Research Spotlight

Technology in Supplier Quality Management: Competitive Differentiation Through SQM

Quality management has a symbiotic relationship with its business partners. Quality does not own product management, but when engaged effectively during New Product Introduction (NPI) it drives improved success, customer satisfaction, and financial performance. Quality does not own manufacturing, but when engaged effectively in production planning and execution the result is improved Overall Equipment Effectiveness (OEE) and On Time Delivery (OTD).

Quality Symbiosis: Those that adopted processes that integrate quality across design, manufacturers and suppliers saw benefits for all.

Likewise, quality does not own the supplier relationship, but when engaged effectively through leading Supplier Quality Management (SQM) practices it improves the performance of the supply chain. Given the importance of the supply chain in today's products, this creates benefits not just in supplier quality but across product management, manufacturing, and service. SQM is symbiotic, and improvements to SQM measurably benefit all parties.

Manufacturers that have invested in technology to advance SQM have realized that differentiated SQM provides a competitive advantage in the market. These manufacturers have automated and connected core SQM processes in years past, and then leveraged the latest technology advancements such as Machine Learning, Cloud, Big Data, and Mobility, to further differentiate their SQM performance. These new technologies improve supplier monitoring and oversight, effective collaboration, and predict potential supplier issues.

LNS' research shows that SQM best practice adoption is highly correlated with improved operational and financial performance. Market leaders have witnessed this. Realization of these improvements spurred continued investment in SQM, thus driving further separation from the rest of the market. Much of the remainder of industry relies heavily on people power, and thus have limited visibility or control of their SQM environment. Lack of visibility and control exposes laggards to disproportionately large market risks and competitive risks. Market changes such as increased globalization, product complexity, and regulatory changes create an increasing risk of recalls, brand damage, and customer or regulatory action for laggards.

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LNS data demonstrates that late adopters of technology will compete increasingly poorly on quality as well as OTD, OEE, and successful NPI. Poor performers compete on price rather than performance, and experience narrower margins; further advancing a vicious cycle.

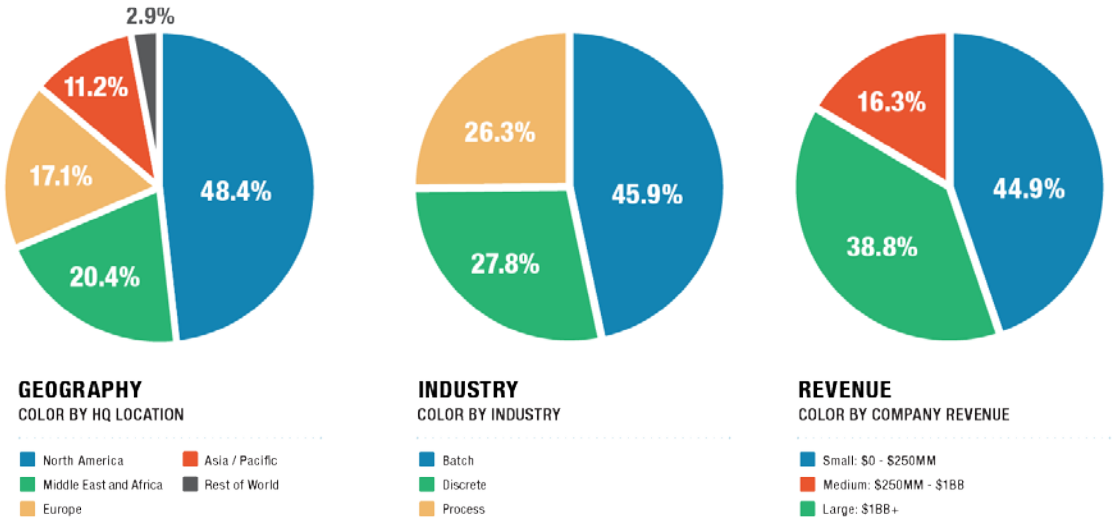
Read on to learn:

- The current state of SQM covering practices adoption by industry, geography, and role in the supply chain
- Anticipated changes in SQM Operational Excellence landscape
- SQM capabilities innovation leaders are deploying to drive competitive advantage
- Technology to consider when constructing your SQM strategy
- Corporate initiatives that rely upon SQM maturity

Manufacturers ignoring SQM and its symbiotic connection to product, manufacturing, service and supply chain operations do so at the detriment of their quality, operational and financial performance.

