$150 USD

Manufacturing 2015: The Return of Profitability

Executive Summary of Benchmark Data and Analysis from the MPI Manufacturing Study

Conducted by The Manufacturing Performance Institute
a division of The MPI Group, Inc.

The MPI Group

People. Purpose. Profits.

Contents

Introduction

Manufacturing 2015: The Return of Profitability examines plant-level performances and practices for facilities in the United States. The MPI Manufacturing Study was conducted by The MPI Group and is intended to help manufacturing executives benchmark their operations performances; compare best practices; assess management of workforces, equipment, and technologies; and, ultimately, improve.

Manufacturing 2015: The Return of Profitability illustrates the changes underway among U.S. manufacturers and hints at what's to come:

- *Manufacturing employment will rise:* Plant employment is likely to pick up in 2015, and manufacturers are taking steps — e.g., higher wages — to retain the employees they have in the face of rising labor turnover rates, as workers leave for opportunities elsewhere. For many plants, labor turnover is problematic, reaching double-digit percentages.

- *Operations are now driven by improvement methodologies:* Lean manufacturing remains the No. 1 improvement approach in manufacturing, especially among executives who value process improvement. Process improvements are boosting profitability for a majority of plants, but production gains are increasingly incremental.

- *Supply chains remain focused on cost and quality, rather than collaboration:* Manufacturers are struggling to manage global supply chains. Too many still approach customer and supplier relationships as "buy-and-sell" transactions, missing out on the advantages of collaboration and partnering.

- *Production capacities are strained:* Production volumes have reached their highest levels in years (as a percentage of designed capacity). Many manufacturers are considering expansions or new facilities, while others look for capacity by improving the reliability of their equipment.

- *Information technology (IT) effectiveness varies dramatically:* Some functions, such as production and scheduling, are improving thanks to effective IT applications and systems. But others, such as asset management and customer service, exhibit poor IT performances. Human resources and logistics are the most likely targets for upgraded IT this year.

- *Plants are getting started with the Internet of Things (IoT):* Few manufacturers have an IoT strategy in place. But there is IoT movement: plants have begun to embed intelligence into their equipment and production lines, a first step in getting an IoT strategy off the ground.

- *Green and sustainability efforts lag:* A majority of manufacturers are mostly ignoring green and sustainability initiatives. Adoption of green practices — and improvements in green metrics — seems to have stalled.

For more information on U.S. manufacturing performance, practices, and trends, read on.

John R. Brandt
CEO
The MPI Group

Human Resources: The War for Talent Intensifies

Hiring and retaining employees will be harder in 2015

The last year saw manufacturers across the country hiring at last, amid rising demand and strained production capacities. In January 2015, U.S. manufacturing employment reached 12.33 million — an increase of nearly 8 percent since January 2010.[1] Employment is expected to keep rising in 2015:

- 119 employees per plant in 2014 to 125 employees in 2015 (median)
- 442 employees per plant in 2014 to 476 employees in 2015 (average).

Annual labor turnover rates are increasing as well, to 6% (median) from 5% in recent years. Nearly a quarter of manufacturers had labor turnover rates of 15% or higher, indicating greater employee willingness to change jobs.

Pressure to retain employees is leading to higher wages:

- $18.00 wages (median) in 2014 vs. $17.00 in 2012.
- $13.00 starting wages (median) in 2014 vs. $12.00 in 2012.

Some 71% of plant executives report that employee wages increased in the past 12 months, and 65% report that benefits costs increased.

Developing an engaged, well-trained workforce matters more than ever

About half of plants train each employee more than 20 hours annually. Nearly two-thirds of plants have a formal employee-training program in place, and 60% have a leader/supervisor development program.

Some 38% of plants have a majority of production workers in empowered or self-directed teams, and 80% of plants empower at least some workers.

Among plants that train employees more than 20 hours annually, 48% have empowered a majority of their employees — vs. just 21% of plants that train less.

Nearly a quarter of manufacturers had labor turnover rates of 15% or higher, indicating greater employee willingness to change jobs.

[1] Bureau of Labor Statistics, February 2015.

