Manufacturing Leadership Council

SURVEY RESULTS

A LENS ON THE FUTURE

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INTRODUCTION

In a time of accelerating change, pervasive digital transition, and continued global disruption, planning ahead based on clear and informed insights is more important than ever for today's leadership teams.

Understanding more about the expectations and challenges that today's manufacturing executives foresee for the future not only helps leaders develop higher levels of preparedness for potential outcomes, but also fuels their vision and focuses their strategic plans to achieve competitive success and longevity for their manufacturing organizations in the years ahead.

That's why the Manufacturing Leadership Council, a division of the National Association of Manufacturers, launched its Manufacturing in 2030 Project, now known as the Future of Manufacturing Project, in the spring of 2021. The project's main goal is to enable manufacturers to envision what manufacturing might look like by the year 2030 so they can plan ahead.

As part of the Future of Manufacturing Project, the MLC fielded the Future of Manufacturing Project: A Lens on the Future research survey in the summer of 2022. The following results analysis is based on the responses and front-line insights of over 260 senior manufacturing industry executives, spanning multiple functional roles, and representing large, small, and medium sized manufacturing companies from multiple industry sectors.

These exclusive survey results also follow the MLC's recent release of its ground-breaking *Future of Manufacturing Project White Paper: The Next Phase of Digital Evolution*.

Armed with this rich combination of real-world predictions and forward-thinking insights, the MLC hopes that manufacturers can better plan their longer-term future and find ways to enhance their value, competitiveness, and contribution to society.

The MLC team wishes to thank its Future of Manufacturing Project partners – EY, Infor, NTT DATA, and West Monroe – for their support and invaluable suggestions. In addition, the MLC thanks the members of its Board of Governors for their expert feedback in preparing this survey.

EXECUTIVE SUMMARY

Today's manufacturing leaders may feel they face unprecedented headwinds at every turn, but looking just a few years out to 2030, there is a clear sense of optimism and enormous opportunity ahead for the industry.

The results of the Manufacturing Leadership Council's new Manufacturing in 2030 Project survey also reveal that over 84% of manufacturing leaders now expect to see an acceleration in the adoption of digital technologies over the next few years, helping to drive growth and competitiveness, spur innovation and new product development, empowering employees to make better decisions, and creating more efficient, cost-effective, flexible, and sustainable production approaches for the future.

Challenges around labor and talent shortages are not going to go away by 2030, however, with almost half the respondents expecting labor issues to continue to be their top concern by the end of the decade. Nevertheless, the widespread application of new digital tools to help automate a broad range of operational activities, plus more technology-enabled working practices such as virtual and remote working, are expected to significantly help mitigate the problem and are strategies that the majority of manufacturers are already pursuing.

Three quarters of manufacturers are also now focusing on urgently upskilling their current workforce to maximize the potential of those digital technologies in the years ahead and fill the digital talent gap, although only a quarter believe their workforce will be "very ready" for digital transformation by 2030, with the majority expecting their employees to be only "moderately ready" by then.

Even in an increasingly automated future, the human factor will continue to be critical to the industry's operational performance. While over half of the respondents expect some degree of autonomous operations in their plants or factories by the end of the decade as AI and machine learning technologies take over many routine and repetitive tasks, they believe that people will still continue to play a significant role.

In fact, the survey predicts that the rapidly increasing adoption of AI and Machine Learning technologies will impact almost every functional activity in some way by 2030, from product development and manufacturing operations, to supply chains and customer experience and field service. But that, in itself, raises new concerns, with over three quarters of manufacturers now believing that as the sophistication of these technologies increases, the industry will need to develop a clear code of ethics for the use of AI, collaboratively devised by the industry working together, or perhaps by industry working more closely with government and academia.

By 2030, the survey also shows that two other key trends will play out that are poised to fundamentally change the nature and structure of manufacturing. Firstly, a widespread rethinking of global production footprints and supply chain networks in the wake of the last few years of disruption, with over 60% of companies expecting more nearshoring or onshoring of their operations to boost resiliency and better meet local customer needs. Secondly, that the drive for more sustainable operations will become directly engrained in manufacturing company cultures. An important part of this drive will manifest in the reduction of greenhouse gas emissions, where over 60% of companies aim to either meet their Net Zero goals by 2030, or at least make significant improvements in developing cleaner and more eco-friendly operations.

So, despite current pressures, these MLC's latest survey results show that while there may still be challenges ahead by the end of the decade, manufacturers can look forward to a period of significant opportunity for improvement and growth by 2030 and are optimistic about achieving those outcomes. In many cases, new digital technologies will help drive those changes and deliver more efficiency, value, flexibility, and a more enlightened and empowered workforce along the way.

As Einstein once said: "In the middle of difficulty, lies opportunity"— a credo that's clearly true about the future prospects for manufacturing in the years ahead.

SECTION 1

Strategic Planning Horizons and Perceptions

Despite more than two years of a devastating pandemic, rising inflation, continued worker shortages, and a grueling war in Europe, manufacturers are almost exuberant in their outlook for the future.

More than 53% of respondents to MLC's new survey on what the future of manufacturing might look like by 2030 say they are "strongly confident" about their company's growth prospects, with another 43.7% saying they are moderately confident. Only a small fraction is less than confident (Chart 1).

A MAJORITY ARE OPTIMISTIC ABOUT GROWTH PROSPECTS

What is your level of confidence today about your company's growth prospects by 2030?

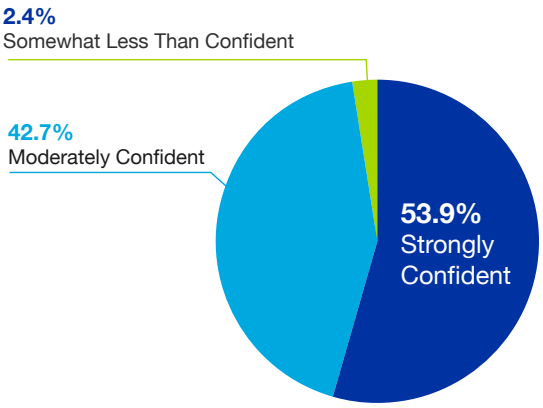


Chart 1

What's driving their optimism about the future?