Research Demographics

The LNS Research Quality Management Survey has been completed by over 700 executives and other senior leaders coming from a variety of company sizes and geographies across a range of industries. The survey questions drill down into the challenges and opportunities companies face, strategic objectives data, and the most important goals currently being pursued around quality.



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There were 54.3% of companies from Discrete Manufacturing industries, with the remainder coming from Food & Beverage/Consumer Packaged Goods, Life Sciences, and Process Manufacturing. Just over half were from North America, followed by just under a quarter from Europe. Almost half, 46.8%, were from small companies, with 38.0% from large companies, and the remainder from mid-sized companies.

State of SQM

SQM is the quality management process area that covers supplier selection, collaboration, monitoring and oversight, and continuous improvement. There can be many industry-specific requirements and variants to SQM processes, but many industries leverage core processes such as waivers, Non-Conformances (NCs), Supplier Correction Action Reports (SCARs), and Supplier Audits. Supplier scorecards may be used to rate supplier performance and identify supplier risk. Processes, such as Production Part Approval Process (PPAP), are becoming more widely used across industries to ensure that a supplier is equipped to deliver a known product that meets quality and production volume. Identification of Control Characteristics (CCs) is embedded in this process.

Proper identification and monitoring of CCs has become a focal point for quality, manufacturing and engineering leaders looking to drive improved quality earlier in development. Many companies look to leverage a supplier portal to provide secure communication of this sensitive quality data.

While the contract manufacturing relationship has existed for many years, relationships between suppliers and customers have evolved. In some cases, this is to include much more active participation of suppliers in the customer's NPI process, or for full product development and manufacturing outsourcing.

For instance, 33% of Life Sciences companies identified that collaborative business models with outsourced research and manufacturing companies are a top industry trend. It is outside the scope of this paper to fully define all SQM practices, and the reader is encouraged to look to other publications from LNS and other sources to gain additional detail, including the eBook entitled: Supplier Quality Management: SQM's Rightful Role in Your Enterprise.

Regardless of the processes in scope, LNS Research surveys organizations about processes to determine which are most critical and least critical to a company's success. SQM stands out in this research, with 50% of respondents (N=1089) indicating that SQM is most critical to company's success.

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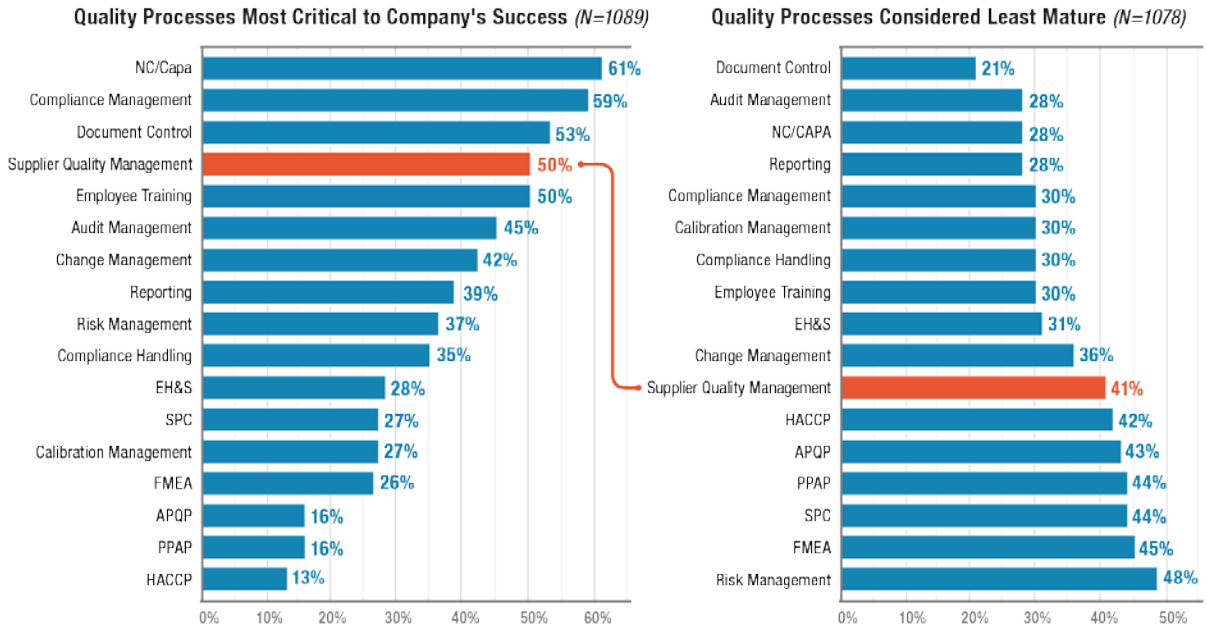

