

REDEFINING MANUFACTURING FOR THE DIGITAL ERA.

How cloud can help the industry prepare for the future.

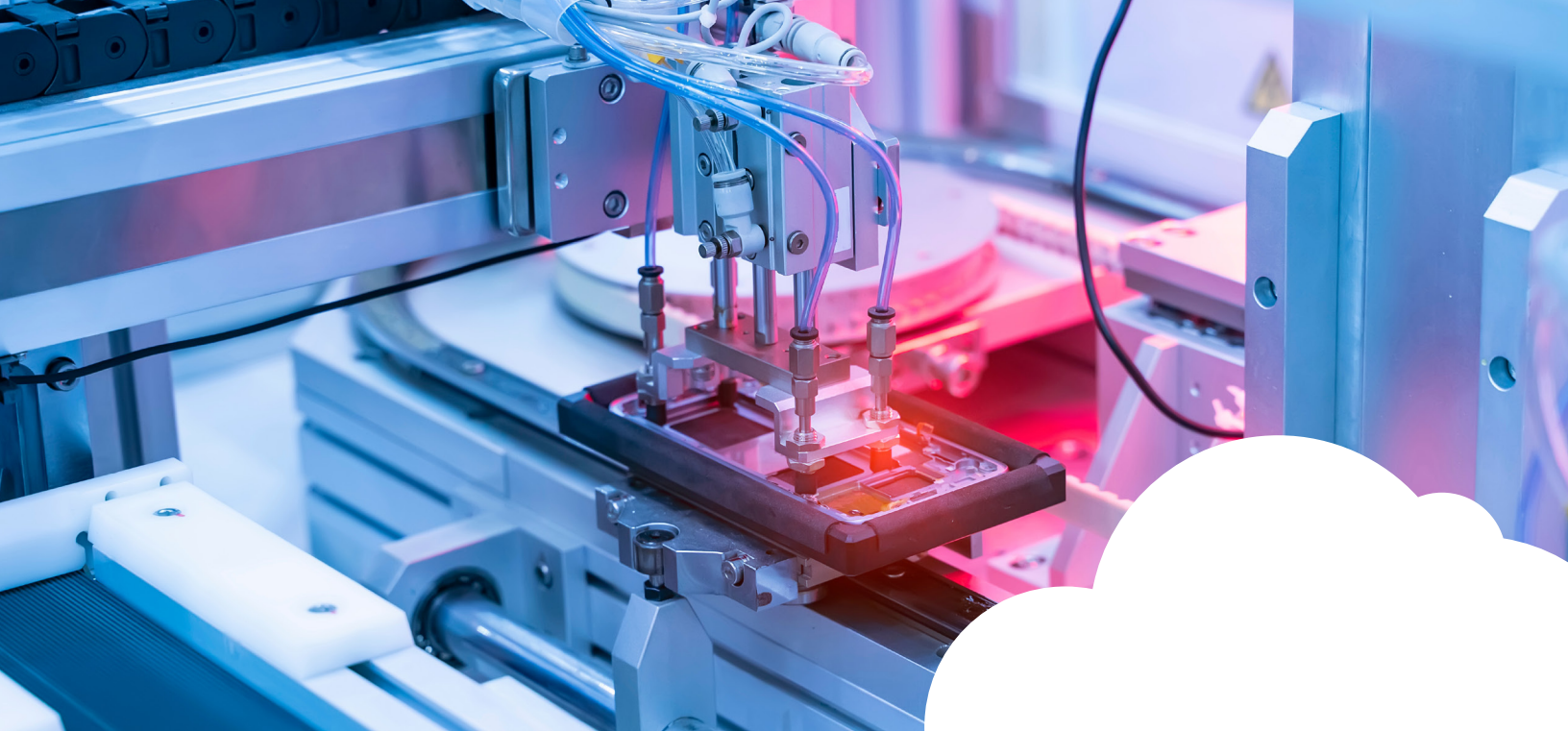


Manufacturers fast-tracked their digital and business transformations to mitigate the impacts of the COVID-19 pandemic and related supply-chain issues, and cloud was key to this rapid transformation. These companies continue to adopt cloud throughout their operations to stay agile, support remote work, and offer cloud-based products.