The motivator appears to be their expectations about the trajectory of Manufacturing 4.0 and its growing impact on a wide range of functions and activities in their businesses. Manufacturers have little doubt that the pace of digital adoption is going to continue to accelerate throughout the decade. In fact, 83.9% of respondents to the new survey say they expect that adoption will indeed speed up (Chart 2).

LARGE MAJORITY SEES DIGITAL ACCELERATION BY 2030

What statement best characterizes your expectation about the pace of digital adoption in your company by 2030?

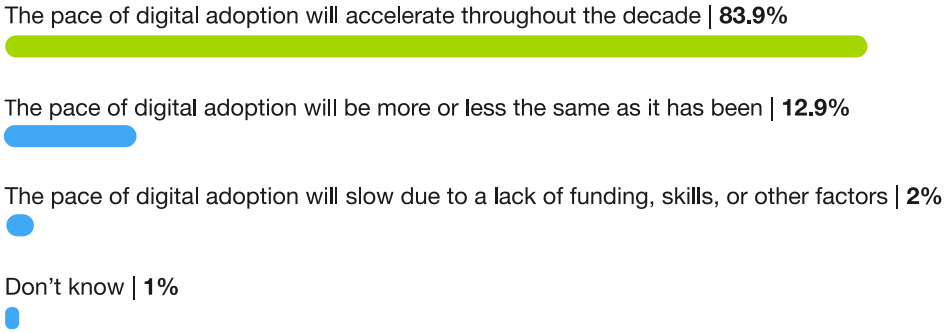


Chart 2

And a majority, 50.7%, believe that digital adoption will be a gamechanger for the industry by 2030 (Chart 3).

SLIGHT MAJORITY SEES DIGITAL AS A 'GAME CHANGER' FOR INDUSTRY BY 2030

Overall, how do you see the impact of digital adoption on the state of manufacturing by 2030?

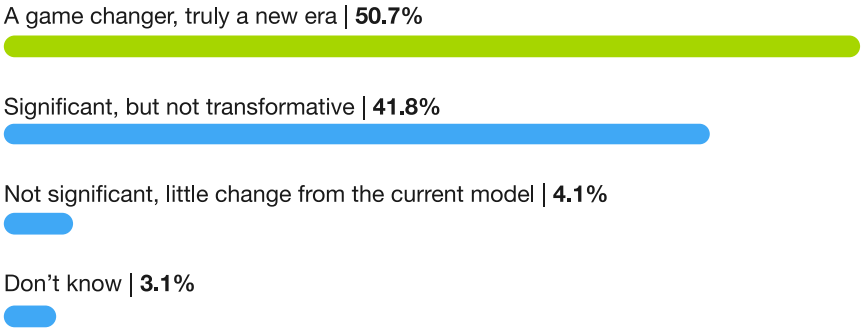


Chart 3

As a result, manufacturers are focused on the power of digital to spur their growth and enhance their competitiveness. Central to that greater competitiveness, survey respondents indicate, is the smart use of data to drive their innovation processes to create and introduce new products to their markets. In addition, they are looking to digital to create greater operational and cost efficiencies and to enable better data-driven decision-making processes in their organizations (Chart 4).

NEW PRODUCT INTRODUCTIONS IS TOP COMPETITIVENESS FACTOR

How would you assess the significance of the following factors on your company's competitive posture by 2030? (% is highest level of significance)

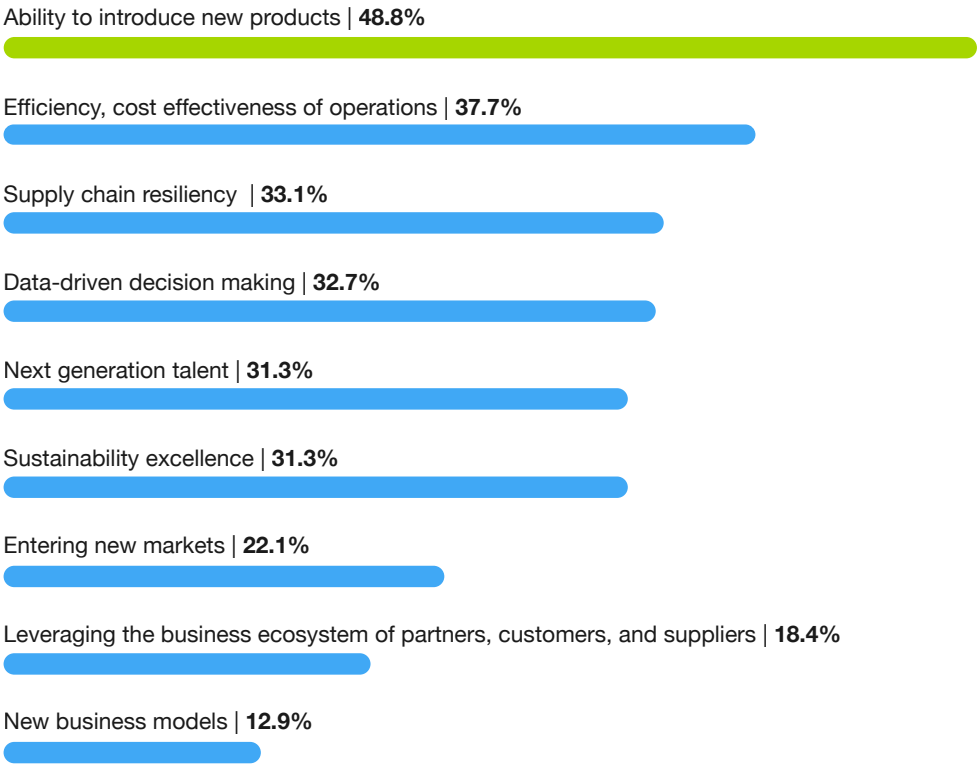


Chart 4

And they are doing so within the context of their strategic planning horizons, which differ by company and by industry sector, and which are largely driven by business units devising plans that are rolled up to corporate. But very few overall – just 6.9% of respondents – are focused on just the next couple of years. For most survey respondents, the planning cycle stretches longer term across multiple years. For example, 56% of survey respondents say their strategic planning horizon is two to five years, while nearly one-quarter indicate that their horizon is five to 10 years. Just over nine percent say longer than 10 years (Chart 5).

