MPI 2020 Industry 4.0 Study
Deadline Feb. 24, 2020

The MPI 2020 Industry 4.0 Study examines the extent to which manufacturers are readying their companies for the evolution of the Industry 4.0 into Industry 5.0 — embedding intelligence and/or smart devices into their operations and connecting them to the enterprise and supply chain, as well as offering new products that incorporate embedded intelligence.

The MPI Industry 4.0 Study is conducted by The MPI Group and sponsored by SAP. Please answer all questions to the best of your ability, and remember that many questions will accept multiple answers "(check all that apply)."

Note: You must have a good understanding of your company’s operations practices, production performances, and product plans. If your answers to the study indicate otherwise, your submission will be rejected.

Profile Characteristics

1. For which of the following functions do you have detailed knowledge of Industry 4.0 activities? (select all that apply):

   Manufacturing/Production
   Maintenance/Asset Management
   R&D/Product Development
   None of the above
2. Please indicate the type of manufacturing company for which you are responding:

- Public manufacturing company
- Not a manufacturing company
- Private manufacturing company

3. Which of the following best describes your title?

- Chairman
- CEO or President
- COO
- CFO
- CTO
- Other C-level title or comparable
- VP or Director or comparable
- Partner or Principal or comparable
- Manager or above
- Other

4. In which country or region are you located?

- United States
- Canada
- Mexico
- Latin/Central America
- Brazil
- Other South America
- France
- Germany
- Spain
- UK
- Other Europe
- China
- Japan
- Other Asia
5. What is the approximate annual revenue (in U.S. dollars) of your company?

- Less than $10 million
- $10 million to $50 million
- $51 million to $100 million
- $101 million to $250 million
- $251 million to $500 million
- $501 million to $1 billion
- More than $1 billion

6. In which of the following manufacturing categories does your company do business? (check all that apply)

- Food Manufacturing
- Beverage and Tobacco Product Manufacturing
- Textile Mills
- Textile Product Mills
- Apparel Manufacturing
- Leather and Allied Product Manufacturing
- Wood Product Manufacturing
- Paper Manufacturing
- Printing and Related Support Activities
- Petroleum and Coal Products Manufacturing
- Chemical Manufacturing
- Plastics and Rubber Products Manufacturing
- Nonmetallic Mineral Product Manufacturing
- Primary Metal Manufacturing
- Fabricated Metal Product Manufacturing
- Machinery Manufacturing
- Computer and Electronic Product Manufacturing
- Electrical Equipment, Appliance, and Component Manufacturing
- Transportation Equipment Manufacturing
- Middle East
- Africa
- Other
7. How many years has your company been in operation?

- Less than 2 years
- 2-5 years
- 6-10 years
- 11-20 years
- More than 20 years

8. In which of the following markets does your company sell products? (check all that apply)

- Agricultural
- Mining and Oil and Gas Extraction
- Utilities
- Construction
- Manufacturing
- Wholesale
- Retail
- Transportation and warehousing
- Information (software, online, publishing, movies, etc.)
- Finance and insurance
- Real estate and leasing
- Professional, scientific, and technical services (not healthcare)
- Healthcare services
- Arts, Entertainment, and Recreation (e.g., concerts, sports)
- Hospitality and lodging
- Food services
- Defense industries
- Government (not defense)
- Consumer services (e.g., auto repair, cleaning)
- Other
9. How much progress has your company made toward achieving world-class manufacturing status?

No progress
Some progress
Significant progress
Fully achieved

10. How important is Industry 4.0 to your business?

Extremely important
Very important
Somewhat important
Not important

11. How extensive is your company's understanding of Industry 4.0 and how to apply it to your business?

Significant companywide understanding of Industry 4.0
Some companywide understanding of Industry 4.0
Limited companywide understanding of Industry 4.0
No companywide understanding of Industry 4.0

12. What impact do you believe the Industry 4.0 will have on your industry over the next five years?

Significant impact
Some impact
Limited impact
No impact
13. What impact do you believe the Industry 4.0 will have on your business over the next five years?