HR programs and investments improve profitability

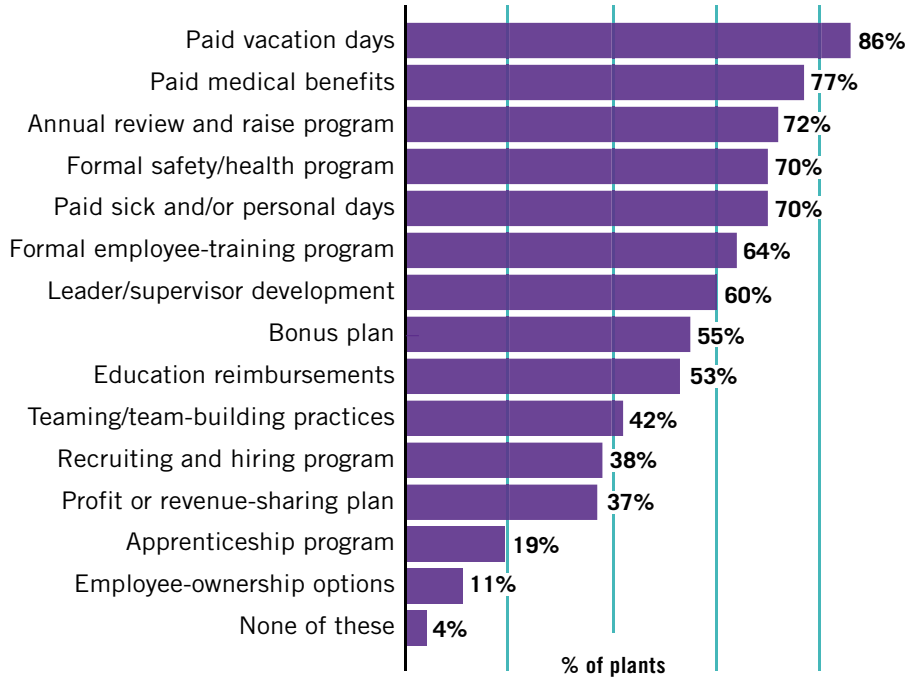
The most common plant-level HR programs and practices are paid vacation days, paid medical benefits, and annual review and raise programs (*Figure 1*).

Employee costs (wages, benefits, etc.) account for 20% (median) of plant sales.

Some 42% of plants will increase their investments in employees this year, and 7% will decrease their investments.

Investments in employees increased profitability at 53% of plants that tried them — 5% of plants enjoyed a major increase and 48% of plants experienced some increase. Investments in workforces decreased profitability at 6% of plants.

Figure 1. HR Practices and Programs
multiple answers possible



Path to World-Class HR

A significantly higher percentage (76%) of executives at plants closest to world-class status believe that HR strategies are important vs. executives at plants furthest from world-class status (53%). Plants closest to world-class status also pay more, train more, and enjoy lower annual labor-turnover rates.

Operations: Lean Holds Center Stage

Process improvement is critical to survival

Lean — characterized by the flow of goods through production, pull systems, and a continuous effort to find problems and remove waste — is in place at two-thirds of manufacturing plants (*Figure 2*).

Some 73% of executives report that process improvement is important to their plants' success over the next five years. Among that group, 75% follow lean manufacturing vs. just 44% of plants that pay less attention to process improvement.

Some 72% of plants report moderate, extensive, or complete adoption of their improvement methodologies (including lean), and have engaged 50% (median) of the workforce in implementing their improvement efforts.

The five most common operations practices and programs are focused on improvement:

- Continuous improvement program: 71% of plants
- Quality certifications: 55%
- Waste elimination: 51%
- Benchmarking: 49%
- Value-stream mapping: 40%

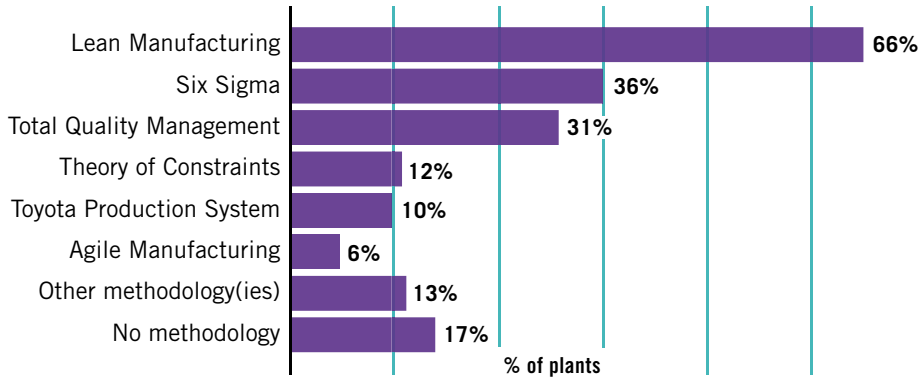
Process improvement investments improve profitability

Process improvement investments accounted for 5% (median) of plant sales; 32% of plants will increase investments this year, and 6% will decrease process-improvement investments.

Improvement methodologies increased profitability at 63% of plants that tried them — 9% of plants enjoyed a major increase and 54% experienced some increase.

Improvement methodologies decreased profitability at 2% of plants.

Figure 2. Improvement Methodology(ies)
multiple answers possible



Cost pressures are damaging bottom lines

Production output (unit volume) increased last year at 64% of plants.

Approximately 59% of plants increased sales per employee. Sales per employee was $180,900 (median) in 2014, down slightly from 2012 ($192,000).

