

5TH ANNUAL
STATE OF
MANUFACTURING
TECHNOLOGY
REPORT

The Right Processes,
People, and Technologies
Deliver the Agility
Manufacturers Need →



EXECUTIVE SUMMARY

In a recent global survey of approximately 200 manufacturers, participants revealed a desire to realize the alluring promise of smart manufacturing. Their success hinges on three factors: their ability to identify what will improve the business and articulate the desired outcomes, select transformative technology to optimize company processes, and implement that technology to fully realize the anticipated value. This study from Plex Systems, developed with the support of LNS Research, explores common manufacturing challenges alongside evolving technology solutions, with an eye toward creating a blueprint that helps companies successfully navigate and achieve business transformation.

Today's manufacturers are operating under enormous pressures.

At any given time, manufacturers contend with an evolving global economy, emerging competition, internal operating pressures, skilled workforce shortage, and the need to continually improve business processes.

Coupled with the coronavirus (COVID-19) pandemic, which as of this report's writing continues to impact the world daily, manufacturers are dealing with new unknowns and complexities in real-time to remain prosperous. The long-term impact of this global pandemic on the supply chain and the broader manufacturing and global economy is unfolding before our eyes.

All of these pressures are compelling manufacturers to re-evaluate their businesses, processes, supply chain, and technology solutions to ensure their survival. Thanks to the promise of Industry 4.0, technology is emerging as the key to not only survive, but also to achieve long-term success.

This *Fifth Annual State of Manufacturing Technology Report* illuminates that path. By compiling the perspectives, beliefs, and predictions of approximately 200 manufacturers, this report will help you benchmark your technology usage and uncover best practices to help your organization stay competitive and thrive.

Here's what you'll learn, based on the experiences, plans, and perceptions of the manufacturers we surveyed:

- Common challenges manufacturers face and how they impact growth plans
- How manufacturers are relying upon technology to achieve future success
- Manufacturing technology options available today, and how they fit into a business transformation strategy
- What defines successful smart manufacturing.
- What stops most technology projects in their tracks, and how to avoid the pitfalls that often lead to pilot purgatory

When combined, these findings deliver a blueprint to companies and leaders preparing to join the smart manufacturing movement.

About State of Manufacturing Technology Survey Respondents

The research in this report is derived from survey data collected in December 2019 by LNS Research. Responses came from approximately 200 executives, business leaders, and professionals in IT, operations, and engineering across a broad range of company sizes and geographies. The research focuses on manufacturers in the following industries:

- Automotive
- Aerospace & Defense
- Consumer Goods (Packaged and Durable)
- Food & Beverage
- Industrial Equipment

The survey data primarily represents companies across North America and Europe. More than half of respondents were located in North America, and the survey was conducted in English. Additional information on respondents can be found in the appendix of this report.

TABLE OF CONTENTS

- Section 1: The State of the Manufacturing Industry..... 5**
 - Strong Growth in 2019 Now Challenged 6
 - Achieving 2020 Financial Objectives..... 7
 - Measurement Informs Management 10
- Section 2: Manufacturing Growth Relies on Technology 11**
 - Future Tech Investments to Focus on Operational Improvements..... 12
- Section 3: Dissecting Successful Business Transformation Efforts 14**
 - Understanding Smart Manufacturing..... 15
 - Part 1: Technology’s Role in Successful Transformation Efforts 16
 - Part 2: Empower Your People to Achieve Business Transformation 24
- Key Takeaways..... 29**
- Appendix 31**



SECTION 1:

UNDERSTANDING MANUFACTURING INDUSTRY TRENDS, CHALLENGES, AND CONCERNS

MANUFACTURERS SEE STRONG GROWTH IN 2019 BUT FACE CHALLENGES IN THE YEAR AHEAD

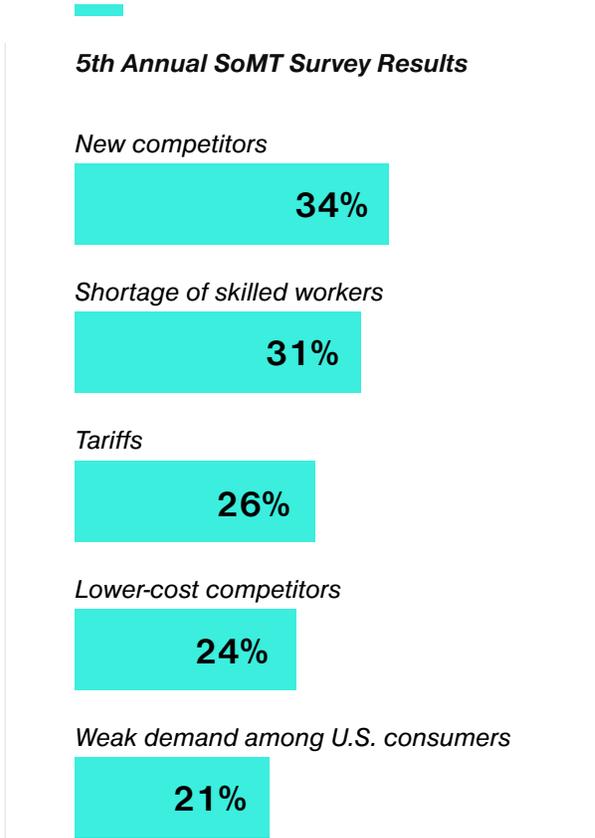
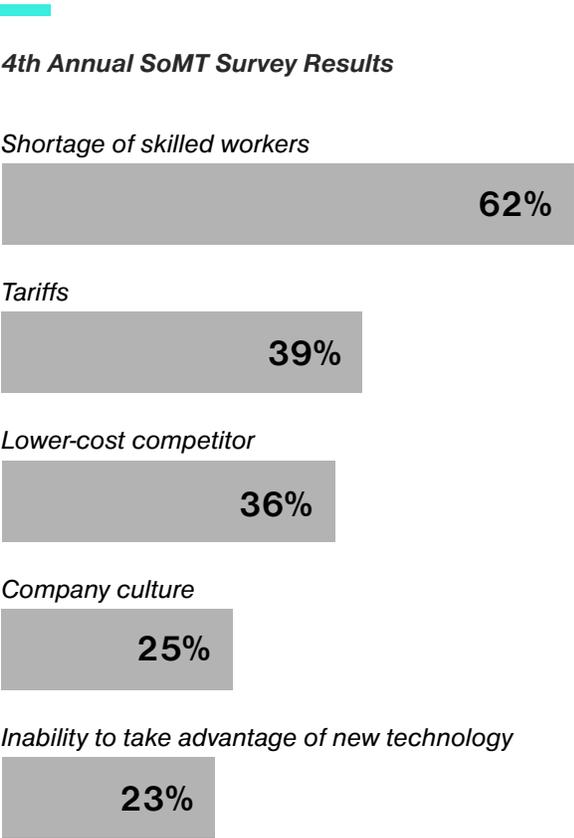
To understand the state of manufacturing technology in 2020, we must start by understanding the state of the manufacturing industry itself. Heading into 2020, 92% of surveyed manufacturers grew or were at least flat in 2019.

This momentum made many manufacturers optimistic about their future, with most planning for ongoing growth this year. However, in January 2020, the novel coronavirus (COVID-19) emerged in China and, in the few months since, has threatened the health of thousands of people all around the world. It has caused

sweeping economic and manufacturing disruptions across Asia, Europe, and North America so far. Now a global pandemic, this virus’s long-term effects will continue to unfold in the months and years ahead.

The virus has challenged the most efficient and effective manufacturers in the world and has exacerbated and exposed existing issues. When we asked manufacturers in 2019 what they see as the biggest obstacles to growth in 2020, they answered in the following order: new competitors, shortage of skilled workers, tariffs, and lower-cost competitors.

Biggest obstacles to growth



For the first time in this report's history, "new competitors" emerged as number one on the list of manufacturers' obstacles to growth. Manufacturers are concerned about the competition—either new or lower-cost, foreign or domestic, large or small—because they believe they're being outpaced in the following key areas:



With the emergence of COVID-19, it's possible that these "new competitors" will become even more formidable due to a combination of financial resources becoming available through economic stimulus packages offering low interest rates and grants and startups' characteristic agility to adapt quickly to changing market needs.