MANY ARE PLANNING UP TO 10 YEARS OUT OR LONGER

What is your company's strategic planning horizon?

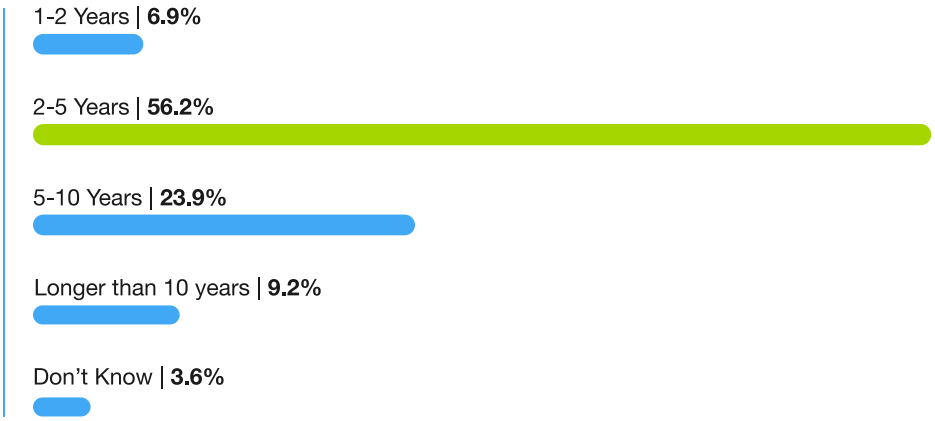


Chart 5

As they consider the effect of digital adoption by 2030 on their strategic planning and what the possibilities may be as a result, it becomes clear why so many manufacturers are focused on accelerating the introduction of new products in the years ahead. Digital is being looked at as the key to time-to-market advances.

SECTION 2

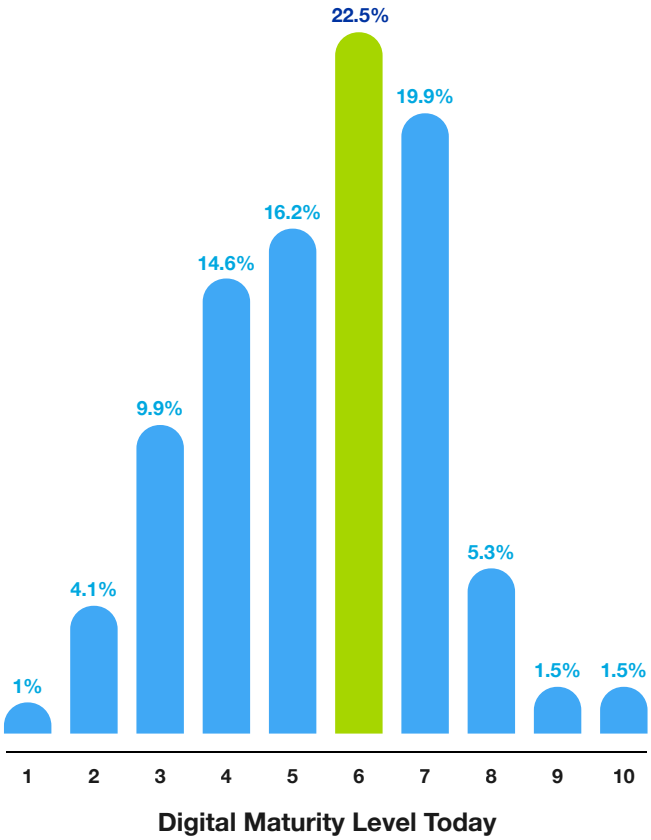
Expected Tech Investment and Outcomes

Along with expectations about the acceleration of M4.0 adoption over the coming years, manufacturers are planning to spend more on digital tools and technologies to advance their digital maturity to realize a menu of benefits, chief of which are greater speed and flexibility to respond to market forces and customer needs.

Right now in terms of digital maturity collectively, most manufacturers position themselves in the middle of the journey – at the 4/5/6 range on a 10-point scale, with 10 being the highest level of maturity. But by 2030, respondents expect to ascend to higher levels, advancing to the 7/8/9 range level as they more fully adopt digital technologies and orchestrate the changes in their organizations necessary to maximize their use (Chart 6).

SIGNIFICANTLY GREATER DIGITAL MATURITY SEEN BY 2030

How would you assess the digital maturity level of your manufacturing enterprise today and what are your expectations by 2030?