Unfortunately, costs (excluding purchased materials) decreased at only 35% of plants over the last three years.

Total inventory turn rate increased at only 45% of plants (see *Figure 3* for current inventory turn rates). Many plants are likely buffering production for increased demand with time and labor (overtime), as well as inventories.

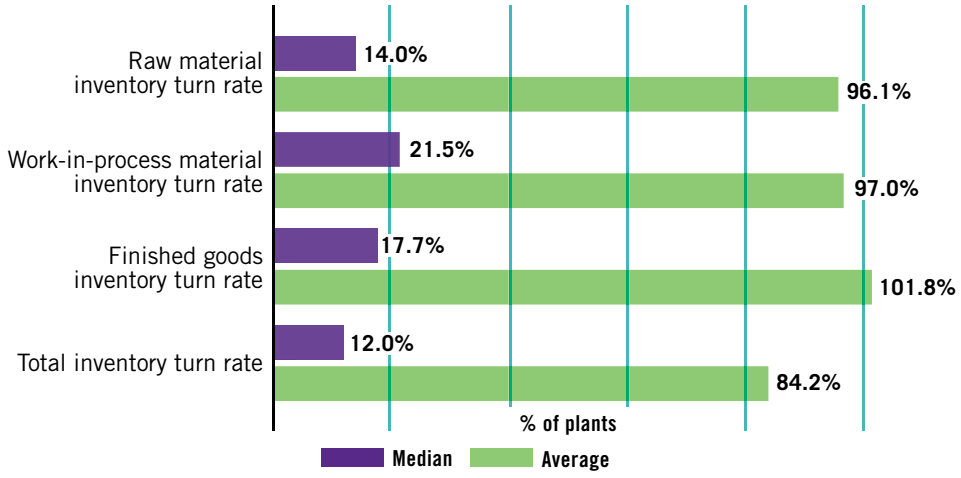
Executives plan only modest increases in material and component investments

Material and component costs accounted for 25% (median) of plant sales. Some 33% of plants will increase investments in the next year; 9% will decrease them.

The most common inventory practices are:

- Just-in-time supplier deliveries: 46% of plants
- Pull systems with kanban signals: 34%
- Vendor-managed or -owned inventories: 31%
- Quick equipment changeover: 24%
- One-piece flow techniques: 23%.

Figure 3. Inventory Turn rates



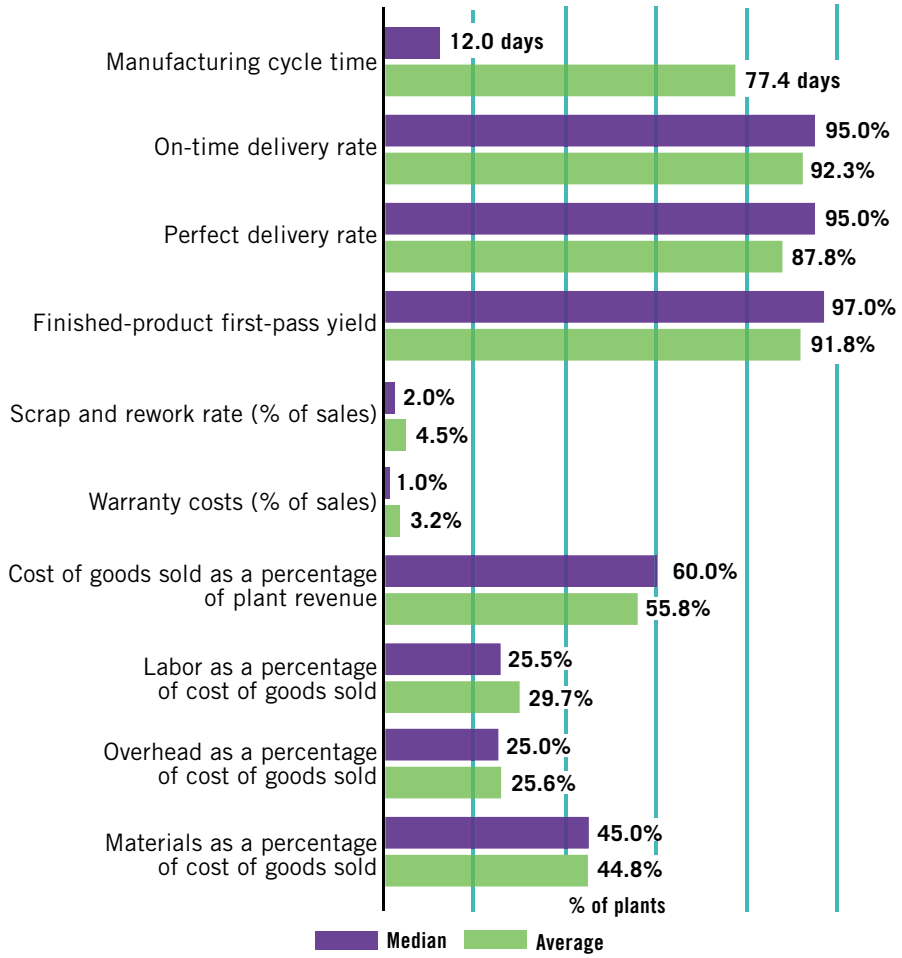
Production performances vary dramatically

Production metrics for plants are generally better than "three years ago." For example, the current scrap and rework rate (as a percentage of sales) is 2% (median) vs. 4% three years ago.