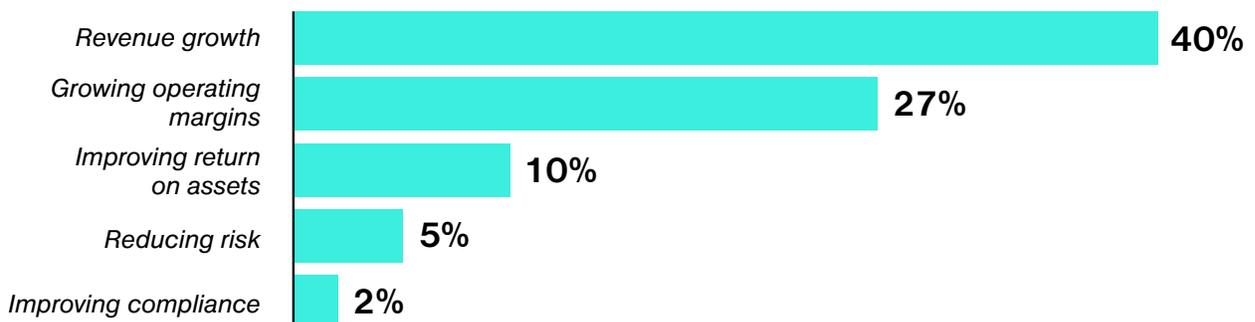
We should also expect that COVID-19 has likely changed the priority of the above concerns for the rest of 2020—and the data to support this re-prioritization. When this survey was conducted, only 16% of respondents mentioned supply chain disruption as an obstacle to growth. However, according to a survey conducted by the National Association of Manufacturers from Feb. 28–March 9, 2020, 35.5% of its member companies were already facing supply chain disruptions at a time when the coronavirus was just starting its rapid spread through Europe and the U.S.

Overall, with unprecedented challenges already facing manufacturers in 2020, these obstacles to growth and the need to address them will likely become even more urgent.

ACHIEVING 2020 FINANCIAL OBJECTIVES REFLECT OPERATIONAL IMPROVEMENTS

When we asked manufacturers in late 2019 how they were expecting to achieve their financial goals this year, financial priorities varied among respondents.

“What is your top financial goal?”



It may be surprising to see that reducing risk was rated as a top financial goal by only 5% of respondents. However, another study of 210 manufacturers conducted on Plex's behalf by data and research consulting firm Noise Doctors during the same time period confirms this finding.

The Noise Doctors study also showed that reducing financial risks is a much higher priority for companies with more than \$3 billion in revenue. It's possible that risk reduction and compliance improvement ranked low on the list of priorities because compliance and risk are often industry- and customer-led, making them a manufacturing standard and not a source of competitive advantage.

Similar to how obstacles to growth are evolving due to the spread of COVID-19, it's likely the virus has influenced the priority

of "reducing risk" for most manufacturers who are trying to maintain business continuity while meeting federal and state recommendations to practice social distancing.

An article in MarketWatch published on March 21, 2020, notes that the manufacturing sector may be more likely to delay layoffs due to their reticence to lose their skilled workers: "In construction and manufacturing, you can't just hire someone with no experience," said Rubeela Farooqi, chief U.S. economist at High Frequency Economics, a New York-based economic research company, "especially if they expect a rebound." Employers "will be hesitant to lay off workers" to cut costs, Farooqi said. They will instead be betting on people taking preventative measures in an effort to stop the spread of COVID-19, the disease caused by the virus SARS-CoV-2."



Compliance is a fundamental requirement [in risk management], but achieving it is not a differentiated strategy. Suppliers looking to improve recurring revenue and bottom line performance should take the proper approach to quality and shift perspective from conformance to performance, from cost-prevention to designed-in quality.

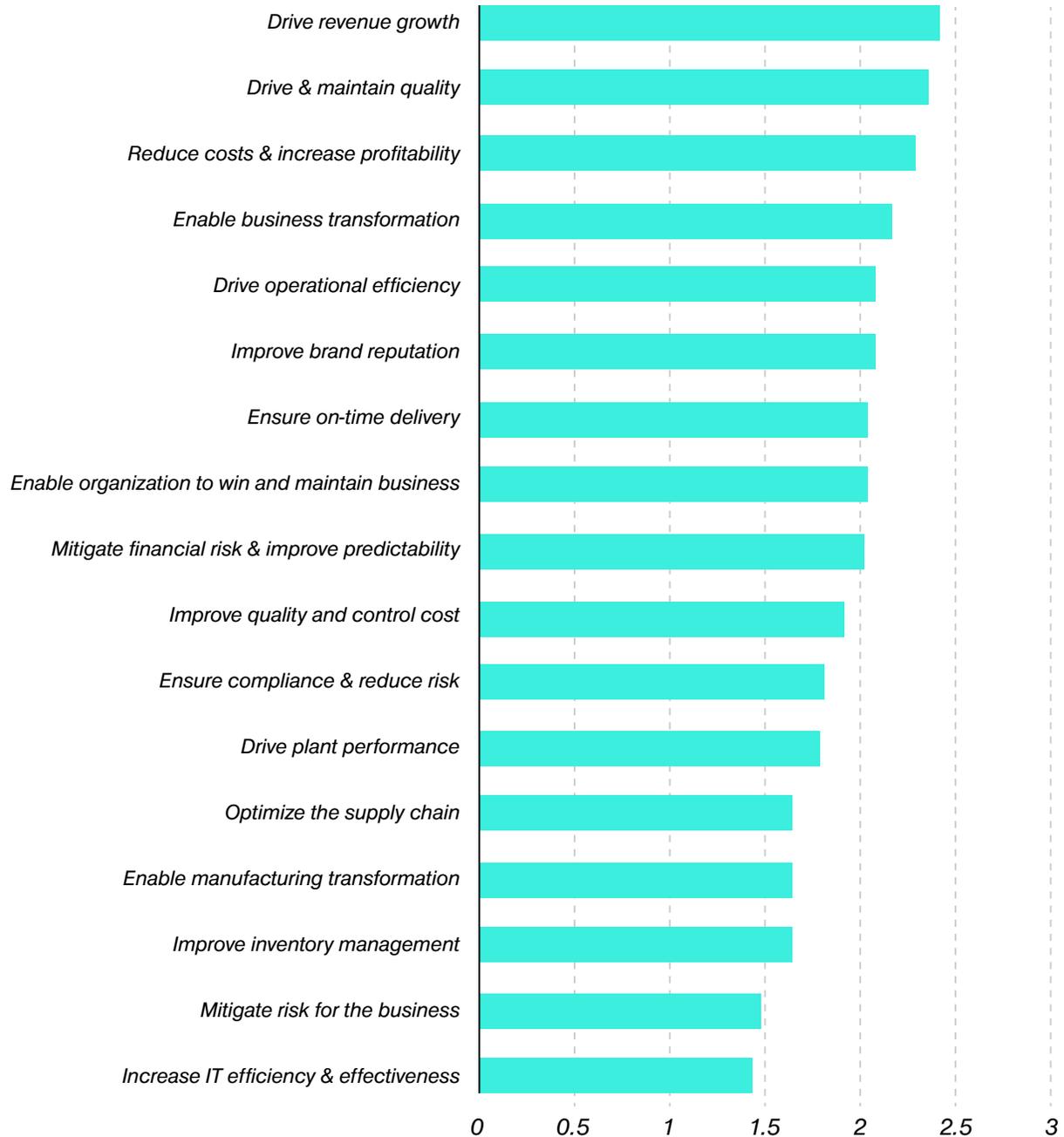
- LNS RESEARCH





Top business priorities include: drive revenue growth, drive & maintain quality, and reduce costs & increase profitability.