- Significant impact
- Some impact
- Limited impact
- No impact

14. Do you see Industry 4.0 as a competitive differentiator?

- Already is
- Will be in the future
- Not likely to change competitive environment

15. Who is leading an Industry 4.0 initiative in your company? (select all that apply)

- Head of Manufacturing
- Head of Service and Maintenance
- Head of Engineering
- Head of Logistics
- Head of R&D/Product Development
- COO
- CIO
- Chief Digital Officer
- Other (please specify):
- No Industry 4.0 initiatives

16. What best describes your company’s strategic readiness to apply Industry 4.0 technologies to processes and embed Industry 4.0 technologies into products? (check one in each row)

- Strategy in place — implemented
- Strategy in place — not yet implemented
- Plan to develop strategy
- No plans to develop strategy

Applying Industry 4.0
17. What best describes your company's Industry 4.0 capabilities compared to others in your industry?

- Industry 4.0 leader
- Industry 4.0 competitive
- Industry 4.0 catchup
- No Industry 4.0

18. Which of the following do you believe are elements of Industry 4.0? (select all that apply)

- Smart assets
- Factory automation
- Integrated processes
- Artificial intelligence (AI)
- Predictive decision-making (maintenance/throughput etc.)
- Mobile devices
- Internet of Things (IoT) platforms
- Location detection technologies
- Advanced human-machine interfaces
- Authentication and fraud detection
- 3D printing/additive manufacturing
- Smart sensors
- Big data analytics and advanced algorithms
- Multilevel customer interaction and customer profiling
- Augmented reality/ wearables
- Fog, edge, and cloud computing

Other (please specify):

- None of the above

19. What type of value is Industry 4.0 most likely to provide to the following areas of your company? (select all)
20. Are your company’s Industry 4.0 initiatives achieving the strategic objectives set forth prior to implementation?

- Achieving all strategic objectives
- Achieving most strategic objectives
- Achieving some strategic objectives
- Achieving no strategic objectives
- No strategic objectives were set prior to implementation
- No Industry 4.0

21. Have your Industry 4.0 initiatives been on schedule?

- Significantly later than scheduled
- Somewhat later than scheduled
- On schedule
- Somewhat earlier than scheduled
- Significantly earlier than scheduled
- No Industry 4.0
22. Have your Industry 4.0 initiatives been on budget?

Significantly over budget
Somewhat over budget
On budget
Somewhat under budget
Significantly under budget
No Industry 4.0

23. How do your company’s information technology staff and operations technology staff currently collaborate?  (check all that apply)

Upgrading legacy operations systems
Upgrading legacy enterprise systems
Resolving technical operations issues
Resolving technical enterprise issues
Linking operations data and with business analytics
Network security
Other
No collaboration

Industry 4.0 Intelligent Plants and Processes

Industry 4.0 Intelligent Plants and Processes

24. For quality purposes, please select Choice 4 below:

Choice 1
Choice 2
Choice 3
Choice 4
Choice 5
Choice 6
25. Please indicate the primary nature of production operations:

Discrete manufacturing  
Process/batch manufacturing  
Both discrete and process/batch

26. What percentage of your company’s production equipment and processes incorporates smart devices/embedded intelligence?

27. How will your company’s application of smart devices and/or embedded intelligence in production equipment and processes change in the next two years?

Increase significantly  
Increase somewhat  
No change  
Decrease somewhat  
Decrease significantly

28. To what extent have smart devices and/or embedded intelligence been applied to the following processes? (check one in each row)

<table>
<thead>
<tr>
<th>Process</th>
<th>No application</th>
<th>Some application</th>
<th>Significant application</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabrication/stamping</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Assembly</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Plating or painting</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Heat-treating</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Welding</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Additive manufacturing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
29. What percentage of your company's non-production equipment and processes (e.g., office, shipping, transportation) incorporates smart devices/embedded intelligence?

30. How will your company's application of smart devices and/or embedded intelligence to non-production equipment and processes change in the next two years?

- Increase significantly
- Increase somewhat
- No change
- Decrease somewhat
- Decrease significantly

31. Describe the ability of your company’s network infrastructure to accommodate the following types of Industry 4.0 communications?