In fact, manufacturers lead all other industries in adopting cloud platforms, according to [Wipro FullStride Cloud Services research](#). Manufacturers at the head of the pack — those with the highest level of cloud adoption — are likelier than others in the industry to use cloud to modernize and optimize their core activities to be more cost-effective. For these innovators, cloud drives growth and helps create a digital, collaborative manufacturing environment that can respond to change faster and pave the way for the future.

Manufacturing cloud leaders' successes make their practices worth a deeper look. For leaders, cloud provides a foundation for other benefits, including new products, improved customer service, and cybersecurity. Leaders spend more on cloud, but get a bigger payoff because of it: a cloud ROI of 42%, almost double that of beginners (24%), and roughly 30% more than that of intermediate cloud users.

Supply-chain issues and other challenges that manufacturers have been dealing with during the pandemic aren't expected to go away anytime soon. The pressures make it critical for other manufacturers to advance their own cloud maturity by following in leaders' footsteps. To achieve the same level of success, manufacturers can work with a partner, combine cloud with advanced technologies such as artificial intelligence (AI), and invest cloud savings into building more cloud initiatives to attain a higher ROI. If they do, they can turn cloud into the innovation platform of the future, one that drives resiliency, growth, and revenue.



What Manufacturing Cloud Leaders Get Right

Manufacturing has proportionately more cloud leaders than any other industry, 32% vs. 18%. We calculated that by looking at the cloud maturity of companies in the industry based on the progress they have made migrating processes to cloud or adopting cloud-native applications; the percentage of their total applications that are cloud based; and the number of advanced technologies they use with cloud (see the “Methodology” sidebar).

Size partly explains why so many manufacturers are cloud leaders. According to Wipro research, larger enterprises have more resources to invest in cloud initiatives, and their cloud adoption is more advanced as a result. The 130 manufacturers we polled fit that description. Those companies have an average annual revenue of close to \$23 billion, making the sector one of the larger industries we evaluated. Their profit margins average close to 10%, slightly higher than the 9.6% cross-industry average, giving them more discretion to spend on their cloud endeavors.

Maturity, manufacturing vs. all industries

Stage	Manufacturing	All Industries
Beginner	27%	32%
Advancer	42%	50%
Leader	32%	18%

The pandemic forced industries of all types to work in new ways. Some manufacturers took the opportunity to modernize, increasing their reliance on cloud-based analytics and real-time information to manage supply chains, for example. Of the manufacturers that meet the definition of cloud leaders, 44% used the pandemic as an impetus to accelerate moving operations and applications to cloud, compared with 29% of cloud beginners and intermediate users. In addition, cloud leaders were likelier than other manufacturers to say that the pandemic provided opportunities to offer cloud-based products (44% vs. 18%), showed the importance of working in an agile way (63% vs. 53%), and caused them to rethink their cloud organizations (17% vs. 9%).

Top pandemic impacts by maturity (% agreeing)

The COVID-19 pandemic has...	Leaders	Others
Shown importance of cloud usage for agility	63%	53%
Opened opportunities for cloud products	44%	18%
Accelerated timetable for moving to cloud	44%	29%
Elevated cloud priority for remote work	32%	28%
Caused us to rethink our cloud organization	17%	9%

Cloud leaders, more than other companies in the manufacturing sector, follow a specific approach to cloud adoption that sets them apart and positions them for greater ROI. This approach incorporates five specific strategies that drive above-average results, offering a roadmap for other manufacturers to emulate to improve their own cloud practices.

Using Cloud Across Business Functions

Manufacturers overall, and cloud leaders in particular, have adopted cloud for critical business functions in order to make factories more responsive to customer needs and market trends. Cloud leaders especially appreciate the data-based benefits that cloud applications offer, including better decision-making. Leaders are ahead of their manufacturing industry peers in using cloud for customer management and experience (44% vs. 20%), IT management and operations (66% vs. 53%), and procurement and supply-chain operations (49% vs. 39%). According to the chief information officer of one German manufacturer, improving visibility into the supply chain has been the company's most successful use of cloud to date.

Areas where cloud leaders are ahead in adopting cloud

	Cloud leaders	Other manufacturers
IT management and operations	66%	53%
Procurement and supply chain	49%	39%
Customer management and experience	44%	20%
Product development, R&D, and innovation	37%	29%
Sales and business development	32%	28%
Quality control	24%	21%



Cloud leaders in particular have adopted cloud platforms for critical manufacturing functions.