Yet many facilities have put their growth and survival at risk by neglecting key measures. For example, one-third of plants report a scrap and rework rate of 5% or higher.

Many facilities have put their growth and survival at risk by neglecting key measures.

Figure 4. Current-Year Production Performances



Path to World-Class Operations

Plants closest to world-class status are more likely to use lean (75%) than plants furthest from world-class status (58%). This focus drives better performances at plants closest to world-class status vs. those furthest away:

- Sales per employee — $200,000 (median) vs. $164,474 at other plants
- Total inventory turns per year — 12 turns (median) vs. 10 turns

In contrast, 26% of plants furthest from world-class status *have no improvement methodology.*

Supply Chain: Buying and Selling Goes Global

Are manufacturers overly focused on costs?

Approximately one-third of executives describe their plants' relationships with suppliers and with customers as "buy and sell" (*Figure 5*).

Most executives report that component/material costs rose in the past 12 months (at 64% of plants). Similarly, logistics/transport and utility/fuel costs also rose (at 66% and 63% of plants, respectively).

Unfortunately, only 55% of executives saw prices for their own products rise.

A gap between strategy and execution threatens supply-chain performances

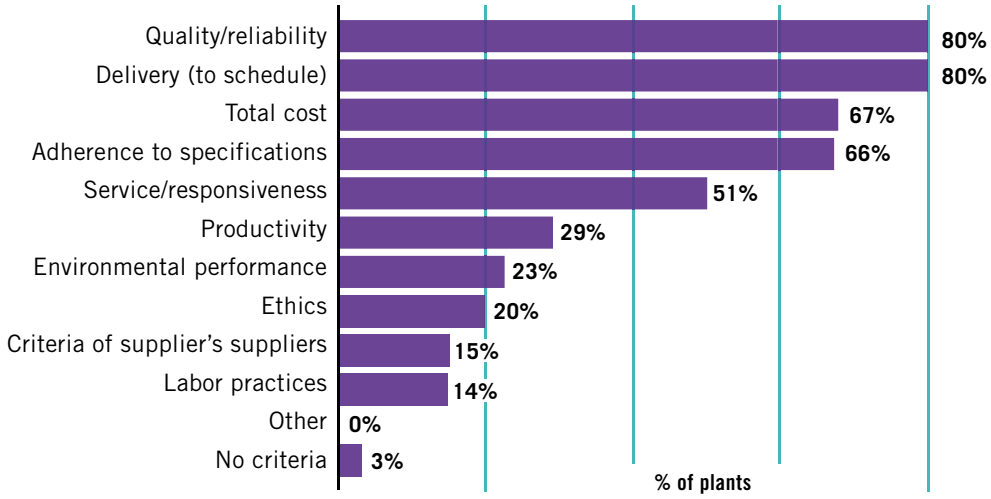
Most executives (74%) believe that supply-chain management is important or highly important to their plants' success over the next five years. Yet only half have implemented certification of major suppliers (53% of plants) or customer-satisfaction surveys (51%).

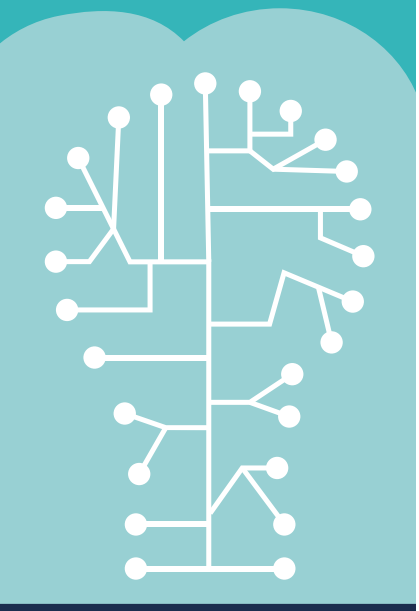
The most common criteria used in assessing suppliers are quality/reliability, delivery, and total cost (*Figure 6*).

