



7TH ANNUAL

STATE OF SMART MANUFACTURING REPORT

SUSTAINABILITY/ESG EDITION

Responding to market
adversity with agility,
improved processes, and
technology adoption



Smart manufacturing is a critical component of driving ESG and sustainability success in manufacturing.

Participants in a recent global survey of 321 manufacturers communicated the desire to improve their business and community through sustainability and ESG (Environmental, Social, and Governance) policy.

The 2022 State of Smart Manufacturing Report is the most robust edition yet and first to cover manufacturers' connection with sustainability/ESG initiatives. While participants span the globe, the results reflect consistency in the rising prominence of sustainability/ESG in manufacturing.

This study from Plex Systems, a Rockwell Automation company, in collaboration with Hanover Research, uncovers how manufacturers are addressing sustainability/ESG initiatives with smart manufacturing to achieve results for environmental stewardship, social purpose, and responsible corporate governance.

With the findings and recommendations in this report, as well as the accompanying checklist found on **page 27** you can create your action plan to embrace the future of sustainable/ESG manufacturing.



“Sustainable manufacturing is the creation of manufactured products through economically-sound processes that minimize negative environmental impacts while conserving energy and natural resources. Sustainable manufacturing also enhances employee, community and product safety.”

Sustainable Manufacturing, US EPA

SMART MANUFACTURING:

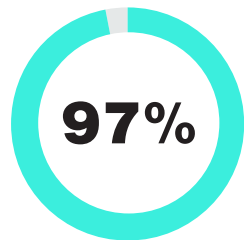
The intelligent, real-time orchestration and optimization of business, physical, and digital processes within factories and across the entire value chain. Resources and processes are automated, integrated, monitored, and continuously evaluated based on all available information as close to real time as possible.

MESA International

SUSTAINABILITY AND ESG POLICY IS A RISING PRIORITY FOR MANUFACTURERS

Sustainability and Environmental, Social, and (Corporate) Governance (ESG) policy is gaining global attention. Public concerns around climate change, social justice, corporate responsibility – including increased regulations, emission reductions, and responsible governance – are increasingly driving more businesses to take action.

- **55%** of manufacturers have a **formal company-wide ESG program** in place.
- **#1** motivation for pursuing ESG initiatives is to address **social inequalities**.



of respondents have a formal or informal ESG policy in place.

MANY MANUFACTURERS ALREADY HAVE SUSTAINABILITY/ESG POLICIES IN PLACE

When asked about ESG policy, **97%** of global manufacturers in this survey responded that they have a formal or informal policy in place. Manufacturers that are focused on efficiency are consciously or unconsciously focused on sustainability and ESG by creating less waste, using less water, recycling scrap, and doing anything else that contributes to developing a more productive and responsible business.

- **47%** of respondents prioritize **energy management** for sustainability/ESG programs.
- **42%** of respondents prioritize **recycling** for sustainability/ESG programs.

TECHNOLOGY HELPS TO MEET SUSTAINABILITY/ESG AND BUSINESS GOALS

Efficiency, adaptability, and accountability are becoming core to stakeholder value. Smart manufacturing increases efficiency by making better use of resources and fostering a culture of purpose when you tie technology investment to ESG and talent initiatives. More efficient technology, processes, and planning enabled by these systems reduce waste and maximize output.

They also enhance agility, whether it is pivoting to a new product line or providing a temporary social good, like producing masks and ventilators for COVID-19.

- **65%** of respondents stated that **technology** plays a “significant” or “very significant” role in the organization’s ESG/Sustainability efforts.
- Manufacturing Execution System (**MES**) is the **#1 system** to address workforce challenges and meet sustainability/ESG goals.

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STAYING COMPETITIVE IN 2022 AND BEYOND



Sustainability and Environmental, Social, and (Corporate) Governance (ESG) policy is growing in importance across all industries. The public concerns around climate change, social justice, corporate responsibility – including increased regulations, emission reductions, and responsible governance – are increasingly driving more businesses to take action.

If taking care of your community and environment, your employees, and your business weren't reason enough, adopting sustainability/ESG policies is also good for business. Accenture points out in their sustainability and ESG research that "Between 2013 and 2020, companies with consistently **high ESG performance tended to score 2.6x higher on total shareholder return than medium ESG performers.**"¹

Analysts from Gartner, IDC, Blackrock, Boston Consulting Group, KPMG, and others emphasize the importance of sustainability/ESG for all companies in all industries. For manufacturing, sustainability and ESG initiatives can do many things. For the bottom line, they can save money and increase profitability. For the brand, they can increase goodwill and reputation. By digitizing the manufacturing environment through smart manufacturing software like manufacturing execution systems (MES), quality management systems (QMS), and/or supply chain planning (SCP) solutions companies can gain efficiencies, lower energy costs, streamline their supply chain, and lower or eliminate waste.

According to IDC, "Digital manufacturers benefited from a **26%** increase in their revenue performance index (RPI) and a **27%** increase in the profit performance index (PPI),

¹Measuring Sustainability, Accenture

²Millennials: The Purpose Generation, Korn Ferry

whereas nondigital manufacturers experienced decreases of **9%** in RPI and **2%** in PPI." Those are **35%** and **29%** differences between the performance of digital vs non-digital manufacturers. How much of a difference would a **29%** increase in profit performance make for you?

Going beyond the numbers, these practices are also good for the environment, which is good for the community hosting the business, and also good for attracting talent. Today's workers are looking for purpose. A recent study from the Society for Human Resource Management (SHRM) found that **94%** of next gen workers want to use their skills to benefit a cause.² Manufacturers that focus on sustainability and ESG initiatives find gains in efficiency, help the planet, and, as a result, are more attractive to the talent they are looking to recruit.

While the 2022 State of Smart Manufacturing report highlighted the acceleration of smart manufacturing adoption and the benefits gained from new technology that has made its way into the mainstream, this report aims to distill the findings gained from hundreds of manufacturers that have made clear that sustainability and ESG are integral to manufacturing success.

Incorporating these as formal policies is good for business and will empower your company to navigate into the next decade (and beyond) of change in manufacturing.

Anthony Murphy

Anthony Murphy, VP Product Management

Plex Systems, a Rockwell Automation Company

SECTION 1:

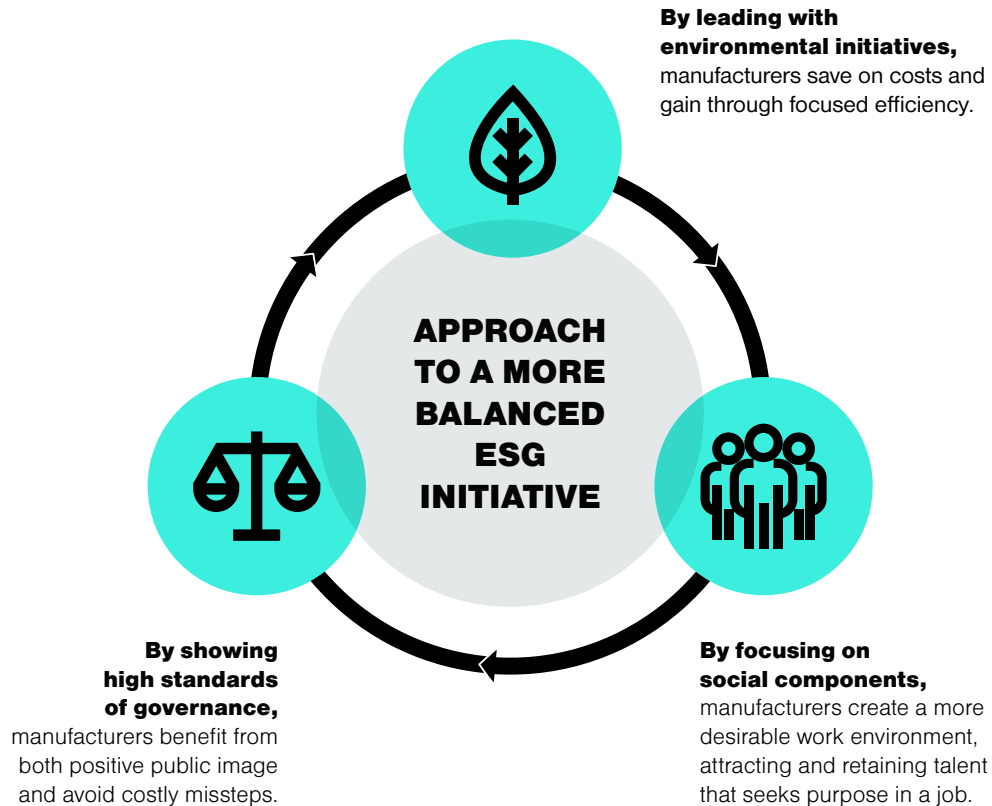
SUSTAINABLE MANUFACTURING AND ESG POLICY

Learn about sustainable manufacturing and how you
unknowingly may already be developing your ESG policy.