Regarding customer experience, manufacturers are using cloud to improve both customer acquisition and customer retention. One automotive OEM uses cloud to ensure that customers anywhere in the

world can easily and quickly download product catalogs and other materials without lag times caused by latency issues. Another auto OEM uses cloud-supported augmented and virtual reality technologies along with computer vision to improve vehicle service. These technologies have helped the company reduce vehicle off-road days (VOR), a key metric of customer satisfaction.

Cloud leaders say that cloud computing improves multiple aspects of their customer experience, including delivery times, customer satisfaction, and customer information systems. It also helps develop more customer-focused solutions. “We are able to offer customers a set of powerful tools to use big data to enhance their operations,” the chief technology officer of a U.K. manufacturer said.

In addition to having proportionately more cloud leaders, manufacturing leads all industries in the sheer number of applications and initiatives launched. The sector’s cloud leaders have implemented an average of about 47 cloud initiatives — including 28 for central IT and 19 for business units. That compares with an average of 39.5 cloud initiatives for all manufacturers and an average of 39 for all other industries. Cloud leaders run 59% of their applications in cloud today and expect that number to jump to 79% in two years — no doubt because of the positive benefits they’ve produced — compared to industry averages of 44% and 61% respectively.

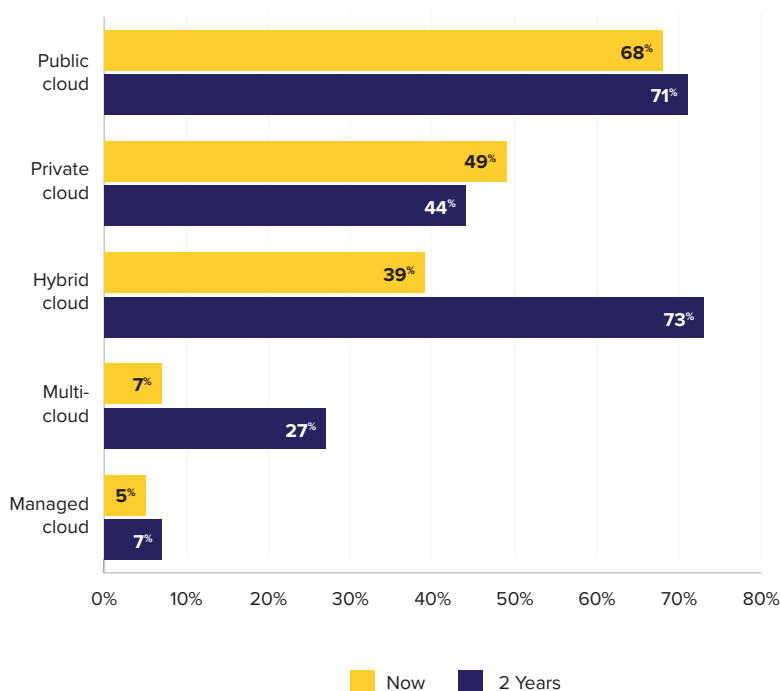
Cloud leaders are all-in on migrating to cloud across all areas of the business, perhaps because of the successes that they’ve had so far. They are twice as likely as manufacturers as a whole to have fully implemented or be in the advanced stages of implementing cloud-based data centers, core process migration, and cloud-native application development. In two years, the vast majority — close to 80% or more — expect their cloud use to be fully optimized across all those processes, a sign that they see cloud as the basis for the smart factory of the future.

Building a Foundation for the Future

It's not uncommon for manufacturers to maintain the same physical infrastructure for decades to get the most out of what can be sizeable capital expenditures. Cloud computing is a way to speed up the equipment refresh cycle. Manufacturers overall expect a substantial increase in their use of hybrid, multi-, and managed cloud architectures during the next two years to bridge the gap between their current infrastructure shortcomings and the foundation they need for ongoing success.

Public cloud is the most popular option among manufacturers of all cloud maturity levels and is expected to remain so in the future. Over time, though, most cloud leaders expect to gravitate to hybrid, multi-, and managed cloud models. Hybrid provides the optimal cloud computing environment for workloads at a German manufacturer, the company's CEO said. When a Swiss manufacturer consolidated business applications onto a hybrid-cloud architecture, the company's enterprise resource planning (ERP) tools were "revitalized" and should result in increasing returns, according to the company's chief strategy officer.

Percentage of cloud leaders using architectures now vs. in 2 years



Most cloud leaders expect to gravitate to hybrid, multi-, and managed cloud.



