CESMII
THE SMART MANUFACTURING INSTITUTE
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2022 Smart Manufacturing Market Survey

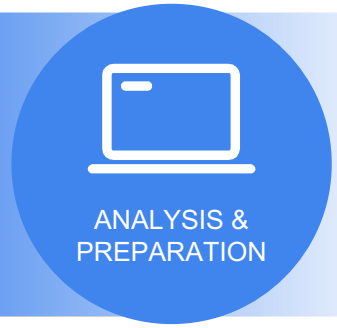
Study Overview

Target Audience: CESMII mailing list; SME database with those involved in smart manufacturing

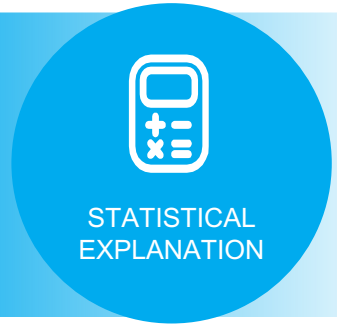
Survey Method: Online

Fielding Dates: March 15 – April 18, 2022

Incentive(s): None



- Tabulations were generated using a statistical software package, SPSS.
- The data is presented in graphic and tabular format detailing the number of respondents who answered each questions.
- Questions with less than 30 responses were not included in this report due to low sample size. The responses to these questions will be supplied upon request but are to strictly be used as directional in nature only.
- Some questions in this survey required respondents to write in a response. These responses have been categorized to be quantifiable where appropriate.
- Sample sizes may vary due to skip logic or data cleaning.
- Data for some charts may not equal 100% due to rounding. Net values (e.g. top 2 box) may not match individual percentages due to rounding.



- **Statistically Reliable Sample Size:** Sample sizes of 30 respondents or greater are generally considered to be statistically reliable, meaning if the study was run again with a different random sample, results would not differ significantly.
- **Statistical Significance:** Results of statistical significance testing are presented to illustrate data that is statistically significant at a 95% confidence level (meaning that there is reasonable support that the results are actually different and not different due to error or variance in the data). Statistical significance testing results illustrate data points that are different enough that they fall outside the margin of error. This means that if the study were conducted multiple times with the sample population, those data points would still be statistically different 95% of the time. The larger the sample size, the smaller the smaller the percent difference needed for a statistical difference to be found.

Key Findings

Smart manufacturing is important to companies, but adoption is moving at a slow pace.

Two-thirds of companies are in some way implementing a smart manufacturing strategy within their company. However, **only two-in-five** companies have a dedicated smart manufacturing headcount.

Three-quarters of respondents (77%) indicated that smart manufacturing will increase their company's competitiveness and that company leadership understands the value of digitization/smart manufacturing and the need to invest. However, **only half** of respondents indicate that their company is willing to invest the financial resources in smart manufacturing initiatives.

Three-in-five respondents indicated that the challenge most often faced is finding qualified individuals for their smart manufacturing strategy.

Respondents view the role of consortia and non-profits as a means of education and training resources to the industry on smart manufacturing topics.

One of the top resources companies utilize for smart manufacturing information is not-for-profits/non-profits within the industry.

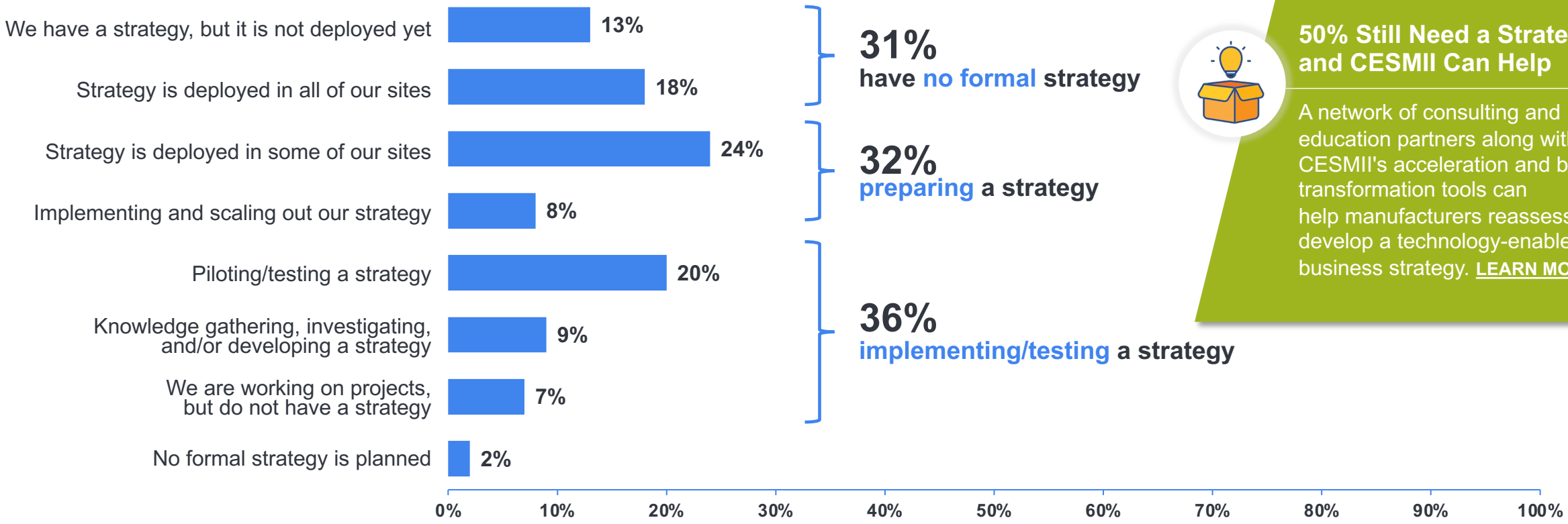
Three-quarters of respondents indicated that their company provides structured training for their employees, and with an average spend of up to $2,000 a person, consortia and non-profits are in a vital position to provide this service to the industry. This is coupled with the fact that education, knowledge, and vendor agnostic training is the most important consortia/association benefit, followed by facilitating harmonization of technology and holding a repository of training and educational content.

There are opportunities for vendors to offer more help the smart manufacturing adoption process within companies.

Satisfaction with smart manufacturing vendor partners is relatively low, especially with the vendors pricing model/level. **Only two-in-five** respondents are satisfied with their vendors approach to being interoperable and open and collaborative efforts with the broader industry.