The importance of managing the supplier-customer relationship outpaces many other Quality Management processes. LNS also tracks processes which respondents consider to be least and most mature at their companies. 41% of respondents singled out SQM as one of their least mature processes. This creates a substantial disparity between the importance of SQM to corporate success and maturity, as respondents cited lower maturity in SQM than many processes considered to be less critical to their success.

This lack of maturity is clearly seen in LNS's survey data. When examining SQM best practices, the median adoption of individual SQM best practices was a mere 12% of the surveyed market, which is the same rate that had no best practices adopted. Even the most widely adopted practices, such as supplier scorecards, are implemented by fewer than 1 in 3 manufacturers. SQM practice harmonization is rare, as is close collaboration between suppliers through IT integrations, incorporation of suppliers in design for quality initiatives, or collection and statistical analysis of supplier quality data.

Enterprise systems have been employed for decades to manage processes effectively, provide timely visibility into the health of systems, and enable data-driven decision-making. Unfortunately, this seemingly fundamental Operational Excellence building block is used to manage SQM at only one in five manufacturers, the least automated of the top 10 processes. Clearly, there is a disconnect between the importance of SQM and investment.

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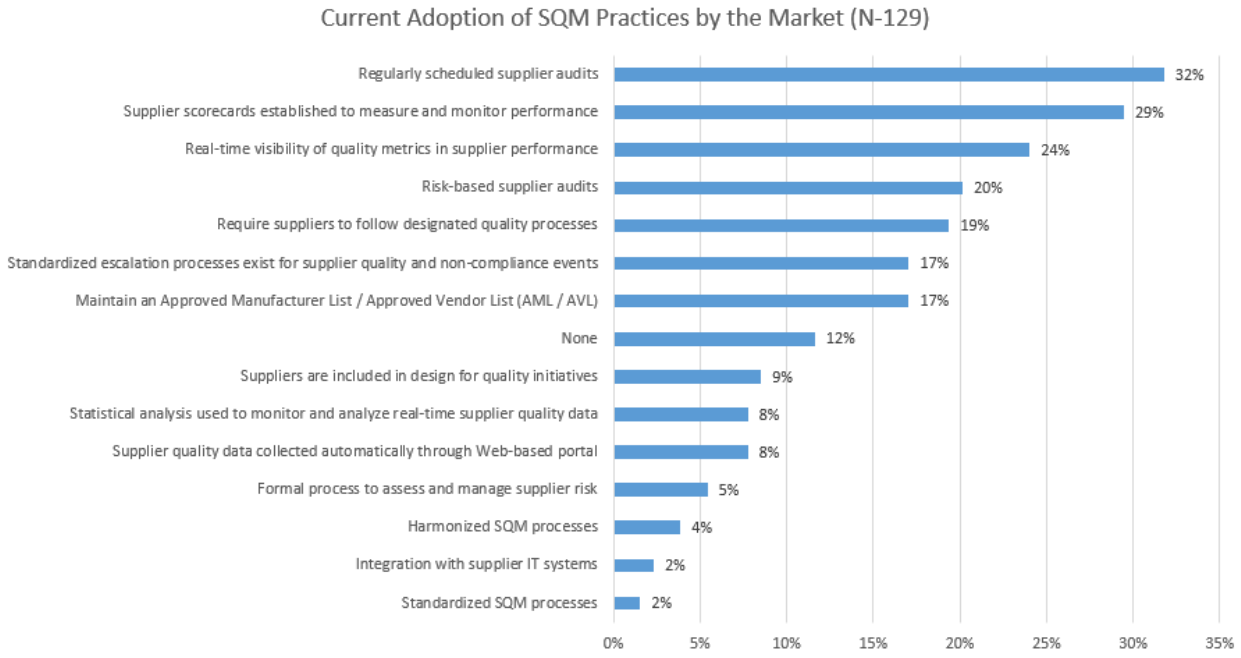