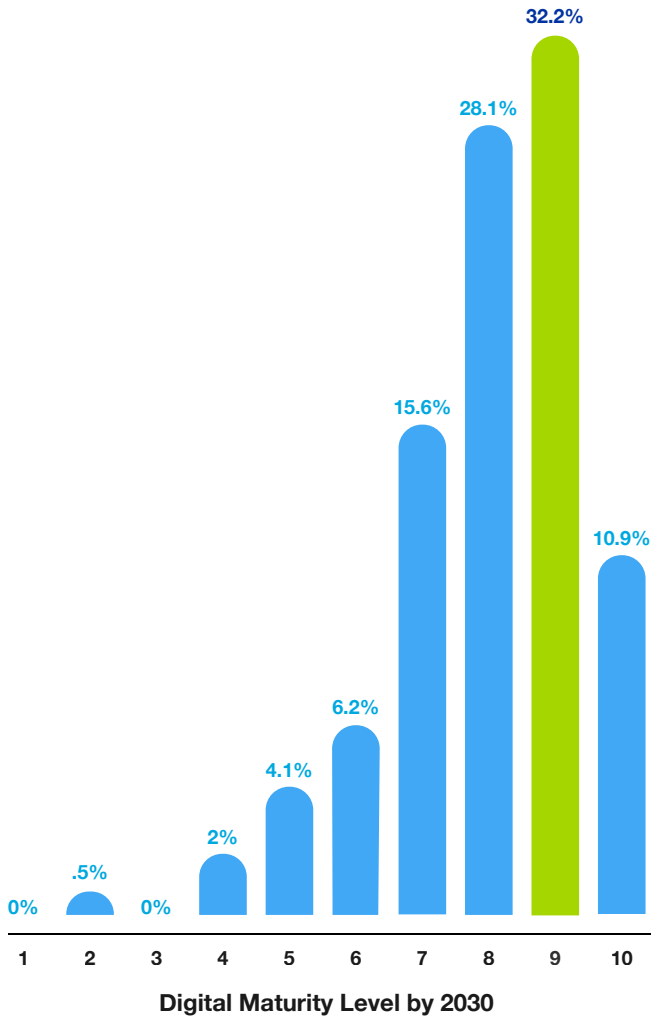


Chart 6

Digital spending intentions generally support the ascension being envisioned. The survey shows little if any expectation that spending will stay the same as it is now or decrease. In fact, an overwhelming 91% of respondents expect to be writing bigger checks, with 29% saying sums will increase significantly and another 62% saying they will increase moderately (Chart 7).

BUT SPENDING INCREASES EXPECTED TO BE MODERATE

Compared to today's spending levels on digital tools, what do you anticipate your investment posture will be by 2030?

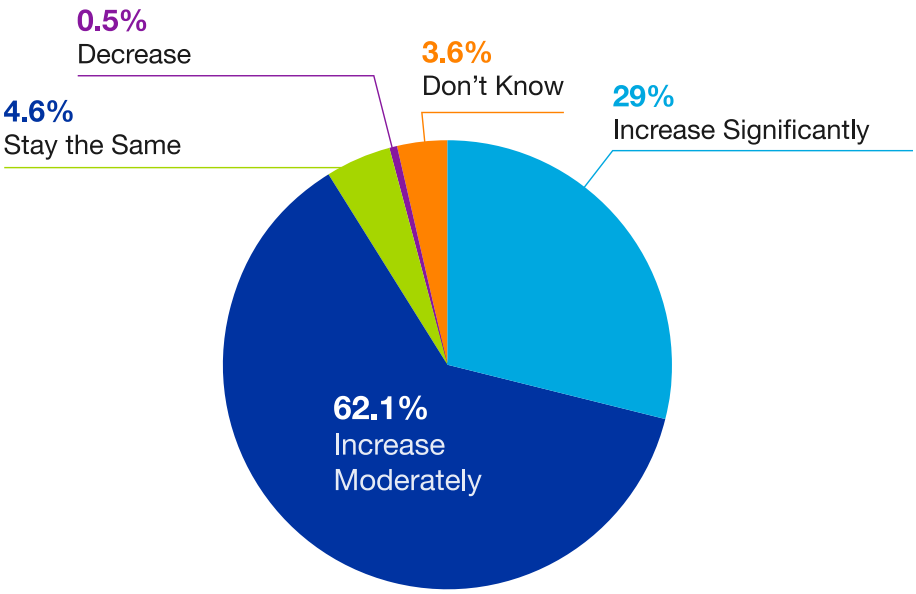


Chart 7

And what technology investments are manufacturers looking at to have the greater impact in their operations? The MLC survey looked at 12 technology categories – ranging from artificial intelligence and machine learning, augmented reality and virtual reality systems, digital twins and threads, and even the so-called metaverse. Respondents were asked to assess the potential impact of these technologies across four functional areas – product design and R&D, manufacturing/production, supply chain/logistics, and customer experience/field service.

What emerged is that respondents have high expectations about the impact of a basket of advanced technologies. Sorted by “high impact” responses, machine learning was the most often cited technology, coming up in each of the four functional areas. AI, 5G, and digital twins and threads came up in three of the four functional categories, and AR/VR was cited in two (Chart 8). Very few manufacturers expect the emerging metaverse to have a significant impact in their organizations by 2030, but when it does begin to have an effect, the most cited functional area in which it may have an impact is in customer experience/field service, according to the survey.

AI, 5G, TWINS SEEN AS HAVING HIGHEST IMPACT BY FUNCTION BY 2030

What impact will key M4.0 technologies have across the following primary manufacturing business functions by 2030? (Top 5 technologies by ‘High Impact’ % only)

	Additive	Digital Twins/ Threads	AR/VR	5G	ML
Product Design/ R&D	58%	37%	33%	31%	29%

	ML	Cobots	Additive	AI	Digital Twins/ Threads
Manufacturing/ Production	60%	60%	48%	47%	44%

	AI	ML	5G	Digital Twins/ Threads	Edge
Supply Chain/ Logistics	58%	44%	42%	31%	28%

	AR/VR	5G	AI	ML	Metaverse
Customer Experience/ Field Service	40%	40%	39%	30%	22%

Chart 8

The net effect of all of these technologies, of course, is to enable successful digital transformation and the business outcomes that will flow from it that manufacturers need to enhance their competitiveness. In addition to greater speed and flexibility, which were cited by 81.3% of respondents, greater customer satisfaction (76.1%), and higher financial returns (62.6%) were the second and third place finishers in the survey (Chart 9).

GREATER SPEED, FLEXIBILITY ARE MOST DESIRED OUTCOMES

What are the most significant business outcomes your company hopes to realize by 2030 from embracing digital transformation?