Pathway to smart manufacturing strategy

Respondents fall into the 1/3 rule for their company's smart manufacturing strategy



50% Still Need a Strategy and CESMII Can Help

A network of consulting and education partners along with CESMII's acceleration and business transformation tools can help manufacturers reassess or develop a technology-enabled business strategy. **LEARN MORE**

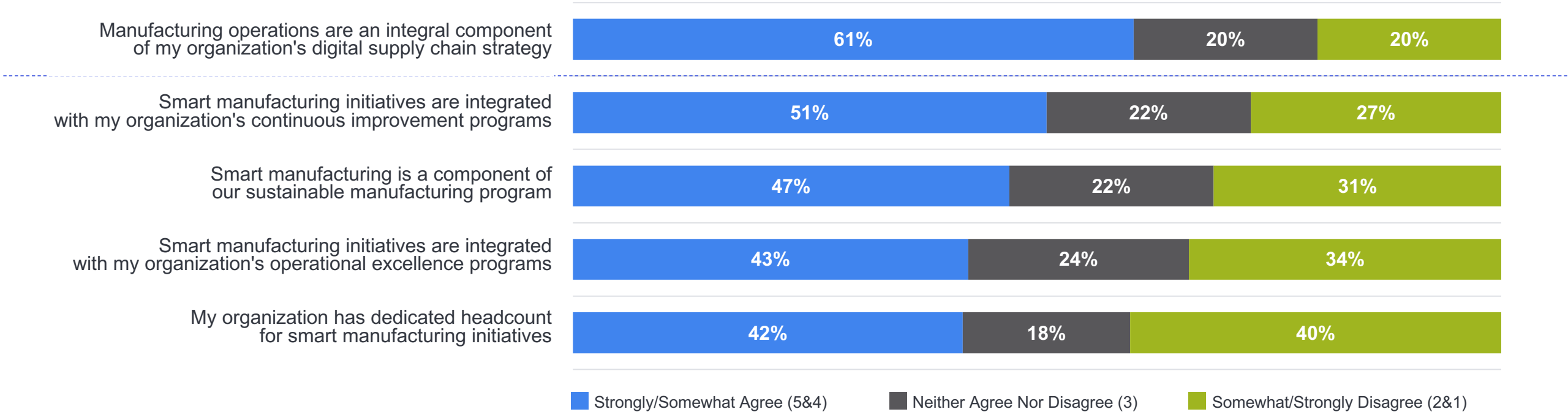
Q5. How far along is your company in terms of adopting a smart manufacturing strategy?

n=169 | Differences considered significant at a 95% confidence interval are indicated

Current smart manufacturing strategy

Almost two-thirds of respondents indicated that their manufacturing operations are an integral component of their organization's digital supply chain strategy. However, only two-in-five respondents indicated that their organization has dedicated headcount for smart manufacturing initiatives.

The market recognizes the importance of **Smart Manufacturing** in their businesses & operations

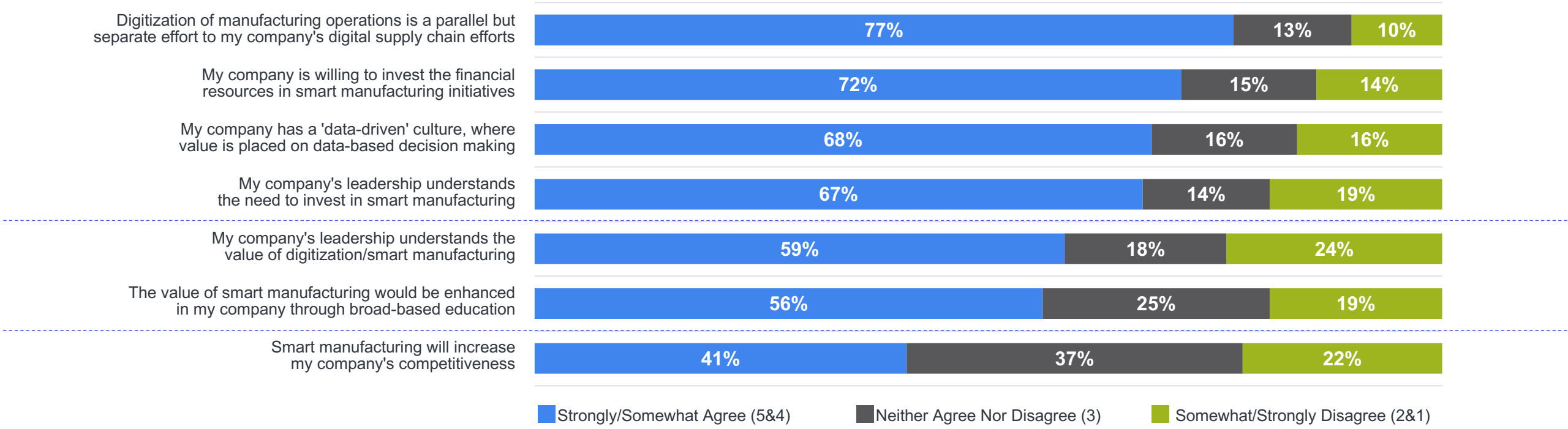


Q6. Please rate your level of agreement with each of the following statements regarding your company's current smart manufacturing strategy.

n=169 | Percentages may not add up to 100% due to rounding | Differences considered significant at a 95% confidence interval are indicated

Current smart manufacturing business operations

Three-quarters of respondents (77%) indicated that smart manufacturing will increase their company's competitiveness and that company leadership understands the value of digitization/smart manufacturing and the need to invest. However, only half of respondents indicate that their company is willing to invest the financial resources in smart manufacturing initiatives.



Q7. Please rate your level of agreement with each of the following statements regarding your company's current smart manufacturing business operations.

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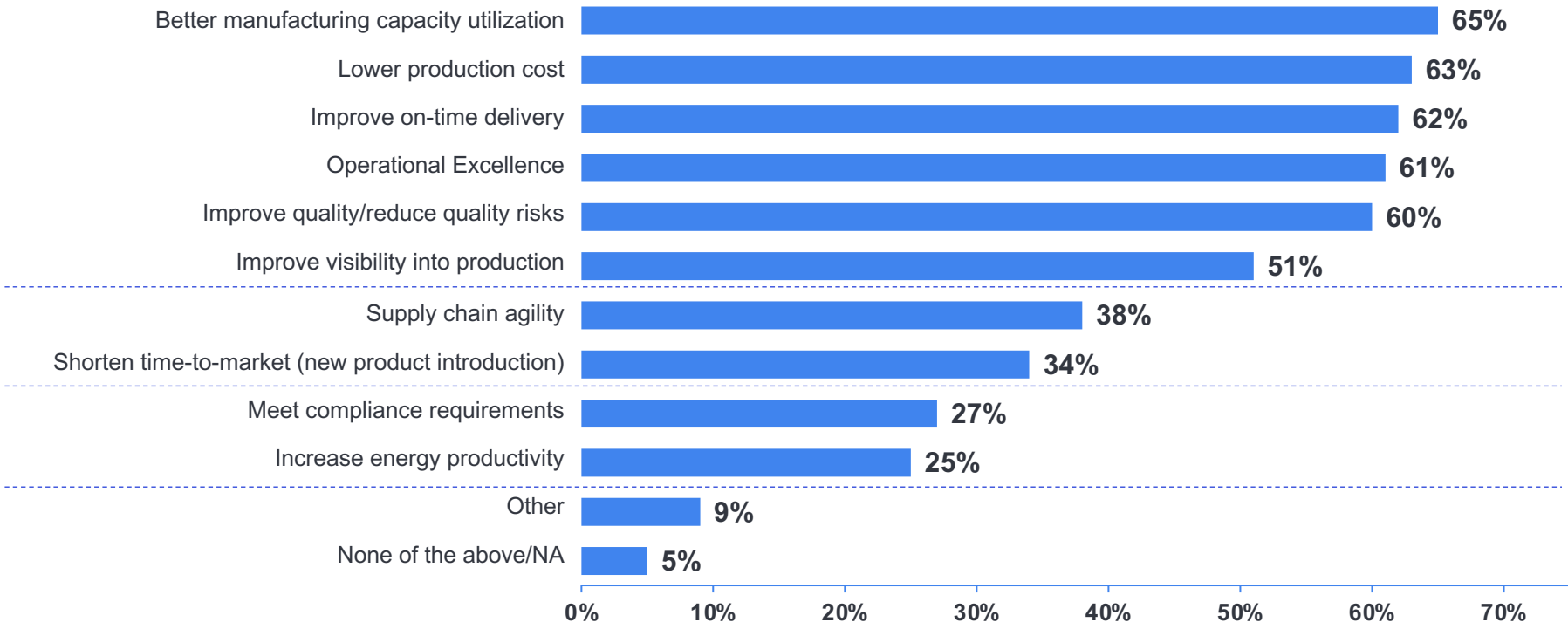
Goals of company’s smart manufacturing strategy

Respondents primarily identified that their company’s goals for smart manufacturing are to better optimize their manufacturing capacity, lower production cost, improve quality and on-time delivery, and Operational Excellence.