Figure 5. Supply-Chain Relationships

	With suppliers % of plants	With customers % of plants
Buy and sell (e.g., cost and quality focus)	36%	33%
Certification (e.g., broad qualifications established)	19%	23%
Cooperation (e.g., sharing product ideas, best practices)	19%	22%
Partnership (e.g., sharing resources, intellectual property, cost savings)	26%	22%

Figure 6. Which of the following criteria are assessed and documented for material and component suppliers?
multiple answers possible





Supply chains stretch around the globe

U.S. plants have expanded their global reach. Overseas sales increased to 10% (median) of dollar volume, up from 7% in the 2012 study. Imported material/components account for 10% (median) of purchased volume, up from 8% in the 2012 study (*Figure 7*).

Approximately 15% of plants generate half or more of their sales overseas, and 13% of plants import half or more of their material/components.

The location of production has remained reasonably stable over the last three years, despite anecdotal reports of onshoring (*Figure 8*).

Figure 7. Supply-Chain Measures

	Median	Average
Customer reject rates (parts per million)	10	1,049
Customer retention rate (% of customer retained from previous year	95.0%	86.3%
Overseas sales (% total dollar volume)	10.0%	18.6%
Imported material/components (% dollar volume purchased outside home country	10.0%	17.7%

Figure 8. Location of Company Production Volume (% of production)

	This plant	Other corporate plant(s) in United States	External contractor plant(s) in United States	Corporate plant(s) outside of the United States	External contractor plant(s) outside of the United States
Current year					
Median	90.0%	0.0%	0.0%	0.0%	0.0%
Average	65.9%	18.4%	3.3%	9.9%	2.6%
Three years ago					
Median	90.0%	0.0%	0.0%	0.0%	0.0%
Average	65.3%	19.3%	3.2%	9.3%	3.0%

Path to World-Class Supply Chain

A significantly higher percentage of executives (83%) at plants closest to world-class status believe that supply-chain management is important to their plants' success over the next five years vs. those at plants furthest from world-class status (65%). These leaders manage differently and achieve better results:

- 69% of plants closest to world-class status certify major suppliers vs. just 39% of other plants
- 66% of plants closest to world-class status conduct customer-satisfaction surveys vs. 37%
- Plants closest to world-class status are less likely to have experienced costs increases in the past 12 months for material/components, logistics/transport, and utilities/fuel.

Capital Equipment: Rising Demand Strains Capacity

Equipment performance is falling behind

Plant production volumes approached their practical limit in 2014: 80% (median as a percentage of designed capacity) compared to 75% in the 2012 MPI Manufacturing Study and 70% in the 2011 study (*Figure 9*).

About one in 10 plants report production volumes at 99% of designed capacity or higher.

Additional capacity already exists in many plants: machine availability is 87.5% (median) as a percentage of scheduled uptime, meaning that plants can't run machinery one out of every eight times they count on it.

Even worse, about one-third of plants report machine availability of 75% or worse. Lost production is compounded by unnecessary maintenance costs: 10% (median) of maintenance costs are unplanned.

Capital investments drive profitability

Capital-equipment spending accounted for 10% (median) of plant sales.

Some 29% of plants plan to increase capital-equipment investments this year, and 14% will decrease them.

New capital equipment increased profitability at 63% of plants where it was installed last year —11% major increase and 52% some increase. New equipment decreased profitability at 4% of plants.

Monitoring and measuring plant performance is critical. A majority of plants have rapid awareness of:[2]

- Process-specific quality: 60%
- Process-specific safety: 57%
- Process-specific pace or speed: 56%
- Location-specific inventory levels: 56%
- Individual equipment or machine performance: 51%
- Process-specific productivity: 50% of plants.

Figure 9. Capital-Equipment Measures

	Median	Average
Production volume (% designed plant capacity)	80.0%	73.3%
Machine availability (% scheduled uptime)	87.5%	78.3%
Overall equipment effectiveness (% machine availability X % quality yield X % of optimal rate)	80.0%	76.2%
Unplanned maintenance as % of total maintenance (% based on annual maintenance expenses)	10.0%	17.3%
Return on invested capital (net operating profit after taxes ÷ by capital invested)	20.0%	30.2%

[2] Monitor and measure rated 4 or 5 on a scale of 1 to 5 where 5 equals real-time capability.

Path to World-Class Capital Equipment

Plants closest to world-class manufacturing status are more likely to have higher production volumes, as a percentage of plant capacity (80% of plants vs.75% of other plants).

Plants closest to world-class manufacturing status also are more likely to have *real-time* monitoring of activities:

- 42% of plants closest to world-class status have real-time monitoring of safety vs. just 20% of other plants
- 41% monitor process-specific quality in real time vs. just 20%.

Information Technology: The Rise of the Cloud

IT effectiveness varies by function

A majority of plants have effective applications and systems in place for:

- Production/operations
- Planning/scheduling
- Accounting/finance
- Procurement/purchasing.

