

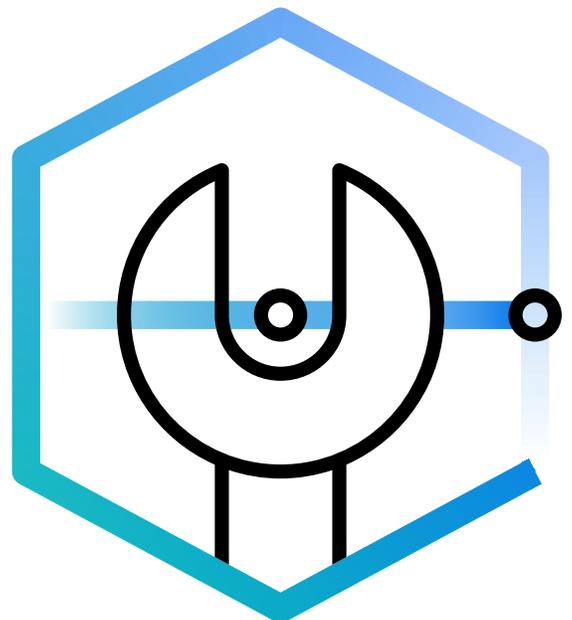


OXFORD
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Greater than the sum of their parts

How cloud and AI work together
in the manufacturing sector

In collaboration with:



Introduction

For manufacturers, data has become a resource just as important as raw materials or machinery. To derive the most value from that data, many are using cloud and AI technologies—tools increasingly relied upon to facilitate advanced automation and next-generation robotics, deliver customized products, and expand operating efficiencies from the supply chain to the shop floor.

Oxford Economics and IBM recently surveyed 6,000 senior IT executives, including 1,200 from the manufacturing sector, to better understand strategies for cloud and AI adoption. Key findings from our analysis of manufacturing respondents include:

- Manufacturers are steadily adopting cloud, with many shifting to a hybrid or hybrid multicloud environment.
- Process automation is a focus for the sector, and a primary motivation behind AI implementation. Robotic process automation (RPA) is the focus of most AI investments, and the automation of tasks and decisions is a key expected outcome from transformation efforts.
- Organizations struggle to manage change and develop adoption plans, which can present barriers to cloud and AI implementation; budget and workforce concerns are also an obstacle for smaller manufacturers.
- Cloud is seen as critical to AI strategy in a range of areas, and already is contributing to ROI in some important ways.

About the survey

Total sample: 6,000 CIOs, CTOs, VPs of IT, and equivalent titles from organizations using cloud and AI in some capacity

Sectors covered: Manufacturing, retail, telecommunications, financial services, and healthcare providers and payers

Countries covered: Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Costa Rica, France, Germany, India, Italy, Japan, Mexico, New Zealand, Panama, Peru, Puerto Rico, Saudi Arabia, Singapore, South Africa, South Korea, Spain, United Arab Emirates, United Kingdom, and United States

Dates fielded: May through August 2020

The big shift to cloud

Manufacturers are steadily moving applications to the cloud, especially to hybrid or hybrid multicloud environments. Tactics and challenges tend to vary by company size, with the largest firms furthest ahead.

Overall, more than one-quarter (28%) of our manufacturing sample qualified as **Cloud Strategists**, a group reporting higher-than-average use of cloud in the past, present, and future; 16% qualified as **Cloud and AI Unifiers**, a group further along in using both technologies. Members of these two groups are more likely to say their technology infrastructure is effective, and those furthest along are more likely to say cloud has accelerated ROI in a range of areas. However, even early adopters have work to do before they can realize substantial business and technical from their combined cloud and AI projects.

The shift to cloud hosting environments has been under way for some time. Just under one-quarter (23%) of applications, on average, were in the cloud two years ago; manufacturers say that number has risen to 40% today and is expected to reach 58% by 2022. The largest manufacturers in our survey (those with more than 20,000 employees) say 42% of their applications are in the cloud today, compared to 37% of the smallest manufacturers in our survey (500 to 999 employees).