Verbatim Comments

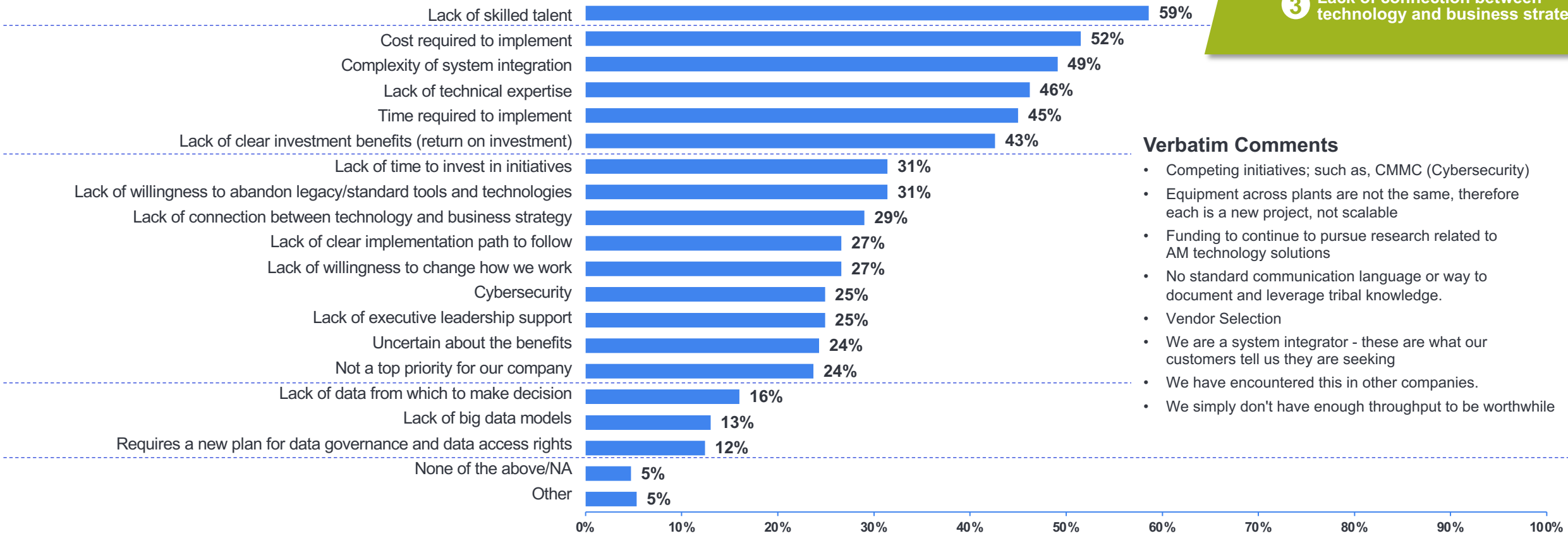
- Develop new smart manufacturing technologies
- Don't have a strategy
- Educate next generation smart manufacturing graduates
- Education
- Enables our customers' strategy - our focus is on the SME segments of our marketplace with a requirement for small lots and quick turnaround. We engineered the capability on a clean sheet when we began the company.
- improved education
- Incorporate into engineering coursework.
- Offering our customer innovative technology alternatives
- Promote SMART Manufacturing with our organization's members
- Reduce labor hours
- Reduce Offshoring and help other companies with onshoring projects
- Top line revenue growth
- Training/Education
- We are a system integrator - these are what our customers tell us they are seeking

Q8. What are the goals of your company’s smart manufacturing strategy? (Please select all that apply.)

n=168 | Differences considered significant at a 95% confidence interval are indicated

Challenges encountered

Three-in-five respondents indicated that the key challenge encountered while pursuing a smart manufacturing strategy is a lack of skilled talent.



Top Challenges

1. Need for skilled talent
2. Cost & complexity to Implement and Integrate
3. Lack of connection between technology and business strategy

Verbatim Comments

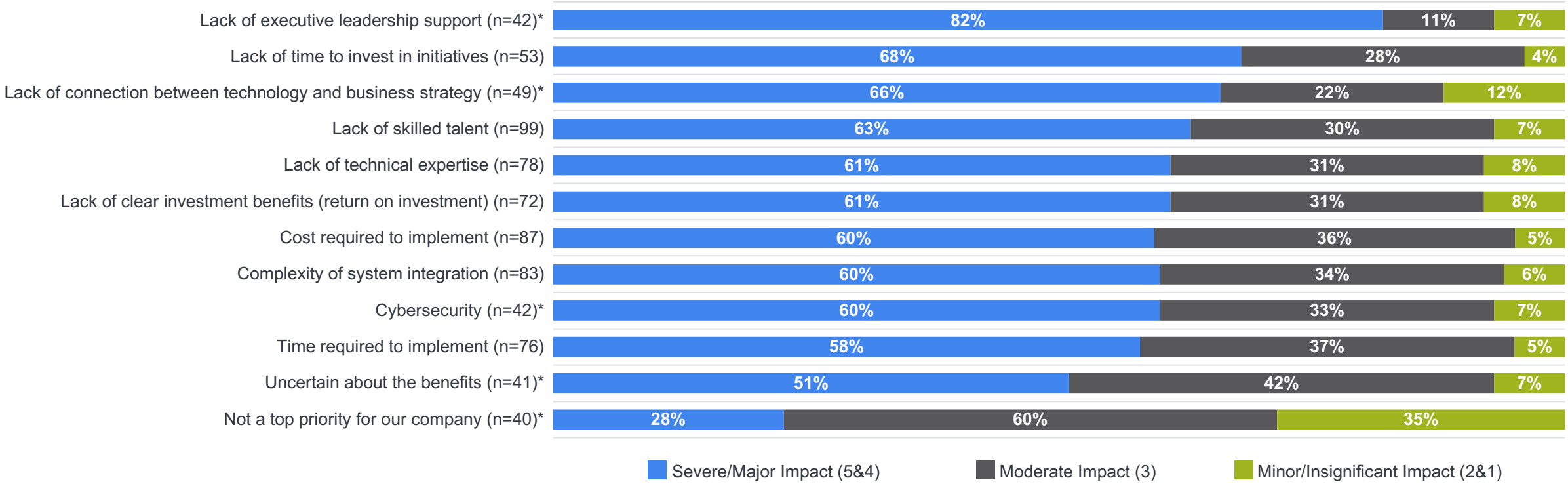
- Competing initiatives; such as, CMMC (Cybersecurity)
- Equipment across plants are not the same, therefore each is a new project, not scalable
- Funding to continue to pursue research related to AM technology solutions
- No standard communication language or way to document and leverage tribal knowledge.
- Vendor Selection
- We are a system integrator - these are what our customers tell us they are seeking
- We have encountered this in other companies.
- We simply don't have enough throughput to be worthwhile

Q9. What challenge(s) has your company encountered while pursuing a smart manufacturing strategy? (Please select all that apply.)

n=169 | Differences considered significant at a 95% confidence interval are indicated

Impact of challenges faced

Among respondents that noted a challenge faced in their smart manufacturing initiatives progress, over four-in-five respondents indicated lack of executive leadership support as a severe/major impact. Only one-in-four respondents indicated that smart manufacturing initiatives are not a top priority for their company, indicating that there is a disconnect between priority status and executive support.