Business priorities

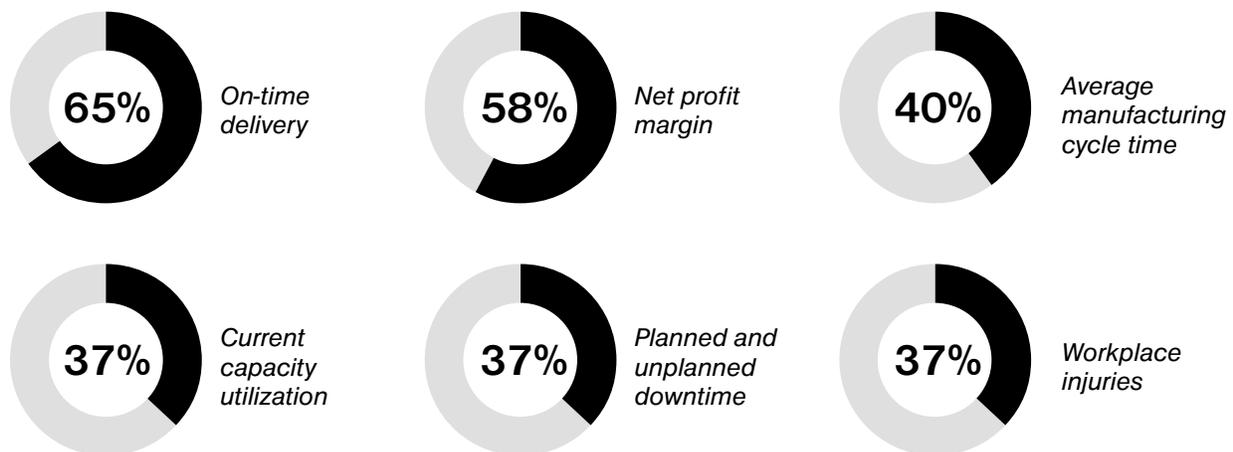


MEASUREMENT INFORMS MANAGEMENT

For all manufacturers—especially the 27% focused on growing their operating margins—it’s essential to have a clear line of sight into how the business is performing. This visibility stems from the ability to capture and extract insights from the data and metrics that most influence the health of the business. Understanding the types of data that a company can or can’t access will ultimately drive technology purchasing decisions. For instance, if a company has no way to properly measure and manage current inventory but knows, based on its financial data, that a disproportionate level of cash is tied up in raw materials, this insight may drive investment plans to align future inventory purchases with sales projections.

When asked which metrics their companies track, respondents indicated both financial and operations performance metrics (respondents could choose more than one option).

“Which metrics does your company track?”



Based on these named metrics, companies highly value operational efficiency and effectiveness as essential to evaluating the overall health of the business. Indeed, operational efficiency and effectiveness helps companies achieve their top three financial goals: revenue growth, operating margin growth and return on assets. Consequently, operational improvements will remain a center of focus when companies consider how best to use technology in the future.

It’s also important to remember that the insight and analysis provided by technology is intended to help people within the organization make better business decisions. Data-driven insights into plant operations from data’s ability to identify, for example, why overall equipment effectiveness (OEE) is below target may enable plant managers to take impactful actions that address manufacturing capacity—such as enhancing maintenance program effectiveness. The combination of leaders, processes, and technology can significantly expand upon the value delivered by technology alone.



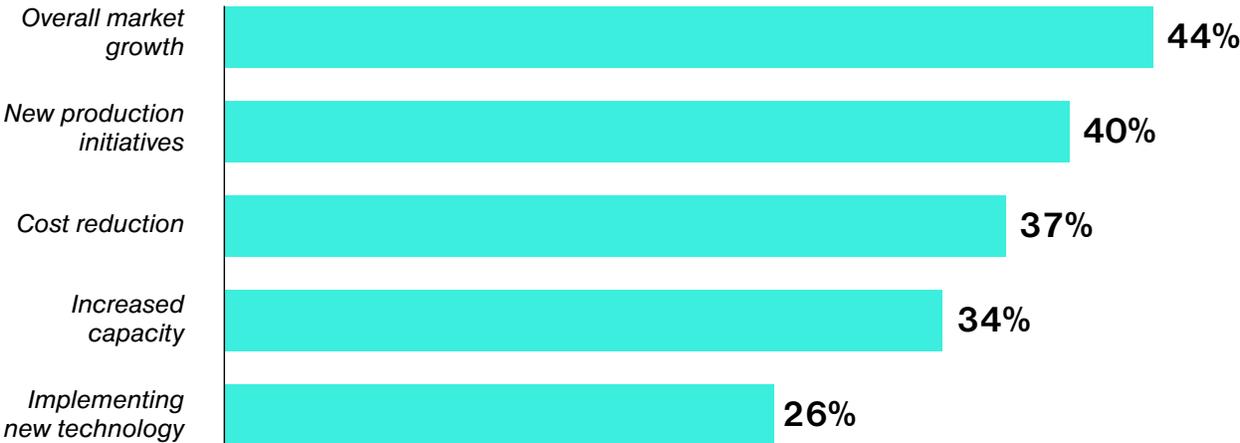
SECTION 2:

MANUFACTURING GROWTH RELIES ON TECHNOLOGY

FUTURE TECH INVESTMENTS TO FOCUS ON OPERATIONAL IMPROVEMENTS

Manufacturers are facing the daunting challenge of improving their operating margins and squeezing profitability from their existing assets while also achieving their revenue growth goals, all while responding to a global pandemic and rapidly evolving economy.

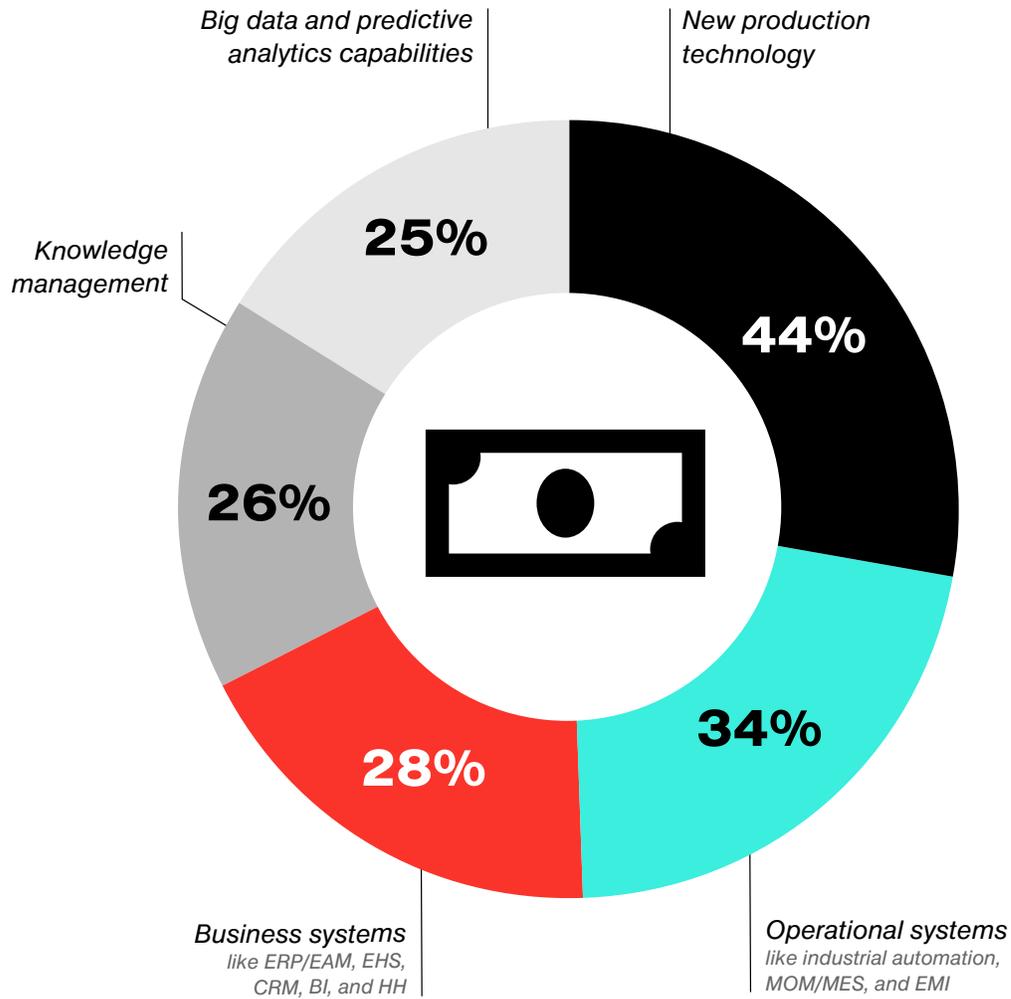
“What are the keys to fueling growth within your organization?”



With just over a quarter of survey respondents identifying the implementation of new technology as a driver of future growth, why does this section of the report focus so heavily on the impact of technology?

The reality is that technology now plays an enabling role in nearly every aspect of business enhancement. In fact, when asked to elaborate, respondents frequently indicated that the growth-driving initiatives listed above were driven by technology. In fact, most manufacturers plan to invest in technology in some way during the upcoming 12-18 months, with only 7% of respondents reporting they do not have plans to invest in technology.

“Where are you focusing your plans for technology investments?”