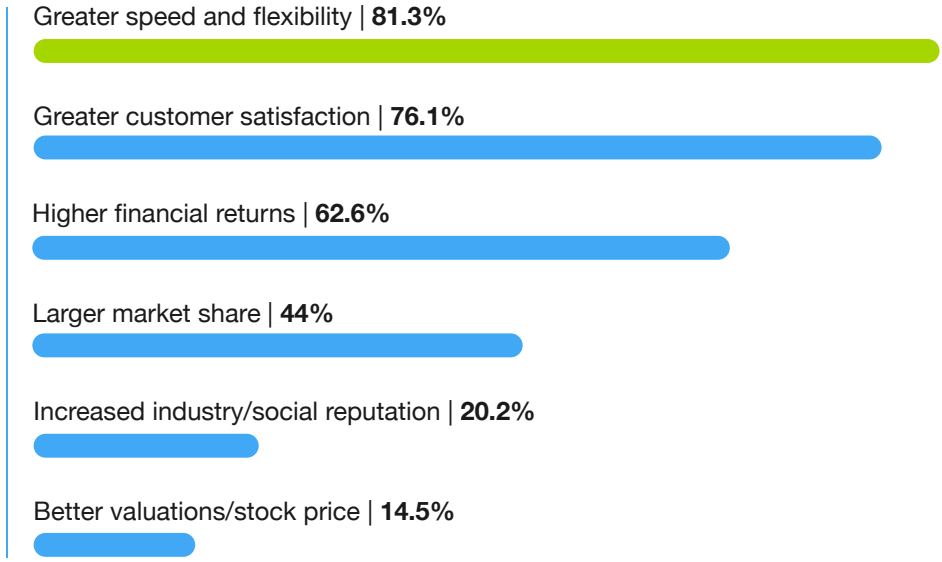


Chart 9

SECTION 3

2030 Expectations

As they think about what their digital technology investments might enable in the years ahead, the subject of how factories and plans will be run is very much in the minds of manufacturing executives. And the question of whether the various digital technologies in combination can allow for autonomous operation in the future or close to autonomous is in the forefront of that thinking.

Only a small fraction of survey respondents, 4.1%, say that autonomous operations is being oversold. Instead, a majority has autonomous to one degree or another on their radar screens. Just under one-third of respondents, for example, expect that factories and plants will become "largely autonomous", with people still playing an important role in running manufacturing operations. Just over 23% look at the question slightly differently, saying that only some factories and plants will become autonomous. A small fraction, 3.6%, expect fully autonomous operations.

But perhaps a more realistic view comes from just over one-third of the respondents who expect factories and plants to become highly automated but who also say that autonomous operations, to whatever degree they might occur, is a long way off (Chart 10).

OPERATIONAL AUTONOMY IS ON RADAR SCREENS, BUT DISTANT

Which statement would best describe your expectation about the state of future factories and plants by 2030?

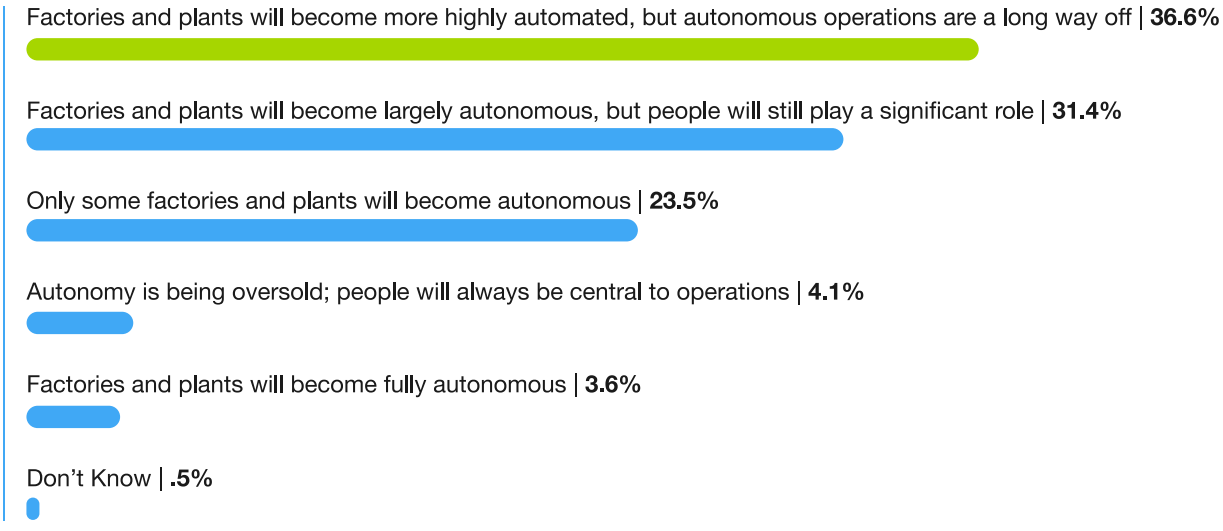


Chart 10

No doubt influencing sentiments about operational status are perceptions about the manufacturing workforce's readiness for digital transformation by 2030. A strong majority, 63.3%, assess their workforces as being "moderately ready". But nearly one-quarter say their workers will be "very ready".

To get to a desired state of digital readiness as well as deal with persistent labor shortages, 74% of survey respondents say they are investing in upskilling their workforces. Closely following, at 72.7%, is investing in automation. But the survey results indicate that, rather than putting their eggs in just one or two baskets, manufacturers are looking at a set of actions to address workforce needs, including allowing virtual working opportunities, creating a more diverse and inclusive workforce, and rethinking the work/life balance equation (Charts 11, 12).

MOST EXPECT TO BE 'MODERATELY READY' FOR DIGITAL CHANGE BY 2030

How ready will your workforce be for digital transformation by 2030?