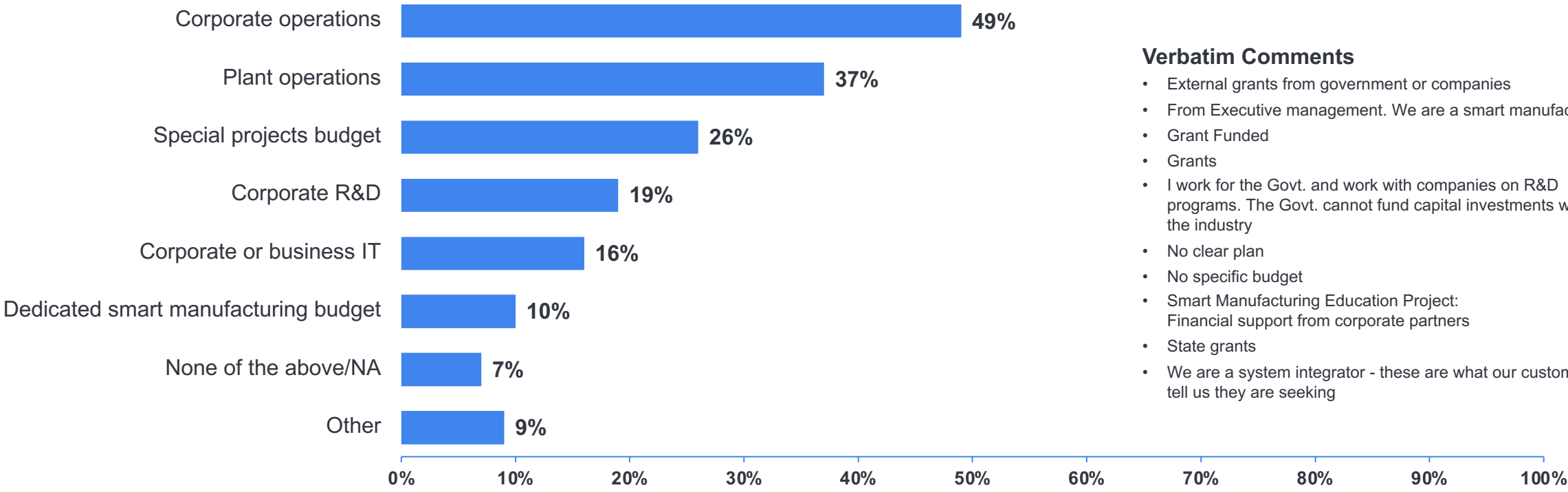


Q10. To what degree has the challenge(s) your company faces impacted progress in furthering your smart manufacturing initiatives?

*Caution: Small sample size (30<n<50); Data not shown if sample size is less than 30 | Percentages may not add up to 100% due to rounding | Differences considered significant at a 95% confidence interval are indicated

Funding Sources

Half of respondents indicated that their corporate operations budget funds their company's smart manufacturing initiatives. Only one-in-ten respondents indicated their company has a dedicated smart manufacturing budget.



Verbatim Comments

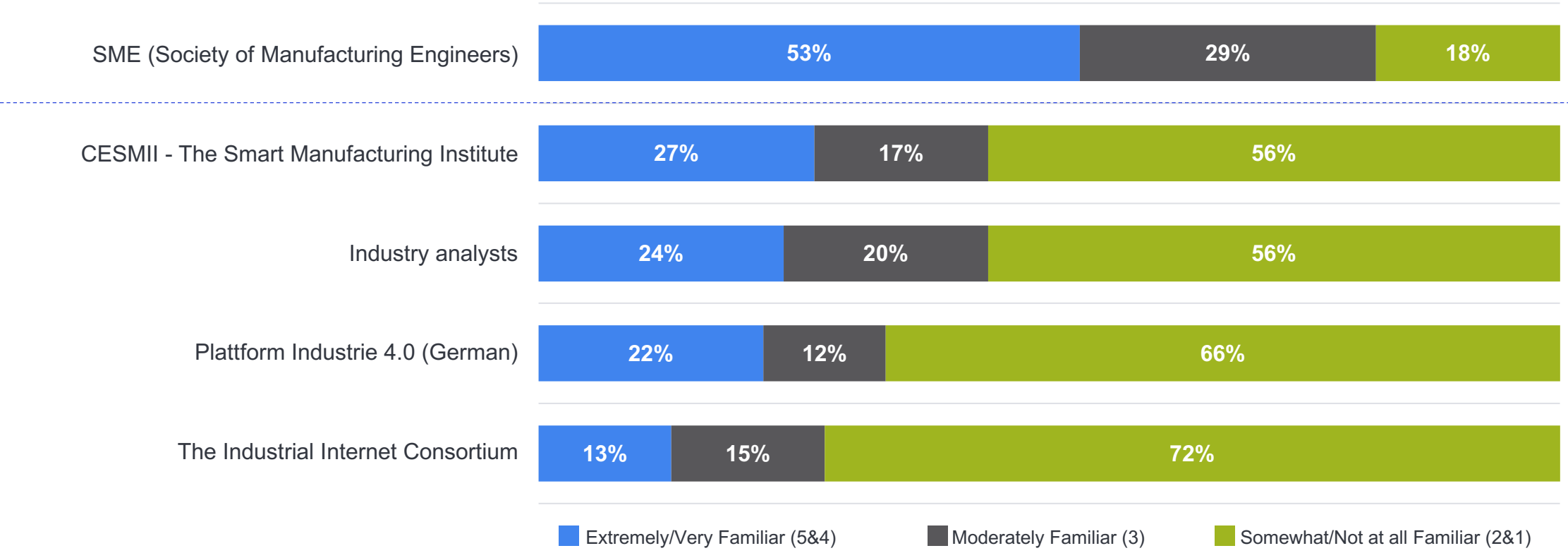
- External grants from government or companies
- From Executive management. We are a smart manufacturer.
- Grant Funded
- Grants
- I work for the Govt. and work with companies on R&D programs. The Govt. cannot fund capital investments within the industry
- No clear plan
- No specific budget
- Smart Manufacturing Education Project: Financial support from corporate partners
- State grants
- We are a system integrator - these are what our customers tell us they are seeking

Q11. From which sources are your smart manufacturing initiatives funded? (Please select all that apply.)

n=167 | Differences considered significant at a 95% confidence interval are indicated

Familiarity with smart manufacturing organizations

Half of respondents indicated they are familiar with SME, with slightly over one-quarter being familiar with CESMII.