Manufacturers have a preference for hybrid environments (hybrid cloud or hybrid multicloud). When compared with their peers in other industries, manufacturers are more likely to use these approaches. Nearly two-thirds (61%, vs. 50% of others) were in a hybrid environment two years ago, and that number has risen to 71% today (vs. 62% of others). And the largest manufacturers are more likely than the smallest counterparts to be in a hybrid cloud environment today (73% vs. 61%)—but more than one-fifth of the largest firms remain in an all-private environment, suggesting that they may have particular IP or security needs.

Hybrid multicloud users are more satisfied with that environment than users of other cloud types are with their hosting choices. Nearly half (48%) of hybrid multicloud users from the manufacturing industry say they are highly satisfied with their hosting environment, while only 24% of private cloud users, 23% of hybrid cloud users, and 10% of public cloud users cite the same levels of satisfaction.

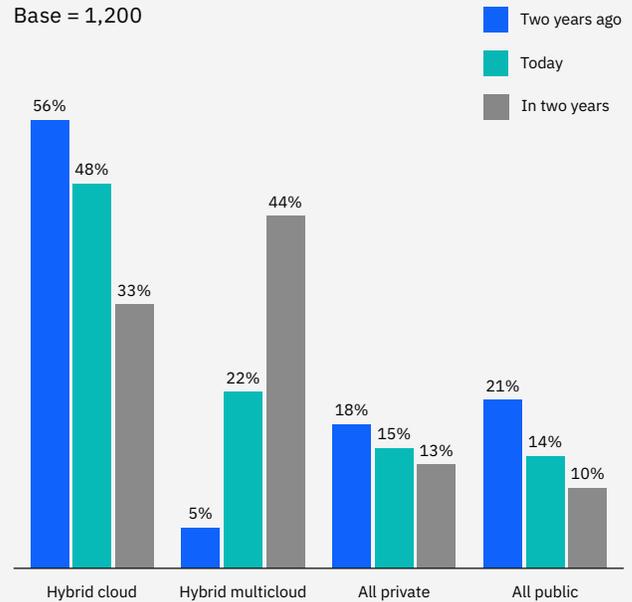
Organizational challenges, rather than technological ones, tend to stall further cloud adoption for manufacturers. Difficulty creating and deploying an adoption plan is the top-cited barrier to cloud implementation in the sector. Manufacturers also face difficulties determining where applications should be hosted—which can be a technical as well as a strategic question. Challenges vary by company size, with the smallest manufacturers more likely than others to cite budget issues and a lack of skills in the organization.

Ultimately, quantifiable returns drive cloud strategy. Possible ROI is cited as the manufacturing industry’s top influence on decisions about where to build and host applications, followed by the complexity of the business application, the relative need of scalability, and the robustness of current technology infrastructure.

Fig. 1: The move to hybrid multicloud

Q: Which best describes your approach to cloud usage?

Base = 1,200



“Our [cloud] strategy is dynamic. At the end of the day, it’s got to be quality of the solution, and of course, total cost of ownership.”