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We find substantial variation in SQM automation across industries. Industries with regulatory requirements for traceability, complex supply chains, and/or manufacture products with high cost/high-value supplier inputs have adopted SQM automation earlier and at higher rates than those without it. Paper (9%), Utilities (10%) and Packaging (11%) industries have among the lowest percentages of SQM automation of industries surveyed, whereas Aerospace & Defense (43%) and Life Sciences (29%) manufacturers lead in SQM automation.

Additionally, SQM automation varies by role in the supply chain. OEMs and Tier 1 manufacturers are much more likely to automate SQM than those that are Tier 2 or below, with OEMs automating SQM with software nearly twice as often as Tier 'x' suppliers. Those at the top of the supply chain have inherently higher complexity SQM challenges, necessitating earlier adoption

Top 10 Processes Automated with Software *(N=610)*

#1	Non-Conformances/Corrective and Preventative Action (NC/CAPA) **46%**
#2	Document Control **44%**
#3	Employee Training **35%**
#4	Complaint Handling **31%**
#5	Statistical Process Control (SPC) **26%**
#6	Reporting **25%**
#7	Audit Management **24%**
#8	Change Management **24%**
#9	Compliance Management **22%**
#10	**Supplier Quality Management 21%**

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of SQM technologies. Of course, this creates a different but similar challenge for the suppliers who receive quality inputs from many customer portals. Additionally, 26% of companies (N=84) require their suppliers to follow company-specific quality requirements. It is important for those at the top of the supply chain to manage supplier data, but those at the bottom need to invest in solutions to harmonize customer-specific quality requirements and consolidate customer-issued Supplier Corrective Action Reports (SCARs), Non-Conformances and other data inputs.

The market plans to double SQM practice adoption in the next year, with a median planned increase in adoption of 12%. This should be understood to mean that the market recognizes the need for improvement, not that SQM adoption will spike. Although the market plans to double automation of many core quality processes, EQMS adoption increases an average of 8% per year, and LNS anticipates that SQM will behave in a similar fashion. However, the data also indicates which processes are most likely to increase in adoption. The market has identified that real-time metrics, risk-based supplier audits, and collection and analysis of supplier quality data are areas of interest.

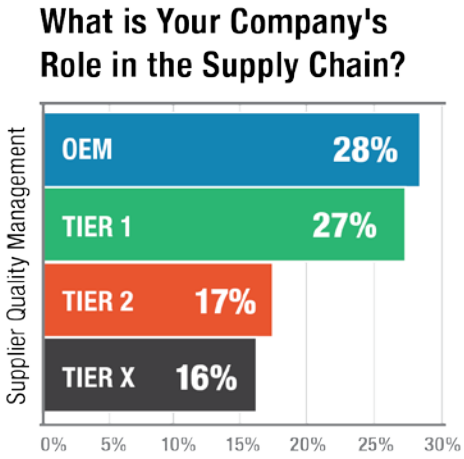
SQM Technology Journey

Effective SQM relies on technology to improve oversight and collaboration. Market leading companies are deploying a range of technologies to improve SQM performance. LNS encourages manufacturers to consider SQM technology as a journey; there is no single-investment that will result in differentiated SQM, and companies should construct an SQM strategy that identifies incremental steps to arrive at a competitive SQM landscape.

LNS also suggests that manufacturers grade their current SQM technology landscape against the capabilities identified in the following sections, and to build a strategy around these technologies.

