

2013-2014 Manufacturing Metrics that Really Matter Summary Report

Today, manufacturers across industries are reaching new levels of excellence, pushed forward by the dynamics of a shifting landscape around global labor, energy expenditures, supply and demand preferences, evolving regulatory considerations, and the emergence of new automation and information technology capabilities.

Manufacturing organizations are achieving this elevated performance through continuous improvement directives and programs that require the synergy between people, processes, and supporting technology resources, but companies also need to ensure that continuous improvement efforts are being accurately and appropriately measured through optimized metrics programs.

The focus of this research is to understand the business impacts of metric programs and that are being used across a wide range of manufacturing industries. With the breadth and span of available metrics, it is important that organizations choose the right metric approaches that align to business and manufacturing processes to diver optimized improvement efforts—these choices will vary by situation.

In this summary report, the following questions will be answered:

- Which metrics are being used to best understand manufacturing performance and opportunity areas for improvement?
- How does my company's performance improvement compare to industry?
- How do we connect operational metrics to financial metrics?
- How can technology help support and impact metrics programs and performance?

Manufacturing companies need to ensure that continuous improvement efforts are accurately and appropriately measured through optimized metrics programs

Research Methodology and Demographics

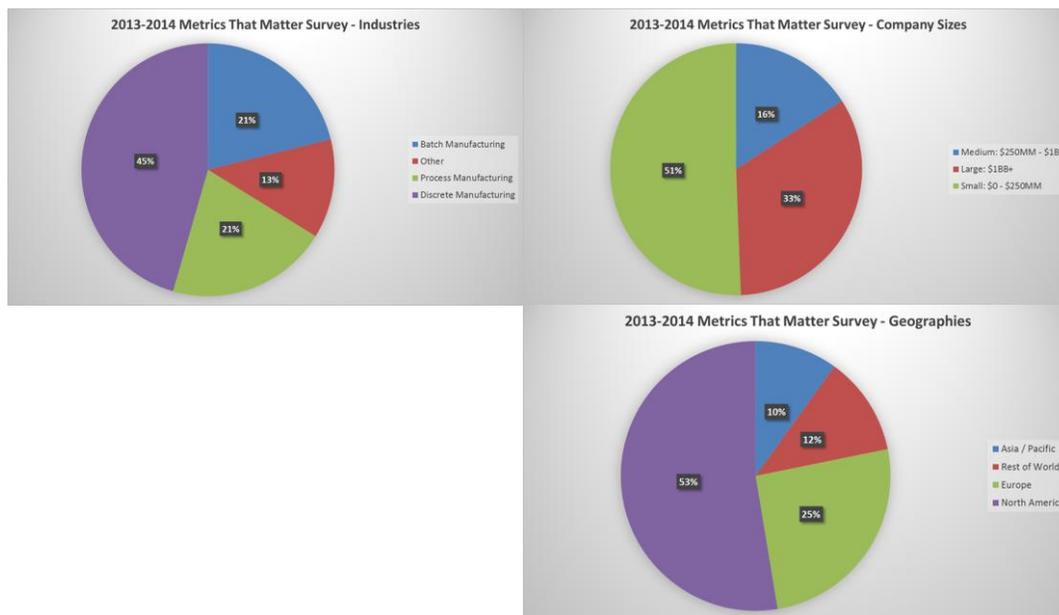
The Metrics that Matter survey was conducted between MESA International and LNS Research between October 2013 and February 2014. A comprehensive survey was created by LNS Research and reviewed by the MESA Metrics Working Group, with valuable insights received from Aditya Birla, Volvo, and Whirlpool, and made possible in part by sponsors Epicor, InfinityQS, Plex Systems, Rockwell Automation, and Schneider Electric (Invensys).



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The survey comprised 214 respondents across a broad mix of industries, company sizes, and geographies.



Most operational metrics programs are looking at plant level upward while most financial metrics programs are starting at the corporate or business unit level and looking downward at plants.

Research Scope

The research showed that the largest percentage of respondents provided metrics performance information at the corporate/company-wide level (42%), with the business unit and plant levels at 27%, and the production line level at 3%.

Approaching the subsets of Financial and Operational metrics, additional insights can be seen from the nearly half (49%) of respondents indicating that they provided corporate financial level information, while plant level financial metrics was provided 19% of the time. The data shows that most operational metrics programs are looking plant level upward while most financial metrics programs are starting at the corporate or business unit level and looking downward at plants.