— **Gus Shahin**
Chief Information Officer, Flex

AI-driven efficiency

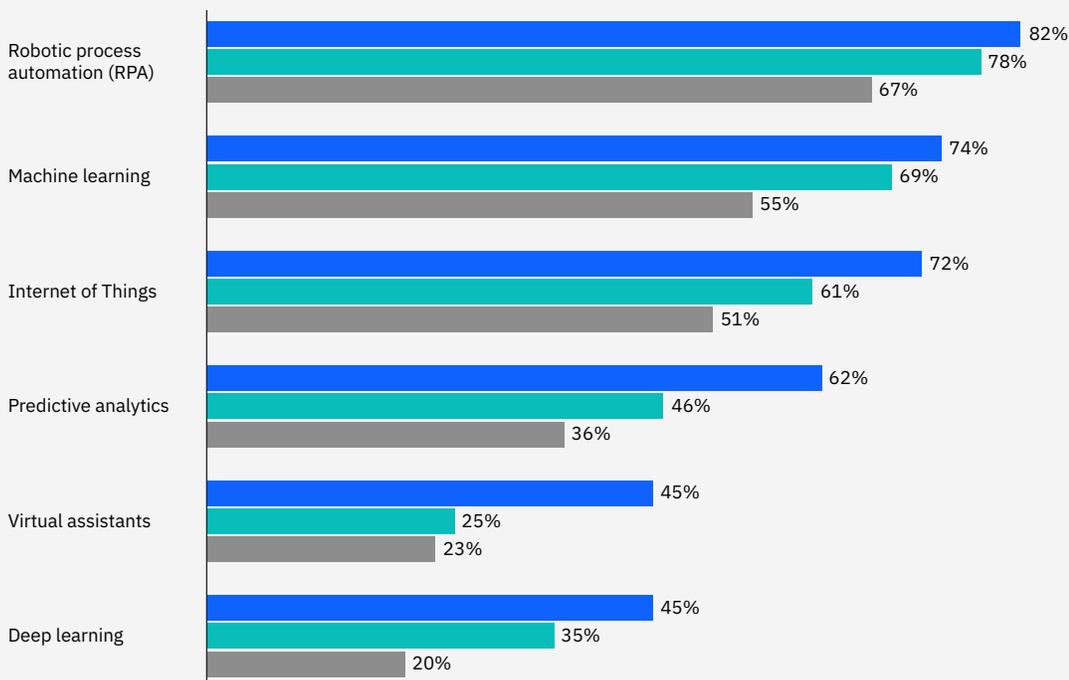
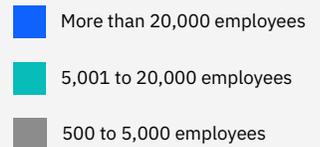
For companies like Flex, a Singapore-based manufacturer with more than \$25 bn in revenue, using AI to optimize data flows and maintenance is critical. “We are collecting logs from every single piece of hardware in the data center,” says Gus Shahin, Chief Information Officer, “and our algorithms are basically predicting when something will fail or when a certain server is going to go out.” For Shahin, this AI application has been successful; “[AI] has been in play and has been really great for us.”

Manufacturers cite modernizing the business and automating workflows and processes as top driving factors for their AI implementation; they also are more likely than others to have invested in robotic process automation (RPA)—77% say so, vs. 40% from other industries. Investments in machine learning and Internet of Things—both of which should support process and product improvements—are also common, cited by 68% and 63% of manufacturers, respectively.

Fig. 2: Large firms lead the way in AI investment

Q: In which of the following AI domains is your organization investing? Top six responses shown.

Base = 1,200



Our survey shows that large manufacturers tend to be further ahead in their adoption of emerging technologies. More than four in five (82%) of the largest manufacturers are investing in RPA, vs. 74% of smaller organizations.

But despite widespread adoption of emerging technologies like AI across industries, many organizations are plagued by familiar challenges as they graduate from theory to practice. Top barriers to AI adoption include difficulty

managing change (37%) and creating an adoption plan (32%), along with difficulty building models with multiple AI providers (31%). The smallest manufacturers in our sample are again more likely to cite budget issues as a constraint—but not a lack of desire to use the technology or understanding as we may have seen in the past.

The cloud and AI payoff

Manufacturing organizations are increasingly comfortable with the idea of integrated technology, but practical implementation remains a barrier for most. Some are already realizing value from their efforts, however, with manufacturers reporting technical ROI in terms of process automation—typically one of their main areas of focus.

80% of manufacturing executives see a unified platform for cloud, data, and AI as critical to long-term success.

A holistic approach to technology implementation is emerging as a priority for many organizations. More than three-quarters (80%) of manufacturing executives see a unified platform for cloud, data, and AI as critical to their organization's success in the long term—a higher percentage than the overall sample. A similar number (79%) say cloud is a critical foundation for data management and AI.

Manufacturers see a clear use case for employing cloud to enable AI. The top advantages include better-quality products or services (cited as a major advantage by 35%), the development of new products or services (32%), and better customer experiences (30%).

Our analysis of the survey data identified two groups of outperformers ahead in adopting cloud and AI.