WHAT DOES ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) MEAN TO MANUFACTURING?

Environmental, social, and (corporate) governance (ESG) aligns with manufacturers' goals:



“Learn, improve and continue to make progress by seeking a balanced stakeholder approach to ESG and constantly iterating as you think of the longer-term ahead. Returns on these initiatives will create a more vibrant and dynamic organization, capable of finding and creating new customer value and outperforming the competition.”

—Gartner

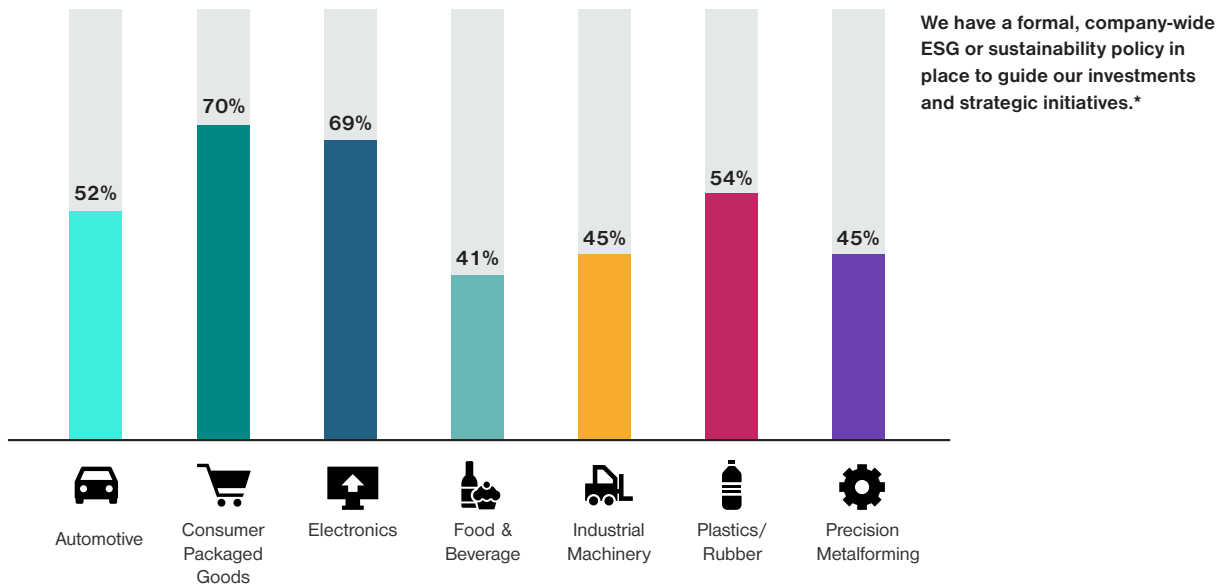
By Jasleen Kaur Sindhu , *Senior Director Advisory* at Gartner
and Uri Lerner, *Senior Research Specialist* at Gartner
[Gartner Blog Network](#)

ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) EFFORTS

This year's respondents overwhelmingly demonstrate the increasing focus on sustainability and ESG, motivated by the desire to show better stewardship, community leadership, and competitiveness.

Whether they are specifically calling it ESG or not, ESG components are critical to manufacturer success and most have a focus in one or more areas within ESG policy.

Q: Which of the following best describes your organization's current efforts around ESG/Sustainability?



“Most companies now recognize that ESG (Environmental, Social and Governance) metrics are linked to performance not just compliance.”

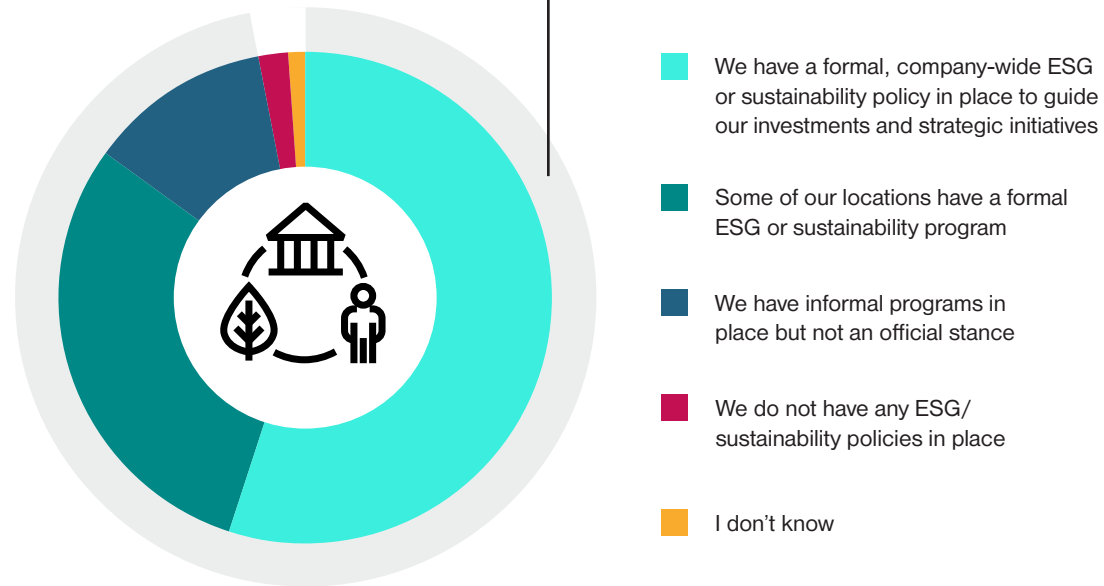
—Accenture

Measuring Sustainability

*May include philanthropy, recycling programs, energy management, supplier selection criteria and employee training programs.

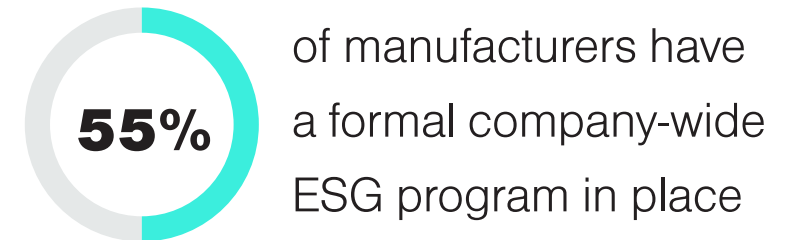
MANUFACTURERS AND ESG: 97% HAVE A POLICY IN PLACE

ESG policy within Manufacturing



When asked about ESG policy, the 321 global manufacturers in this survey responded in a big way – **97%** stated that they have a formal or informal policy in place.

For readers that may think this is extraordinary, think again about your own operations. Do you look for efficiencies in your operations? Are you creating less waste, using less water, recycling scrap, or doing anything else that contributes to developing a more productive and responsible business? If so, then you are already enacting pieces of sustainability and ESG policy.



SECTION 2:

WHAT ARE MANUFACTURERS SAYING ABOUT ESG?

While motivations vary, 97% of the respondents for this survey showed strong motivation to expand their sustainability and ESG approach. Learn more about the “why” in this section.



KEY MOTIVATIONS TO PURSUE ESG/SUSTAINABILITY

Across all industries, a desire to do good, to build community presence, and to address social inequalities ranked highest, while pressure from investors ranked lowest for motivation in pursuing ESG/sustainability policies.



