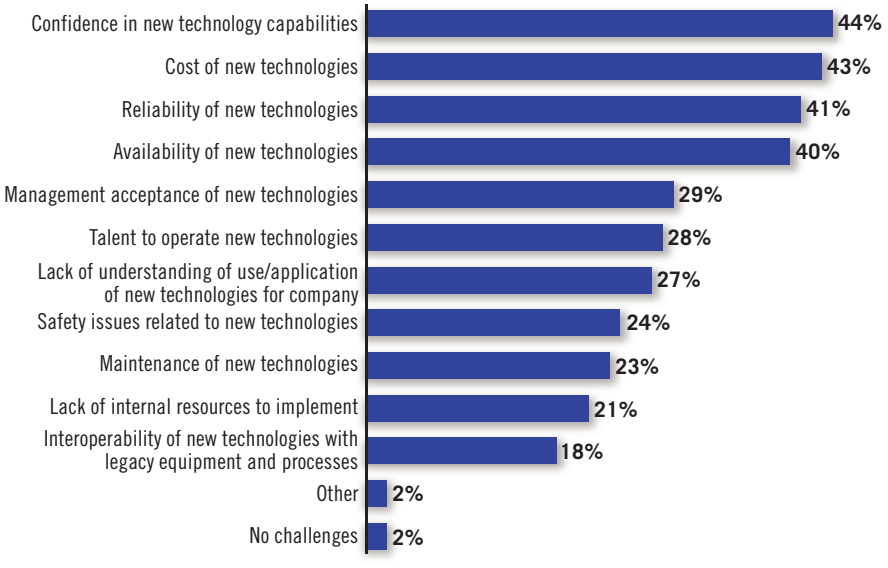
With so many performance measures likely to improve via disruptive technologies, it's no wonder that manufacturers are implementing them aggressively.

Emerging technology implementation patterns are comparable among industry leaders, competitive companies, and laggard firms — as are the obstacles these manufacturers face. Top challenges in adopting *manufacturing* technologies are cost, confidence in new capabilities, and availability *(Figure 5)*. Top challenges when adopting *enterprise* technologies are confidence in new capabilities, cost, and reliability *(Figure 6)*. The high adoption percentage of cloud technology may help to diminish cost concerns in years to come.

5. Company's biggest challenges when implementing new manufacturing technology (% of manufacturers)



6. Company's biggest challenges when implementing new enterprise technologies (% of manufacturers)



Leveraging Emerging Technologies for Profit: Industry Leaders and Best Practices

Not all manufacturers are earning the same returns on their investments in new technologies. Analysis of study data shows that manufacturers pursuing disruptive-technology best practices — i.e., industry leaders — are more likely to achieve better outcomes.

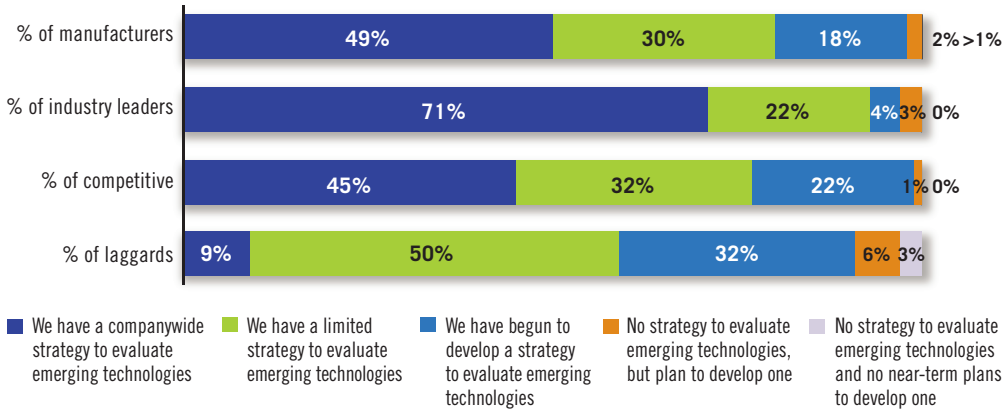
It Starts with Strategy

Less than half of manufacturers (49 percent) have a companywide strategy to evaluate emerging technologies. Industry leaders are far more likely to pursue a strategic approach: 71 percent of industry leaders have a companywide strategy in place vs. just 45 percent of competitive companies and only 9 percent of laggards *(Figure 7)*.