- To qualify for the **Cloud Strategists** group, respondents must report a higher-than-average share of applications in the cloud two years ago, today, and expected in two years. 28% of manufacturers qualify.
- To qualify for the **Cloud and AI Unifiers** group, respondents must meet the above criteria; report that more than one-fifth of new applications incorporate AI; use cloud in combination with AI; and agree that a unified platform for cloud, AI, and data is critical to success. 16% of manufacturers qualify for this group.

These respondents are more likely to report strong performance in some areas; **Cloud and AI Unifiers** report stronger business ROI in terms of IT operations, human resources, and financial operations, and are more likely to say cloud has accelerated ROI in a range of areas. However, members of these groups do not outperform their peers by other important metrics, a sign that even leaders have much left work left to do.

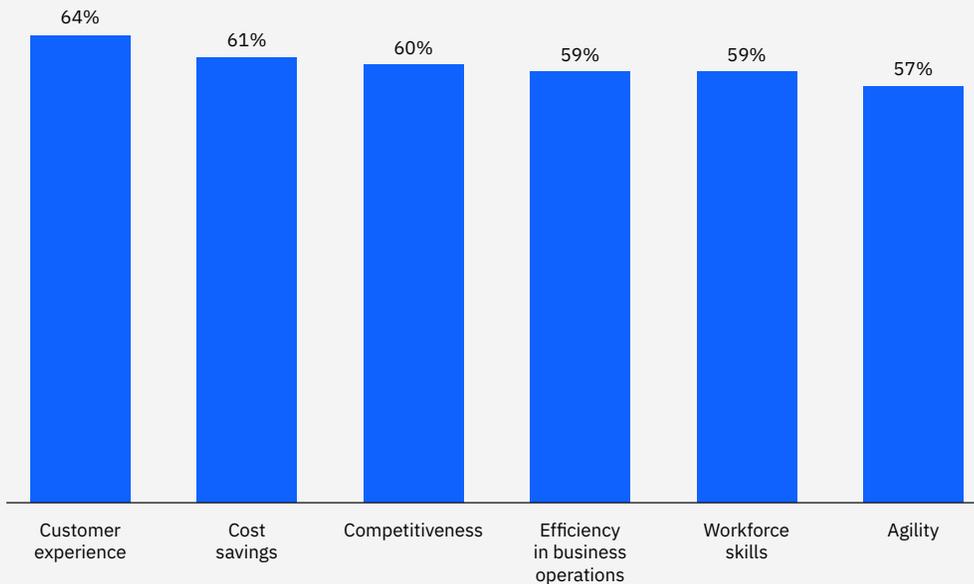
These potential advantages help explain why many are already thinking of cloud and AI as part of a unified strategy. Cloud is second only to RPA when it comes to how frequently it is used in combination with AI among manufacturers. This may be because many respondents see their use of cloud as substantially important or critical to AI in terms of facilitating analytics and machine learning (44%), facilitating data-sharing (45%), scaling AI applications (42%), and expanding the network of developers for AI applications (40%)—numbers broadly in line with cross-sector averages.

Ultimately, investments in cloud should support success in AI and feed positive returns into cloud and data management, creating a virtuous circle of ROI. That ROI is already being realized for some manufacturers—nearly two-thirds are seeing process automation as a technical ROI. Many also say cloud has accelerated these returns in the form of customer experience, cost savings, competitiveness, efficiency, and workforce skills.

Fig. 3: How cloud accelerates ROI

Q: To what extent has your organization’s use of cloud enabled or accelerated your positive return on investment (ROI) in the following areas? “To a significant extent” and “Meaningfully” responses; top six responses shown

Base = 1,200



Conclusion

The rapid adoption of cloud and AI is expected to revolutionize manufacturing for years to come as they seek to drive efficiency and make meaning from the data they collect. But manufacturers must be aware of organizational challenges to further cloud and AI adoption, which may prevent companies from realizing the full value of these transformative technologies.

For more information about how companies across sectors are adopting cloud and AI, and best practices for implementing the technologies, [see the full research report](#).

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IBM Corporation
New Orchard Road
Armonk, NY 10504

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