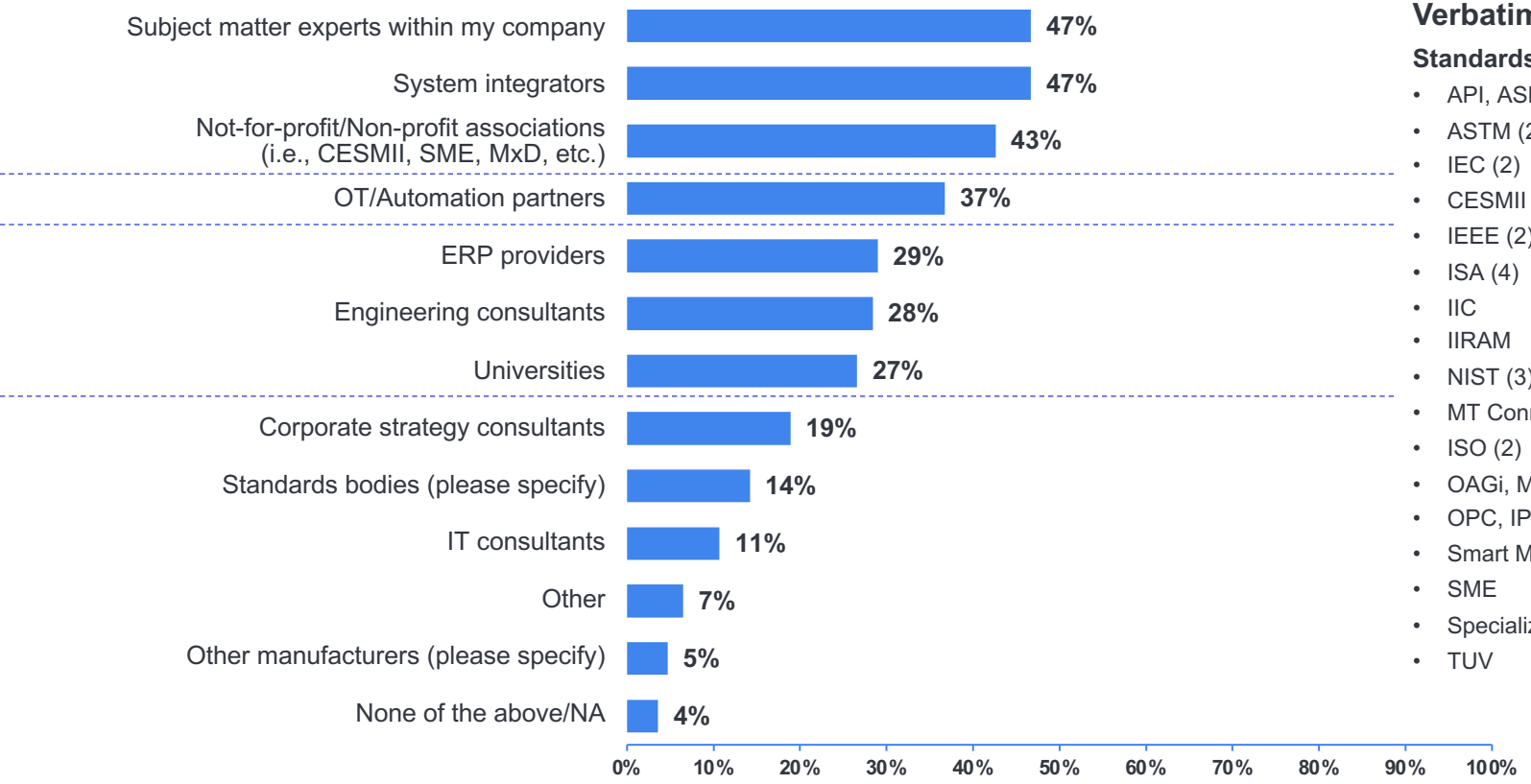


Q12. Please rate your level of familiarity with the following smart manufacturing organizations.

n=169 | Percentages may not add up to 100% due to rounding | Differences considered significant at a 95% confidence interval are indicated

Sources of SM technology & implementation information

The primary sources of smart manufacturing and technology implementation information are subject matter experts within their companies, system integrators, and non-profit/not-for-profit organizations.



Verbatim Comments:

Standards Bodies

- API, ASME
- ASTM (2)
- IEC (2)
- CESMII (3)
- IEEE (2)
- ISA (4)
- IIC
- IIRAM
- NIST (3)
- MT Connect
- ISO (2)
- OAGi, MTConnect
- OPC, IPC
- Smart Manufacturing Standards Committee
- SME
- Specialized consultants
- TUV

Other Manufacturers

- ABB through Yokogawa, all major automation providers
- Boing
- Peer networking

Other

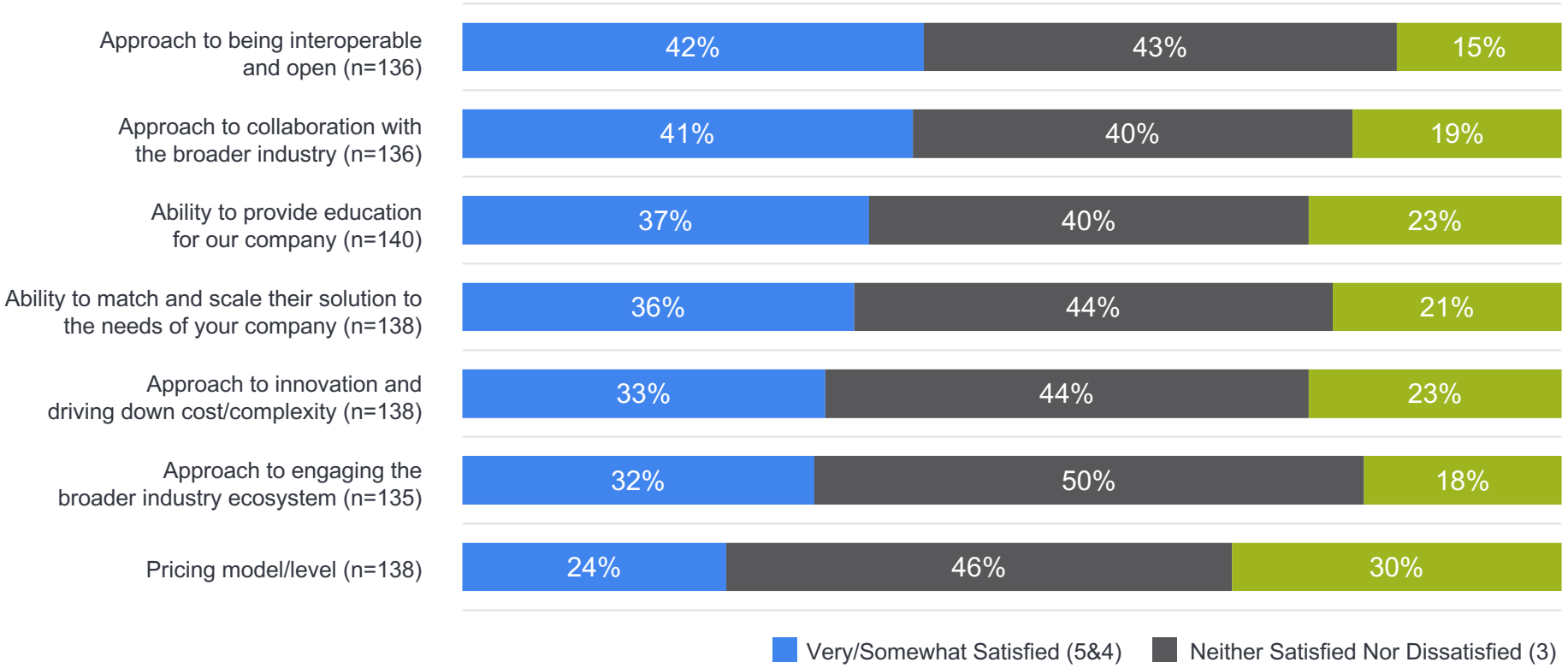
- Companies we work closely with teaching and testing new methods and concepts
- Conferences
- FBI
- Inductive Automation
- Industry publications in the Pharmaceutical space
- My former team members
- Robotics, CV, and ML researchers and suppliers
- Technology providers
- Universities
- Web searches

Q14. Where are you most likely to seek out smart manufacturing technology and implementation information? (Please select all that apply.)

n=169 | Differences considered significant at a 95% confidence interval are indicated

Satisfaction with smart manufacturing vendor partners

Satisfaction with smart manufacturing vendor partners is relatively low, especially with the vendors pricing model/level. Only two-in-five respondents are satisfied with their vendors approach to being interoperable and open and collaborative efforts with the broader industry.