Glossary of Acronyms

MOM/MES: Manufacturing Operations Management/Manufacturing Execution System

EMI: Enterprise Manufacturing Intelligence

ERP: Enterprise Resource Planning

EAM: Enterprise Asset Management

EHS: Environmental, Health, and Safety Management

CRM: Customer Relationship Management

BI: Business Intelligence

HR: Human Resources



SECTION 3:

DISSECTING SUCCESSFUL TRANSFORMATION EFFORTS

UNDERSTANDING SMART MANUFACTURING

Manufacturers are clearly shifting toward digitization—the adoption of technology that connects people, systems, machines, and supply chains and also automates business processes. With manufacturers focused on driving meaningful growth while achieving their financial objectives, the need to embrace smart manufacturing technology is becoming increasingly critical to achieving those goals. Smart Manufacturing, which is also referred to as Industry 4.0, encompasses the convergence of physical and digital systems, leading to the rise of smart factories.

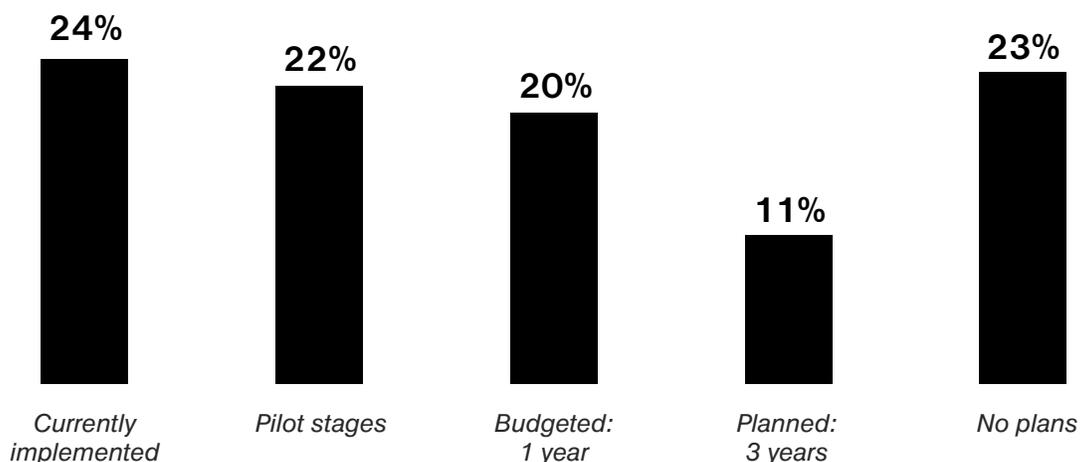
Less than half of the manufacturers who took this survey were currently implementing or in the pilot stages of their smart manufacturing program. This indicates that manufacturers getting involved now have both a model for success and access to cutting-edge best practices while becoming part of a smart manufacturing movement that is gaining traction.

Case Study:

Sanders and Morley Candy

For Sanders and Morley Candy, a fine chocolatier, investing in new hardware and software through new production lines, automating packaging processes, and adopting a cloud-based ERP system have given the company greater visibility and control over its operations. This has empowered sales, enabled faster product testing and development, and allowed the company to redeploy its staff to complete higher-value tasks throughout the organization. These changes have helped the company achieve double-digit growth every year for the last decade, with plans to reach \$100 million in revenues in the coming years.

“What is the status of your company’s Industry 4.0, Smart Manufacturing, or other industrial transformation program?”



PART 1: TECHNOLOGY'S ROLE IN SUCCESSFUL TRANSFORMATION EFFORTS

It should be no surprise that the specific type of technology used in a manufacturing environment can separate leaders on the path to smart manufacturing from followers. According to a separate study on digital readiness conducted by LNS*, most companies leading the way in digital readiness are building on solid and accurate business and operational systems. Without an integrated approach to manufacturing software or a system of record delivering a single source of truth, manufacturers will likely find themselves making decisions in silos.

Connecting Across the Business Is Key

When asked where manufacturers are choosing to spend their time on their smart manufacturing journeys, leaders* say breaking down silos with the help of data, IIoT, and analytics is at the top of their list.

A full 39% of the leaders identified in the LNS survey* focus their efforts on IT/OT convergence and Industrial IoT/Analytics systems to gain shop floor to top floor visibility and control. These technologies and processes have been tasked with capturing high resolution shop floor data, generating contextual insights from across business verticals, and disseminating that information to relevant stakeholders. This approach gives leaders the ability to make better decisions by connecting systems to integrate and standardize across the business, automating key processes to reduce errors and enforce in-line quality, and enabling end-to-end material tracking and traceability to reduce risk.



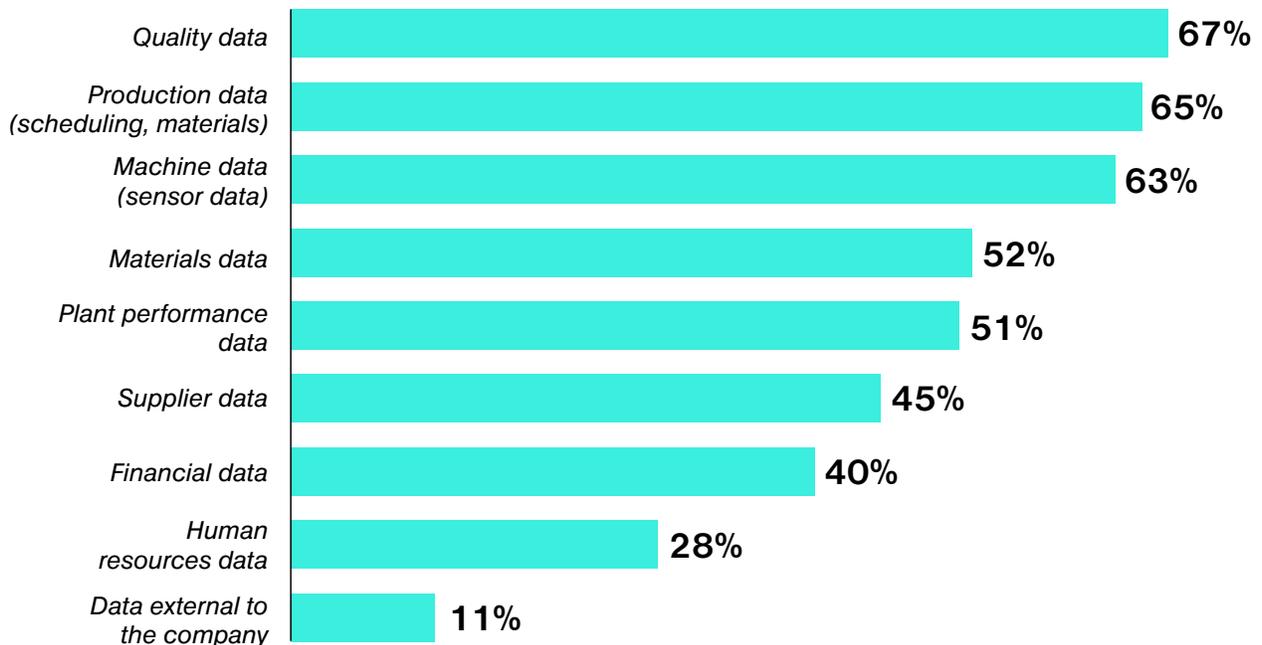
Another 38% of these leaders* are focusing their efforts on upgrading information management and business systems. They understand that future-proofing their manufacturing operations requires the ability to handle the data volumes and data management required to contextualize analytics that drive informed decision making.

Meanwhile, followers appear to be less structured in their investments. They tend to focus on areas that address pressing near-term challenges and provide greater business agility and responsiveness but fail on one essential point: tying these technologies into the broader system of record.

Data Models

Not surprisingly, leaders in smart manufacturing are those who have developed the ability to make good use of advanced analytics and data models to help solve business problems. Approximately one-third (32%) of this year's survey respondents stated they had the resources to build their own enterprise data models. Of those that can build their own data models, quality and production data were most commonly cited as being included in their models, with machine data not far behind, likely due to their power to differentiate the business.

“What sources of data are being included in your data model?”