Staffing Requires Investment, Too

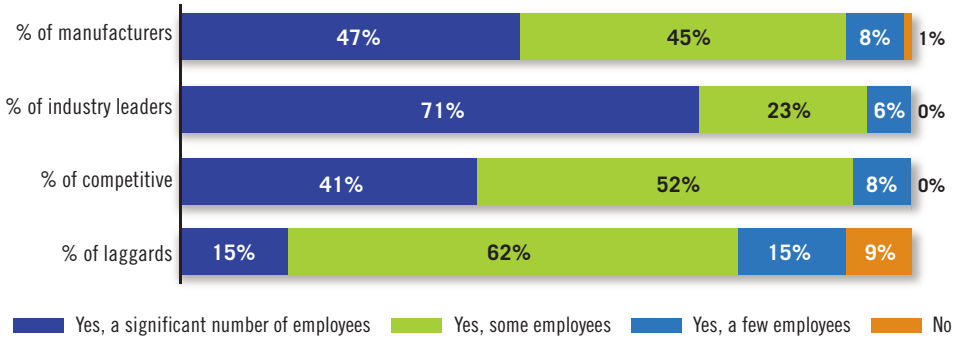
Just 47 percent of companies have "a significant number of employees" dedicated to the evaluation and utilization of emerging technologies. Industry leaders invest heavily in the human capital behind

Figure 7. Use of strategy to evaluate emerging technologies



Manufacturers pursuing disruptive-technology best practices — i.e., industry leaders — are more likely to achieve better outcomes.

Figure 8. Staff fully dedicated to the evaluation and utilization of emerging technologies



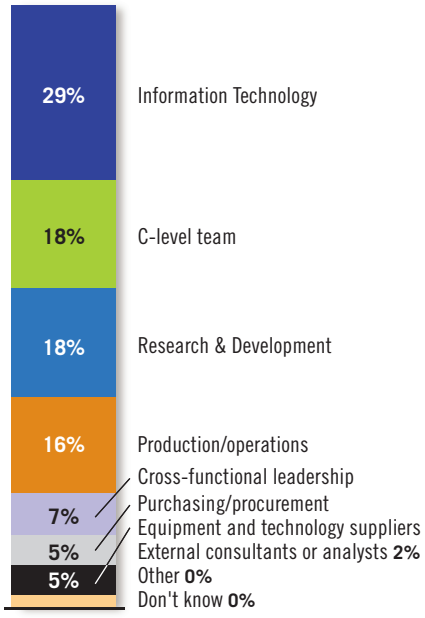
their emerging technologies: 71 percent of industry leaders have a "significant number of employees" evaluating and utilizing emerging technologies vs. just 41 percent of competitive companies and only 15 percent of laggards *(Figure 8)*.

Leadership Matters

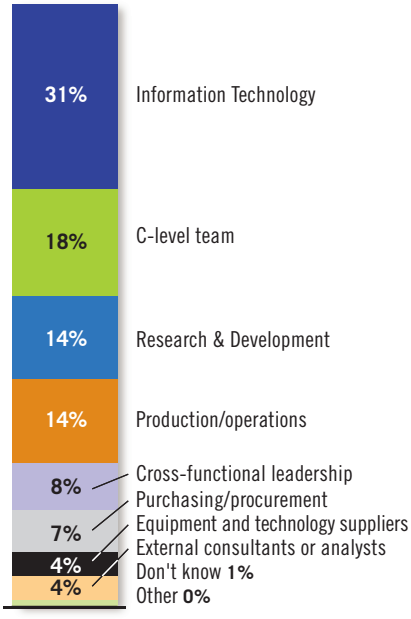
Manufacturers are most likely to rely on their information technology (IT) departments and C-level teams to lead the evaluation and utilization of new *manufacturing* technologies *(Figure 9)*. Similarly, they are most likely to rely on their IT departments and C-level teams to lead the evaluation and utilization of new enterprise technologies *(Figure 10)*. Manufacturers in Europe are more likely to look to C-level teams to lead efforts for both *manufacturing* technologies (29 percent) and *enterprise* technologies (30 percent).

Industry leaders are more likely to look to their IT departments to lead efforts around both *manufacturing* and *enterprise* technologies.

9. Function that leads the evaluation and utilization of new manufacturing technologies
(% of manufacturers)



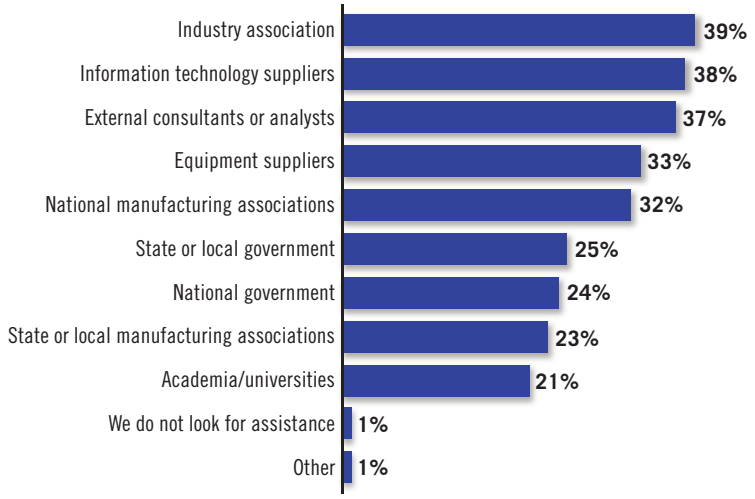
10. Function that leads the evaluation and utilization of new enterprise technologies
(% of manufacturers)



