

Business Analytics in Manufacturing

Benchmarking the Analysis of Data To Gain Insight



Benchmark Research White Paper



V E N T A N A
R E S E A R C H

Aligning Business and IT To Improve Performance

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June 2011

Ventana Research performed this research to determine attitudes toward and utilization of business analytics and metrics in manufacturing. This document is based on our research and analysis of information provided by organizations that we deemed qualified to participate in this benchmark research.

This research was designed to investigate the business analytics and metrics practices and needs of individuals and organizations in the manufacturing sector and the potential benefits from improving their existing processes, information and systems. This research is not intended for use outside of this context and does not imply that manufacturing organizations are guaranteed success by relying on these results to improve planning. Moreover, gaining the most benefit from improving the use of business analytics and metrics requires an assessment of your organization's unique needs to identify gaps and priorities for improvement.

We certify that Ventana Research wrote and edited this report independently, that the analysis contained herein is a faithful representation of our evaluation based on our experience with and knowledge of analytics and the manufacturing sector, and that the analysis and conclusions are entirely our own.

A stylized, handwritten signature of 'Ventana Research' in a dark brown or black ink.

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Executive Summary

Today where business and technology intersect it seems as if everything is about analytics. Why? The key is information. Businesses, especially those in the manufacturing sector, have more of it than ever before, stored in more systems and locations, being produced in increasingly varied forms and being used in strikingly varied ways. Advances in information technology, many of them newly developed and involving the Internet, have fueled this explosive growth, creating both opportunity – in new ways for manufacturers to reach new markets and customers – and complexity – in trying to collect, manage and interpret data and turn it into information that can help guide them to success. Technology, a two-sided coin, also can provide tools to handle the complexity, and that is where analytics come in.

Businesses in manufacturing now collect and track information from a wider, deeper array of sources: multiple enterprise systems, real-time external feeds, their own websites and those of others, as well as voice recordings and videos. But this is only the first step. Under increasing pressure to operate more efficiently and make better decisions, business people in manufacturing need capabilities to analyze information, foresee future outcomes and plan how to take advantage of them. In the past they have relied on their organization's IT department to manage business intelligence (BI) systems that provide insight on processes and performance. Such efforts have made strides in standardizing querying, reporting and the delivery of information, but they cannot provide the complex analytic capabilities that line-of-business analysts and management require today.

The upshot is that analysts and managers in companies in manufacturing industries must take more active roles, in collaboration with business management, in defining the analytics they need and the information sources that go into them. To advance efforts in analytics, business people in manufacturing must take responsibility for improvement and not assume that IT will know how to deliver what they need. Greater collaboration and cooperation between business and IT departments is necessary, as is greater clarity from the business side on what the right analytics are.

Manufacturing organizations must recognize that they cannot take only a general approach to improving business analytics; they must focus on each line of business and its needs.

Companies with a manufacturing focus also must recognize that they cannot take only a general approach to improving their use of business analytics; they must examine each line of business (LOB) and its needs, which vary from finance and human resources to the supply chain to production to marketing and sales, and to customer service and contact centers. Just as important is supplying analytics so the internal IT group can improve its own operations and better support the enterprise systems and infrastructure that enable the rest of the organization. In all of these cases a strong foundation of analytics for manufacturing can support improvement in the key areas of people, processes, information and technology.

In many cases, however, manufacturing-focused companies and individuals must understand first what analytics can do and ascertain what analytics they need. The buzz about analytics in manufacturing industries has created confusion in several ways. Not only is the meaning of the term itself misunderstood, so are the definitions of the business tools analytics are used to produce: measures, metrics and key performance indicators (KPIs). Nor is there only one kind of manufacturing analytics; confusion also surrounds the differences among historical, root-cause, real-time and predictive analytics. And managers, executives and their reports need to understand clearly the practical business value of applying analytics to their own activities.

Ventana Research undertook this benchmark research to acquire real-world information about levels of maturity in the manufacturing sector, trends and best practices in how organizations use business analytics. It explores how they do this now, how their personnel feel about the current processes and tools, plans they have to change or improve them, and benefits they hope to gain by doing so. We conducted comprehensive benchmark research into the nature, use and value of analytics in business. As well as extensive research across all industries and lines of business worldwide, an undertaking that analyzed input from more than 2,600 participants, we did focused analyses of seven key lines of business and IT. We also examined in depth analytics use in small and midsize businesses and in 11 vertical industries. This report summarizes the state of business analytics in the manufacturing sector.

As many manufacturing organizations are not satisfied with the process currently used to create analytics as are satisfied with it.

This research in manufacturing found that the most important categories of metrics (which we define as measures of business performance) are central to business: financial (identified by 68% of participants), cost (67%) and operational (57%). These priorities understandably varied by line of business: Financial metrics rank first for those in finance and business departments but sales is the first priority for the marketing, sales and product areas. Yet in this industry, cost metrics ranked first for more areas than in all industries combined, chosen by human resources, IT, manufacturing and the supply chain. By role, executives were more likely than the average to mention financial, cost, profitability and pricing metrics; that is, they

value higher-level business metrics used for measuring performance of the whole manufacturing organization.

Issues also arise in providing current metrics and KPIs to people. Although 53 percent of manufacturing organizations do so within one week after the end of the month, quarter or year, the rest take longer than that. The timeliness of the source data for metrics and KPIs is a related challenge: For exactly half of these organizations, some or most of the data is stale or outdated. Similarly, more than half (59%) said the data they use for business analytics is only somewhat accurate. Having outdated or inaccurate data is likely to undermine confidence in the metrics it is used to produce, and the research also shows that 37 percent are only somewhat confident or not confident in the quality of the information being generated by their analytics.

In broader terms, as many manufacturing companies are not satisfied with the process currently used to create analytics as are satisfied with it (43% each). The numbers of the dissatisfied increase with the percentage of work time people spend with analytics: Among those who spend 75 percent or more of their time, more than half (51%) aren't satisfied while only 36 percent are; in all the lesser quartiles, the satisfied slightly outnumber the dissatisfied (by only a single point in the 50 to 74 percent range). Regarding the current technology for creating and applying analytics, those only somewhat satisfied with it outnumber those who are satisfied (by 40% vs. 31%), and at the extremes, more are not satisfied than very satisfied (19% vs. 9%). Those who spend 75 percent or more of their time with analytics registered both the most dissatisfied (23%) and very satisfied (12%).