Addressing social inequalities and fostering collaboration ranked highest for manufacturers

Motivation for pursuing ESG (all industries)



42%

To address social inequalities



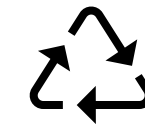
42%

Fosters a collaborative environment



41%

To build our presence in the community



41%

To address potential environmental issues



39%

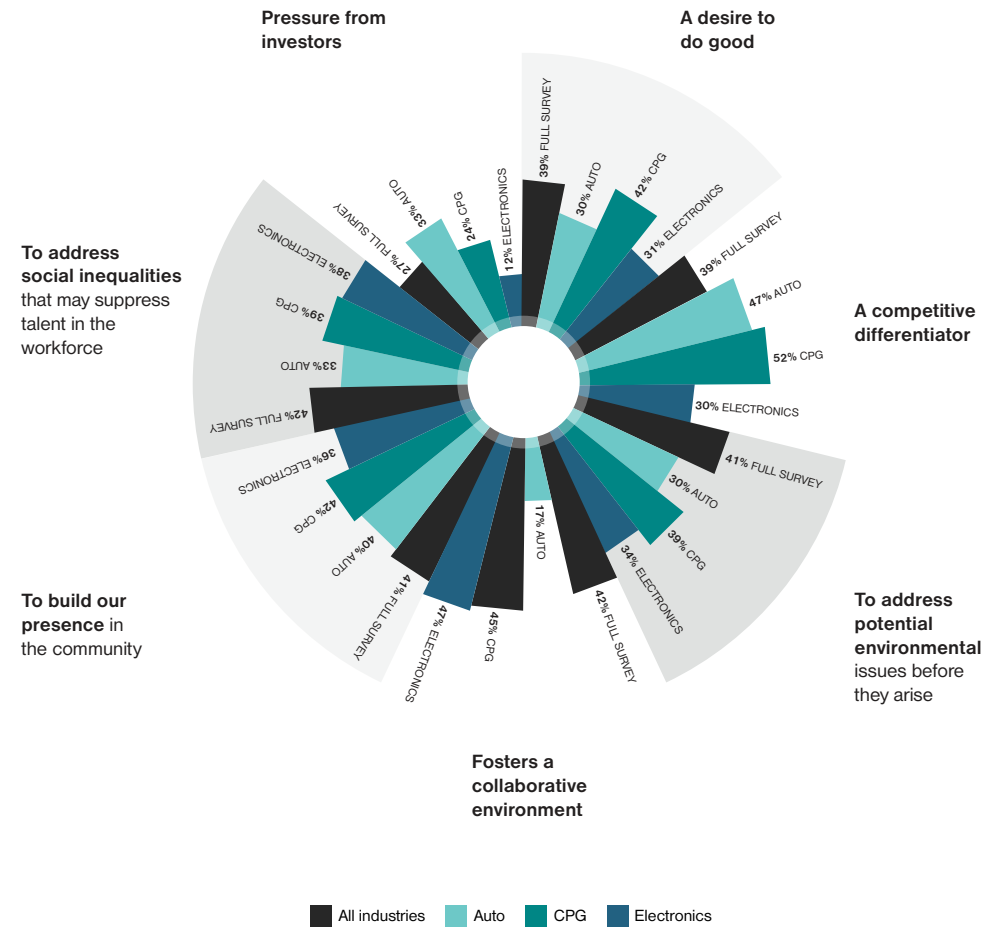
A competitive differentiator



39%

A desire to do good

What motivates manufacturers to pursue ESG/sustainability policies?



Q: Which of the following drives or motivates your organization to pursue ESG/sustainability?



EFFICIENCY HAS ALWAYS BEEN A TOP PRIORITY FOR MANUFACTURERS

Of the items included in manufacturer ESG programs, energy management, recycling, and commitment to “eco-friendly” processes ranked as the top three steps for action.

Manufacturers try to run as efficiently as possible because idle time keeps machines on unnecessarily when they’re not producing, which wastes energy and drives up costs.

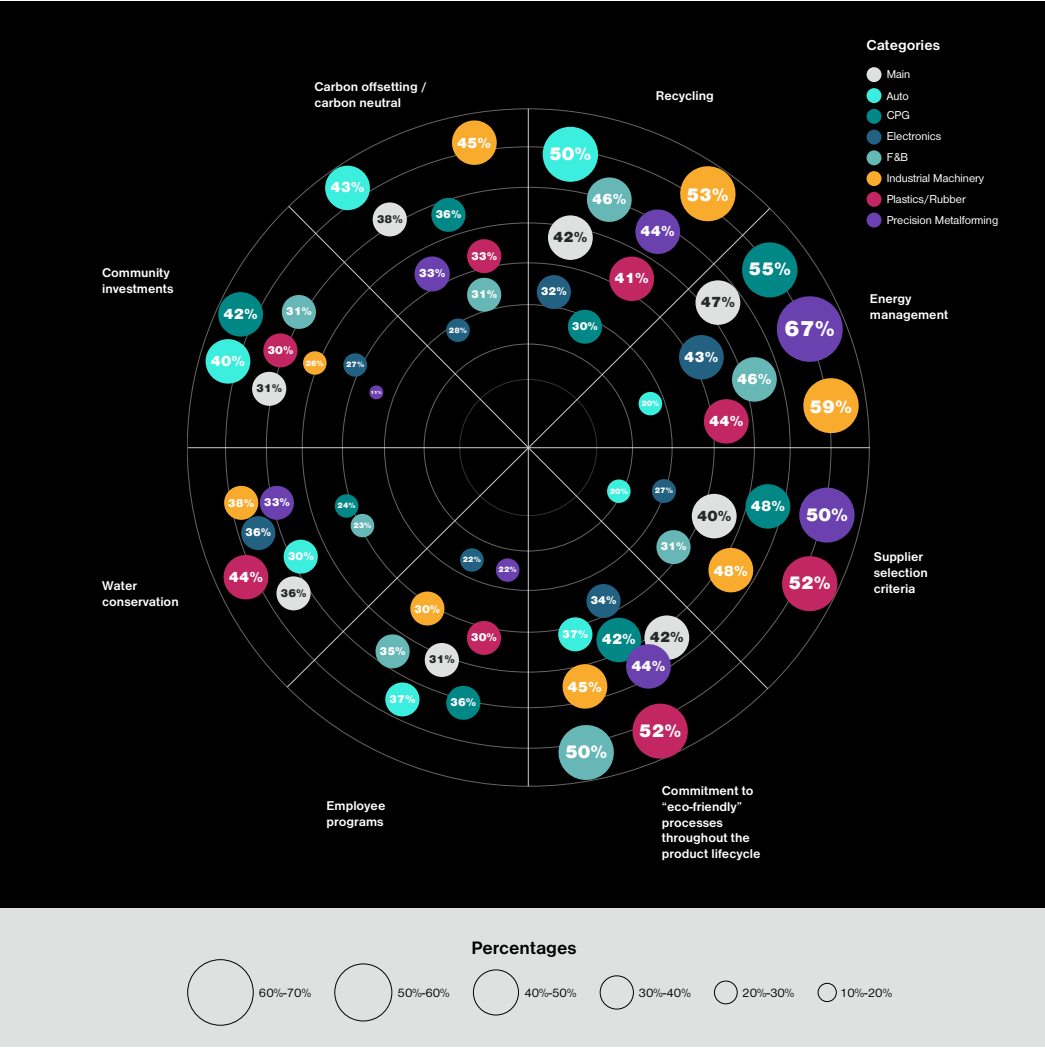
Recycling by reusing by-products and minimizing waste through tracking and traceability brings cost savings to the business. Waste that can’t be reused at one manufacturer can often go to another that can re-use it, including raw metal scrap, cardboard/packaging, and other materials.

The cost of compliance is often high from both an overall management and a brand perspective. These costs include time spent managing permits for wastewater run-off, handling of materials that may be deemed hazardous, and energy usage tracking. On top of this are the costs and time needed if you do have a compliance issue, which can include fines and reputational damage.

“Technology eliminates hundreds of thousands of pounds of paper waste. Using our own advanced automation technology, we reduced paper job packets for our engineered-to-order (ETO) products by **70%**.”