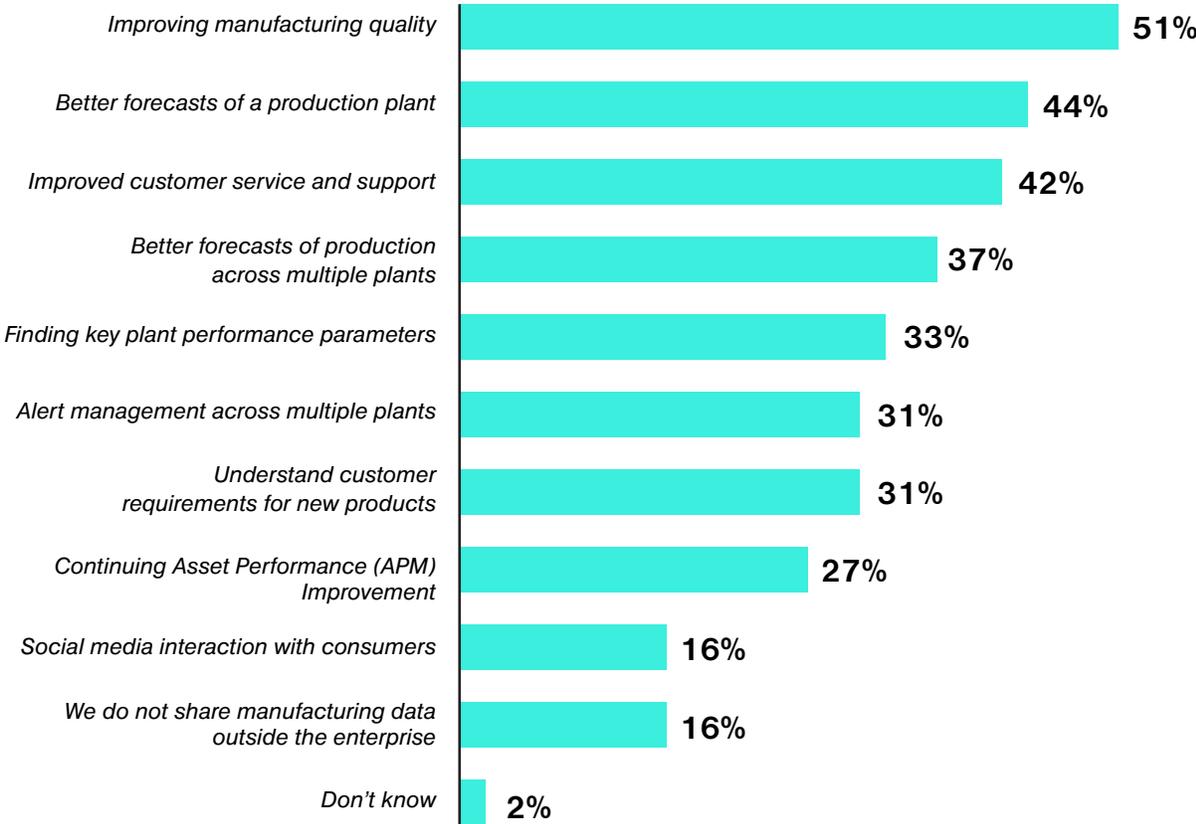
* Insights based on a separate study on digital readiness conducted by LNS Research.

While opportunities to implement a data model or data architecture plan appear to be skewed toward larger enterprise-size companies due the resources they require, mid-sized companies are not far behind in this capability.

	Enterprise	Midsized
<i>Have data models implemented</i>	39%	28%
<i>Piloting or have plans to implement data models in 3 years</i>	49%	39%

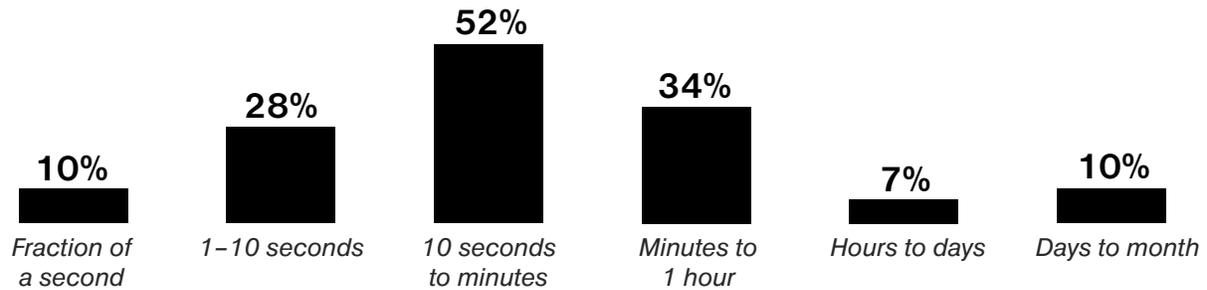
And though data modeling is important, possibly more critical is having the ability to glean insights and learnings from these models. Survey respondents indicated that, when it comes to using analytics to improve business and manufacturing performance, they’re focusing specifically on tracking, managing, and improving their quality and forecasting performance.

“How are you using analytics to improve business and manufacturing performance across the enterprise? Select all that apply.”



And, in today's fast-paced world, speed does matter. How quickly companies can process and analyze data is key to maximizing the value of advanced analytics. Expectations of real-time responses are quickly becoming the norm. But, in reality, manufacturers aren't quite there yet in terms of speed.

“For prescriptive analytics, what is the typical timing goal of the feedback loop? Select all that apply.”



IloT

The top technology trend among all manufacturers—regardless of where they are in their journey to smart manufacturing—was investment in IloT platforms and advanced analytics.

“Industrial IoT” is an umbrella term that covers a broad range of architecture frameworks and solutions, including on-premise edge technologies, customizable development tools and libraries on an open platform or infrastructure, and entire ecosystems and marketplaces with industry-specific solutions for data consumption and analytics.

Today, manufacturers can pick from a range of IloT solution options that meet their custom needs around data volume, storage, latency, analytics, user experience, and other key factors.

The sheer number of options manufacturers have when selecting IloT solutions should be considered a positive development—one that's unlike anything the manufacturing industry has seen before. But we are also seeing that a variety of options doesn't necessarily translate to a higher success rate since it creates an increasingly crowded marketplace and confusion among buyers.



Industrial IoT provides us a direct view into the status and overall performance of assets, giving us the ability to tie quality and part-level performance expectations to asset performance—information that has traditionally been extremely difficult to generate. With this information available we can both correlate data—as well as understand causality in order to continuously make operational improvements that positively impact our bottom line.

- BOB BIERWAGEN, VP of Digital Strategy, MPI Corporation



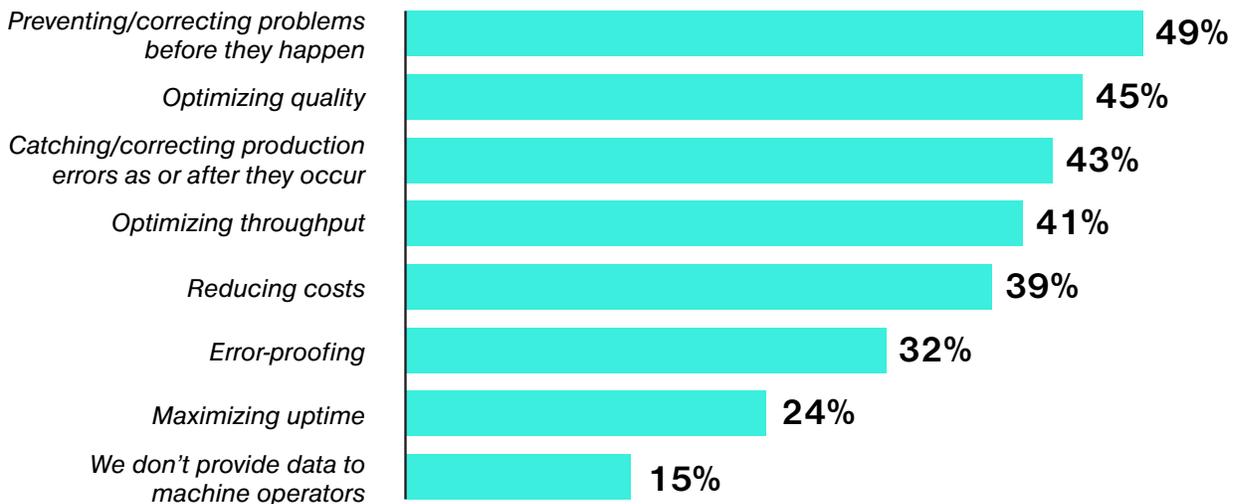
Another important aspect of IIoT is how it can help manufacturers address and respond to technological and industry trends.

First, consider the cloud. While manufacturers have historically been wary of cloud technologies, our latest survey reveals that 61% of respondents use Google or Microsoft Azure for general cloud services. In some cases, they may simply be using Office365 or GSuite, and many manufacturers may never want to advance beyond their on-premise solutions. However, the data points to an encouraging trend: Manufacturers' comfort level with managed

cloud infrastructures is increasing, a change that will allow for greater scalability and extensibility as companies increasingly collect data.