Plants need the most IT help with asset management, but only 6% of plants are likely to purchase applications or systems for that function (*Figure 10*).

Cloud computing

Just 1% (median) of plant IT systems and applications are in the cloud (SaaS).

Yet there are many examples of cloud-computing usage among plants:

- 14.4% (average) of applications and systems are in the cloud
- 13% of plants have half or more of their applications and systems in the cloud.

Larger plants (revenues of $25 million or more) are more likely to use cloud applications and systems: 10% (median) vs. 0% at smaller plants.

Cloud-based applications and systems are most commonly used for human resources (18% of plants), logistics/distribution (13%), and enterprise management (13%).

IT investments drive profitability

IT spending accounted for 5% (median) of plant sales.

Some 22% of plants plan to increase IT investments this year, and 7% will decrease them.

New IT increased profitability at 32% of plants where it was installed last year — 4% major increase and 28% some increase. New IT decreased profitability at 7% of plants.

Path to World-Class IT

Plants closest to world-class manufacturing status are more likely to have effective IT applications and systems: e.g., 74% effective production/operations IT vs. 50% of other plants.

Plants closest to world-class status also are more likely to:

- Leverage cloud-based applications and system: 10% (median) vs. 0% at other plants
- Invest more in IT: 5% (median percentage of sales) vs. 2%.

Figure 10. IT Effectiveness and Purchase Plans

	Effective IT applications and systems in place (% of plants)	Application and/or systems likely to be purchased in next 12 months (% of plants)
Production/operations	62%	13%
Planning/scheduling	58%	15%
Accounting/finance	57%	8%
Procurement/purchasing	56%	5%
Enterprise management	43%	12%
Supply-chain management	40%	9%
Logistics/distribution	40%	14%
Human resources	38%	11%
Customer service/support	35%	11%
Design/development	35%	7%
Asset management	28%	6%
None of these	12%	52%

Internet of Things: A Slow Start for the Next Industrial Revolution

IoT plans are only just getting started

Operations and information technologies converge within the Internet of Things (IoT). Also known as M2M and Industrie 4.0, the IoT consists of self-monitoring and self-correcting machines, machine-to-machine communications, and machine-to-enterprise system communications.

These technologies drive proactive problem identification and resolution, and inform decision-making with real-time insights.

Only 5% of plants have implemented an IoT strategy; another 6% plan to implement an IoT strategy.

A large percentage of plants have no IoT plans (43%), or are led by executives who have not heard of the IoT (46%).

Yet many plants have the operational infrastructure in place to begin leveraging IoT. Fully 10% (median) of plant equipment is already intelligent (i.e., incorporates technologies that enable machine-to-machine or machine-to-IT system communications).

One-quarter of plants have embedded intelligence in more than 50% of their machines.

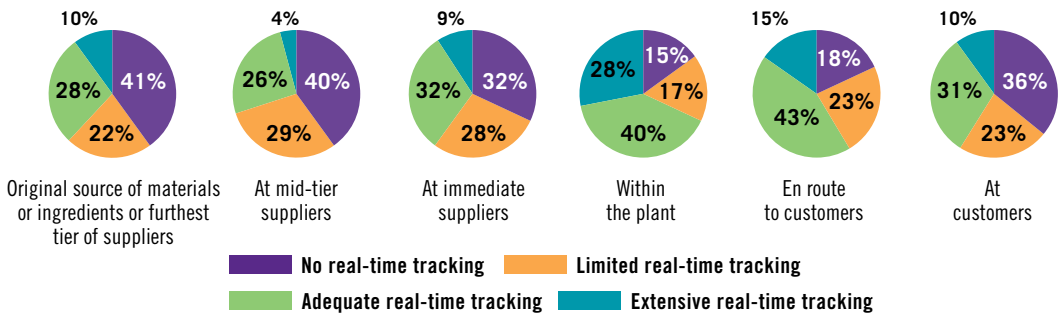
Product tracking increases at many plants

A common IoT application is the use of devices and sensors to track products as they move through the supply chain, often with RFID technologies. Plants do so to improve production (44% of plants) and ensure product quality (40%).

Some 30% of plants still have no tracking capabilities.

Real-time tracking is most likely to occur within the plant, and least likely at the source of materials or ingredients in the supply chain (*Figure 11*).

Figure 11. Tracking Supplies and Products in Real Time



Path to World-Class IoT

Plants closest to world-class manufacturing status are twice as likely to have or are planning an IoT strategy (15% vs. 7% of other plants). They also have three times as much equipment with embedded intelligence (median 15% vs. 5% at other plants).

Plants closest to world-class status are more likely to have real-time tracking throughout their supply chains: 80% have some level of real-time tracking at immediate suppliers vs. just 55% of other plants.