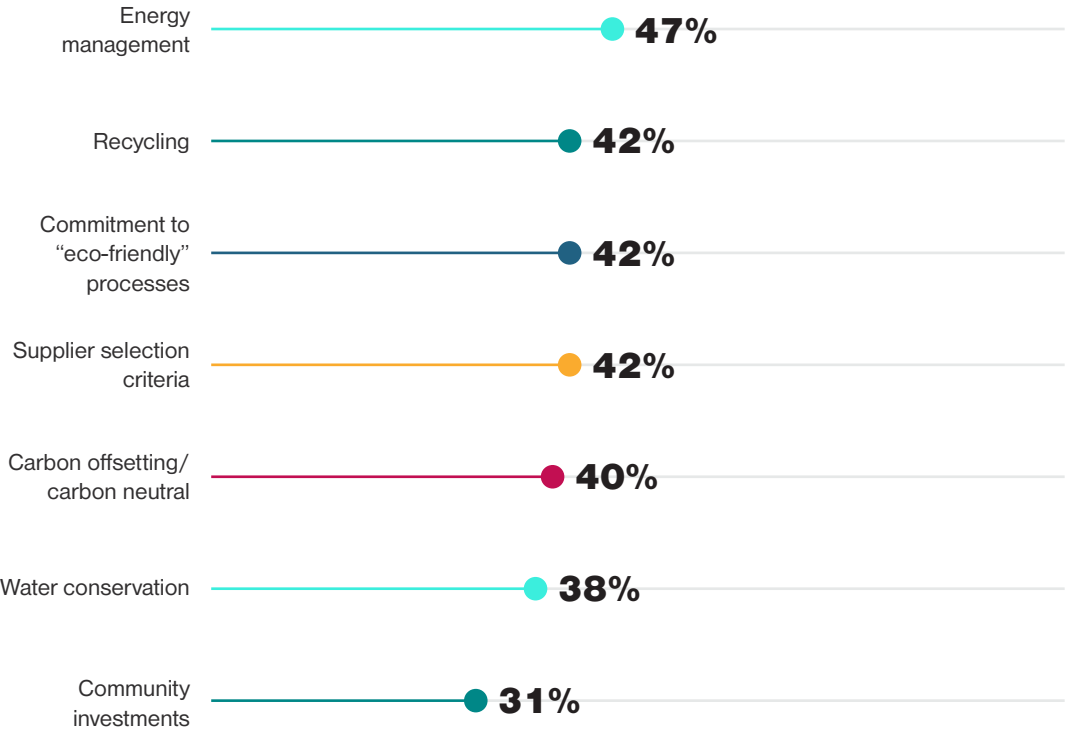
—2021 Sustainability Report, Rockwell Automation

ESG/Sustainability Program Inclusions by Industry



Q: Which of the following are included in your organization's ESG/sustainability program?

Top initiatives in manufacturing ESG sustainability programs (all industries)



SECTION 3:

GROWTH THROUGH ESG IN MANUFACTURING

While the sustainability and ESG conversation is often focused on doing good, that “good” is generally not understood as good for business. Learn about the gains and growth that modern sustainability and ESG programs can bring to your organization.



SMART MANUFACTURING ADOPTION EMPOWERS SUSTAINABILITY/ESG INITIATIVES

Smart manufacturing increases efficiency by making better use of resources and fostering a culture of purpose when you tie technology investment to ESG and talent initiatives.

Smart manufacturing initiatives can:



Reduce costs
through automation
and efficiency.



Increase brand
reputation as a
technology leader.



Decrease brand risk
with transparent
tracking and compliance.

“A MAPI and Deloitte study found smart factory initiatives led to **10-12%** gains in efficiency, utilization, and productivity for manufacturers. These added efficiencies and capabilities can also enhance company sustainability efforts. In addition to supporting business objectives, manufacturers expect sustainability efforts to further outcomes tied to environmental impact and safety.”

—Manufacturers Alliance

Intersecting Sustainability: ESG and Smart Manufacturing Trends

SYSTEMS THAT SUPPORT SUSTAINABILITY/ESG EFFORTS

When asked about systems for investment to support these sustainability/ESG efforts, respondents focused heavily on manufacturing execution systems (MES), quality management systems (QMS), and supply chain planning (SCP). By using these systems, companies can address many of their top sustainability/ESG efforts.

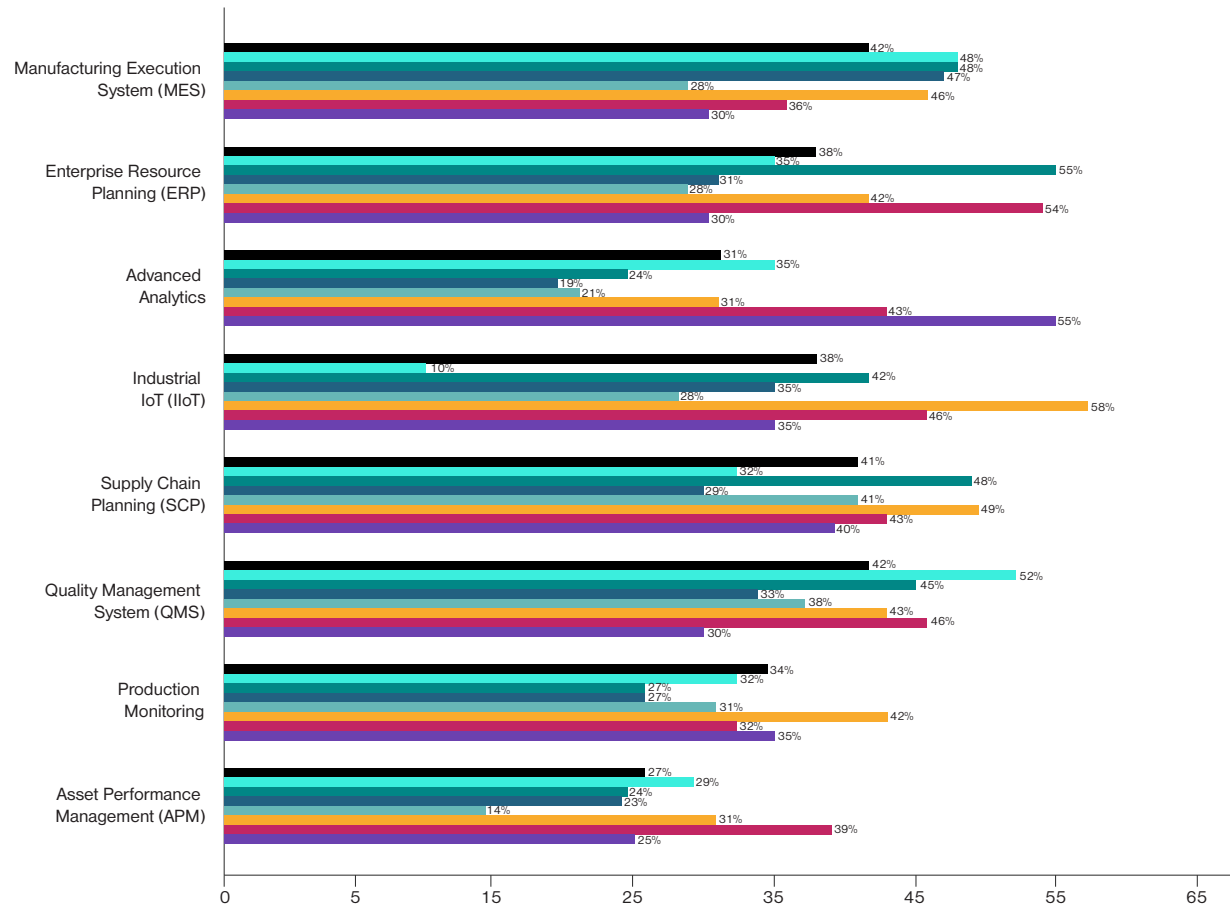
Industrial IoT and Asset Performance Management (APM) also ranked highly as they can connect your software and hardware ecosystem to better understand and control your production. This will become even more valuable as global regulators enact stricter governance around sustainability/ESG compliance.