SQM Automated with Software

- Aerospace & Defense **43%**
- Life Sciences **29%**
- Consumer Durable Goods **29%**
- Industrial Equipment **26%**
- Oil & Gas **26%**
- Automotive **25%**
- Chemicals **25%**
- Electronics **25%**
- Food & Beverage **25%**



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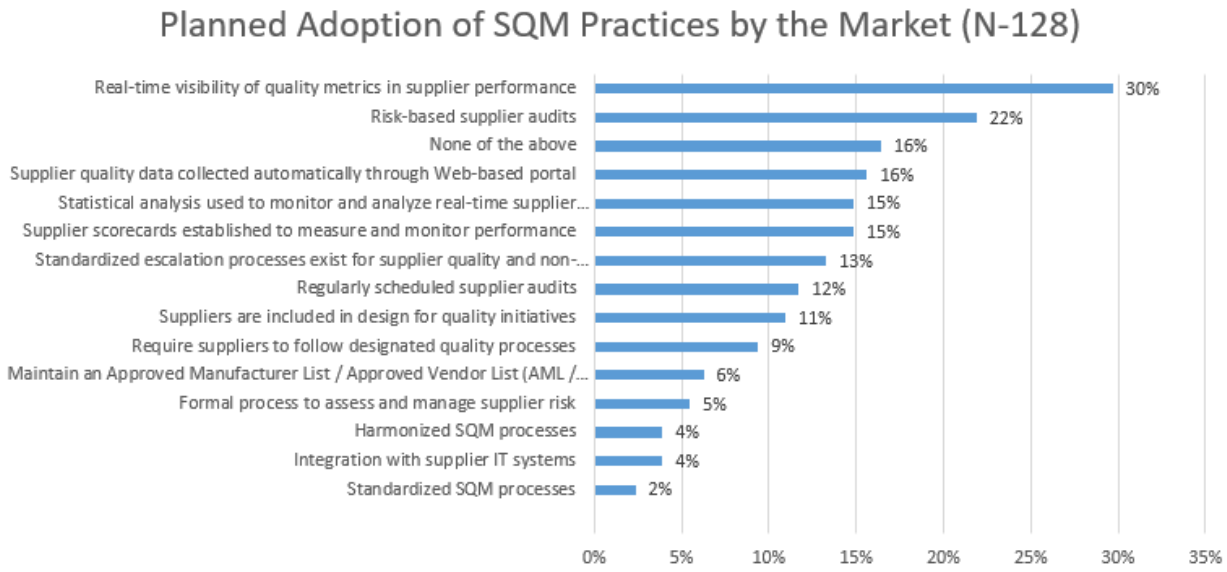

Automate and Integrate SQM

Given the complexity of SQM and the importance of SQM to corporate success, it is surprising that so few have automated SQM with software. Through automation of SQM with enterprise software, companies gain a platform to manage and monitor supplier performance consistently. These platforms multiply the valuable expertise of Supplier Quality Engineers (SQEs), improving the efficiency of SQEs and their coverage of the supply base.

Perhaps more importantly, when connected to other enterprise solutions, SQM solutions make the work performed by SQEs visible and connected to the rest of the enterprise; feeding decision-making processes from purchasing to manufacturing to engineering. Currently, 9% of the market have integrated SQM with other enterprise solutions, which is 43% of those that have automated SQM with software. Quality leaders that have adopted SQM technology solutions should maximize the value of their investment by leveraging this information across the enterprise.

Knowledge retention and skills development are important considerations for quality leaders. In the absence of an enterprise platform, supplier data is often captured in individual emails and files. This presents a real organizational risk for corporations, as employee turnover will result in loss of important institutional knowledge. Leaders should have a plan for global knowledge retention and skill sharing, and enterprise SQM automation can be an important part of that plan.