The findings about which technologies manufacturers currently use shed some light on these numbers. The only tools used by more than half of these organizations to generate analytics are spreadsheets (in 63%) and business intelligence systems (52%). Almost half of all organizations (48%) use spreadsheets regularly for business intelligence and analytics, and 44 percent more use them universally for those purposes – a total of more than 90 percent who use them at least regularly. We have found repeatedly that spreadsheets are not well suited for complex analytics and recurring analytical and reporting tasks. We often find excessive spreadsheet use associated with negative impacts on accuracy and timeliness, which this research confirmed. Overall, we find that companies that use spreadsheets universally or regularly take about two days longer to provide metrics and KPIs than those that use spreadsheets occasionally or rarely. Those that seldom use them are more likely to describe the data they use in metrics and KPIs as accurate.

Companies that use spreadsheets universally or regularly take about two days longer to provide metrics and KPIs than those that use spreadsheets occasionally or rarely.

For these and other reasons, our Maturity Index analysis concludes that only 12 percent of all manufacturing-focused corporations attain the highest Innovative level of maturity in their use of analytics. Maturity requires a balanced focus on people, process, information and technology; the research found issues in each category and also concerns about progress in addressing them. Although a majority of manufacturing participants (60%) said that it is very important to their business goals to simplify making analytics and metrics available, only one-third (34%) plan to take the Innovative step of changing the way they generate and apply analytics in the next 12 to 18 months. The dominant reasons for making changes are to improve decision-making (69%), business processes (68%) and operational efficiency for cost savings (56%).

When we analyzed the maturity of companies' individual lines of business by aggregated industry sector, Manufacturing had the largest percentage of companies at the two highest maturity levels and at the highest Innovative level in four of the LOBs (and was tied for the most in three others). Thus, although manufacturing companies have plenty of room for improvement in business analytics, they are in one of the more mature industries.

However, fundamental barriers block the road to improvement for many manufacturers. The absence of resources, of a strong business case, of a budget and of awareness of the need to change all were identified as issues by more than 40 percent of these participants. To overcome these barriers will require first understanding the business benefits of investing in an initiative and then choosing the right tools to help deliver them. Among our standard seven technology and vendor considerations, 58 percent of manufacturing organizations said that the most important is usability – being able to apply the tool readily to business needs; second-most important are the functional capabilities of the analytics (very important for 49%). Manufacturing executives rated both of these more highly than did the average of all job titles, and management (vice presidents) stressed their importance even more. We note also that in today’s environment in which nontechnical users must be able to benefit from a tool as much as analysts, both ease of use and a gamut of capabilities from the simple to the sophisticated are necessary.

Thus, manufacturing companies are maturing only slowly in their use of analytics despite the fact that they view them as valuable and important. This benchmark research indicates that usability and flexible functionality are important criteria in their search for the right analytics, that failing to examine timely availability, broad access and efficient handling can obstruct analytics use, and that in technology terms spreadsheets should be replaced with more appropriate tools. When business users of analytics are clear about their needs, analytics can be developed and tuned more efficiently and they can explore new approaches such as predictive analytics and the availability of analytics on mobile devices. But investments in analytics must still be sold, using arguments about improving business processes, decision-making and operational efficiency.

About This Benchmark Research

Methodology

Ventana Research conducted this benchmark research over the Web from March through December 2010. We solicited survey participation via e-mail blasts, our Web site and social media invitations. E-mail invitations were also sent by our media partners and by vendor sponsors.

We presented this explanation of the topic prior to entry into the survey:

There isn't an aspect of business today in which people don't claim they use analytics to generate information, typically in the form of metrics and key indicators. But there is much confusion about their usefulness and value to the business and about how best to select and implement historical, root-cause, real-time and predictive analytics. The uncertainty this causes poses a challenge for organizations.

Management and managers need advice on how to select the measures most useful for them and guidance about best practices and common mistakes in choosing business and operational measures, metrics and key indicators. They also need more reliable information than is currently available about integrating historical and predictive analytics into systems and processes so they can make better use of existing investments and plan new ones that provide deeper insight from multiple systems using more sophisticated analytical methods. This benchmark research is designed to generate that advice and guidance by examining the use of metrics across the entire business. It also will determine the maturity distribution of organizations in their use of analytics.

We included the following definitions:

Analytics – Programs or algorithms that derive meaning from data
Metric – A measure of business performance
Performance indicator – A specific metric chosen to measure the performance of an organization or some component of it.

The following promotion incited participants to complete the survey:

All qualified participants will receive a report on our research findings that you can apply to your organization's efforts and a quarterly membership to the Ventana Research Community valued at US\$125 or €92. In addition, all qualified participants will be entered into a drawing to win a benchmark research report of your choice valued at US\$995 or €732. Thank you for your participation!

Qualification

We designed the research to assess the use of and plans for deployment of business analytics across organizations and industries. We described qualification to participate as follows:

The survey for this benchmark research is designed for business and IT managers who develop, deploy or use analytics or are involved with the purchasing of analytics technology. Others such as consultants and

systems integrators may participate in the survey but are not eligible for incentives and will be used in the analysis only if they meet the qualifications. Incentives are provided to qualified participants in the research and also are conditional on provision of accurate contact information including company name and company e-mail address that can be used for fulfillment of incentives.

Further qualification evaluation of participants was conducted as part of the research methodology and quality assurance processes. It entailed screening out responses from companies that are too small, questionnaires that were not materially complete, or those where the submission is from an inappropriate submitter or appears to be spurious.

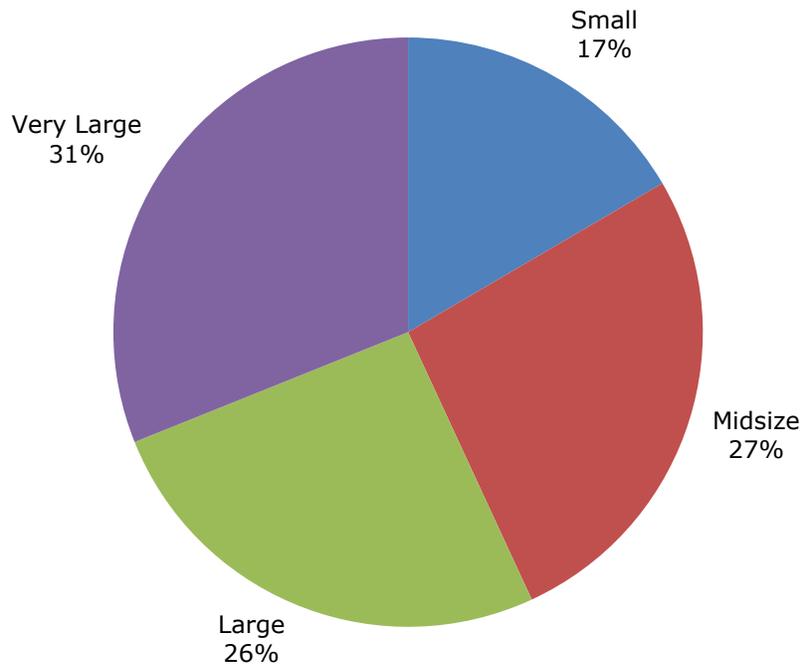
Demographics

We designed the survey used for this research to be answered by executives and managers across a broad range of roles and titles working in manufacturing. We deemed 682 of those who clicked through to this survey to be qualified to have their answers analyzed in this research. In this report, the term “participants” refers to that group, and the charts in this section characterize various aspects of their demographics and qualifications.