Financial and Operational Metric Improvements

MESA International and LNS Research identified the 28 most used financial and operational metrics from previous surveys and included them in this year's iteration. All respondents were asked about specific performance levels of three critical metrics:

- On-Time Completed Shipments (OTCS)
- Overall Equipment Effectiveness (OEE)
- Successful New Product Introductions (NPI)

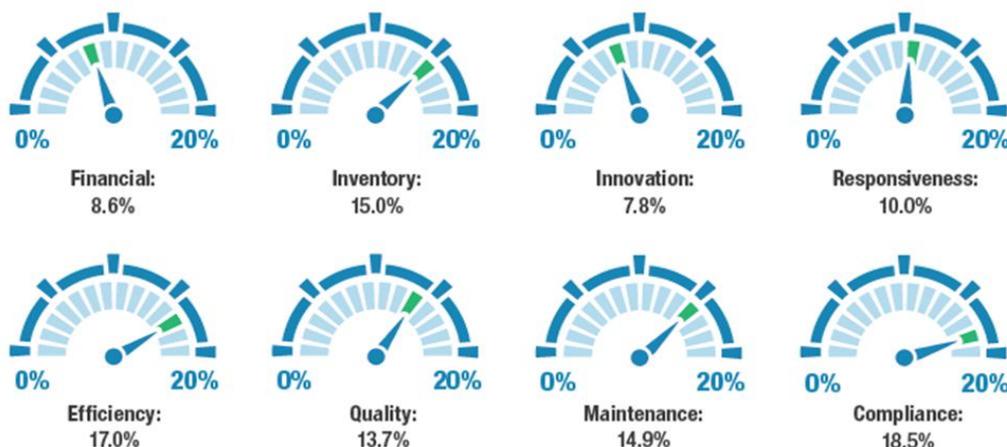


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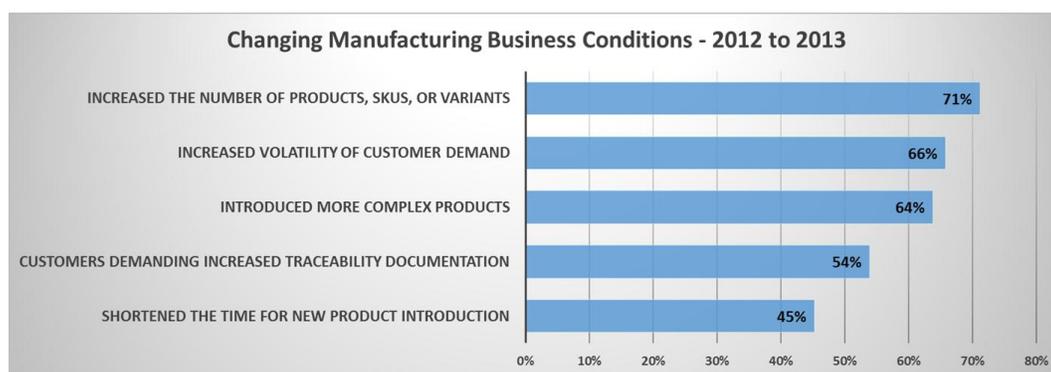
The other 25 metrics were surveyed to uncover average annual performance improvement percentages, and these were combined into eight categories, represented by the dials below.

Average Manufacturing Performance Improvements from 2012 to 2013

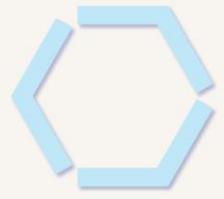


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Generally, manufacturers are making great strides, as the overall average for those providing metrics was consistently in double digits for most metric categories. To add context to these improvements, respondents were asked about changes that have occurred to their businesses since the last survey.



As the graph shows, companies have a greater number of overall products to manage, and a greater level of challenges in getting new products to market along with the need for increased flexibility within manufacturing operations. Those who improved the percentage of successful NPIs appear to also be doing a better job at OTCS, with an average annual improvement of 19.1% versus and overall annual OTCS improvement average of 12.5%. This stands to reason, given that the



effective management of new product processes would carry forward into ongoing customer deliveries.

Key Relationships Between Operational and Financial Metrics

It should come as no surprise that many positive correlations were found between average annual metric improvements and average annual financial metrics. This has been true for every MESA Metrics Survey since 2006, and it stands to reason that the converse is also true. This year's survey revealed the following key observations:

- The average percent successful NPIs was 72%, with the top 7% of performers achieving 90% or better
- The average OEE was 71, with the top 11% performers achieving 80 or better
- The top performers in NPI had average annual financial improvements of 16% versus 8.6% for all others
- Those with OEE of 80 or better had average annual financial improvements of 14% versus 8.6% for all others

NPIs

Respondents with NPIs of 90% or better reported average annual financial improvements of 16%. These respondents also had 32% annual improvements in customer fill-rate/on-time delivery/perfect order versus an average of 12.5% overall.

OEE

Those with OEE of 80 or better had average financial improvements of 14%. Specifically, 11% of respondents had 20% annual improvements in Revenue per Employee/Productivity versus an average of 8% overall.

Those who improved the percentage of successful NPIs appear to also be doing a better job at OTCS, with an average annual improvement of 19.1% versus and overall annual OTCS improvement average of 12.5%.