Second, the skilled workforce gap, which is only expected to grow in the years ahead, remains a constant challenge, even with unemployment rates skyrocketing due to COVID-19. The increased investment in and focus on IIoT/analytics technologies indicate that manufacturers aim to use data and analytics more effectively to augment and automate decision making, which would reduce the strain on individual workers.

**“What is the intended use of the data provided to machine operators or factory personnel?
Select all that apply.”**



To understand the real-world power of IIoT, consider how an empowered manufacturing operator who manages quality might benefit from the ability to take the following insights into account:

- Critical machine health parameters that impact part quality
- Upstream and downstream supply chain behaviors that impact decision-making
- The financial and risk equations associated with changing quality tolerances for a specific part

Suddenly, decisions can be made quickly, with uptime, productivity, and quality benefiting from putting critical information in the right hands at the right moment.

The Role of “Hyped” Technologies in Transformation

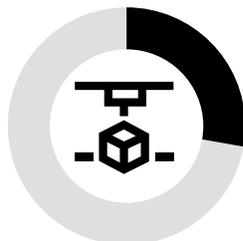
Some technologies and discussions seem to take up disproportionate time and attention, generating unwarranted “hype.”

The popularity of these technologies is understandable—they have the potential to change the way manufacturers make things, use data, and interact with their supply chain and customers. Technologies like these could lead to enormous leaps in manufacturers’ abilities to respond to the increased consumer desire for personalization, deliver fast and flawless supply chain traceability in the case

of a food recall, and eliminate excess inventories.

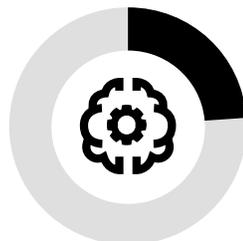
However, because most manufacturers identify themselves as pragmatists, it is important to contextualize these technologies by identifying where they fit within the transformation efforts of leading manufacturers.

To start, which technologies are actually being used by manufacturers today? According to our survey respondents, these are the top four emerging technologies employed in manufacturing operations:



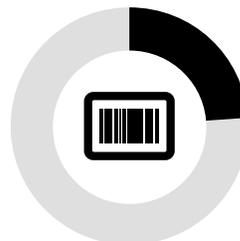
28%

3D printers/additive manufacturing



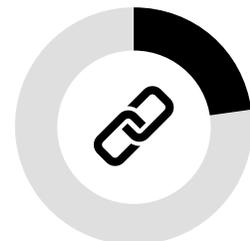
24%

Machine learning



24%

Industrial hardened devices



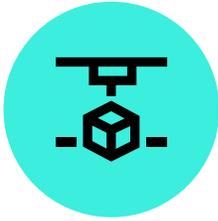
23%

Blockchain

When considering the size of organizations that have adopted these technologies, it may be no surprise that these adoption rates are higher among \$750M-and-larger organizations, which have the resources and scale to recognize the benefits of these innovations.

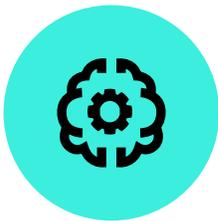
And, while most of these technologies could be considered “hype” because they haven’t reached broad adoption, we recommend that manufacturers take them seriously, because what really matters isn’t necessarily broad adoption, but whether they deliver value to your business, and solve your unique challenges.

Just consider how these technologies can support a manufacturer’s ability to respond to changing customer needs, enable a modern workforce and streamline regulatory demands.



3D printers/additive manufacturing

3D printing and additive manufacturing enable customization down to the individual part level. With agility and responsiveness being a requirement in some industries, 3D printers and additive manufacturing eliminate retooling time and expense. These technologies can also remove the need for on-hand inventory for parts assembly. Just imagine if your mechanic could manufacture parts instead of ordering them and waiting for a shipment to arrive (especially hard-to-find parts for equipment that is no longer in production). For made-to-order manufacturers, such as aerospace and defense companies, the increased availability of printable materials has expanded their use of this technology. Titanium, for instance, has empowered aerospace manufacturers to 3D print parts including fuel nozzles and turbine blades. Or consider this recent example: Ventilators, which are critical for those hospitalized with coronavirus, are only designed to serve one patient at a time. One innovation—a 3D printed splitter—gave medical professionals the ability to adapt the ventilator to serve four people simultaneously, delivering life-saving resources to regions that could not procure enough ventilators to meet the demand.



Machine learning and industrial hardened devices (such as ruggedized handheld barcode scanners or tablets)

Tied for second place, these two very different technology applications have a shared outcome: they both help manufacturers take advantage of a lean workforce with improved accuracy and effectiveness. Machine learning powered by AI has the power to turn collected data, which must be analyzed and contextualized before it can be used, into actionable insights. These insights recognize patterns and opportunities for improvement at a rate unmatched by a single human—or even an entire team. On the other end of the spectrum, industrial hardened devices can deliver accurate, real-time information to a manufacturing worker and enable responsiveness while they remain mobile on the shop floor.



Blockchain

This technology also serves a growing need for regulatory and supplier transparency and traceability. Blockchain has the power to instantaneously and securely connect every step of the supply chain, with the potential to make days- or even months-long food recalls a thing of the past. This technology's promise is already being realized by major retailers such as Walmart and used by their supply chains.





While cost-effective, off-the-shelf applications of some of these technologies may be years away, even the most pragmatic of manufacturers should not be quick to dismiss them. Because of their transformative and disruptive power, these Industry 4.0 technologies may one day be the foundational technologies manufacturers count on to secure data throughout their global supply chains, realize the benefits of artificial intelligence, and more fully automate production processes.



While there are near-countless technologies associated with smart manufacturing, three that I believe have the most potential to disrupt the manufacturing industry are additive manufacturing/3D printing, machine learning, and blockchain. Together, they share an important commonality and characteristic of smart manufacturing technologies: They are all brought together in the cloud, where you can store loads of data and analyze it with unlimited computing power.



- JERRY FOSTER
CTO, Plex Systems

PART 2: EMPOWER YOUR PEOPLE TO ACHIEVE BUSINESS TRANSFORMATION

Manufacturing leaders put people at the center of their transformation journeys. Technology choices, integration frameworks, and systems of record are all examples of how companies can empower manufacturing operators, managers, and leaders with relevant contextual insights to augment and automate decision making.

But when it comes to being a smart manufacturing leader, empowering people is only half of the equation. Successful transformation requires responsible change management, some of which we will explore in the section below. When leaders disregard people, processes, and technology, projects can suffer.

According to LNS Research, human behavior plays a key role in the journey toward smart manufacturing. The following scenarios represent the most common reasons most companies fail to realize the value and the behaviors that contribute to the failure:

- **Pilot purgatory:** When manufacturers fail to move out of the pilot stage, scale, or sustain efforts in part due to lack of communication or misunderstanding of requirements across the stakeholders in the business
- **Zombie programs:** When leaders generate top-down transformation efforts but skip the people—eliminating the processes of gaining buy-in and learning from front-line users and managers
- **Failed leapfrogging:** When decision makers choose to layer digital on top of spaghetti code or across disparate and siloed systems without focused efforts to bring those systems together

Despite carefully planned smart manufacturing initiatives, ROI assessments, and technology selection, some manufacturers grapple with the unfortunate reality that too many projects begin with so much promise only to end up in a suspended state.



Early Planning Strategies and Recommendations

Below are four early planning strategies and recommendations based on conversations with manufacturing leaders as well as experts' personal experiences piloting and launching transformational business technologies. These strategies can help improve the likelihood of successfully realizing business value from pilot programs.

1. Get the correct people involved

A “go it alone” mentality may entice manufacturing professionals who are anxious to pilot new technologies, especially if the price point is low enough to not require senior level buy-in. However, the noble thought that buy-in down the road will be easier with proven ROI rarely works out in practice. And technology that can benefit many will only increase the business case if the time comes for real funding and enterprise adoption.

Competing initiatives, shifts in strategic direction, budget cycles, and personnel changes are all realities that can derail technology pilots. Similar scenarios play out repeatedly, no matter how “mature” the innovation culture may be at a company.

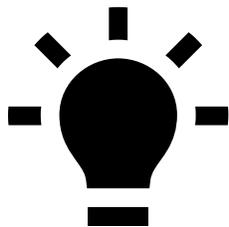


For manufacturer Gill Industries, rapid growth and an acquisition had significantly expanded its technology stack, and executive leaders were pushing for performance metrics across the company. Buy-in from the shop floor to the top floor was critical to create an organizational movement that would help them achieve their goals while solidifying the corporate culture. Gill pulled together a cross-functional team that standardized all eight of its facilities on one smart manufacturing platform and streamlined over 600 settings differences down to 30 with the help of business process owners across its locations.