Company Size by Number of Employees

We require participants to indicate the size of their entire company. Our research repeatedly shows that size of organization is a useful means of segmenting companies because it correlates with the complexity of processes, communications and organizational structure as well as the complexity of the IT infrastructure. In this research, when measured by number of employees more than half of participants (57%) are larger organizations: That is, almost one-third are very large companies (having 10,000 or more employees), and about one-fourth are large companies (with 1,000 to 9,999 employees). Also about one-fourth are midsize companies (with 100 to 999 employees), and almost one in five are small companies (with fewer than 100 employees). This equal distribution is consistent with our research objectives and provides a suitably large sample from each size category. Compared to our complete panel of research participants, the segment from manufacturing has 5 percent more very large organizations.

Figure 1
Participants by Company Size (Number of Employees)

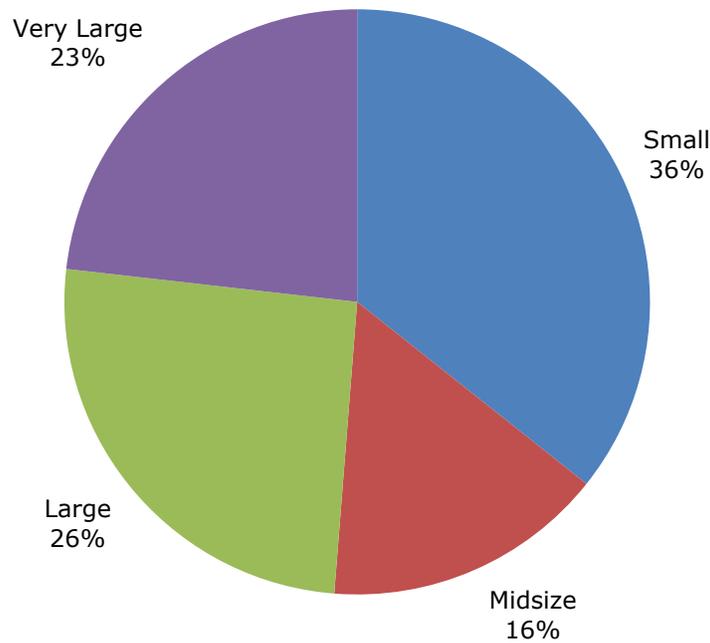


Source: Ventana Research

Company Size by Annual Revenue

When we measured size by annual revenue, the distribution of categories shifted downward, with small companies gaining substantially and the very large losing share. By this measure, 8 percent fewer are very large companies (having revenue of more than US\$10 billion), the same percentage are large companies (having revenue from US\$500 million to US\$10 billion), 11 percent fewer are midsize companies (having revenue from US\$100 to US\$500 million), and more than twice as many are small companies (with revenue of less than US\$100 million). Compared to our complete panel of research participants, when measured by revenue the segment from manufacturing has 5 percent more very large organizations and about the same fewer small ones.

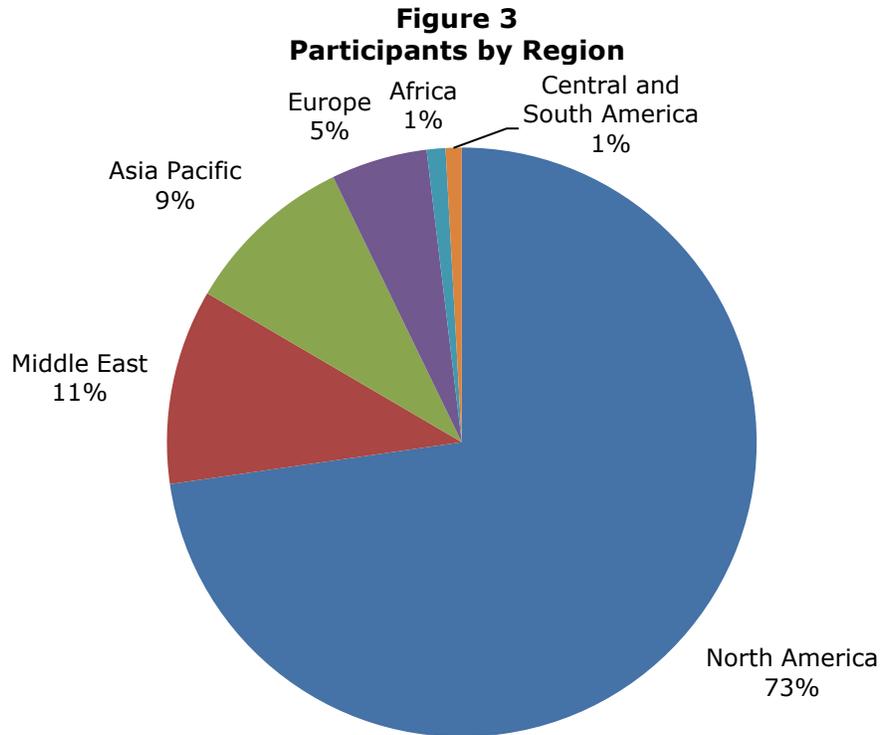
Figure 2
Participants by Company Size (Annual Revenue)



Source: Ventana Research

Geographic Distribution

Slightly less than three-fourths of participating companies are located or headquartered predominantly in North America. Those based in the Middle East formed the second-largest area at 11 percent, followed by those in Asia Pacific (9%), Europe (5%) and Africa and Central and South America at 1 percent each. This is almost identical to the distribution of organizations in the overall research. This result was in keeping with our expectations at the start of this investigation, since organizations participating in our research most often are headquartered in North America. However, many of these are global organizations operating worldwide.