Spending More to Save More

As large companies, manufacturers spend more on cloud initiatives than smaller enterprises, and manufacturing cloud leaders typically spend more than the average on IT. Leaders' cloud costs are also more than one and a half times those of cloud beginners.

Manufacturers overall allocate approximately 5% of their IT spending to cloud initiatives. One explanation for this relatively low proportion of IT spending could be because leaders have already made substantial up-front investments ahead of others in the sector.

For many companies in the industry, including the leaders, adopting cloud is still a cost play. Of the leaders, 55% say cloud has directly led to lower costs, compared to 41% of beginners. More leaders than beginners also credit cloud with helping them move products to market faster, improve decision-making, make risk management more effective, support teamwork and corporate culture, and bolster shareholder value.

The current benefits cloud leaders achieve more than beginners

Decreased costs	55%
Improved planning/decision-making	51%
More effective risk management	40%
Greater teamwork/corporate culture	33%
Accelerated time to market	28%
Greater shareholder value	20%

Cloud leaders' expected benefits in two years

Increased revenue	66%
Improved planning	66%
Greater shareholder value	46%
Greater ability to scale	44%
Reduced carbon footprint	37%
Stronger reputation	29%

In the future, cloud leaders believe their cloud use will evolve to include more non-cost benefits, including increased revenue, a stronger reputation, a greater ability to scale, and a reduced carbon footprint. A Swiss manufacturer implemented cloud applications for product innovation and expects returns to rise in the near future because of it, according to the company's chief technology officer.

However, cloud leaders don't have to wait for the future for higher revenue growth from cloud use. Those companies report a close to 5% revenue gain from using cloud, more than the 4% average, or a 2% increase for cloud beginners. For more than half of manufacturers with high cloud maturity, the technology has led directly to faster time to market, new markets, and better market position. And 47% say cloud has helped them launch new products and services, increase customer retention, and enter new client segments.

Investing in High ROI Initiatives



By using cloud platforms across key business functions and adopting advanced technologies to give their cloud efforts more firepower, manufacturing cloud leaders achieve almost double the ROI of beginners (42% vs. 24%), and roughly 30% more than intermediate-level cloud users. That in itself should motivate those new to cloud to expand their investments to broaden their own cloud use.

Manufacturing cloud leaders' ROI is good, but it could be even better. That's because they and other manufacturers tend to focus more on cloud's costs than its benefits. Since manufacturers of

all cloud maturity levels continue to see cloud initiatives as a major cost play, cost remains a determining factor when they calculate the ROI of their cloud endeavors. The top costs that cloud leaders consider more than others when calculating ROI are application licenses, governance, and data storage fees. In addition, all manufacturers consider modernization costs.

Top benefits leaders consider more than others in ROI

Benefits	% citing	% ppt diff.
Greater shareholder value	41%	+19
Reduction in cybersecurity costs	34%	+18
Decreased IT costs	78%	+17
Reduced carbon footprint	39%	+15
More effective risk management	56%	+12

Top costs leaders consider more than others in ROI

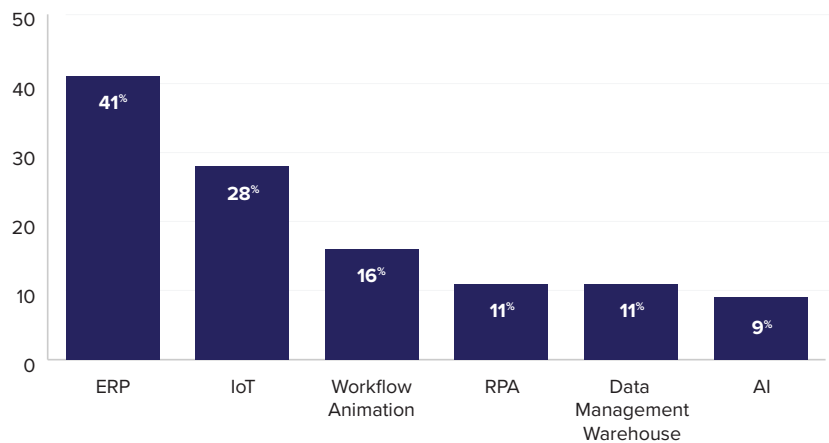
Costs	% citing	% ppt diff.
Cloud-based app licenses	46%	+22
Establishing governance standards	66%	+6
Data storage fee	68%	+4
Modernization costs	73%	+1
Managing cloud implementation/usage	44%	+1

Pairing Cloud Platforms with Advanced Technologies

To build future-ready factories, leaders are combining cloud platforms with advanced technologies, in particular AI, data management warehousing, ERP, and the internet of things (IoT). Two-thirds or more of manufacturing cloud leaders employ these tools, and 45% or more use workflow automation and robotic process automation (RPA). Pairing cloud with newer technologies allows companies to adopt digital-era processes that accelerate innovation, which can improve production, supply chains, and delivery to end customers.