We had buy-in all the way to our executive level. Having them really digging in deep has pushed the system. It's not just this initiative that IT wants but that the whole company wants.

- RANDY EDLER

Director of IT, Gill Industries



Expert recommendations

- Even if you don't need buy-in for budget, involve cross-functional leaders early and get aligned on the definition of success to help ensure future funding to scale or for widespread adoption.
- Make sure there is long-term viability to extend the solution to other parts of the business when the solution proves ROI.



2. Get enough people involved

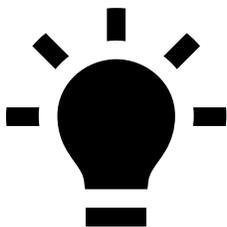
The biggest barrier to the successful adoption of new technologies is the resistance to developing new habits. Proving ROI is not enough to go from a pilot to enterprise-wide adoption. Your users need to adopt the technology, work with it regularly, and grow to consider it a valuable part of their workflow.

To build enough momentum around new technology initiatives and avoid “pilot purgatory,” manufacturers must achieve a certain critical mass of adoption. But they should not include so many people that the project becomes paralyzed. A cross-functional team consisting of anyone who will interact with the technology or the insights it produces—such as IT, operations, maintenance, quality, and executive teams—will build comfort and familiarity with the technology. This large team may appear to slow progress at the beginning, but it will ultimately accelerate the path from pilot to rollout.

Case Study:

Eurotranciatura Mexico

When Eurotranciatura Mexico implemented a system of record, its first wave of users saw what it could do for their production and engineering processes. They then became evangelists for the technology and requested that it be further rolled out across the company’s operations. This type of championing is what organizations should strive for because it helps build a critical mass of adoption and ultimately leads to momentum for technology pilots and deeper, enterprise-wide use. As a result of these efforts, Eurotranciatura reduced its scrap rates from 2.5% to 1.5% and improved on-time delivery to nearly 100%.



Expert recommendations

- Create cross-functional technology pilot teams early.
- Encourage many stakeholders to remain as engaged as possible.

3. Change management is key

Short-term technology pilots can seem deceptively straightforward. If things go well, you'll bring in a new technology, test it in a sandbox to prove value, and make a recommendation to purchase or implement on a broader scale. Alternatively, you'll make the recommendation to scrap the project and rapidly try a new approach to solve the problem. This is the point at which projects have the greatest potential to become stalled.

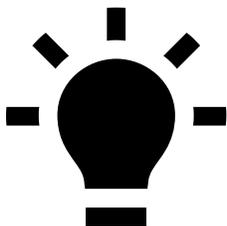
If you haven't properly planned the change management process, you may realize that not all stakeholders' needs were accounted for, that competing priorities and timelines are slowing down the rollout, or that some aspect of the technology—such as integrations into existing systems—weren't fully thought through. Even worse, you may find that the disruption caused to existing processes—often creating a need to re-train employees—is more harmful than helpful. Companies in these cases find themselves extending pilots to fully validate and test the change management processes, essentially moving from a crawl to a walk, then a run.

Be warned: This can drag on for a while.

Case Study:

Coastal Automotive

For Coastal Automotive, training became essential to the successful adoption of a digitized system of record. By working with the software vendor, Coastal was able to practice various business processes on a test database before going live. By the time the company's implementation was complete and Coastal Automotive was up and running, its 30 full-time employees and many part-time workers felt fully comfortable on the platform. The company has since been able to streamline its inventory counting from a two-day to less than one-day process, reduced scrap, streamlined compliance audits from two days to just hours, and increased shop floor productivity.



Expert recommendations

- Plan the change management steps and process early.
- Make sure you understand this process deeply and intimately and ensure it is incorporated into your pilot execution plan and success criteria.

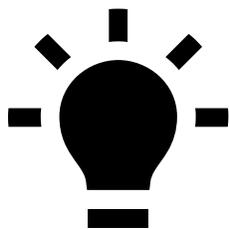


4. Make actionable decisions by choosing the right process

Sometimes the simplest ideas are the ones most easily overlooked. Bringing in new technology comes with its own set of risks, and pilot programs are a good way to de-risk these efforts. Manufacturers de-risk by limiting scope to a well-established, documented process (such as running a pilot in a single facility or one consistently reliable production line or machine), by limiting investments, exposure, or time.

Often, this opens bandwidth to de-risk decisions by piloting multiple technologies or even vendors at the same time.

Make no mistake that while you might de-risk the license fees, technology pilots need commitment to be successful. They require a large investment in time and resources, careful planning, diligent execution, and firm decision making.



Expert recommendations

- Define success criteria and agree to move forward once the success criteria is met.
- Address any new risks identified in phase one of the rollout process.
- Repeat for subsequent phases.
- If criteria are not met, be comfortable saying, “This did not succeed,” and move on.

Manufacturers need to see technology pilots not just as ROI proving grounds and de-risking initiatives, but as the first step in a broader, longer-term digital transformation. As you would with any such project, remember what’s important. Involve the right cross-functional leadership team, build critical mass, create safe spaces for failure, manage change at all levels of the organization, and enable the teams to make bold decisions.

FINAL REPORT TAKEAWAYS

- 1 Manufacturers are facing new pressures to become more efficient, more effective, more profitable, and more competitive in an increasingly challenging environment.
- 2 Despite these challenges—and in large part due to them—the drive to digitize is picking up speed. Manufacturers that do not proactively decide to pursue smart manufacturing initiatives may find themselves struggling to keep up with the competition or respond with agility in times of crisis, such as the current COVID-19 pandemic faced by manufacturers globally.
- 3 When weighing, piloting, and scaling new technology implementations, leaders should apply laser focus to delivering benefits to the business by doing the following:
 - Taking a step back to look at the overall business challenges faced and articulate desired outcomes
 - Understanding the roles of technologies, people, and processes in business transformation and how to apply them
 - Investing in technologies that can provide scalable solutions that quickly deliver sustainable improvement and implementing them with end users in mind
- 4 People are at the heart of a successful pilot program and are essential to the process of becoming a smart manufacturer. Companies that prioritize technologies that directly benefit their workforce and implement these technologies in collaboration with them are the companies that are most likely to succeed.
- 5 Smart manufacturing technologies offer great promise, but it takes more than choosing the right technology to ultimately realize the benefits.

ABOUT THE AUTHORS

ABOUT PLEX SYSTEMS

Plex Systems, Inc.® delivers the first smart manufacturing platform that empowers the world's leading innovators to make awesome products. Plex gives process and discrete manufacturers the ability to connect, automate, track and analyze every aspect of their business—from the shop floor to the top floor—to drive business transformation. Built in the cloud, the Plex Smart Manufacturing Platform includes MES, ERP, supply chain management, Industrial IoT, and analytics to connect people, systems, machines, and supply chains, enabling them to lead with precision, efficiency and agility in an ever-changing market.

Learn more at www.plex.com.

©2020 Plex Systems, Inc. All rights reserved.
The Plex logo are registered trademarks of Plex Systems, Inc.

ABOUT LNS RESEARCH

LNS Research provides research and advisory services to guide industrial companies through digital transformations. The firm's research focuses on how digital technology drives transformations across the value chain and offers insights into the people, processes, and technologies required for achieving Operational Excellence. The firm's publications include quantitative research on trends and best practices, as well as Solution Selection Guides. The company's research analysts work with industrial companies, including manufacturers in discrete, batch, and process industries, to minimize risks associated with alignment, time, and cost in Industrial Transformation, from assessing readiness through solution selection and deployment. This work uses proven methodologies to drive convergence between IT and operations teams, and to empower team leaders to achieve goals and time-to-value, quickly and confidently. www.lnsresearch.com