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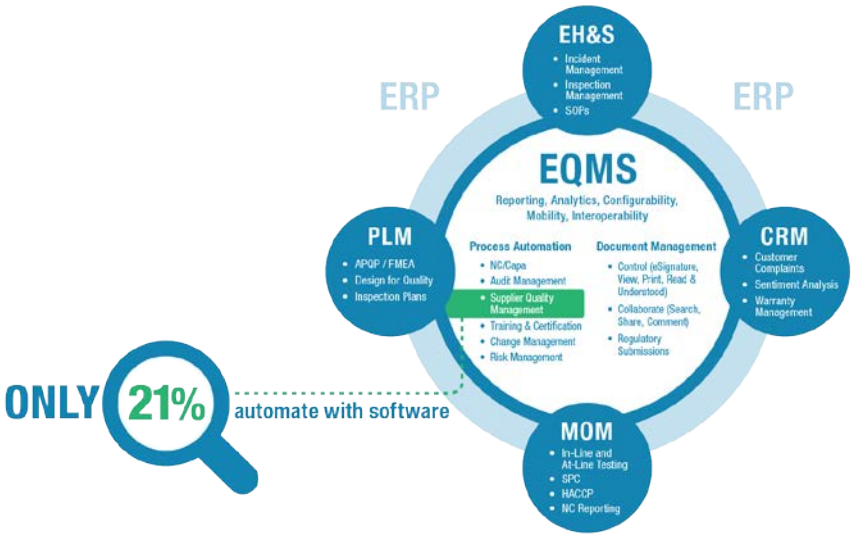
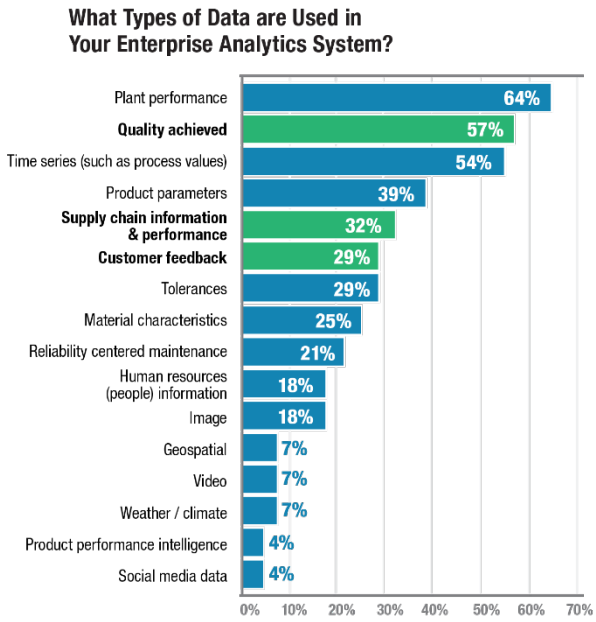
Leaders should also be aware that SQM data is highly sensitive documentation both for customers and their suppliers. This data contains competitive information from suppliers, often including lot-to-lot supplier performance and submissions of engineering, production and quality capabilities. In an age increasingly concerned with cyber-security, poor management of SQM data is a dangerous practice. Storing this sensitive data in individual files and emails is risky behavior.



Data-Driven Decision-Making

One of the top challenges for quality management is poor visibility into quality metrics. In large part, this is driven by the hodge-podge of tools and systems that are used by quality to manage its workload. It is not uncommon to see dozens of systems in use across processes, sites, and business units, in addition to spreadsheets and documents. In these cases, it is quite difficult to generate accurate metrics, as these different sources often capture different perspectives of the state of quality and describe it in uncontrolled ways. For instance, lists of possible failure mechanisms are rarely standardized across systems, and so an analyst must conscientiously and tediously consolidate these many ways of describing “broke” and which part or process did break. If two analysts compile the data, there may be a lack of agreement on the results.



Of course, this also impacts the timeliness of analysis and therefore its value in decision-making. In immature companies, it is likely that quality metrics are laboriously computed infrequently; possibly in support of scheduled reviews or upon executive request. The information is immediately out of date, and while of historical value, is of limited worth in identifying developing trends.

Two LNS data points underscore these challenges. Firstly, companies that have Ad Hoc quality maturity know their Cost of Quality metrics less than one-third as often as Innovation Leaders (reference LNS eBook Supplier Quality Management:

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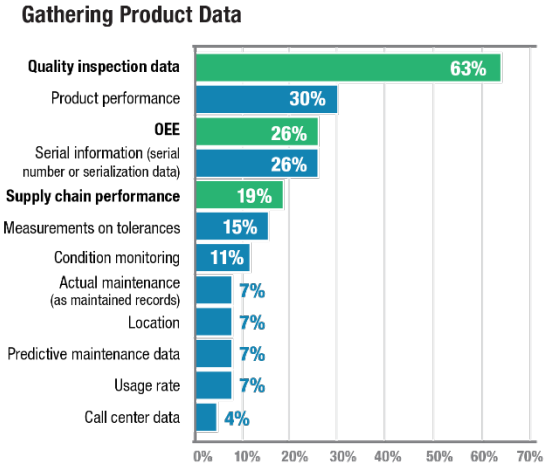
SQM's Rightful Role in Your Enterprise for more details on maturity). Immature companies struggle to generate metrics. Also, only 9% of respondents have real-time SQM metrics (N=95). In conversations with organizations, metric generation is often a laborious process, and quality leaders question the accuracy and value of their metrics.