Green/Sustainability: Implementation Lags

A green disconnect threatens relationships with customers

Some 71% of Americans consider the environment when they shop, and the percentage is increasing.[3] Yet many manufacturing executives aren't listening: Only 29% report that green/sustainability is important or highly important to their plant's success over the next five years (down from 35% in 2012).

Some 16% of executives say green is *not important*.

Green performances remain stuck in neutral

A majority of plants have recycle/reuse programs and energy-management programs in place (*Figure 12*).

Executives report improvement in green performance measures (current year vs. three years ago), yet the current-year measures (*Figure 13*) are comparable to those reported by executives in the 2012 MPI Manufacturing Study.

Path to World-Class Green

Plants closest to world-class manufacturing status are more likely to identify green/sustainability as important or highly important to the plant's success over the next five years (43% vs. 16% of other plants).

Plants closest to world-class manufacturing status also are more likely to:

- Use green practices: e.g., 64% have an energy management program vs. 48% of other plants
- Post better green performances: e.g., 14% (median) of purchased components or materials are green (recyclable/regrind) vs. 5%.

Figure 12. Improvement Methodology(ies)
multiple answers possible

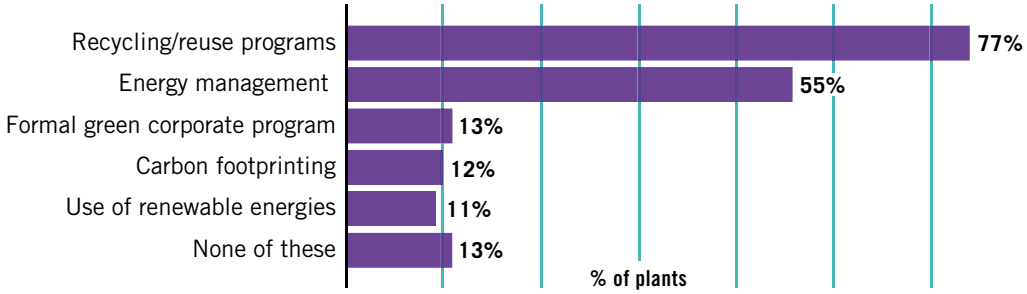
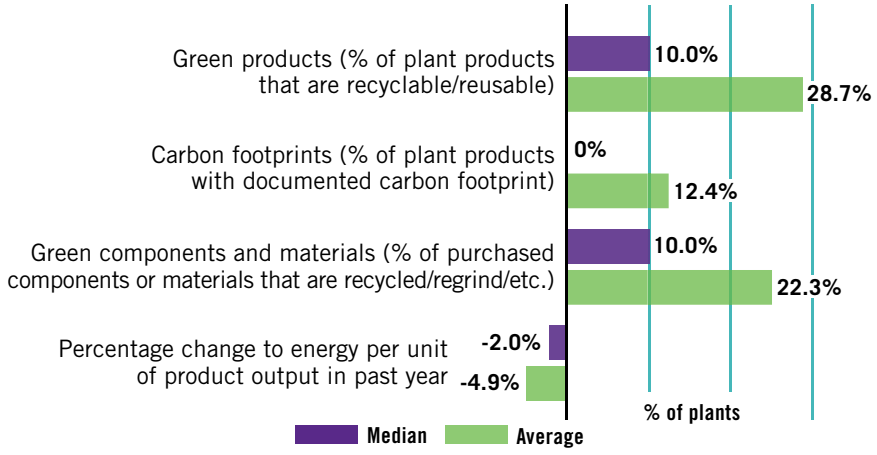


Figure 13. Green Performances



[3] *2013 Cone Communications Green Gap Trend Tracker,* Cone Communications, April 2013.

Plant Profiles

Figure 14. Type of Company

	% of plants
Public	31%
Private	69%

Figure 15. Nature of Operations

	% of plants
Discrete (measured by numeric quantities)	65%
Process (measured by weight or volume)	22%
Both or hybrid	13%

Figure 16. Plant Volume and Mix

	% of plants
High volume/high mix	35%
High volume/low mix	19%
Low volume/high mix	34%
Low volume/low mix	12%

Figure 17. Corporate and Plant Revenues

	Median	Average
Corporate parent revenue	$60,000,000	$3,511,387,667
Plant revenue 2013	$22,000,000	$206,130,197
Plant revenue 2014	$23,000,000	$236,563,780
Anticipated plant revenue 2015	$24,500,000	$212,341,429

Figure 18. Years Since Plant Startup

	% of plants
Less than 5 years	4%
5 – 10 years	11%
11 – 20 years	12%
More than 20 years	73%