More efficient technology, processes, and planning enabled by these systems reduce waste and maximize output. They also enhance agility, whether it is pivoting to a new product line or providing a temporary social good, like producing masks and ventilators for COVID-19. Efficiency, adaptability, and accountability are becoming core to stakeholder value.

“The fast-evolving ESG landscape may require close monitoring in 2022 for manufacturers. Many organizations are complying voluntarily within a complex network of reporting regulations, ratings, and disclosure frameworks. But regulators globally are also moving toward requiring disclosure for more nonfinancial metrics. Proactive approaches may help manufacturers stay ahead of the change and create competitive advantage.”

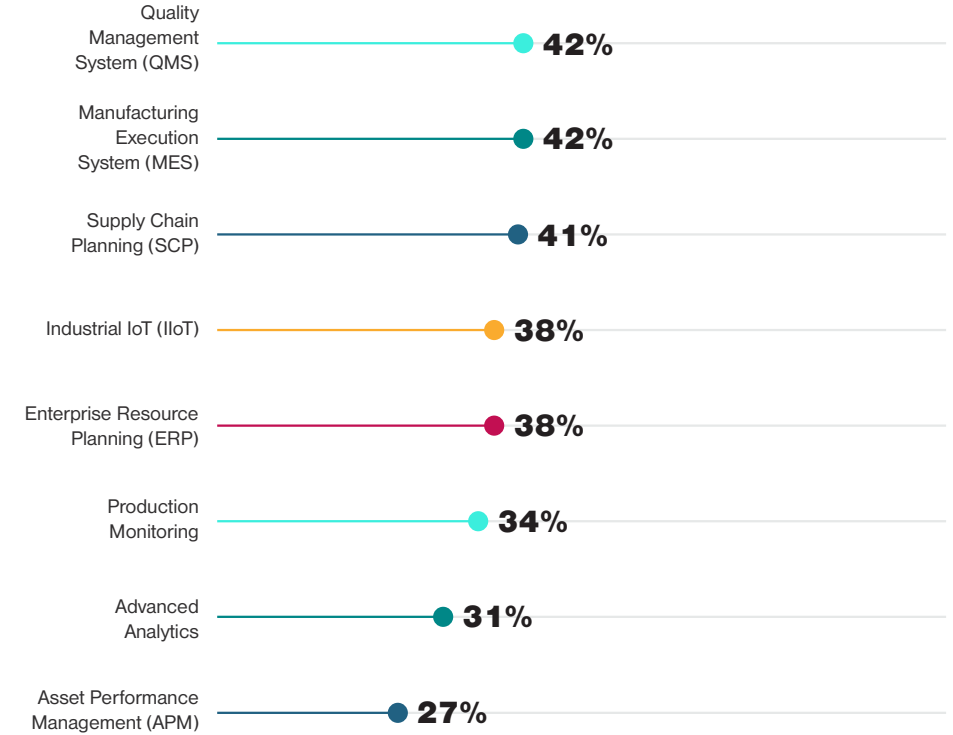
—2022 Manufacturing Industry Outlook, Deloitte US

Top Ranked Smart Manufacturing Software Systems to Support Sustainability/ESG Efforts



Q: What systems has your company invested / does your company plan to invest in that you feel directly support your organization's ESG/Sustainability efforts?

Top initiatives in manufacturing ESG sustainability programs (all industries)



OPTIMIZE YOUR PRODUCTION ENVIRONMENT AND IMPROVE YOUR SUSTAINABILITY AND ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) EFFORTS

Automation and other smart technologies can eliminate manual tasks and free up more workers' time for value-adding tasks that promote growth. They also attract next generation talent that is looking to learn and grow in a role with purpose, driven by leadership in environmental, social, and governance responsibility.



64% of organizations agree that technology can reduce hiring challenges and fuel growth in the next five years

System investments to address workforce challenges



42%

Manufacturing Execution
System (MES)



41%

Quality Management
System (QMS)



40%

Industrial
IoT (IIoT)



39%

Supply Chain
Planning (SCP)

“...this is also more than just an exercise in “doing the right thing.” In a recent article on *Business Fitness*, former Unilever CEO Niall FitzGerald once said that ESG is a vital part of any company strategy, “not because it is a nice thing to do or because people are forcing us to do it ... but because it’s good for business.”

—Responsibility And Opportunity:

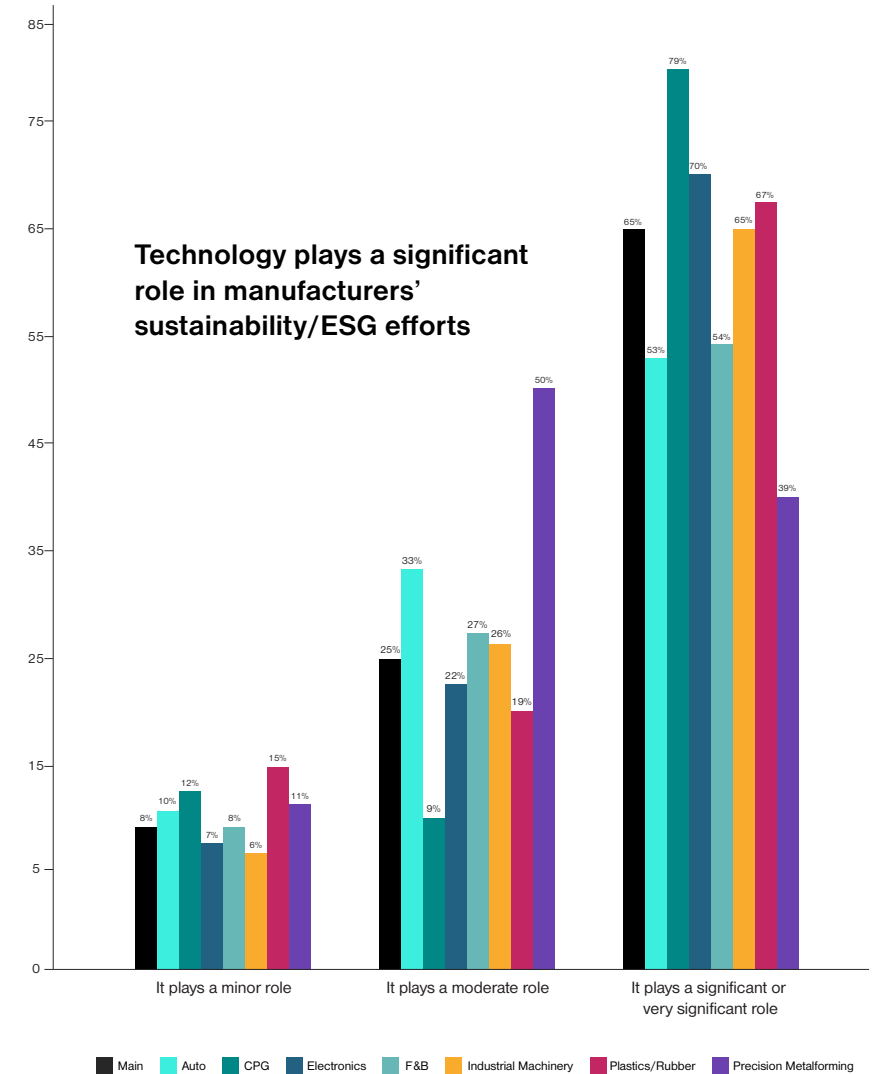
How Manufacturers Can Get Ahead Of The Game On ESG (forbes.com)

THE ROLE OF MANUFACTURING TECHNOLOGY IN SUSTAINABILITY/ESG EFFORTS

Automation and other smart technologies are proven to provide many benefits. When asked about the role technology plays in the organization's ESG/Sustainability efforts, 65% of the total respondents stated that it plays a "significant" or "very significant" role, ranking highest in consumer packaged goods, plastics/rubber, and industrial machinery.