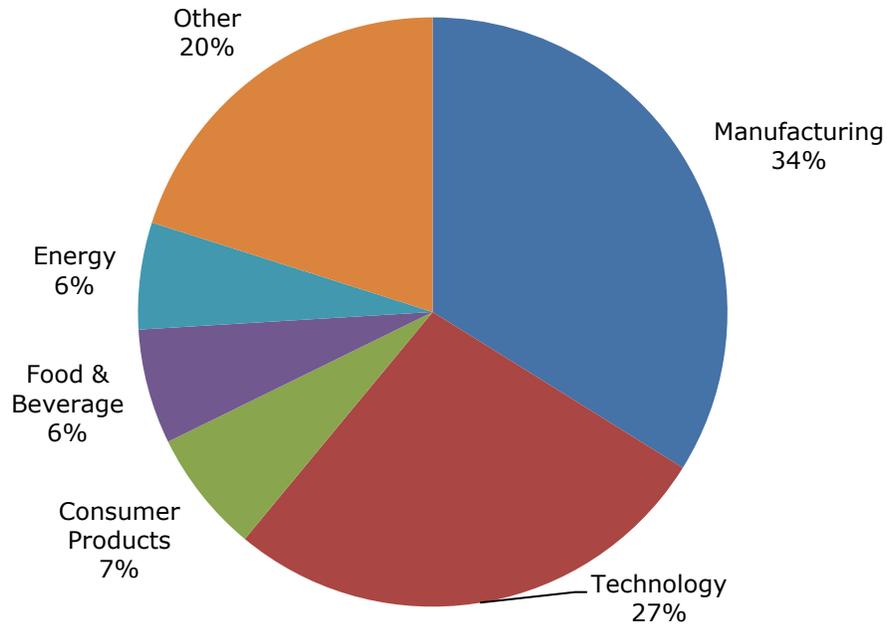


Source: Ventana Research

Industry

We grouped the companies in this industry-focused benchmark research into five specialized categories plus a general one and a miscellaneous Other, as shown below. The largest group, about one-third, fall in the general manufacturing category. Technology manufacturers were the second-most represented, and in almost equal proportions, consumer products, food and beverage and energy manufacturers made up 19 percent. One in five we categorized as Other.

Figure 4
Participants by Type of Industry

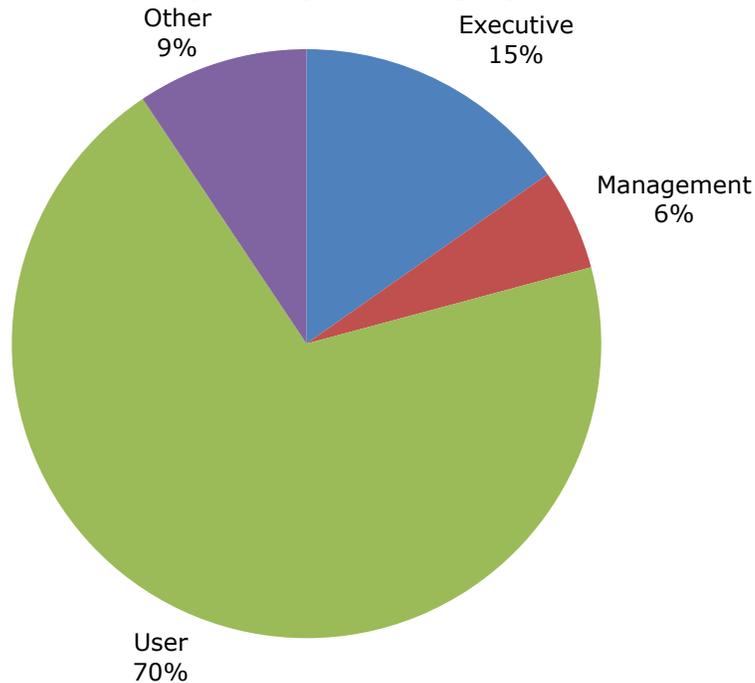


Source: Ventana Research

Job Title

We asked participants to name the job title that best describes theirs. We sorted these responses into four categories: executives, management, users and others. More than two-thirds identified themselves as having titles that we categorize as users, a grouping that includes senior manager or manager (30%), director (11%), analyst (21%) and staff (7%). Those with vice president titles constitute the management category, which amounts to 6 percent of the total, and 15 percent are executives. A variety of other titles, each with small numbers of participants, added up to 9 percent. This distribution is almost identical to that of organizations in the overall research.

Figure 5
Participants by Job Category



Source: Ventana Research

This is how we aggregated the core title response options:

Executive

CEO, President
Other CxO

Management

EVP or SVP
VP

User

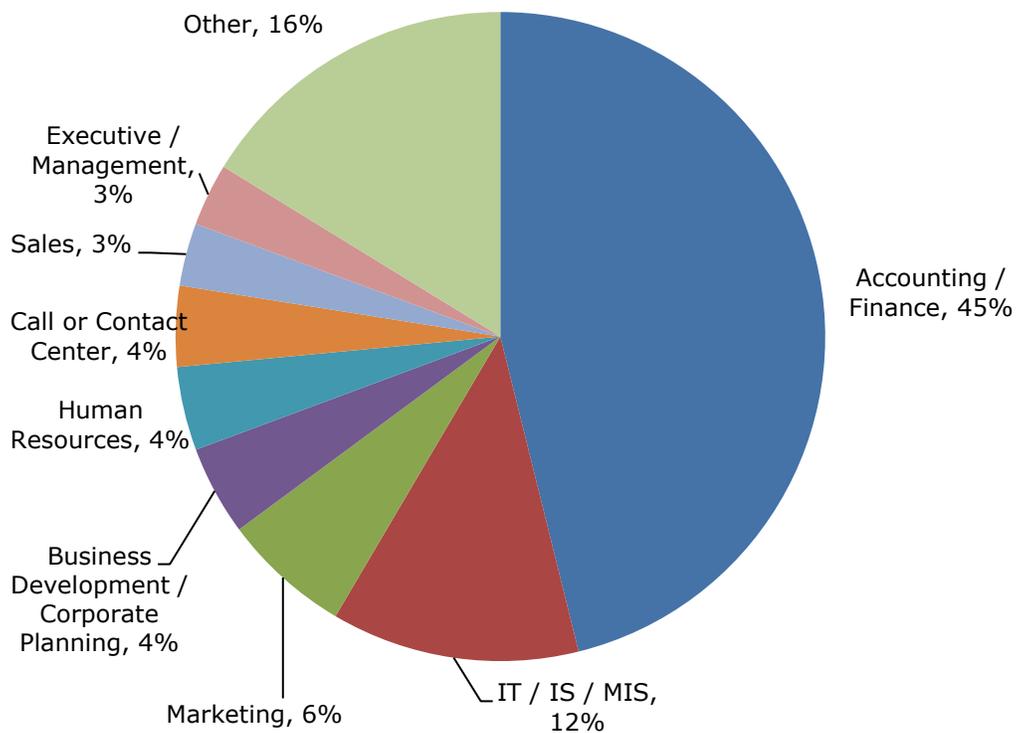
Senior Manager or Manager
Director
Analyst (Business, Financial, etc.)
Staff

We concluded after analysis that this response set provided a meaningfully broad distribution of job titles.