Figure 19. Percentage of Union Production Workers

	% of plants
0%	80%
5 – 25%	2%
26 – 50%	3%
51 – 75%	6%
76 – 99%	4%
100%	5%

Figure 20. Primary Product Produced

	% of plants
Computer and electronic product manufacturing	18%
Fabricated metal product manufacturing	13%
Machinery manufacturing	11%
Chemical manufacturing	10%
Transportation equipment manufacturing	7%
Food manufacturing	6%
Plastics and rubber products manufacturing	5%
Miscellaneous manufacturing	5%
Primary metal manufacturing	4%
Paper manufacturing	4%
Furniture and related product manufacturing	4%
Electrical equipment, appliance, and component manufacturing	3%
Printing and related support activities	2%
Nonmetallic mineral product manufacturing	2%
Beverage and tobacco product manufacturing	1%
Textile product mills	1%
Apparel manufacturing	1%
Wood product manufacturing	1%
Textile mills	1%
Leather and allied product manufacturing	0%

Figure 21. Progress toward World-Class Manufacturing Status

	% of plants
No progress	10%
Some progress	43%
Significant progress	38%
Fully achieved	10%

Methodology

The MPI Manufacturing Study was conducted using an online questionnaire promoted by the Manufacturing Performance Institute (a division of The MPI Group, Inc.) and by a panel company to its group of manufacturing plant managers. The MPI Group received 319 valid participants in November and December 2014. Responses were entered into a database, edited, and cleansed to ensure answers were plausible, where necessary. All respondent answers to the survey are anonymous. As an incentive, respondents who provided contact information after completing the study receive complimentary access to an online benchmarking tool, which contains study data, and this *Executive Summary*.

Presentation of Data

MPI Manufacturing Study questions consisted of:

- Directive single-answer questions for which respondents were asked to "check one" answer category
- Directive multiple-answer questions for which respondents were asked to "check all that apply"
- Open-ended numeric questions for which respondents were asked to respond with a number.

Tables and charts for "check one" and "check all" answer categories are presented either in the format presented on the survey or, where more meaningful, in descending order based on the percentage of responses for a particular answer category (i.e., the answer category with the highest percentage is listed first).

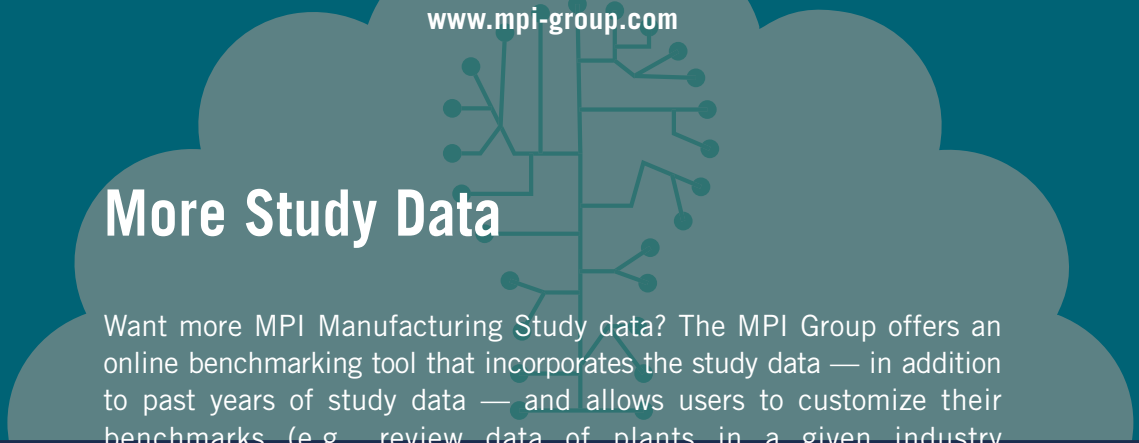
Data for directive questions are presented with the percentage of responses for each answer category.

Tables and charts for open-ended questions are presented with the median and average statistics. *Note:* The median is the "typical" measure, not distorted by a few unusually high or low values that may exist in the sample due to special circumstances. The median figure represents the midpoint of the figures for a particular measure, with one-half of participants reporting figures above it and one-half below.

About The MPI Group

The Manufacturing Performance Institute, a division of The MPI Group, serves leaders with research, advice, and performance-targeted solutions that provide a competitive advantage in today's fierce marketplace. MPI combines the disciplines of research, strategic advice, knowledge development, and hands-on leadership to create a difference — in performance, in profits, and in the people who make them possible.

P.O. Box 201610
Shaker Heights, OH 44120
Phone: 216-991-8390
Fax: 216-991-8205
www.mpi-group.com



More Study Data

Want more MPI Manufacturing Study data? The MPI Group offers an online benchmarking tool that incorporates the study data — in addition to past years of study data — and allows users to customize their benchmarks (e.g., review data of plants in a given industry and/or employee size). **Click here** to learn more or visit us online at **www.mpi-group.com**.

The MPI Group

People. Purpose. Profits.