This is starkly contrasted with the Enterprise's plans both for enterprise analytics as well as for data coming back from smart devices. Quality data and supply chain information and performance are heavily featured in these plans. Once again there is a dichotomy between the current immature state of quality systems and the plans for data from these systems. Quality leaders must highlight this disconnect and gain support to address it.

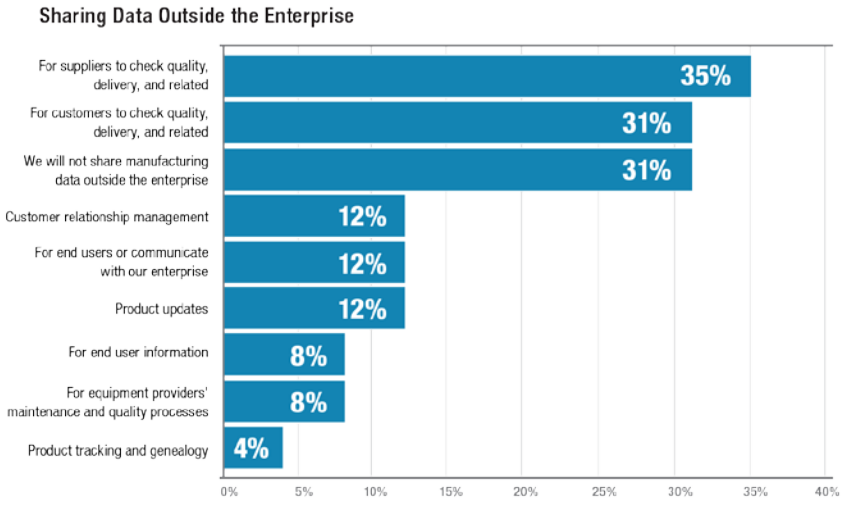


Sharing Quality Data Outside the Enterprise

Many companies are planning to share manufacturing data outside the enterprise - in fact, only 31% of companies do not plan to share manufacturing data outside the enterprise. Company's top goals when sharing data are to improve collaboration with suppliers and customers regarding quality and delivery data. Manufacturers have identified that sharing quality data with suppliers and customers are the top benefits of cross-company collaboration.

Collaboration can take many forms, from submission of PPAP documentation or a lot's Certificate of Conformance/Analysis (CoC/CoA). Market leaders are gaining access to supplier quality statistics through real-time portals and using this to monitor or even predict supplier performance.

Of course, they must do it with adequate security, both from outside cyber security threats as well as in a manner that ensures supplier confidentiality. Suppliers may be partners in some projects and competitors within others.



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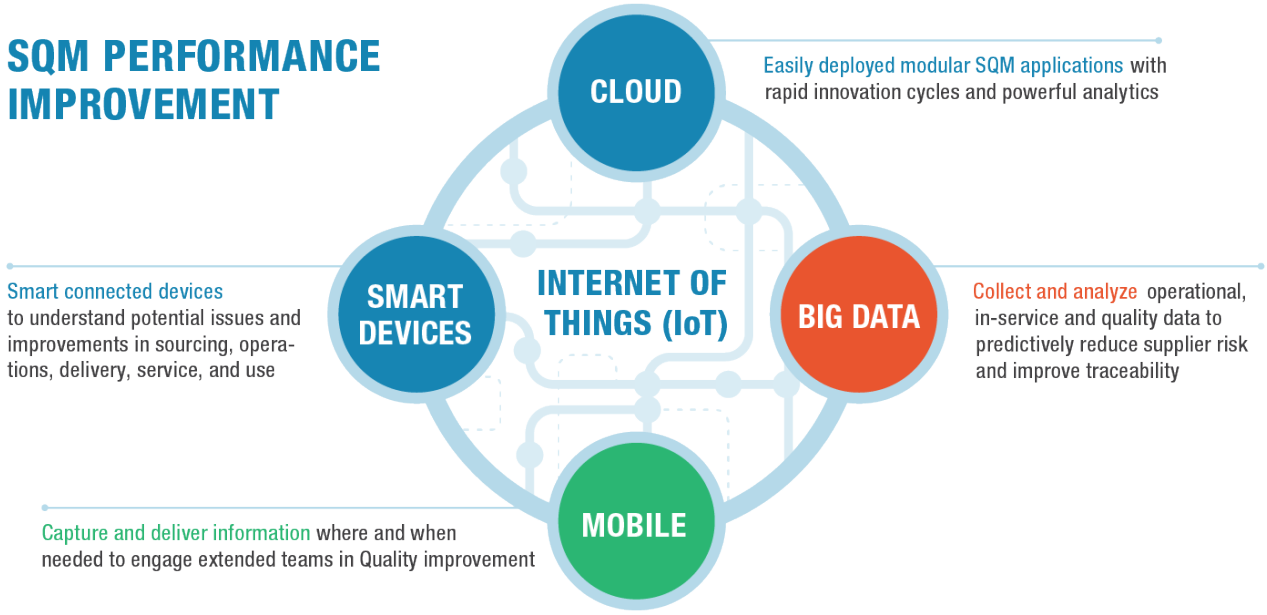
While security is critical, leading industry solutions have addressed this sufficiently to support highly complex security scenarios.