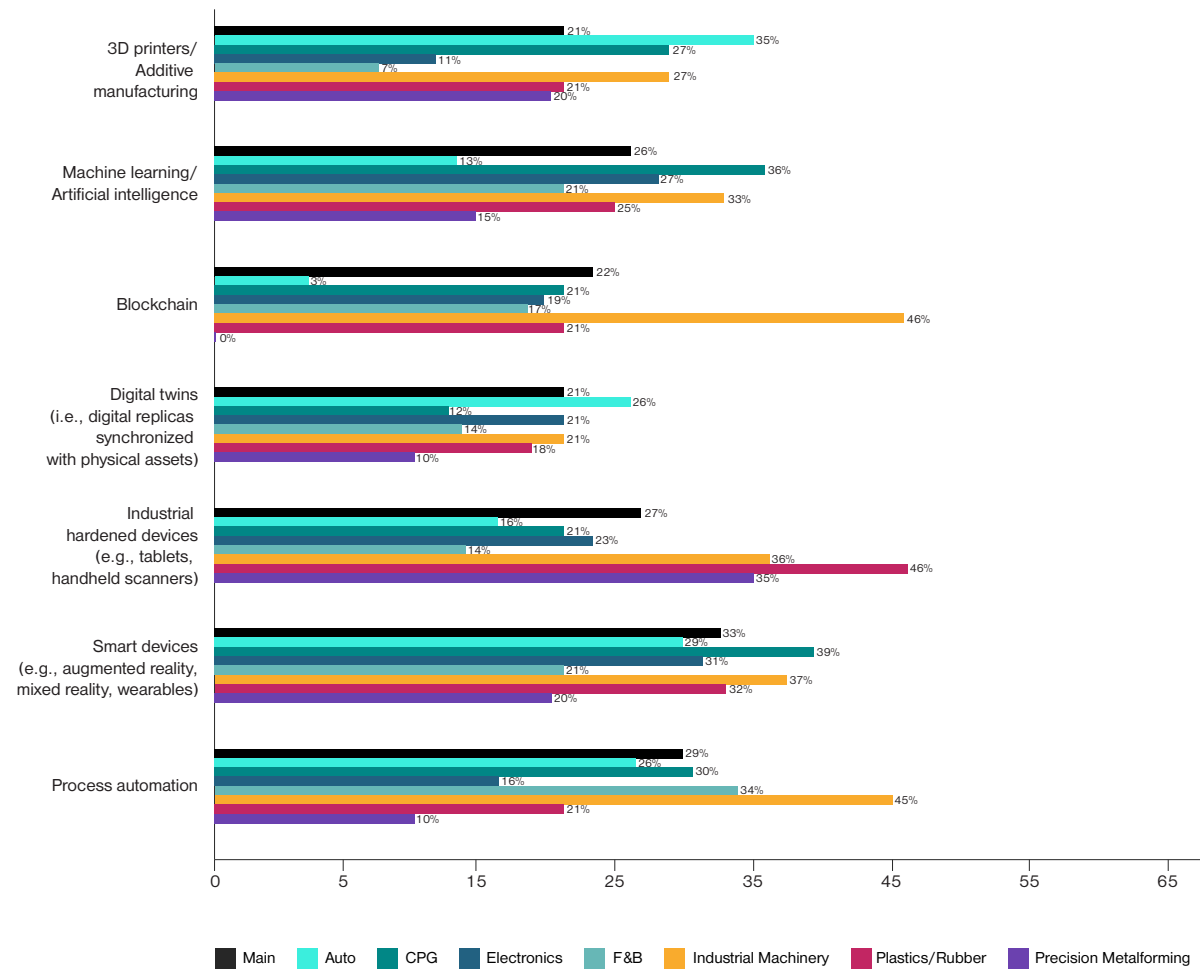
“To attract talent and appeal to workforce expectations, most manufacturers are making ESG efforts more visible.”

—2022 Manufacturing Industry Outlook, Deloitte US



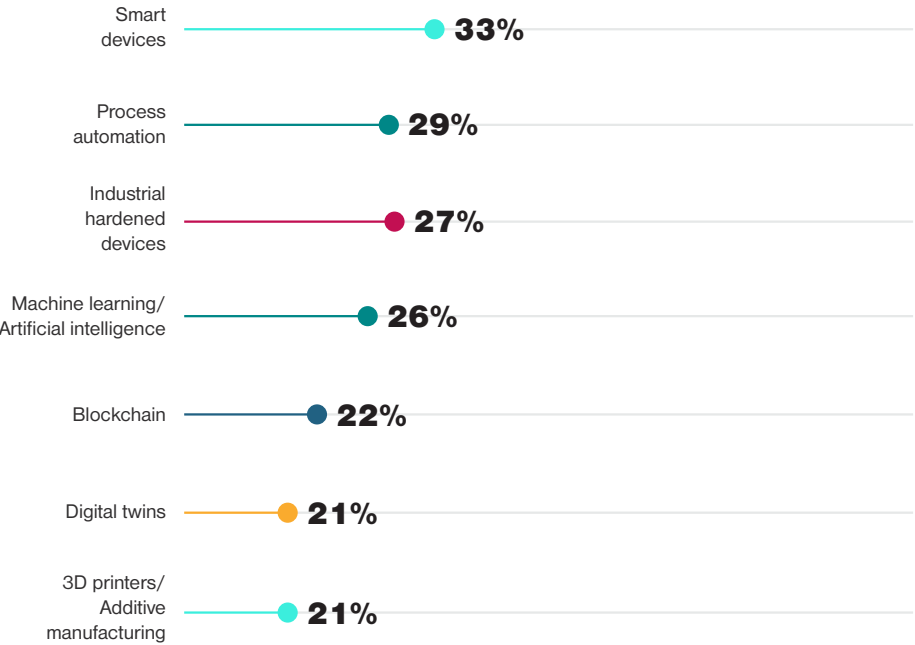
Q: What role does technology play in your organization's ESG/Sustainability efforts?

Technologies that directly support sustainability/ESG efforts in manufacturing



Q: What technologies has your company invested / does your company plan to invest in that you feel directly support your organization's ESG/Sustainability efforts?

Top initiatives in manufacturing ESG sustainability programs (all industries)



TAKING ACTION



Smart manufacturing empowers manufacturers' sustainability/ESG efforts and helps them adapt to a changing market, unlocking long-term opportunities by connecting and automating their business.

Use the information in this report to help your business — and your people — regardless of where you are in the technology adoption process.

FIVE STEPS TO ORGANIZATIONAL IMPROVEMENT THROUGH SMART MANUFACTURING ADOPTION TO MEET YOUR SUSTAINABILITY/ESG INITIATIVES



Identify key stakeholders and agree on your greatest need



Make the business case for investment



Research and select your solution(s)



Design and deploy the solution(s)



Manage change and drive adoption



STEP 1

IDENTIFY KEY STAKEHOLDERS TO CREATE A MEASURABLE PLAN WITH CLEAR EXPECTATIONS

Gather the people connected to this change – the leadership team and representatives throughout the company who will be charged with carrying out the sustainability/ESG plan. Diverse perspectives refine the approach and the solutions that can help the business achieve results.

KEY QUESTIONS TO ANSWER:

- ☒ Where are your information gaps?
- ☒ Have you assembled the key stakeholders?
- ☒ What are the operational challenges you're trying to solve?

**STEP 2****MAKE THE BUSINESS CASE WITH CONSIDERATION OF INTERNAL/EXTERNAL STAKEHOLDERS**

Develop your business case. Include key areas of sustainability/ESG that your company wants to achieve, how you will achieve them, and what impact it will have. Potential areas to address include increased quality and efficiency to eliminate waste and lessen environmental impact, better tracking and traceability to ensure adherence to regulations, and a responsible approach to supply chain management with ethically sourced materials.

KEY QUESTIONS TO ANSWER:

- ☒ What does success look like?
- ☒ What risks should be considered and mitigated?
- ☒ Which use cases offer the right balance of value creation and time-to-value?

**STEP 3****RESEARCH AND SELECT SOLUTION(S) THAT DRIVE DESIRED OUTCOMES**

Do the work. There are many solutions available that can meet your sustainability/ESG goals. It is important to do your research and align your brand and values with your selection. Narrow your potential solutions and review them with the key stakeholders.

KEY QUESTIONS TO ANSWER:

- ☒ Will the solution provide the desired efficiency?
- ☒ Will it be able to support you in the future?
- ☒ Does the solution meet your requirements and business objectives?