Role by Functional Area

We asked participants to identify their functional area of responsibility as well. Nearly half have finance jobs, the largest grouping, which is significantly larger for the manufacturing sector than the one-third in the overall research. IT, while still the second-largest specific group, has 5 percent fewer than overall, and fewer than half as many participants are from the contact center. A dozen areas each with only 1 to 2 percent comprised the rather substantial Other category and contribute to the diversity of functions among manufacturing participants.

Figure 6
Participants by Functional Area



Source: Ventana Research

Key Insights: Manufacturing Analytics

Our benchmark research yielded the following important general findings and key insights regarding the use of analytics in manufacturing organizations. (We discuss maturity levels in the Maturity Index portion of the full research report; the actual questions asked in our survey are in the Appendix to the research report.)

Manufacturing organizations are maturing slowly in their use of analytics.

This benchmark research found that manufacturing organizations are advancing in their ability to apply analytics, but most have substantial room for improvement. The Ventana Research Maturity Index places only 12 percent of them at the highest Innovative level in their use of analytics, and 60 percent are in the bottom half of the maturity hierarchy.

Manufacturing organizations are held back in the maturity of their business analytics by a variety of factors. In people-related issues our analysis identified lack of skilled resources and lack of executive support. Process-related issues include taking longer than a week to provide metrics from analytics, formally reviewing metrics no more often than quarterly or annually and low prioritization and lack of budget. In information-related issues negatively impacting business analytics use the research identified stale, outdated and inaccurate information as well as failing to prioritize basic informational needs. In the category of technology the research found immature technology that is not working, unsophisticated technology that is known to be ineffective and a failure to prioritize forward-looking and predictive analytics.

All these shortcomings impede a manufacturing organization's effectiveness and performance. The research confirms our long-established hypothesis that maturation in business analytics requires a balanced focus on people, process, information and technology and a dedication to methodical improvement.

The most important categories of business metrics for manufacturing are financial, cost and sales.

Among the categories of metrics, manufacturing participants most often identified financial metrics (68%) and cost metrics (67%) as important or very important to their role in their business; operational metrics (54%) and sales metrics (55%) followed. This is understandable; of data categories, accounting data has been available for the longest time and in the greatest depth, and people's performance assessments typically involve financial targets and their ability to control costs. The utility of analytics for performance measurement probably explains why the operational area is a prominent subject of analytics. The least important metrics categories currently are sustainability (11%) and risk exposure (22%), likely because most companies lack the ability to measure these elements in manufacturing.

In our research on product and supply chain analytics, areas relevant to many manufacturing companies, eight in 10 participants said that using analytics to create operational plan metrics is important or very important. For participants in this research from manufacturing the most important process metrics used by these organizations are order fill rates (chosen by 30% vs. 24% across all industry categories).

In our research on the importance of the types of data that underlie metrics, the financial category topped the list (chosen by 77%), followed by customer (67%) and sales data (64%). However, customer data was ranked first most often by those with IT titles and financial second. Users need important data to be integrated efficiently into their business analytics, but the research indicates that manufacturing companies face impediments: More than two-thirds (69%) spend most of their time in unproductive tasks – waiting for data, preparing data and reviewing it for quality and consistency. Complicating integration is the finding that more than just traditional data from databases is important: text, unstructured data, events and even voice recordings have become needed input for business analytics.

Business analytics users in manufacturing require flexible, capable tools.

The research investigated from several perspectives the qualities manufacturing organizations seek in business analytics. Of the seven categories of product and vendor considerations we use to evaluate analytics products, organizations ranked usability highest, with 58 percent rating it very important. More than 40 percent each rated functionality, reliability, manageability, return on investment (TCO/ROI) and adaptability very important. The manufacturing sector ranked TCO/ROI higher than did all industries combined. Even the lowest-ranked factor – vendor validation – was considered important or very important by more than three-fourths of the participants. That the least important category is validation of vendor references, viability and commitment suggests one of two possibilities: that users generally assume vendors are viable and stand by their software or that they have become wary of vendor references and do not consider them reliable.

Usability stands out as the most important of seven categories of consideration in selecting business analytics in manufacturing because companies deploy software to “do something.” This is more or less the case regardless of company size, industry, individual role or functional area. Ranking next most important is functionality. To be usable and functional, analytics systems also must have the right presentation components; while charts, reports and tables are the presentation vehicles most often selected, documents, visualizations such as gauges and sliders, text, Web pages and maps were also identified as important by one-third to one-half of these companies.

Analytics tools must support a range of roles in a manufacturing organization.

The benchmark research examined analytics needs in the lines of business as well as by analysts in manufacturing. Much of analytics use is to measure and monitor specific conditions; doing so can, for example, enable management by exception. Such periodic, repetitive analyses (in contrast to one-off data discovery efforts) are fundamental to deriving value from data. Not surprisingly, then, the research finds that the most important capability for an analytics system is to make it possible to search for specific existing answers; this was rated very important by one-third of participants and important by another half. When an anomaly is discovered (a routine occurrence in business), individuals need to be able to drill down to find underlying causes, and the second-most frequently chosen capability is to explore data underlying analytics, deemed very important by 31 percent and important by 48 percent more. The participants rated similarly (22% to 28% deemed them very important) four of the seven capabilities we asked about: being able to publish analytics and metrics; to explore data by working with maps, charts and tables; to

set alerts and thresholds; and to collaborate in the review of analytics. Rated of least importance was to access analytics and metrics via a mobile device, selected as very important by just 10 percent and important by 26 percent; we anticipate that this will grow in importance as more users come to rely on these devices to do their jobs.

Analysts need more sophisticated analytics. All of the nine capabilities we suggested were rated important or very important by analysts in at least three-fourths of manufacturing organizations. The most important, with about half rating it very important, is being able to source data for the analytics; without this capability it's difficult to put together meaningful analytics. Manufacturing companies rated equally high being able to take action based on the outcome of the analytics (that is, to complete the cycle of measure, decide and act); in all industries combined, this ranked second.

Manufacturing organizations take seriously issues involving marketing analytics.