Key Relationships Between Metrics and Software Use

Some of the key relationships uncovered under this year's survey were correlations between average annual metric improvements and the use of software technologies to support them. There were some interesting trends found with respect to adoption rates compared to the previous survey. Overall, the most deployed applications by all respondents were ERP, Planning, Scheduling & Dispatching, Quality Management, Data Historians, Manufacturing Execution Systems (MES), and Asset Management. Specifically, there was marked adoption growth from the last survey participants in:

- ERP: From 67% previously to 74%
- Data Historians: From 39% to 42%
- MES: From 35% to 40%

Financial Metrics and Software Relationships

It is important to note that software, in and of itself, is not a panacea for achieving operational and financial improvements. Some 85% of survey respondents also had process improvement programs such as ISO 9000/9001, Lean, Six Sigma, etc. in place; however, manufacturers are supporting, accelerating, and sustaining process and metrics improvements through leveraging select software applications.

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Average Annual Improvements in:

 **TOTAL COST PER UNIT** | 13.1% Overall Average

24.1%

Users of Operations Intelligence/Enterprise Manufacturing Intelligence (OI/EMI)

22.5%

Users of Manufacturing Execution Systems (MES)



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The average annual improvement in Total Cost per Unit Excluding Materials was 24.1% for users of Operations Intelligence (OI)/Enterprise Manufacturing Intelligence (EMI) versus 13.1% for all respondents.

This value was 22.5% for users of MES versus 13.1% for all respondents

Given the aggregation and data contextualization capabilities from multiple sources that OI/EMI provides, and the ability of MES to enforce operational procedures, provide traceability, etc., these relationships stand to reason.

- The average annual improvement in OTCS was 22.0% for users of MES versus 12.5% for all respondents
- The average annual improvement in OTCS was 20.4% for users of Quality Management software
- The average annual improvement in OTCS was 19.1% for users of PLM

More and more PLM systems are integrating with real-time plant workflows and bi-directional information from MES and Quality Management applications that are speeding time-to-market changes while receiving direct feedback on production issues and quality to improve future designs.

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Operational Metrics and Software Relationships

Just as there were notable positive correlations between financial metrics and software relationships, similar connections were found with respect to operational metrics.

Average Annual Improvement in Reportable Health & Safety Incidences

- All Respondents: 17.1%
- Users of Quality Management Software: 23.8%

Average Annual Improvement in Reportable Environmental Incidences

- All Respondents: 19.9%
- Users of Document Management Software: 27.6%

Average Annual Improvement in the Number of Non-Compliance Events

- All Respondents: 18.5%
- Users of Document Management Software: 24.6%

With regard to this last metric, the converse was also found to be true. The average annual improvement in the Number of Non-Compliance Events for those who *did not* use either Document Management or Quality Management software was only 7%.



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These key observations in improvements make a powerful case for the effectiveness of a combination of Document Management and Quality Management software applications.

Summary

Research shows that companies are achieving elevated performance through following effective continuous improvement programs. This requires the collaborative support of people, processes, and technologies, but in order to focus on the correct areas, companies also need to ensure that the most impactful metrics are used within these programs. With the breadth and span of available metrics today, it is crucial that organizations select the correct metrics approaches that align to their business and manufacturing processes to drive optimized improvement efforts. These choices will vary with each individual company situation.

Which metrics are being used to best understand manufacturing performance and opportunity areas for improvement?

- The top 10 financial metrics and top 18 operational metrics are listed and highlighted in this [LNS Research blog post](#).

How does my company's performance compare to industry?

- You can compare with the average annual improvements achieved by others for metrics categories show on Page 3. Additionally:
 - The average percentage of successful NPIs was 71.5% and the top performers averaged 90%
 - The average OTCS was 87.6% and the top performers achieved 95% or better
 - The average OEE was 70.7 and the top performers achieved 80 or better.

How do we connect operational metrics to financial metrics?

- There were many positive correlations between average annual operational metric improvements or performance and improvements in average annual financial metrics highlighted on Page 4. Average annual financial improvements were 8.6%; however, top operational metric performers had significantly better values across a range of categories.

Research shows many positive correlations between average annual operational metric improvements or performance and improvements in average financial metrics.



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Conclusion/Recommendations

If you are not currently working toward a metrics improvement program, you should be. MESA has several valuable resources on its website available to members [here](#), and LNS Research also has a [Performance Management Research Library](#) available to participants, who engage in its ongoing social research by completing the Metrics that Matter survey. A much more comprehensive, 35-page eBook report of these findings is available from both of these online resources.

MESA International and LNS Research would like to thank the sponsors of this 2013-2014 MESA Metrics research project. Development and distribution of this valuable information was made possible by:

MESA International is a global not-for-profit industry association dedicated to improving outcomes for businesses and their people through the use of manufacturing information.



LNS Research provides advisory and benchmarking services to help Line-of-Business, IT, and Industrial Automation executives make critical business and operational decisions.

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