**STEP 4****DESIGN AND DEPLOY THE SOLUTION(S)**

Select an implementation partner and create the map that you will follow for a successful process. Record your goals and identify KPIs to track for measuring sustainability/ESG success. Once created and agreed on by your key stakeholders, begin deployment.

KEY QUESTIONS TO ANSWER:

- ☒ Does the design fit your needs?
- ☒ Is there a timeline and achievable ROI?
- ☒ Have the key stakeholders reviewed and agreed on the plan?

**STEP 5****MANAGE CHANGE AND DRIVE ADOPTION**

To effectively integrate a formal sustainability/ESG program powered by smart manufacturing, you will need sponsorship, messaging, and accountability. Establish sustainability/ESG governance and reassess progress quarterly to adapt as needed.

KEY QUESTIONS TO ANSWER:

- ☒ Who will be your adoption champion(s)?
- ☒ What is your adoption communication/messaging plan?
- ☒ How will you adapt your culture through change management?

CONCLUSION

To achieve positive, enduring change, be thoughtful about your approach. Set and track goals for continuous improvement and decide how you will best measure adoption success early in the process. Each organization is different, and the points laid out here will help to ask the right questions in pursuit of answers that will guide your mission.

ABOUT PLEX

Plex Systems, a Rockwell Automation Company, is the leader in cloud-delivered smart manufacturing solutions and has been helping manufacturers improve their businesses for decades. Plex has resources and deep industry expertise in defining business value from technology, and we're ready to assist manufacturers in adopting smart manufacturing technology and processes to achieve their business goals.

Learn how to achieve your business goals using smart manufacturing at Plex.com

TEN STEPS TO SUSTAINABILITY/ESG-FOCUSED TECHNOLOGY ADOPTION [CHECKLIST]

Check: Steps:	Notes:
Identify the leadership team and representatives throughout the company who will be charged with carrying out the sustainability/ESG plan and smart manufacturing adoption	
Gather these key stakeholders and create a measurable plan with clear expectations	
Make the business case for investment by aligning sustainability/ESG initiatives with technology, strategy, and metrics/KPIs	
Create a sustainability/ESG policy and a communications plan that will sustain the vision for future desired outcomes	
Research and select technology solution(s) that fit your sustainability/ESG plan	
Assess your current capabilities, risks, and opportunities; benchmark yourself again your competitors to understand how your sustainability/ESG focus will differentiate your business	
Design and deploy the technology solution(s) that will empower your sustainability/ESG initiatives	
Prioritize changes that address your initiatives and the problem(s) you want to solve; assess ROI and eliminate the most risk	
Establish and implement an organizational change management program and drive sustainability/ESG policy through technology adoption	
Assign sustainability/ESG sponsorship, create your message, and build a framework for accountability. Dedicate a sustainability/ESG champion to reiterate awareness from everyone	