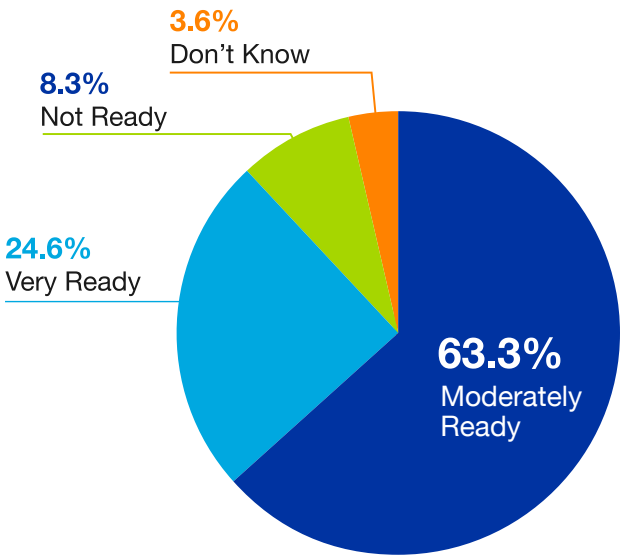


Chart 11

UPSKILLING, AUTOMATION LEAD WAYS TO ADDRESS LABOR SHORTAGES

What strategies are being pursued by your company to address labor shortage issues headed into 2030?

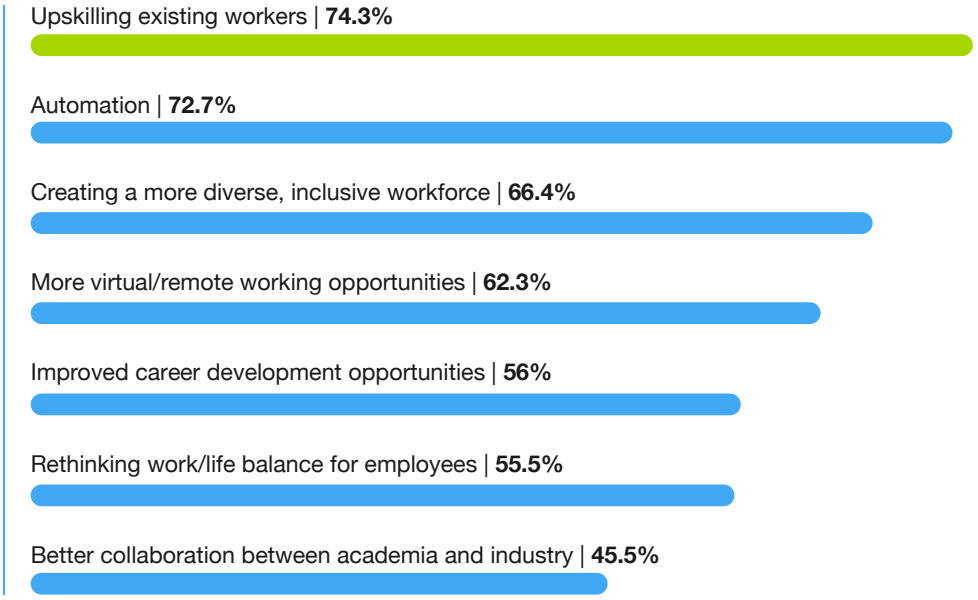


Chart 12

The survey also sought to assess perceptions about whether the industry needs a code of ethics on AI, whether manufacturers would on-shore production facilities, the relationship between sustainability and corporate culture, and how pronounced they expect cybersecurity to be by 2030.

Given concerns that AI could be used inappropriately to surveil and categorize people, it is no surprise that a powerful majority of survey respondents, 75.9%, say the manufacturing industry needs a code of ethics or conduct for its use. But respondents are somewhat divided on how that code should be devised. About 34% of survey takers say that a code should be developed by industry participants working together. Another 33% say it should be devised by industry, academia, and government. Very few want the government alone to devise rules (Charts 13, 14).

SOLID MAJORITY WANTS A CODE OF ETHICS FOR AI

As artificial intelligence grows in sophistication do you believe that manufacturers should adopt a code of ethics or conduct for its use?

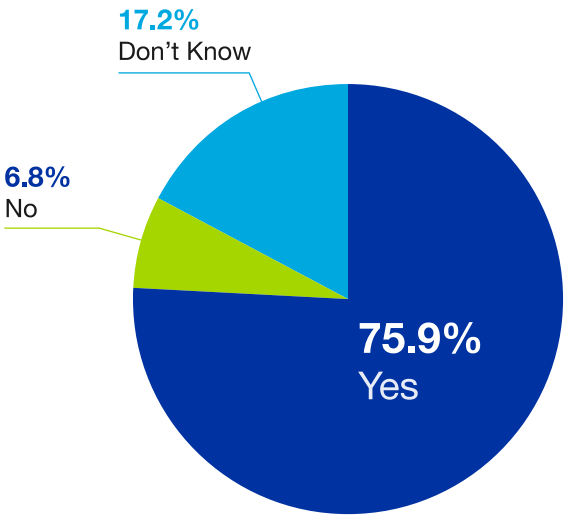


Chart 13

Chart 13

AN ETHICS CODE SHOULD BE DEVISED COLLABORATIVELY

If yes, how should a code of AI ethics or conduct be devised in manufacturing?

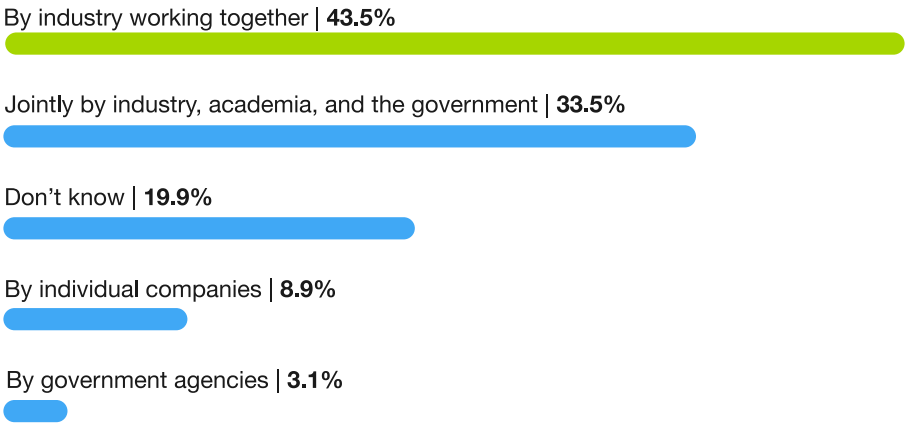


Chart 14

On the subject of whether they see their production and supply chain networks changing by 2030, once again respondents take different paths. The option of more near-shoring, at 35.6% of the sample, garnered the highest response. More on-shoring of facilities garnered 27.7%, as did no changes planned. Only 8.9% said they would engage in more off-shoring (Chart 15).