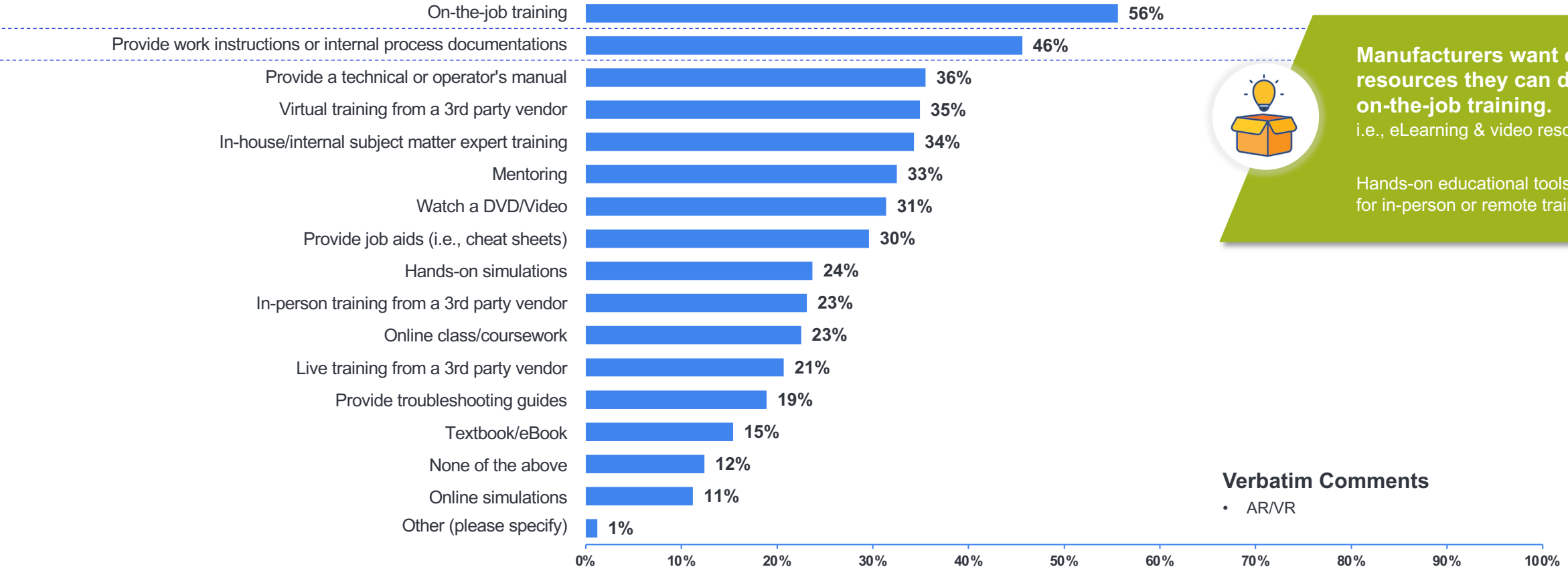
These low satisfaction levels solidify the importance of **CESMII's Smart Manufacturing Innovation Platform (SMIP)** strategy

Q15. How satisfied are you with your smart manufacturing (software and automation) vendor partners…(N/A removed)

n=169 | Percentages may not add up to 100% due to rounding | Differences considered significant at a 95% confidence interval are indicated

Smart training

Over half of respondents indicated that they primary smart training employees is on-the-job, followed by work instructions/internal process documents.



Manufacturers want educational resources they can deploy for on-the-job training.
i.e., eLearning & video resources

Hands-on educational tools are needed for in-person or remote training.

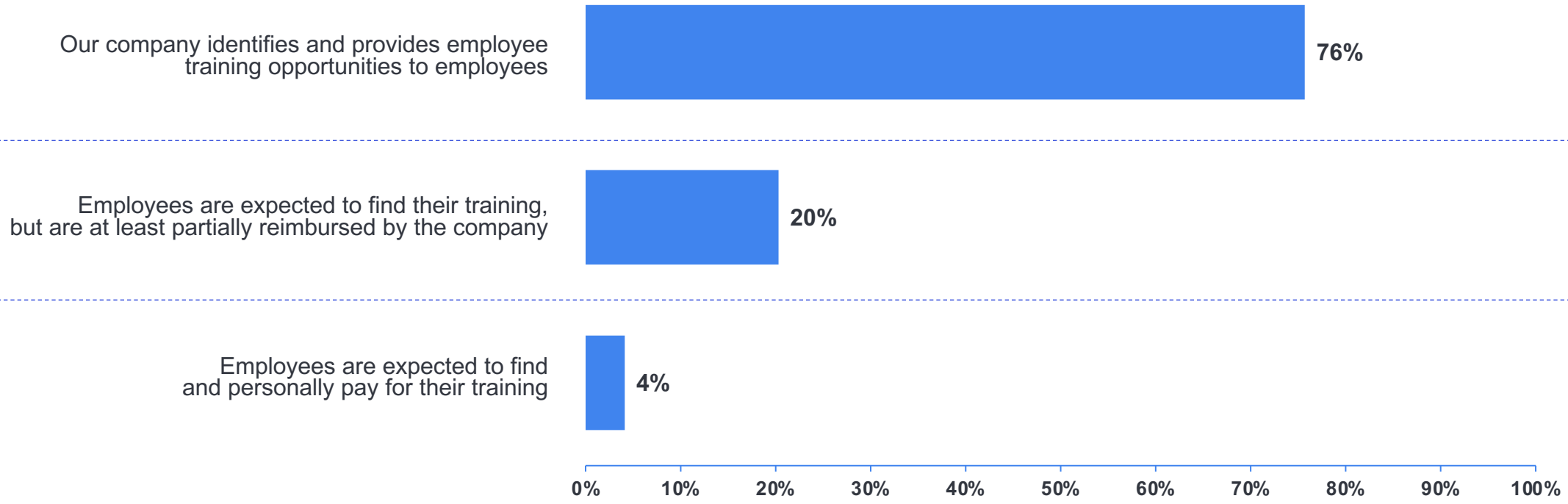
Verbatim Comments

- AR/VR

Q20. What types of smart training do your company's production employees receive? (Please select all that apply.)
n=169 | Differences considered significant at a 95% confidence interval are indicated

Company approach to training

Three-quarters of companies identify and provide training opportunities to employees.