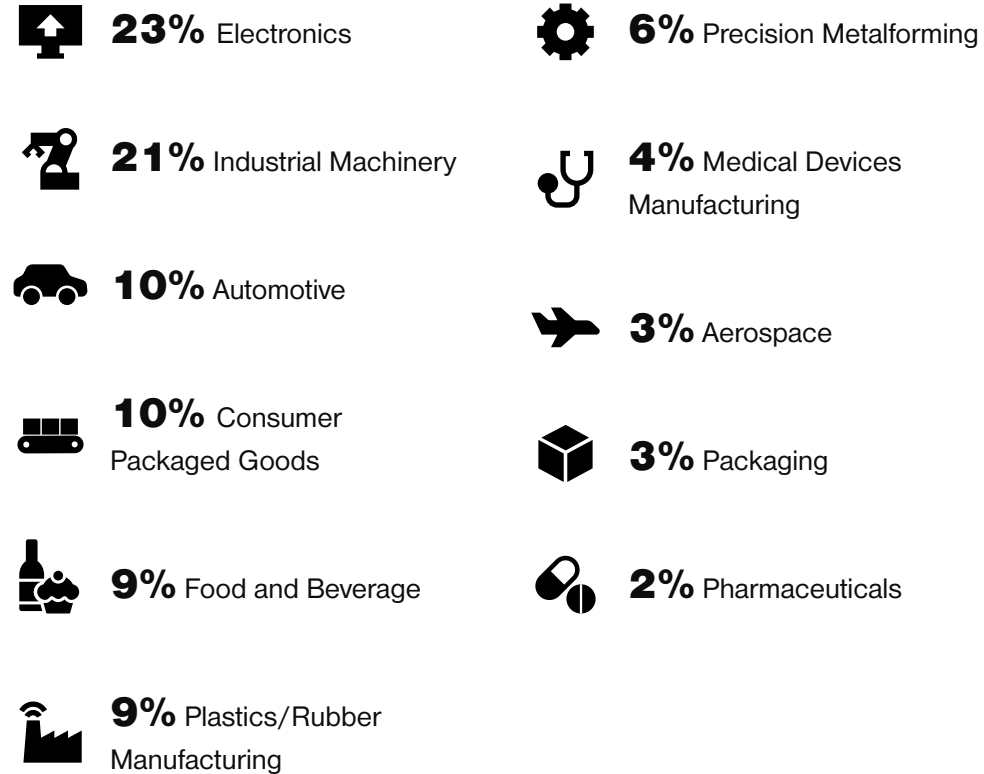
SURVEY DEMOGRAPHICS AND FIRMOGRAPHICS



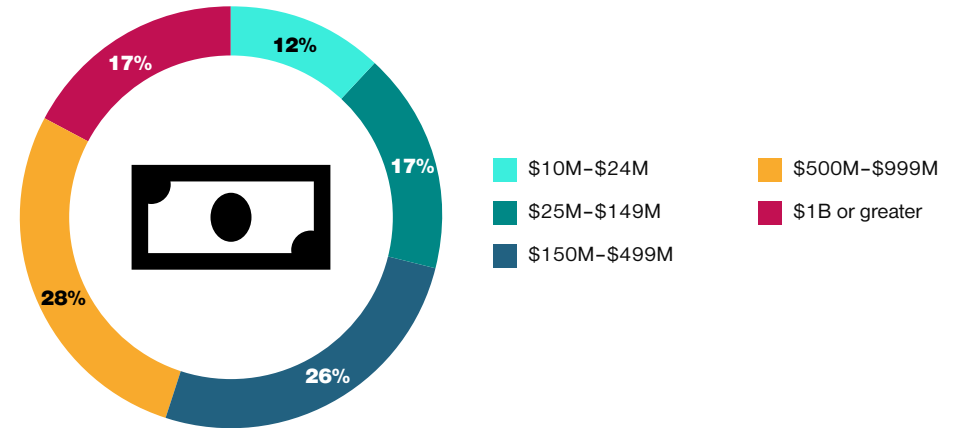
SURVEY DEMOGRAPHICS AND FIRMOGRAPHICS

All survey data collected in October 2021

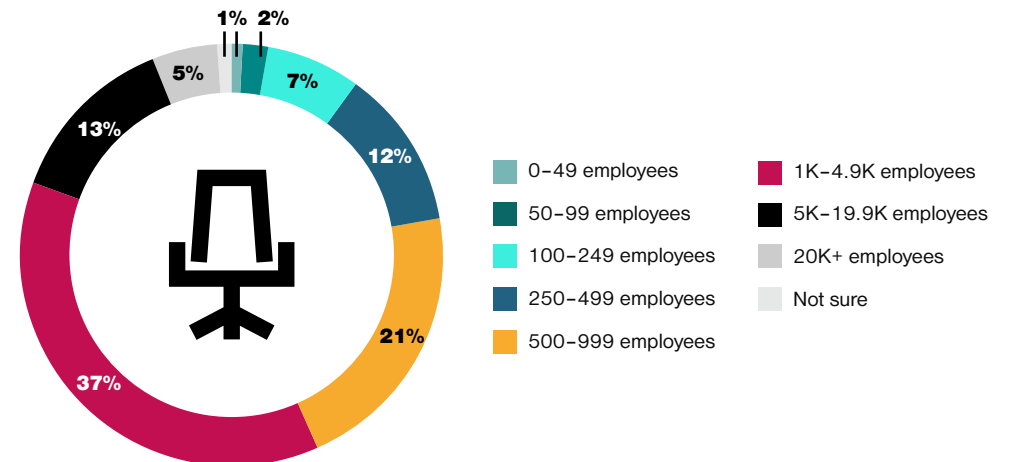
Industry

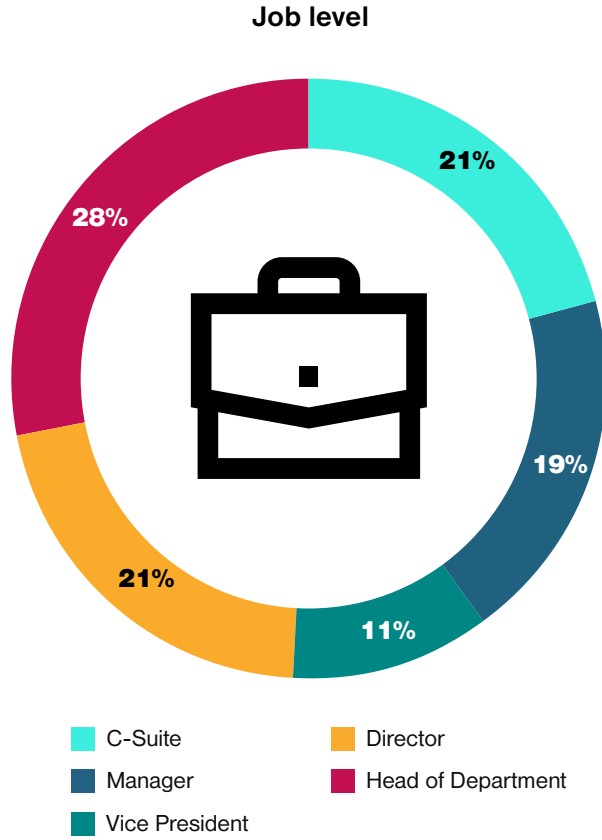
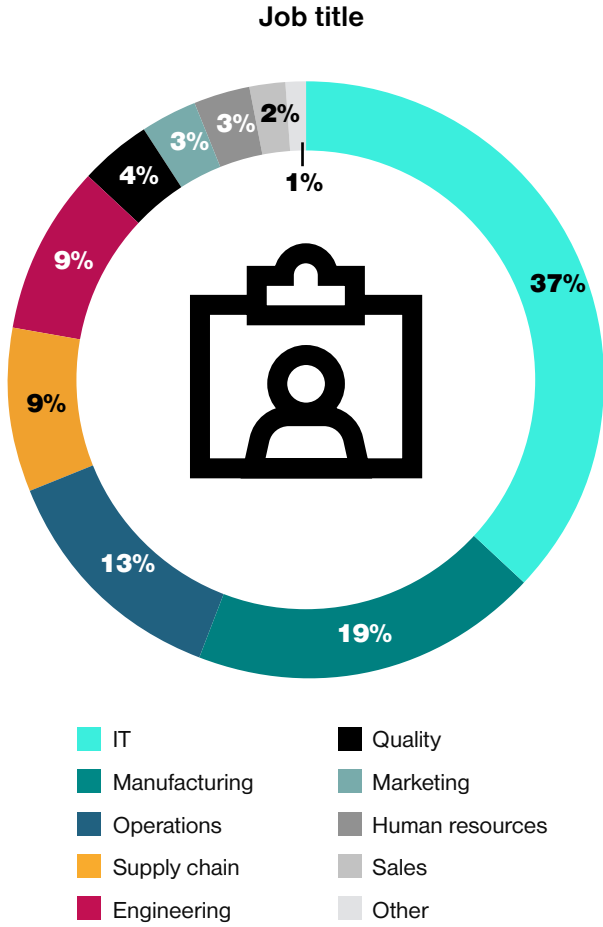


Organization's annual revenue

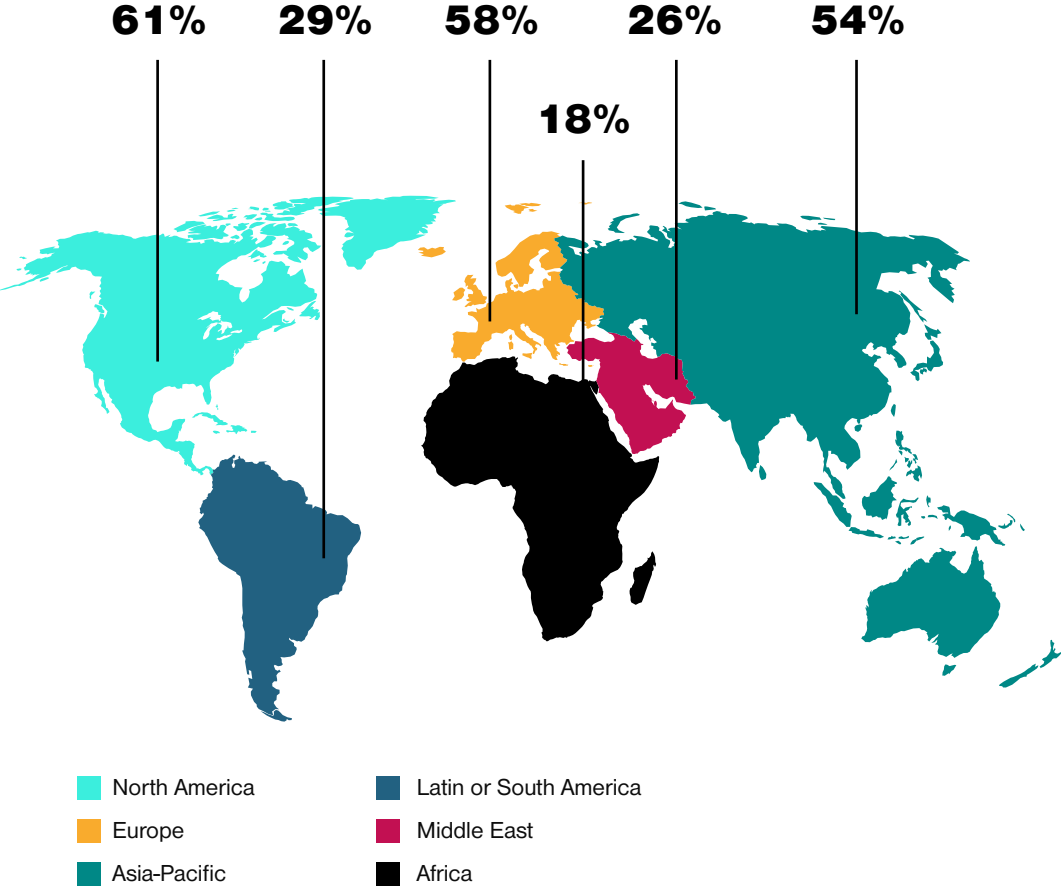


Organization size





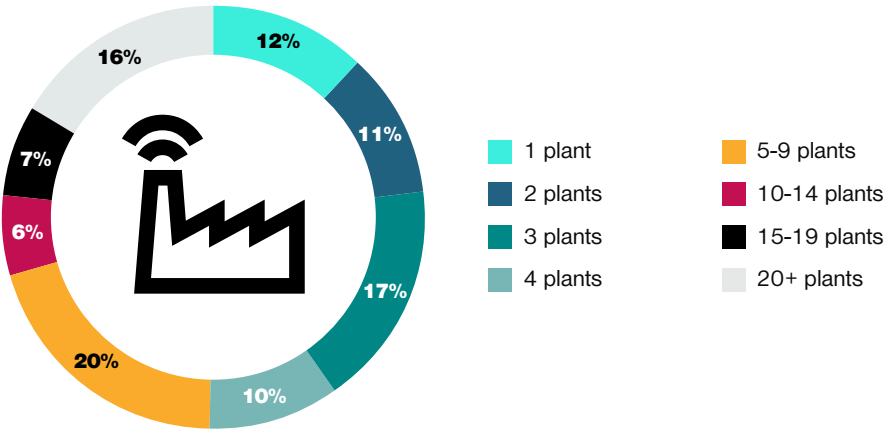
International regions served



Organizational reach



Number of plants





**Rockwell
Automation**

PLEX