MORE THAN ONE-THIRD SEE INCREASED NEAR SHORING

How do you see your production and supply chain networks changing by 2030?

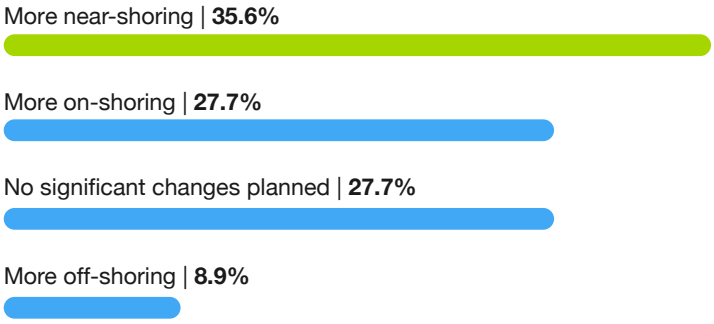


Chart 15

Sustainability is clearly being thought of as a critical component of corporate culture. Just over 73% say it has to be engrained in corporate culture much like safety or continuous improvement. And just over one-fifth expect to reach their Net Zero targets by 2030 (Charts 16, 17).

CULTURE SEEN AS KEY TO SUSTAINABILITY

How do you see your company's future position on sustainability?

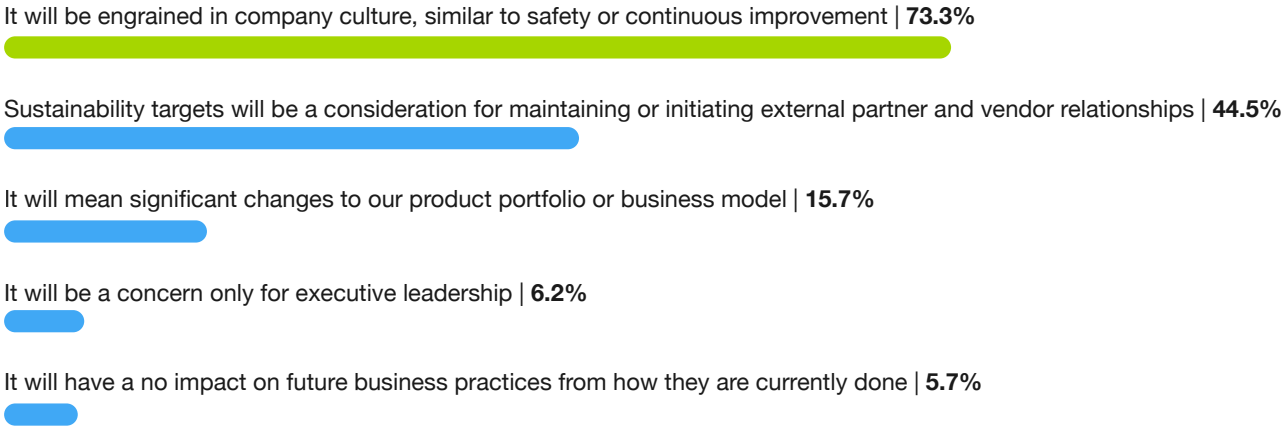


Chart 16

MOST DON'T EXPECT TO HIT NET ZERO TARGETS BY 2030

Does your company already plan to reach a Net Zero target by 2030?

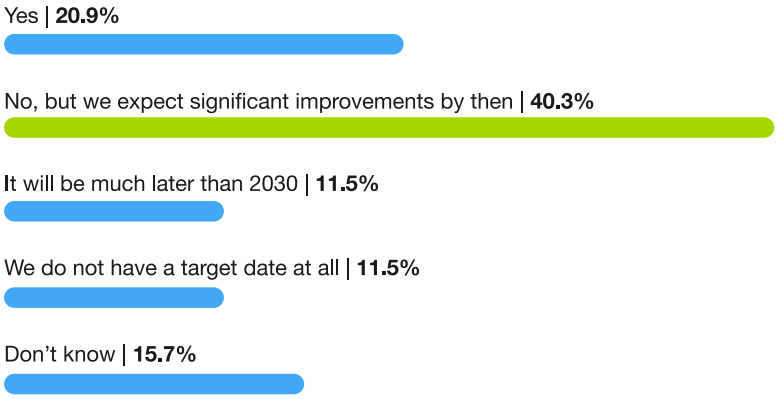


Chart 17

Interestingly, expectations with regard to cyber disruptions reflect a finding revealed in MLC's survey on cybersecurity earlier this year – that manufacturers have made much progress in developing effective cyber strategies and approaches to defend their companies against attacks.

By 2030, more than one-third of survey respondents expect that they will be less vulnerable to attacks than they are today. Only 15.7% say they expect to be more vulnerable to attacks (Chart 18).

CYBER VULNERABILITY PROJECTED TO BE A MIXED BAG

What do you expect your company's exposure to cyber disruptions to be by 2030?