One U.S. manufacturer pairs cloud with AI for autonomous driving functionalities. According to the chief technology officer of a Germany company, the combination of cloud and AI “opens up completely new possibilities to achieve greater sustainability with improved resource utilization, and thus helps us serve the needs of our customers more precisely.”

Cloud leaders' use of advanced tech tools ahead of the industry average



In the next two years, those at the beginning or intermediate stages of their cloud maturity expect to follow the leaders in adopting more advanced technologies to pair with cloud operations, including newer technologies such as 5G, open-source data systems, edge computing, and grid computing. With these advanced technologies, manufacturers can accelerate digital processes and enhance customer engagements. One automotive OEM, for example, combines cloud with edge computing to allow customers to track the status of a vehicle they've purchased as it moves through the production and delivery pipeline.

Greater dependency on cloud and advanced technologies creates risks, though, and cloud leaders are developing cybersecurity capabilities and the teams to support them (see the sidebar, “Strengthening Cybersecurity as Cloud Use Grows”).

Strengthening Cybersecurity as Cloud Use Grows

When manufacturers switched to cloud-based applications during the pandemic to support digital operations and remote work, it ramped up the need to guard those functions from online threats.

Protecting against ransomware and other cyberattacks will be even more important as companies add more cloud applications and initiatives for vital business functions, transition from private cloud to more public or hybrid cloud architectures, and pair cloud operations with advanced technologies such as IoT and 5G.

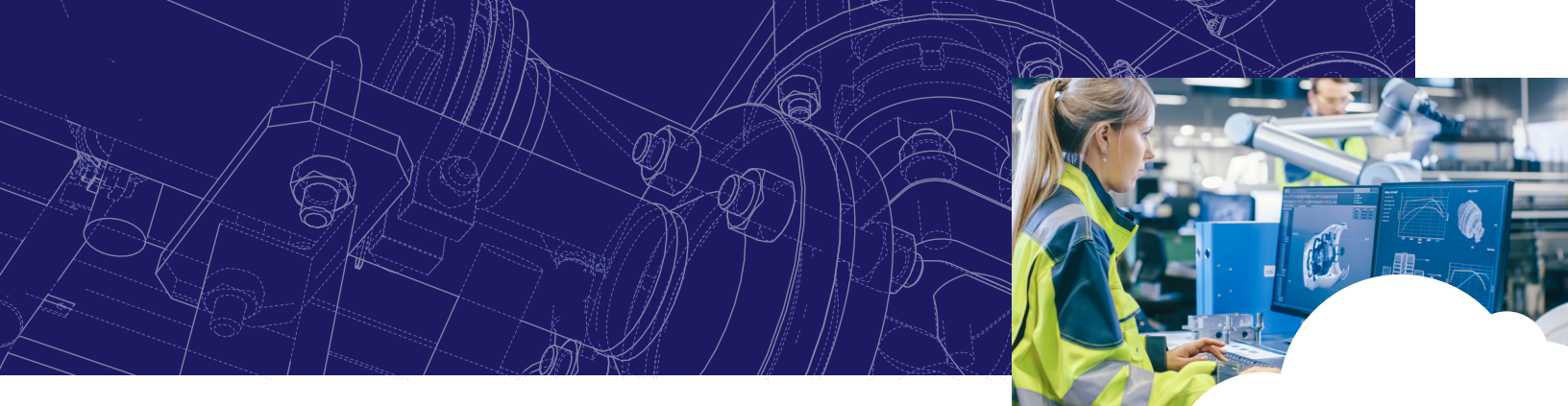
Cybersecurity is among the top three challenges that cloud leaders cite when moving to cloud, along with regulations and inadequate IT and data systems. Until now, however, only 29% of cloud leaders and 28% of all manufacturers attest to making “significant progress” in cloud-based cybersecurity and risk management. Over the next two years, 45% of all manufacturers expect to have made substantial headway in bolstering their efforts, and 41% plan to increase cybersecurity spending. “The cloud has revolutionized our cybersecurity program to prevent legacy threats,” the chief operating officer at one U.K. manufacturer said.