<table>
<thead>
<tr>
<th>Industry 4.0 Communications</th>
<th>Currently capable</th>
<th>Some upgrades required</th>
<th>Significant upgrades required</th>
<th>Network overhaul required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine to machine (e.g., sensors in one machine trigger actions of another machine)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Machines to enterprise IT systems (i.e., machine sensors send data to your company's business systems)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
32. How have the application of smart devices and/or embedded intelligence into operations affected the following performances? (check one in each row)

<table>
<thead>
<tr>
<th>Performance</th>
<th>Worsened</th>
<th>No change</th>
<th>Some improvement</th>
<th>Significant improvement</th>
<th>No Industry 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing costs</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Product quality</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
</tr>
<tr>
<td>On-time delivery</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Safety</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Energy costs</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Machine reliability/uptime</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Equipment changeover times</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Inventory turns</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Regulatory compliance</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Compliance to customer specifications</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>☐</td>
<td>☐</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

33. How has the application of Industry 4.0 to plants and processes impacted your company’s productivity over the past year?

Increased productivity more than 10%
34. What impact to productivity will application of Industry 4.0 to plants and processes have at your company over the next five years?

- Increase productivity more than 10%
- Increase productivity 6-10%
- Increase productivity 1-5%
- No change to productivity
- Decrease productivity
- No Industry 4.0 currently or planned

35. How has the application of Industry 4.0 to plants and processes impacted your company’s profitability over the past year?

- Increased profitability more than 10%
- Increased profitability 6-10%
- Increased profitability 1-5%
- No change to profitability
- Decreased profitability
- No Industry 4.0 currently or planned

36. What impact to profitability will application of Industry 4.0 to plants and processes have at your company over the next five years?

- Increase profitability more than 10%
- Increase profitability 6-10%
- Increase profitability 1-5%
- No change to profitability
- Decrease profitability
- No Industry 4.0 currently or planned
37. How have the application of smart devices and/or embedded intelligence into operations affected the following business activities and objectives? (check one in each row)

<table>
<thead>
<tr>
<th>Business Activity</th>
<th>Worsened</th>
<th>No change</th>
<th>Some improvement</th>
<th>Significant improvement</th>
<th>No Industry 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security of IT systems and data</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Ability to leverage business analytics</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Corporate decision-making/strategy</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Production decision-making</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>R&amp;D/Product development</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Operations coordination with customers</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Operations coordination with suppliers</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Operations agility and responsiveness</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>New-product ramp-ups</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Remote-monitoring capabilities</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Visualization capabilities</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

38. What aspects of Industry 4.0 capabilities present the biggest challenges for your company? (check all that apply)

Where/how to get started with Industry 4.0
Identifying opportunities/benefits of Industry 4.0
Incorporating smart devices/embedded intelligence
Network capabilities to handle Industry 4.0
Network capacity to handle Industry 4.0
39. How confident are you in your organization’s current cyber risk management program (including risk assessment, monitoring, incident response planning/testing, business recovery, etc.) to address the Industry 4.0 environment?

Very confident  
Confident  
Not confident  
Unsure

40. What steps, if any, have you taken in the last 12 months to improve your organization’s security in the Industry 4.0 environment? (check all that apply)

Increased investment in security technologies  
Conducted a cyber risk assessment  
Conducted penetration testing  
Implemented new OT security controls  
Integrated IT and OT security  
Adopted the Industrial Internet Security Framework  
Drafted or revised a third-party risk management policy  
Other

We have not applied Industry 4.0 to our company  
None of the above
41. What best describes current access to Industry 4.0-enabled data within your company and by supply chain partners? (check one in each row)

<table>
<thead>
<tr>
<th></th>
<th>All who need it have access</th>
<th>Most who need it have access</th>
<th>Some who need it have access</th>
<th>No one who needs it has access</th>
<th>No Industry 4.0 data to access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company executives</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Customers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Suppliers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

42. How much has your company invested in implementing an Industry 4.0 strategy into your plants and processes in the past year (as a percentage of sales)?

- 0%
- 1-2%
- 3-5%
- 6-10%
- 11-15%
- More than 15%

43. How will investments in Industry 4.0 plants and processes change in the next two years?

- Increase more than 20%
- Increase 11-20%
- Increase 1-10%
- No change
- Decrease

44. Which function or area of your company leads your Industry 4.0 strategy for plant and process applications?

C-level team
45. What are the following performance measures for your company’s facilities?