Clearly, sharing quality data between suppliers and customers is valuable and important for customers and suppliers. Quality leaders should recognize that this is a top use case for external collaboration. However, leaders should also focus on how to maximize the impact of this collaboration.

Digital Transformation and SQM

Digital Transformation is the journey manufacturers undertake as they leverage disruptive new technologies such as Cloud, Mobility, Big Data Analytics, and the Industrial Internet of Things (IIoT) to transform product and service offerings for competitive advantage. Many companies are now on this journey: LNS Research showed that in 2016, 39% of respondents understood IIoT and saw value to their operations/customers, 33% were still investigating, and only 19% did not yet know about IIoT. Additionally, many companies are targeting Quality and external collaboration as IIoT use cases.

Quality leaders should exploit the potential for Digitally Transforming SQM to gain unprecedented insights and visibility. To fully realize the potential of Digital Transformation, leaders should identify how to converge data from connected devices with IT systems. This can be understood by overlaying quality, the value chain, and connected devices onto the ISA-95 model. This model can be used to build a complete quality strategy that includes enterprise, functional and IIoT



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quality. For additional information on Digital Transformation and Architecture, reference IIoT and Big Data Analytics: How Manufacturing System Architecture is Being Transformed.

Digital Transformation and analytics such as Machine Learning provide new insights into old questions and answers previously unanswerable questions. While Machine Learning can provide value for internal operations, it is arguably more valuable when interfacing with the increased complexity of data, product, and services exchanged with many 3rd parties.

In SQM, this could mean applying advanced analytics on incoming inspection data to find previously undetectable trends in supplier defects, detect these trends more quickly, or even detect them at the Supplier's sites. Industry leaders are applying analytics to parse supplier performance by part, by feature, by lot, or by previously unsuspected categorization. Yet, other SQM insights might be possible by connecting performance of fielded connected products back to supplier-related causes.

This is very much a story of "the rich get richer." However, the IIoT alone does not address the complete technology requirements of SQM. Quality leaders should actively identify Digital Transformation initiatives underway at their companies, align quality with these strategic objectives, and guide executive leaders to understand this bigger picture. This approach is successful, as LNS has seen that some C-suite executives identify deploying Enterprise Quality and SQM as a critical piece of a Digital Transformation journey.

Recommended Actions

Quality has a symbiotic relationship within an organization, and SQM extends this to the supply chain. While today's state of SQM is immature, quality and SQM are top use cases for collaboration, analytics, and Digital Transformation. Quality leaders should consider a complete SQM strategy to support initiatives in these areas, as well as to drive operational and financial benefits for the company at large.

One important consideration is the state of technology. Quality leaders should compare themselves to leading organizations on the following points:

- Has the organization automated and integrated SQM processes? Is there a single harmonized system?
- Which functions and roles have real-time access to SQM metrics and information?
- Data is likely being exchanged with suppliers and customers, but is it secure, is it automated and is it rich?

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- Has the organization developed and deployed secure mobile, Cloud and analytics strategies to enter the next generation of predictive analytics?

Advancing the SQM technology landscape is a journey, but one that should be embarked upon soon.

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