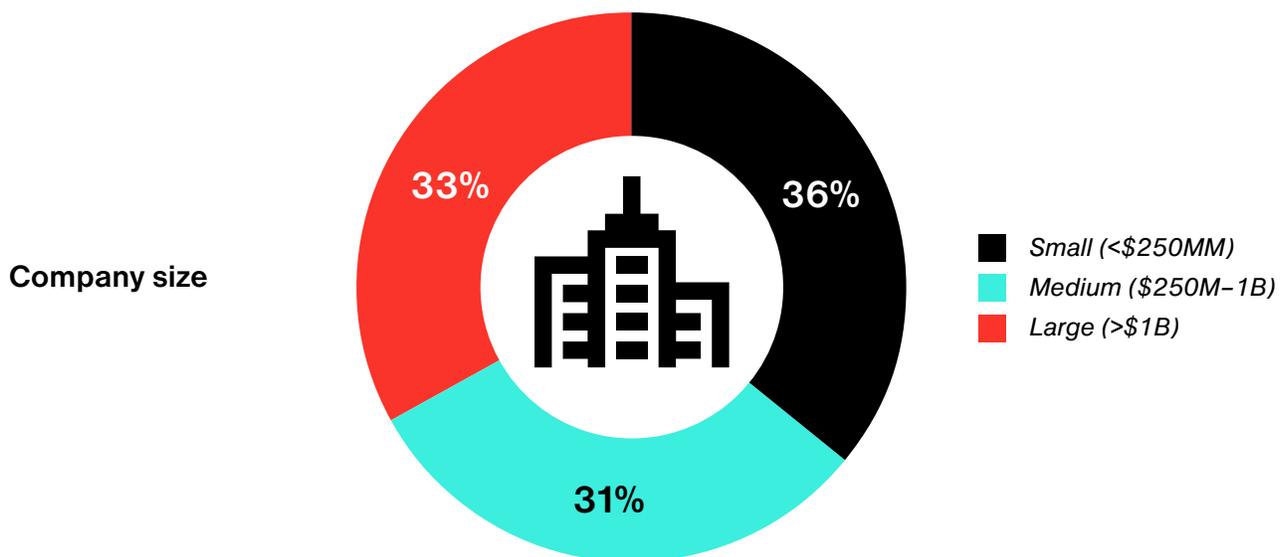
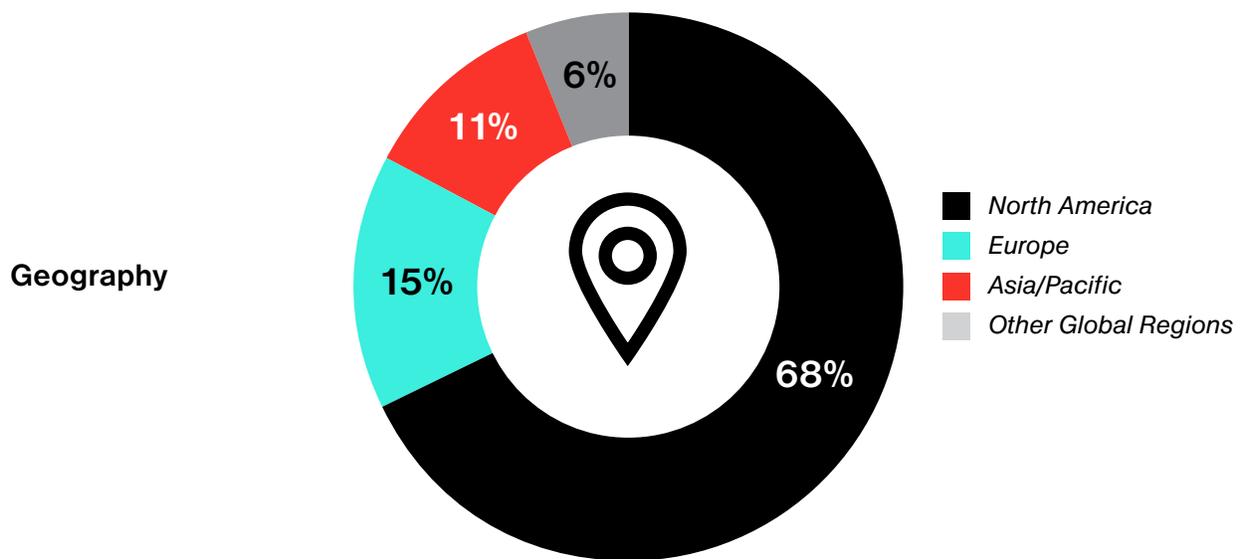
APPENDIX

DEMOGRAPHICS

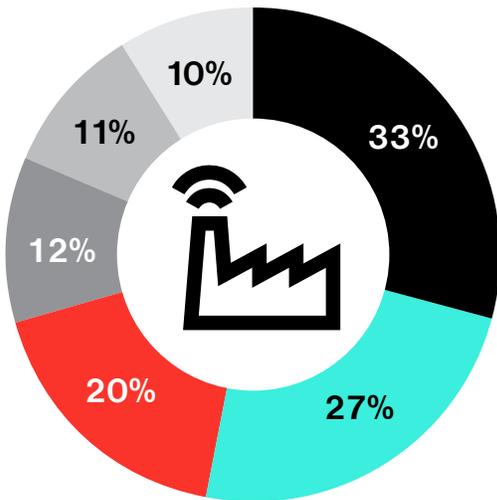
The research presented by Plex Systems in this report comes from survey data collected in December 2019 by LNS Research with responses from approximately 200 executives, business leaders, and professionals across a broad range of company sizes and geographies.

Slightly more than half of the companies operate in discrete manufacturing industries, with the remainder nearly equally split between process (including batch) manufacturing sectors.

LNS Research primarily serves industrial companies in North America and Europe. The survey was conducted in English.

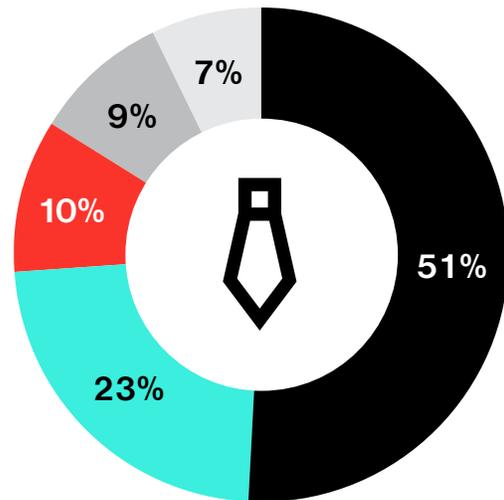


Industries



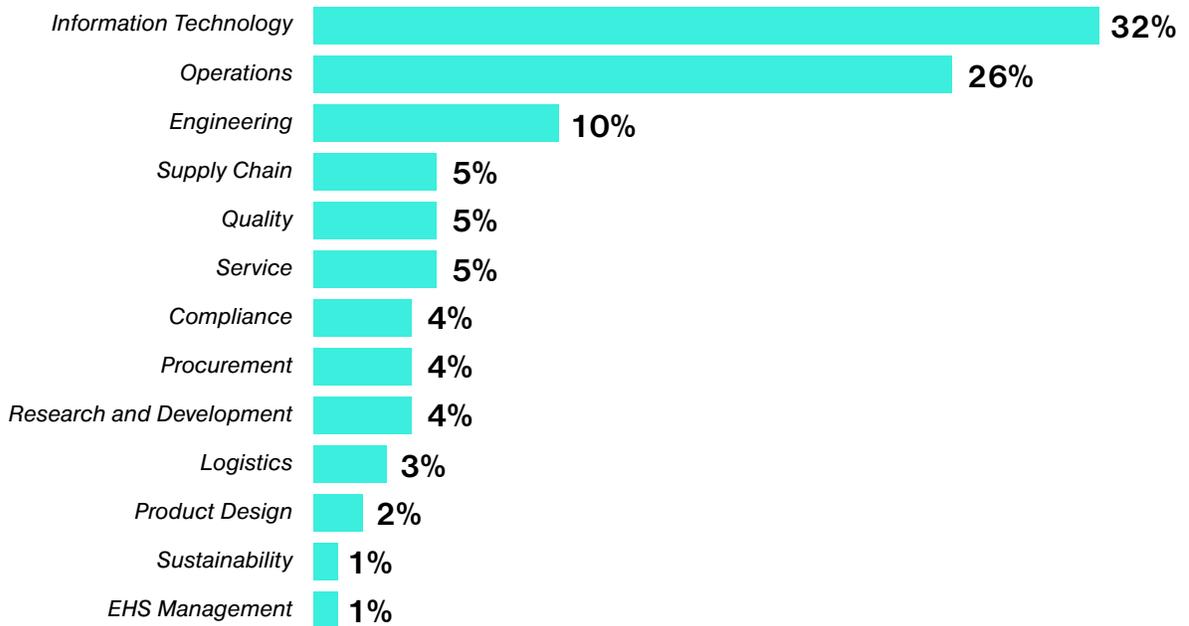
- Food & Beverage
- Automotive
- Industrial Equipment
- Consumer Packaged Goods
- Consumer Durable Goods
- Aerospace & Defense

Job title



- Manager
- Director
- CxO (C-suite executive)
- Vice President (VP/SVP/EVP)
- President

Area of Responsibility



PLEX MAKE
IT
SMART™

www.plex.com