Ask for Help

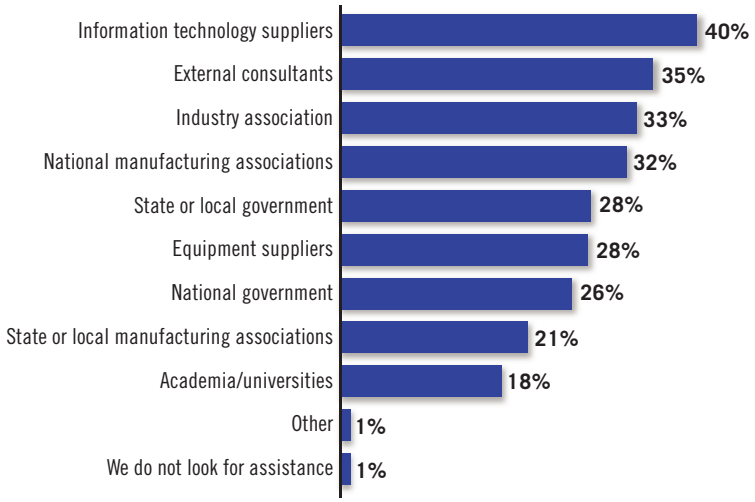
Manufacturers are most likely to look to industry associations (39 percent) for assistance with new *manufacturing* technologies *(Figure 11)* and to IT suppliers (40 percent) for assistance with new enterprise technologies *(Figure 12)*. Industry leaders are most likely to look to IT suppliers (43 percent) for help with both new *manufacturing* technologies and *enterprise* technologies.

11. Assistance evaluating and implementing new manufacturing technologies (% of manufacturers)



Multiple responses possible

12. Assistance evaluating and implementing new enterprise technologies (% of manufacturers)



Multiple responses possible

Invest Today for Tomorrow

A full 50 percent of manufacturers budgeted more than 10 percent of sales in 2018 for new *manufacturing* technologies, and 41 percent budgeted more than 10 percent of sales for new *enterprise* technologies. Industry leaders invest even more:

- 57 percent of industry leaders budgeted more than 10 percent for new *manufacturing* technologies (vs. 48 percent of competitive companies and 41 percent of laggards). Approximately 14 percent of industry leaders budgeted more than *20 percent of sales* for new manufacturing technologies (vs. just 4 percent of competitive companies and 3 percent of laggards).
- 55 percent of industry leaders budgeted more than 10 percent of sales for new *enterprise* technologies (vs. 35 percent of competitive companies and 35 percent of laggards). Approximately 12 percent of industry leaders budgeted *more than 20 percent* of sales for new enterprise technologies (vs. just 3 percent of competitive companies and 0 percent of laggards).

Industry Leaders Are Driving Performance with New Technologies

Manufacturers are right to fear negative consequences from disruptive technologies: business models and processes can rapidly become irrelevant; customers may migrate toward early adopters; and revenues and profits could plunge. But they should remember what the *MPI Disruptive Technologies Study* also uncovered: adoption of disruptive technologies can lead to better performance, *if* manufacturers select the right technologies and implement them in the *right* ways.

Industry leaders are significantly outpacing their slower competitors in leveraging new technologies to improve operations, profitability, and productivity *(Figure 13)*. These companies are wielding their technology investments for gains that may make the difference between surviving — and thriving.

Isn't it time for your company to start managing emerging technologies like an industry leader? The path they've blazed is clear:

1. Develop and implement a disruptive technologies strategy.
2. Back up strategy with human resources, skills, and talent.
3. Explore what's new, and retain outside help if necessary.
4. Invest — and profit.

Figure 13. Outcomes when leveraging emerging technologies

	Industry leaders	Competitive companies	Laggard companies
Gross profit percentage (average)	**39.7%**	**33.9%**	**18.1%**
Sales per employee (average)	**$193,483**	**$148,097**	**$131,330**
"Fully achieved" world-class manufacturing status	**48% of companies**	**18% of companies**	**18% of companies**