- Cost of goods sold (the cost of direct labor, materials, and manufacturing overhead as a percentage of sales)

- Machine availability (the percentage of time that equipment is available for use when it is scheduled to be in operation)

- First-pass yield (the percentage of products completed to specifications and meeting quality targets)

- Scrap and rework products (the value of products — as a percentage of sales — that are either scrapped or require rework)

- On-time delivery (the percentage of product orders that are delivered to customers on time)
What are your company’s sales per employee (total sales / total employees)?
(PLEASE answer in U.S. dollars — dollar sign, decimals, commas, etc. not required)

Industry 4.0 Intelligent Products

46. Describe your company’s efforts to embed smart devices and/or intelligence into products?

Significant focus of our product innovation plans
Some plans to embed smart devices in products
Limited plans to embed smart devices
No plans to embed smart devices in products

47. What percentage of product dollar sales are from products with embedded smart devices/intelligence?


48. What is your profit margin percentage on Industry 4.0-enabled products?


49. What is your profit margin percentage on products that are not Industry 4.0-enabled products?


50. To what extent has your company created the following Industry 4.0 products? *(check one in each row)*

<table>
<thead>
<tr>
<th>Product Description</th>
<th>No products</th>
<th>Some products</th>
<th>Many products</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company’s finished products with embedded smart devices and/or intelligence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parts/components for other manufacturers’ products with embedded smart devices and/or intelligence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smart devices for other manufacturers’ products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials for other manufacturers’ products with embedded smart devices and/or intelligence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry 4.0 software for other manufacturers’ products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluids/substances for other manufacturers’ products with embedded smart devices and/or intelligence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

51. How has embedding smart devices and/or intelligence into your products affected the following? *(check all that apply)*

<table>
<thead>
<tr>
<th>Impact Description</th>
<th>Worsened</th>
<th>No change</th>
<th>Some improvement</th>
<th>Significant improvement</th>
<th>No products with embedded smart devices and/or intelligence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit margins per product</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue from new products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market share</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
52. How has the application of Industry 4.0 to products impacted your company’s revenues over the past year?

- Increased revenues more than 10%
- Increased revenues 6-10%
- Increased revenues 1-5%
- No change to revenues
- Decreased revenues
- No Industry 4.0 currently or planned

53. What impact to revenues will application of Industry 4.0 to products have at your company over the next five years?

- Increase revenues more than 10%
- Increase revenues 6-10%
- Increase revenues 1-5%
- No change to revenues
- Decrease revenues
- No Industry 4.0 currently or planned

54. How has the application of Industry 4.0 to products impacted your company’s profitability over the past year?

- Increased profitability more than 10%
55. What impact to profitability will application of Industry 4.0 to products have at your company over the next five years?

- Increased profitability 6-10%
- Increased profitability 1-5%
- No change to profitability
- Decreased profitability
- No Industry 4.0 currently or planned

56. What aspects of Industry 4.0-enabled products present the biggest challenges for your company? (check all that apply)

- Where/how to get started with Industry 4.0 products
- Identifying opportunities/benefits of Industry 4.0 products
- Technologies needed to embed smart devices into products
- Suppliers capable of delivering high-quality smart devices
- Liabilities/risks of embedded devices
- Clear understanding on customer needs/value
- Keeping up with the pace of smart-device technology changes
- R&D and innovation skills/talent in this area
- Budget/resources to develop Industry 4.0-enabled products
- Leadership support for Industry 4.0-enabled products
- Systems and applications (e.g., modeling) to support R&D efforts
  Other:

- None of the above

57. How much has your company invested in embedding Industry 4.0 technologies into products in the past

- Increased profitability 6-10%
- Increased profitability 1-5%
- No change to profitability
- Decreased profitability
- No Industry 4.0 currently or planned

- Increase revenues more than 10%
- Increase revenues 6-10%
- Increase revenues 1-5%
- No change to revenues
- Decrease revenues
- No Industry 4.0 currently or planned

- Increase revenues more than 10%
- Increase revenues 6-10%
- Increase revenues 1-5%
- No change to revenues
- Decrease revenues
- No Industry 4.0 currently or planned
year (as a percentage of sales)?

0%
1-2%
3-5%
6-10%
11-15%
More than 15%

58. How will investments in Industry 4.0 products change in the next two years?

Increase more than 20%
Increase 11-20%
Increase 1-10%
No change
Decrease