Organizations in the manufacturing industry comprised more than half (54%) of participants in this research. They placed the most importance on simplifying marketing analytics (77%) but ranked only third (31%) among industries planning to make changes in the near future. Manufacturers selected cost per lead (74%) as the most important financial metric most often among industries, which overall favored revenue growth (62%). This industry makes applying marketing analytics for lead generation the highest priority (83%). Manufacturing also considers the quantity of qualified marketing leads more important than do other industries (71% vs. 56%). More than two-thirds of manufacturing organizations (73%) said analytics systems are hard to build and maintain; we believe one factor in this complaint stems from the reliance on spreadsheets (by 51%). As well, manufacturing spends more time than any other industry preparing data for analysis.

Business analytics in manufacturing should be more accessible.

Analytics are not always at hand when people need them, the research shows. Among all our research participants, only one-third of senior executives and one-fourth of vice presidents, directors and managers have them always available. While it is true that a large majority of executives have most of what they need, this is insufficient for optimally effective performance. Manufacturing organizations pursuing excellence need programs and processes to continuously evaluate the adequacy of the analytics and metrics available to executives and managers and to quickly and efficiently address gaps that they find.

Manufacturing participants said making analytics more accessible is a priority: Nine in 10 regard making it simpler to provide analytics and metrics to those who need them as important or very important. The implication of this finding is clear: Manufacturing organizations must focus on making it easier for employees to access useful and relevant analytics and metrics. At least 60 percent of executives, management and those below them all said this is very important. The research found that the tools that are used most often for analytics are Microsoft Office and spreadsheets, which often produce individual silos of data and analysis.

Issues of timeliness and readiness impede productive use of business analytics and metrics in manufacturing.

Business analytics should be about determining what is happening and will happen to an organization. Unfortunately the research shows that people in manufacturing spend more time fiddling with data than analyzing it. Dividing the process into data preparation (waiting for data, preparing data and reviewing it for quality and consistency), data analysis and working with metrics, we find that the first takes the most time for almost seven in 10 manufacturing companies (69%). Another 3 percent spend most of their time grappling with not-easily accessible metrics. Only about one-fourth (28%) spend most of their time on the analysis portion of the cycle: assembling scenarios, trying to determine root causes and determining how changes will impact current business. There was only a small difference in this pattern between those who spend 75 percent or more of their time working with analytics and those who spend less. If these issues could be addressed, the amount of time people work with analytics could be reduced; currently 60 percent are spending more than 25 percent of their time with them.

The time required to prepare data for analytics is not the only challenge the research found. The timeliness of the data to which analytics are applied is critical if organizations are to be able to discover and act on metrics and key indicators to improve the performance of processes and people. Even though almost half (46%) of manufacturing organizations work with data that they receive in real time or close to real time, more than that (50%) said that some or most of the data is stale or outdated. Time is the enemy of data and business effectiveness. If it takes too long to produce or present the data needed to do analyses and assessments, the results will have less relevance and credibility. Similarly critical is the accuracy of the data, which if it is dubious will require more time to review and ensure consistency and quality. The challenge here also is similar: 28 percent said the data they use for business analytics is accurate, while more than half (59%) characterized it as only somewhat accurate. In other words, it falls short of what it should be: utterly reliable. While it's hard to gauge the seriousness of the accuracy shortfall, persistent small errors in data detract from the perceived validity of assessments and leave room to argue that the data, not the performance it measures, is at fault.

Spreadsheets are not appropriate for business analytics in manufacturing.

Spreadsheets are ubiquitous, and the research shows that along with business intelligence technologies (for querying, reporting and performing analysis) and analytic warehouses and databases, they are the tools most commonly used to generate analytics. The research found that Microsoft Office, with its spreadsheet, presentation and electronic mail components, is used for business analytics in two-thirds of manufacturing organizations. In addition spreadsheets are used universally in more than one-third (38%) and regularly in more than half of them.

However, our analysis shows that manufacturing organizations that use spreadsheets least have more accurate, timely data and deliver periodic reports about 30 percent sooner. This finding leads us to repeat one of our most persistent admonitions: While spreadsheets are appropriate for ad-hoc analysis and for information used by a limited number of people, organizations must limit their use of them as data stores and for repetitive analyses, particularly in cases where the results are reported to and used by more than a few people. Although many people are comfortable with spreadsheets, their failings, limitations and necessary work-arounds undermine the needs identified by this research to simplify analytics and metrics and ensure

technology usability in for the process of producing business analytics within manufacturing.

IT and the lines of business in manufacturing often work together on analytics.

The research found that most people who have primary responsibility for designing and deploying analytics typically have experience with sophisticated tools. In more than half of manufacturing companies (53%) analytics are designed and deployed by the business intelligence or data warehouse team or by general IT resources. Line-of-business (LOB) analysts are involved in 39 percent of companies; 22 percent use LOB analysts alone and another 17 percent have IT analysts and LOB analysts collaborate. Just 8 percent go outside the company, using external LOB consultants or outsourced IT resources. This pattern validates our conclusion that a deep understanding of a company's specific operations and requirements is critical to the analytics creation process.

The research also finds some cooperation of business analysts with IT in business analytics for manufacturing. In 30 percent of these organizations the two work together to design and deploy analytics, while business units do that for themselves in 35 percent. In the process of making new analytics available, only 21 percent will have the IT organization alone build them; more often business analysts (in 30%) will work with IT to design and deploy them. Only 6 percent will work with consulting firms to make new analytics available. Purchasing prebuilt analytics could be a quick way to deploy analytics when resources are scarce, but only 8 percent plan to do that. In 41 percent of manufacturing companies the general business budget provides the funds for analytics technology investment; next-most prevalent is the business IT budget (26%), while 11 percent use the general IT budget.

Manufacturing also ranked higher than other industry categories in some important measures of IT analytics, showing the highest percentage (27% v. 19% overall) in which metrics are delivered immediately or within one day. Manufacturers also reported the highest availability of analytics, suggesting that the discipline of running a manufacturing operation spills over into running the IT organization.

Predictive and forward-looking analytics should have higher priority in manufacturing.

Technology has advanced to a stage where it is feasible to enable a variety of users to harness the potential that predictive analytics offer. Yet predictive analytics are not high-priority analyst capabilities for the lines of business, nor are what-if and planning-based analytics. Exceptions were contact centers, in which predictive analytics ranked second-most important, and supply chains, where they are third-most important. Some industries (for example, telecommunications, medicine and financial services) are heavier users of these analytics, but even there no more than 20 percent said they employ them. Finance departments are the least likely to use predictive analytics, even though they could be widely applicable within this function.

What-if and planning-based analytics ranked about as low as predictive in importance to manufacturing organizations even though they could help to advance maturity in business processes. The sales and supply chain business areas did select them as one of their top three priorities, but again finance participants did not. We consider both of these types of forward-looking analytics to be hallmarks of maturity,

and these findings contribute to the prevalence of immaturity our Maturity Index analysis found in manufacturing organizations.