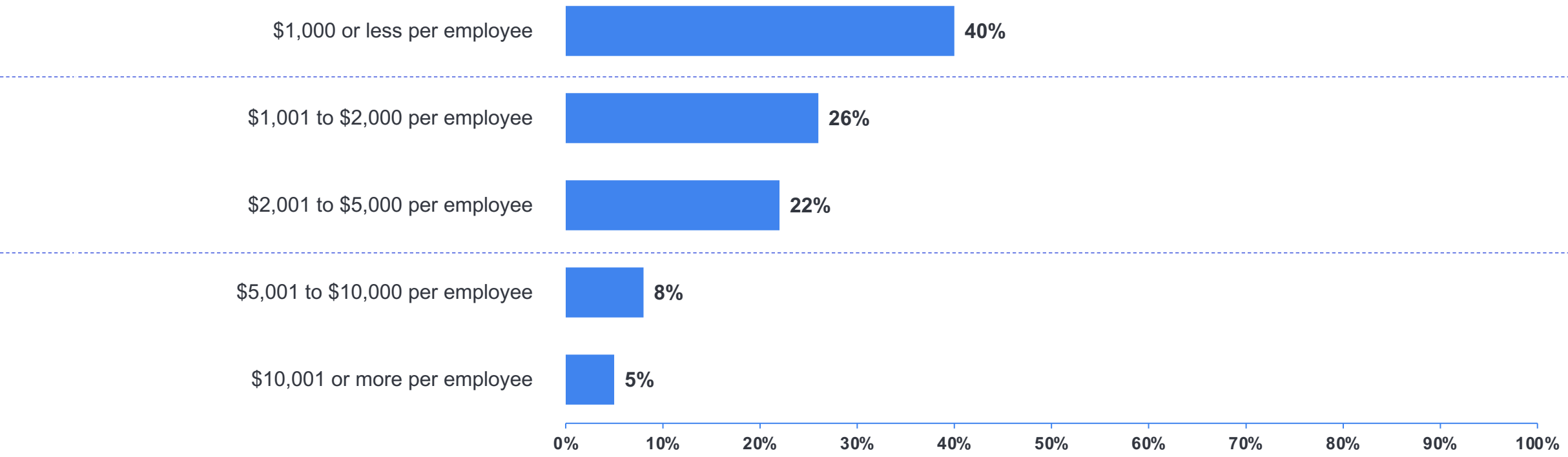


Q21. Which of the following most accurately reflects your company's approach to training?

n=148 | Differences considered significant at a 95% confidence interval are indicated

Annual training budget

Two-thirds of respondents indicated that they spend $2,000 or less on employee training each year.

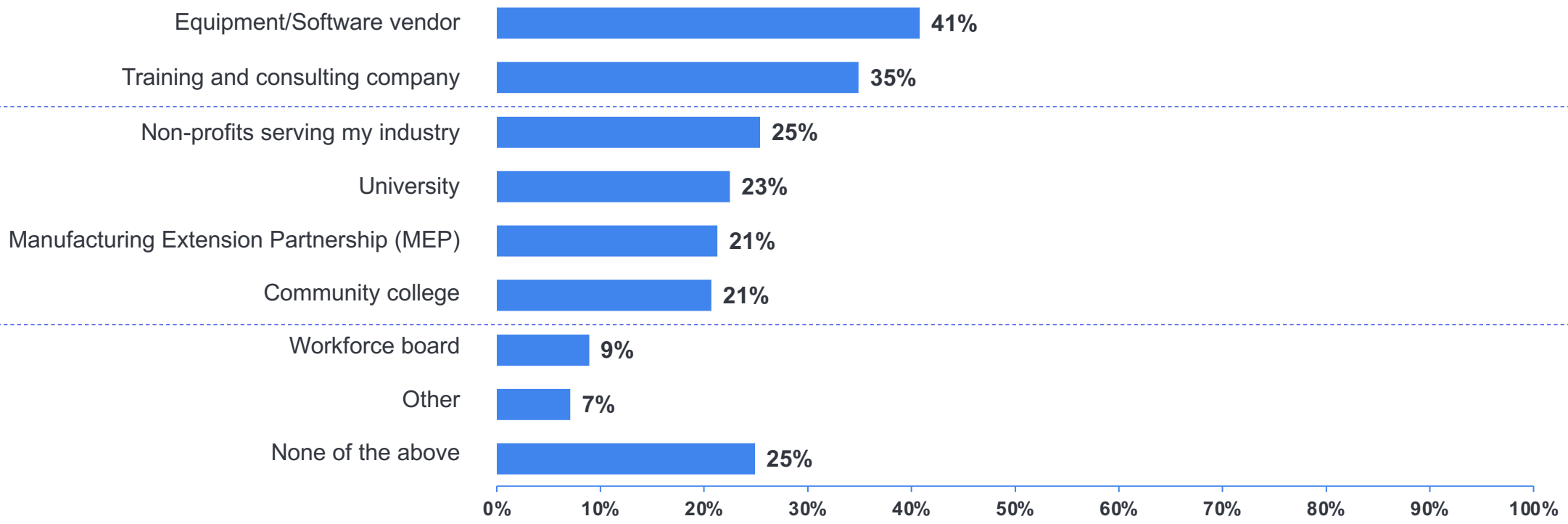


Q22. On average, how much does your company spend on training each year? (Don't know/Unsure removed)

n=86 | Differences considered significant at a 95% confidence interval are indicated

Types of organizations utilized for training

Smart manufacturing training is provided for employees by their vendors and training/consulting companies.



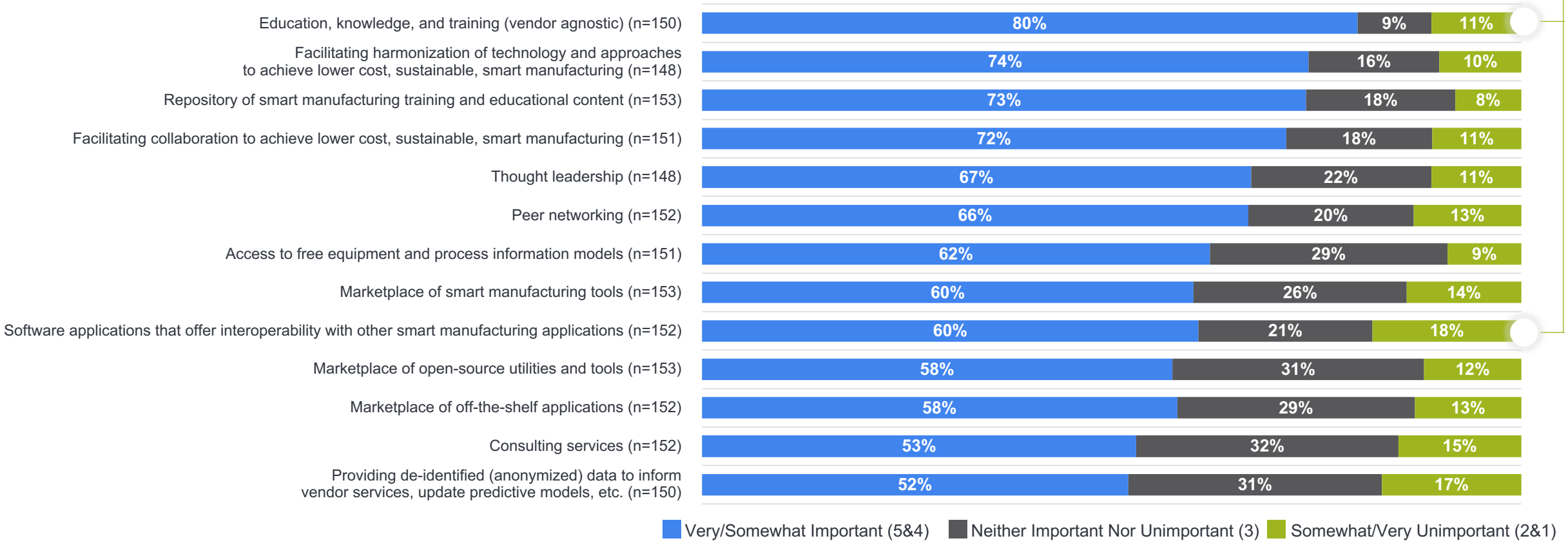
Q23. Which of the following types of organizations does your company enlist for SM training to develop your workforce? (Please select all that apply.)

n=169 | Differences considered significant at a 95% confidence interval are indicated

Consortia/association benefits

Education is at the top of expected benefits & there is a high percentage looking for **Marketplace Benefits.**

Education, knowledge, and vendor agnostic training is the most important consortia/association benefit, followed by facilitating harmonization of technology and holding a repository of training and educational content.