Effective cloud security and governance are so important that 61% of cloud leaders have taken steps to develop cybersecurity teams, compared to 40% of cloud beginners. With more invested in cloud applications and initiatives, cloud leaders need to ensure they have the human resources in place to protect their infrastructure. Cloud leaders are also more likely than cloud beginners to factor the cost benefits of cybersecurity into their cloud ROI and align cybersecurity strategies with their overall digital transformation plans.



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By contrast, cloud beginners are more likely than leaders to focus their efforts on basics such as creating a cybersecurity governance policy, training staff, auditing systems, and improving processes.



How to Take Cloud to the Next Level

Manufacturers looking to follow in cloud leaders' footsteps to increase or improve their cloud adoption will need to craft a well-founded strategy that addresses the primary challenges. By anticipating potential trouble spots and proactively developing plans to address them, companies can accelerate their success.

Work with a partner. A savvy partner can help a manufacturer identify the appropriate cloud architecture and technology for their particular situation, as well as the use cases or applications that would be the most beneficial to launch as a pilot. A partner also can help an organization analyze its existing systems to determine if functions can be moved directly to a cloud-native software-as-a-service (SaaS) environment or if they would be better off hosted in a hybrid cloud infrastructure.

Although the ideal partner will be different for each organization, it should have a few essential qualities, including a willingness to share its knowledge in a way that propels the company toward its goals. A partner should have experience working with IT teams and with business units, since more business units are using cloud apps and managing the apps that they use. A partner should be certified in cloud systems that a manufacturer is considering, and it should be able to explain the typical implementation roadmap and the changes needed to maximize the value of switching to a new system. A way to maximize results is to set up contracts so a partner is paid for reaching specific milestones in the transformation, rather than on the basis of time and materials.

Invest cloud savings to earn a greater ROI. Companies can use the savings from cloud-

based cost efficiencies to further adopt cloud applications across business areas, as cloud leaders' experience has shown that applying cloud to key business functions yields direct benefits. Companies should also use their savings to pair cloud platforms with more advanced technologies, including relatively common ones such as [AI](#) and data management warehousing, as well as more emerging technologies, such as [5G](#) and [edge computing](#). [Digital twins](#) can also be used to create cloud-based models for every machine in a factory to improve decision-making and analyze a system's efficiency and effectiveness without interfering with its operations.

Keep an eye on the future. Manufacturers in general expect to move more of their business to cloud in the next two years. Cloud will continue to deliver Industry 4.0 innovations and market advantages, requiring continual cybersecurity upgrades. With pandemic-related subvariants causing further health concerns and supply-chain disruptions continuing, developing further cloud maturity can help strengthen resiliency and keep operations on course.

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As manufacturing cloud leaders have shown, moving key functions to cloud can lower costs and improve efficiencies and customer service. By embracing cloud, manufacturers can gird themselves for supply chain struggles and other unforeseen issues, while simultaneously modernizing operations and increasing growth. Following cloud leaders' strategies can help beginning and intermediate cloud users accelerate their own cloud journeys and set themselves up for future success.

Methodology

The insights shared in this report are based on a survey conducted for Wipro between June and September 2021 by **ThoughtLab Group** to analyze the current and future patterns of enterprise-level cloud adoption. The overall respondents included 1,400 executives at organizations ranging in size from less than \$5 billion in annual revenue to more than \$20 billion, with the largest share in the mid-sized category. The survey included 130 manufacturing companies in Australia, France, Germany, Switzerland, the U.K., and the U.S. All manufacturing industry respondents are “knowledgeable” or “very knowledgeable” about the use of cloud technologies at their respective companies, with the largest portion of respondents holding the title of chief technology officer (23%) or chief digital officer (15%). Additional insights come from responses to open-ended questions.

To calculate cloud maturity, we analyzed each company to determine the cloud progress it is making, the percentage of its applications that operate in cloud, and the number of advanced technologies it uses in conjunction with cloud. Based on those criteria, we classified the top 32% of manufacturing respondents as cloud leaders, the middle 42% as intermediate users, and the other 27% as beginners.

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