Although manufacturing organizations realize they need to improve business analytics, many are not ready to act.

Overall, only about one-fifth (21%) of manufacturing organizations are satisfied with their current analytics efforts, and the same number are not. Moreover, 55 percent of management said that their company can significantly improve its use of analytics and performance indicators, compared to 42 percent overall. In our research on sales analytics, participants from the manufacturing industry sector were especially dissatisfied with their current process (52% vs. 36% for all sectors). In this type of analytics manufacturers have a stronger sense that they can improve their use of analytics significantly (62% vs. 40% overall).

Companies that have issues with the timeliness and accuracy of their data are more likely to say that improvement is necessary, and that their efforts to do a better job must address these issues and their underlying causes. Yet while 70 percent of manufacturing organizations recognize a need to make changes, just one-third are planning to make them in the next 12 to 18 months. Another one-third acknowledge the need to make changes but don't view this as a sufficiently high priority on which to take action. In sales analytics, those in manufacturing are more eager to make changes (33% vs. 24% overall.)

The research shows that the most significant barriers to making changes in analytics are fundamental: lack of resources, no budget, a business case that is not strong enough and too low a priority assigned to the effort. In our experience these barriers are interrelated: Failure to provide a compelling business case results in a project receiving a low priority and therefore not being allocated the resources or budget sufficient to implement the changes. Resources must be adequate to enable investment in technology to make analytics easy to access and use; lack of resources is the foremost process and technology barrier in half of the lines of business. Driving change and addressing barriers require understanding the benefits of investments; the research found that the factors most often driving change are seeking to improve decision-making (in 69% of manufacturing organizations), business processes (68%) and operational efficiency (56%). As well as these three choices, increasing visibility into business areas, increasing profitability, gaining a competitive advantage and increasing workforce productivity each were cited by at least 40 percent of these organizations. Organizations in all industries ranked business processes ahead of decision-making as the top target for improvement; they also rated creating new revenue opportunities more highly.

Cloud computing is on the rise for business analytics in manufacturing.

Installation on-premises remains the most popular option for deploying business analytics in manufacturing, with slightly more than half of organizations preferring this method to purchase and maintain them. However, the research found a significant preference (of 28%) for software as a service (SaaS), an on-demand approach commonly called cloud computing. Only 5 percent prefer software hosted by the supplier. A significant number (15%) expressed no preference for any of these approaches and so may be open to new methods to acquire business analytics. We conclude that SaaS is no longer a marginal preference and can provide affordable, rapid deployment to enable any organization to gain access to business

analytics. Interestingly, participants with IT titles did not prefer on-premises significantly more often than business people do, although they are less willing to consider SaaS (22% vs. 29% of business). Those with management titles prefer SaaS significantly more often than the average of all participants (43% vs. 28%). Preferences were generally consistent for all sizes of manufacturing organization, although the very large prefer on-premises more and SaaS less than others, while the reverse is true for small ones.

What To Do Next

Participants in this benchmark research expressed a number of common concerns regarding the need for and use of business analytics. The metrics they most often identified as important across their varying roles span the core categories of financial, cost and sales. The research makes clear that many are concerned about how well they handle them; only one-fifth (21%) of manufacturing participants are satisfied with their current analytics efforts. For manufacturing businesses wishing to improve their performance through business analytics, we offer the following recommendations.

Assess the maturity of your business analytics.

This benchmark research found that manufacturing organizations are held back in the maturity of their business analytics by a variety of factors. While the Ventana Research Maturity Index places 12 percent of them at the highest Innovative level in their use of analytics, the majority (60%) are in the bottom half of the maturity hierarchy. In people-related issues our analysis identified lack of skilled resources and lack of executive support. Process-related issues include taking longer than a week to provide metrics from analytics, formally reviewing metrics no more often than quarterly or annually and low prioritization and lack of budget. In information-related issues that negatively impact business analytics use, the research identified stale, outdated and inaccurate information as well as failing to prioritize basic informational needs. In the category of technology the research found immature technology that is not working, unsophisticated technology that is known to be ineffective and a failure to prioritize forward-looking and predictive analytics. These shortcomings all impede a manufacturing organization's effectiveness and performance and all need to be addressed. We advise those seeking to mature in business analytics to take a thorough and balanced approach to their people, process, information and technology issues.

Look for business analytics tools that are easy to use and flexible.

The research investigated qualities manufacturing organizations seek in business analytics. Of the seven product and vendor considerations we use to evaluate analytics products, these organizations ranked usability highest, with 58 percent rating it very important. More than 40 percent each rated functionality, reliability, manageability, total cost of ownership and return on investment (TCO/ROI) and adaptability very important. Even the lowest-ranked factor – vendor validation – was considered important or very important by more than three-fourths of the participants.

Usability and functionality – that is, business capabilities – stand out as manufacturing organizations' most important considerations in selecting business analytics regardless of company size, individual role or functional area. These should be central focuses in evaluating tools. To be usable and functional, analytics systems must provide a range of options for how to include the information in presentations, and these are increasing; participants indicated an interest most often in the standard charts, reports and tables, but documents, visualizations such as gauges and sliders, text, Web pages and maps were also identified as important by one-third to one-half of these companies. Determine which of these are important to you today and may be tomorrow.

Look for tools that support a range of roles in a manufacturing environment.

The benchmark research examined analytics needs of people in the lines of business as well as analysts in manufacturing. The most important capability for an analytics system is to make it possible to search for specific existing answers; this was rated important or very important by three-fourths of participants. Because anomalies are common in business, individuals need to be able to drill down to find underlying causes, and the second-most frequently chosen capability is to explore data underlying analytics, also deemed important or very important by nearly three-fourths. The participants rated similarly (22% to 28% deemed them very important) four other capabilities: to publish analytics and metrics; to explore data by working with maps, charts and tables; to set alerts and thresholds; and to collaborate in the review of analytics. When you evaluate products, ask about these capabilities for business users and also about the more sophisticated analytics needed by your analysts. The most important capability for them, rated by about half as very important, is being able to source data for the analytics; without this capability it's difficult to put together meaningful analytics. Rated equally by manufacturing participants was to be able to take action based on the outcome of the analytics (that is, to complete the cycle of measure, decide and act).

Ensure that business analytics are widely accessible.