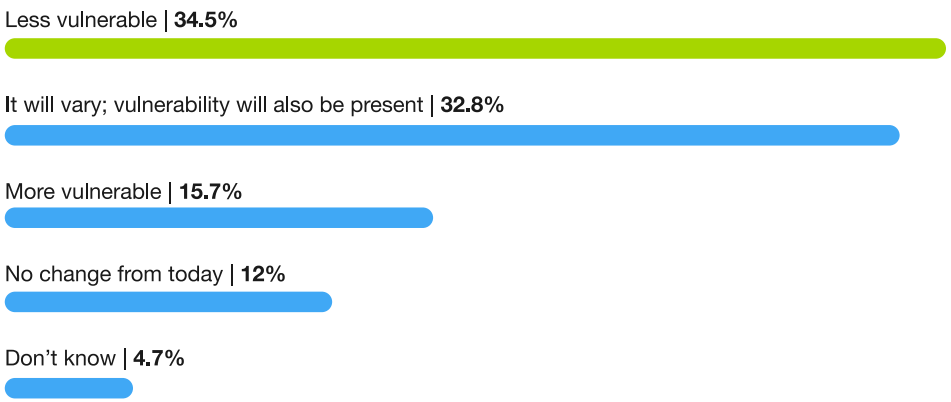


Chart 18

SECTION 4

The Challenges Ahead

While the accelerated adoption of digital technologies may hold the promise of helping to alleviate the labor shortage by replacing many routine and repetitive jobs over the next few years, the scarcity of manufacturing labor is still predicted to be the most significant challenge for manufacturers by 2030, cited by almost half of the respondents (Chart 19). The difference, perhaps, may be the type of employees needed by the end of the decade, when digital skills will be in increasingly high demand.

WORKFORCE ISSUES TOP LIST OF CHALLENGES

How would you assess the significance of the following challenges facing the manufacturing industry by 2030? (% is highest level of significance)

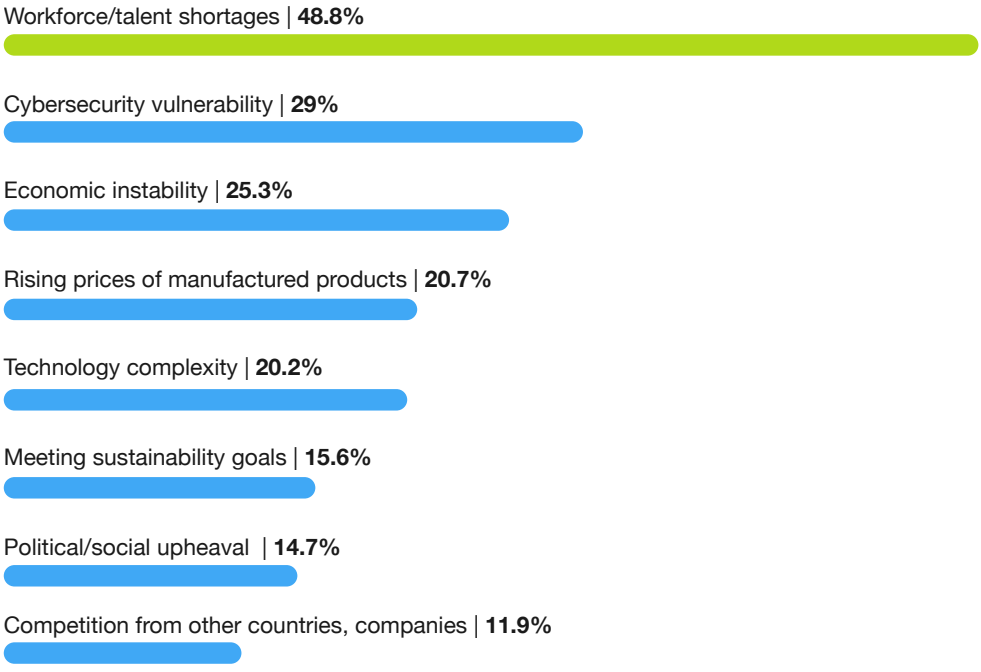


Chart 19

Many executives also see a range of other challenges continuing to concern their leadership teams by 2030, including cyber vulnerabilities as digital platforms and networks become ever more pervasive (29%), economic instability, including sudden disruptions that may impact future plans (25%), rising prices for manufactured products (21%), and increasing technology complexity as companies try to master the tsunami of data generated by multiple new digital technologies across their organizations and partner ecosystems (20%).

While many manufacturers are optimistic about the future of the industry, they also remain realistic about some of the potential challenges they may face along the road ahead and are aware that they will need to factor these risks into their future planning to help mitigate them as they emerge.

CONCLUSION

As the results of this exclusive MLC survey clearly indicate, the future of manufacturing is rich in opportunities for the years ahead to 2030 – opportunities to achieve greater efficiencies in manufacturing operations, to drive competitiveness and growth through innovation, to improve resiliency across partner ecosystems, to empower workforces to be more digitally effective, and to become increasingly sustainable in the products they make and the way they make them.

The power of digital transformation lies at the core of many of these opportunities, with manufacturers continuing to improve their levels of digital maturity along the way, better adapting to new digital models of doing business, and more focused than ever on extracting more business value from the technologies they invest in. And they are approaching that journey with a more informed and enlightened understanding of both what's possible, and what the possible challenges may be.

By 2030, it seems, manufacturers will have not only achieved new levels of performance and productivity, but also be better prepared for whatever the following decade may bring.

FUTURE OF MANUFACTURING PROJECT PARTNERS

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Survey Research, Analysis and Writing Team

David R. Brousell
Co-Founder, Vice President and Executive Director
Manufacturing Leadership Council

Paul Tate
Co-Founding Executive Editor and Senior Content Director
Manufacturing Leadership Council

Founded in 2008 and now a division of the National Association of Manufacturers, the Manufacturing Leadership Council's mission is to help manufacturing companies transition to the digital model of manufacturing by focusing on the technological, organizational and leadership dimensions of change. With more than 2,500 senior-level members from many of the world's leading manufacturing companies, the MLC focuses on the intersection of advanced digital technologies and the business, identifying growth and improvement opportunities in the operation, organization and leadership of manufacturing enterprises as they pursue their journeys to Manufacturing 4.0. For more information, please visit www.manufacturingleadershipcouncil.com.

The National Association of Manufacturers is the largest manufacturing association in the United States, representing small and large manufacturers in every industrial sector and in all 50 states. Manufacturing employs more than 12.7 million men and women, contributes $2.71 trillion to the U.S. economy annually and accounts for 58% of private-sector research and development. The NAM is the powerful voice of the manufacturing community and the leading advocate for a policy agenda that helps manufacturers compete in the global economy and create jobs across the United States. For more information about the NAM or to follow us on Twitter and Facebook, please visit www.nam.org.

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