Analytics are not always at hand when people need them. In our overall research on business analytics, only one-third of senior executives and one-fourth of vice presidents, directors and managers have them always available. While it is true that a large majority of executives have most of what they need, this is insufficient for optimally effective performance. Almost nine in 10 manufacturing organizations regard making it simpler to provide analytics and metrics to those who need them as important or very important. At least 60 percent of executives, management and those below them all said this is very important. We urge such companies to focus on making it easy for employees to access relevant analytics and metrics. In your efforts to improve accessibility of analytics and metrics, keep in mind that doing this from mobile devices such as smartphones and tablet computers will only increase in demand; already more than one-third of participants said this is important or very important.

Don't let inferior data undermine use of business analytics and metrics.

Business analytics should be about determining what is happening and will happen to an organization. But the research shows that people spend more time preparing data than analyzing it. In almost seven in 10 manufacturing organizations they spend the most time waiting for data, preparing data and reviewing it for quality and consistency. Conversely only about one-fourth (28%) spend most of their time on true analysis processes such as assembling scenarios, trying to determine root causes and determining how changes will impact current business. If these preparation obstacles could be addressed, the amount of time people work with analytics could be reduced; currently 60 percent are spending more than 25 percent of their time with them.

A related issue is the timeliness of the data to which analytics are applied. It is encouraging that almost half (46%) of manufacturing organizations work with data that they receive in real time or close to real time, but in more than that (50%) some or most of the data is stale or outdated. Analyses and assessments based on such data will have less relevance and credibility. Similarly critical is the accuracy of

the data; if it is dubious more time will be required to review it and ensure consistency and quality. While 28 percent said the data they use for business analytics is accurate, more than half (59%) characterized it as only somewhat accurate. Take steps to ensure that your source data for analytics is both fresh and correct; if it isn't, you risk undermining the use of metrics and KPIs as business improvement tools.

Replace spreadsheets as tools for business analytics.

Spreadsheets are well-established as a tool for analysis in organizations of all kinds and sizes, but they are ineffective for repetitive analyses shared by more than a few people. Yet the research shows that along with business intelligence technologies (for querying, reporting and performing analysis) and analytic warehouses and databases, spreadsheets are the tools manufacturing companies use most commonly to generate analytics. Indeed, spreadsheets are used universally in more than one-third (38%) and regularly in more than half of these organizations. While they may be familiar, our research shows that organizations that use spreadsheets least have more accurate, timely data – and they deliver periodic reports about 30 percent sooner. This and similar findings lead us to urge all organizations to limit the use of spreadsheets as data stores and for repetitive analyses, particularly in cases where the results are reported to and used by more than a few people. Their failings, limitations and necessary work-arounds undermine the needs identified by this research to simplify analytics and metrics and ensure technology usability in the process of producing business analytics.

It helps when IT and the lines of business work together on analytics.

The research found that most people who have primary responsibility for designing and deploying analytics have experience with sophisticated tools. In more than half of manufacturing organizations (53%) analytics are designed and deployed by the business intelligence or data warehouse team or by general IT resources. Line-of-business (LOB) analysts are involved in 39 percent of companies; 22 percent use LOB analysts alone and another 17 percent have IT analysts and LOB analysts collaborate. The research also finds some cooperation of business analysts with IT in analytics for manufacturing. In 30 percent of these organizations the two work together to design and deploy analytics, while business units do that for themselves in 35 percent. Investigate working relationships between those on the business side and IT and explore how strengthening them can help make your analytics more useful.

Understand the value of predictive and forward-looking analytics.

Predictive analytics can give a business glimpses of what may happen, the consequences of actions and scenarios for how to respond to change. Technology has advanced to a stage where it is feasible to provide them to a variety of users in manufacturing businesses. Yet the research shows predictive analytics are not yet high-priority analyst capabilities for the lines of business (LOB), nor are what-if and planning-based analytics; each is deemed very important by less than 30 percent in the LOBs. Exceptions were contact centers, in which predictive analytics ranked second-most important, and supply chains, where they are third-most important. Finance departments are the least likely to use predictive analytics, even though they could be widely applicable within this function. Both of these types of forward-looking analytics can help advance maturity in business processes; consider what they could do for your organization.

Address barriers standing in the way of improving business analytics and performance.

The research shows that the most significant barriers to making changes in analytics are fundamental: lack of resources, no budget, a business case that is not strong enough and too low a priority assigned to the effort. In our experience these barriers are interrelated: Failure to provide a compelling business case results in a project receiving a low priority and therefore not being allocated the resources or budget sufficient to implement the changes. Resources must be adequate to enable investment in technology to make analytics easy to access and use; lack of resources is the foremost process and technology barrier in half of the lines of business. Driving change and addressing barriers require understanding the benefits of investments; the research found that the factors most often driving change in manufacturing organizations are seeking to improve decision-making (in 69%), business processes (68%) and operational efficiency (56%). Other drivers were identified as well: increasing visibility into business areas, increasing profitability, gaining a competitive advantage and increasing workforce productivity each were cited by at least 40 percent of manufacturing organizations. Demand that vendors show how their products deliver clear benefits such as these and address issues such as total cost of ownership and return on investment that can help lower the barriers in your organization.

Consider cloud computing for deploying for business analytics.

Slightly more than half of manufacturing organizations still prefer on-premises deployment for business analytics, but the research found a significant preference (of 28%) for software as a service (SaaS), an on-demand approach commonly called cloud computing. Only 5 percent prefer software hosted by the supplier. A significant number (15%) expressed no preference for any of these approaches and so may be open to new methods to acquire business analytics. SaaS can provide affordable, rapid deployment to enable any size of organization to gain access to business analytics. We advise you to evaluate it if your organization is looking to avoid the effort and expense of having in-house technology resources manage your business analytics.

How Ventana Research Can Help

Ventana Research helps organizations develop, execute and sustain business and technology programs that align people, processes, information and technologies essential for success. As an objective and trusted advisor, we are your insurance that your business and IT initiatives deliver both immediate and long-term improvements to your business.

We offer a variety of customizable services to meet your specific needs including workshops, assessments and advisory services. Our [education](#) service, led by analysts with more than 20 years of experience, provides a great starting point to learn about important business and technology topics from compliance to business intelligence to building a strategy and driving adoption of best practices. We also offer tailored [assessment services](#) to help you connect the business and technology phases of your project by leveraging our research foundation and methodologies. And we can provide Ventana On-Demand access to our analysts on an as-needed basis to help you keep up with market trends, technologies and best practices.

Everything at Ventana Research begins with our focused [research](#), of which this report is a part. We work with thousands of organizations worldwide, conducting research and analyzing market trends, best practices and technologies to help our clients improve the efficiency and effectiveness of their organizations.

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research notes, briefings, telephone/e-mail consulting sessions to provide input and feedback, quotes and validation for media, use of Ventana Research materials for business purposes, additional analyst availability and access to our team for scheduled strategy consulting sessions.

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