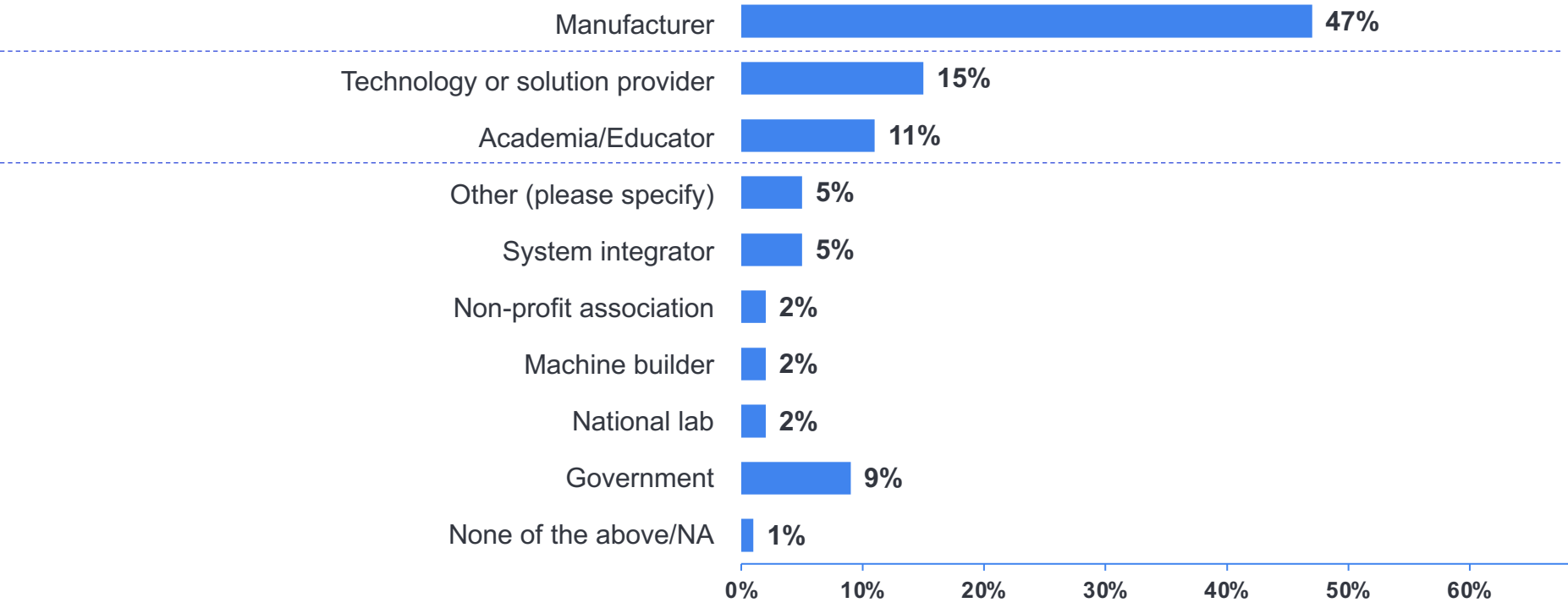
Q26. Please rate the following benefits of a smart manufacturing industry consortia/association?. (N/A removed)

n=169 | Percentages may not add up to 100% due to rounding | Differences considered significant at a 95% confidence interval are indicated

Demographics

Organization classification

Almost one-half of respondents are manufacturers, followed by technology/solution providers and academia/education.



Verbatim Comments

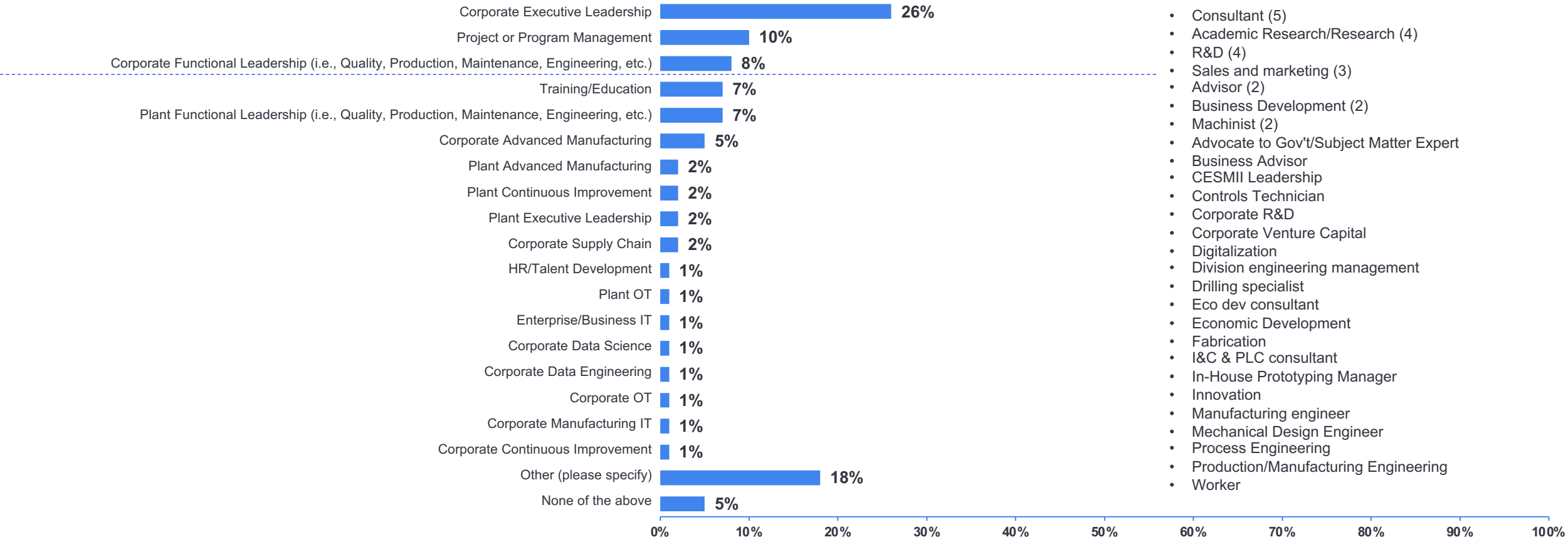
- Consultant (6)
- Analyst
- Clean Energy Technology and Hardware Provider
- Corporate Lab
- CPA Firm
- Custom tooling maker
- Education
- Expert
- FFRDC
- Market intelligence and strategic advisory services
- Mfg Eng Consultant
- R&D
- SRA Center for CMTC MEP
- Technical Support to Gov't for Space Programs
- UARC
- Venture Capital

Q1. Which of the following best describes your organization?

n=264 | Differences considered significant at a 95% confidence interval are indicated

Job role

One-quarter of respondents are Corporate Executive Leadership.



Verbatim Comments

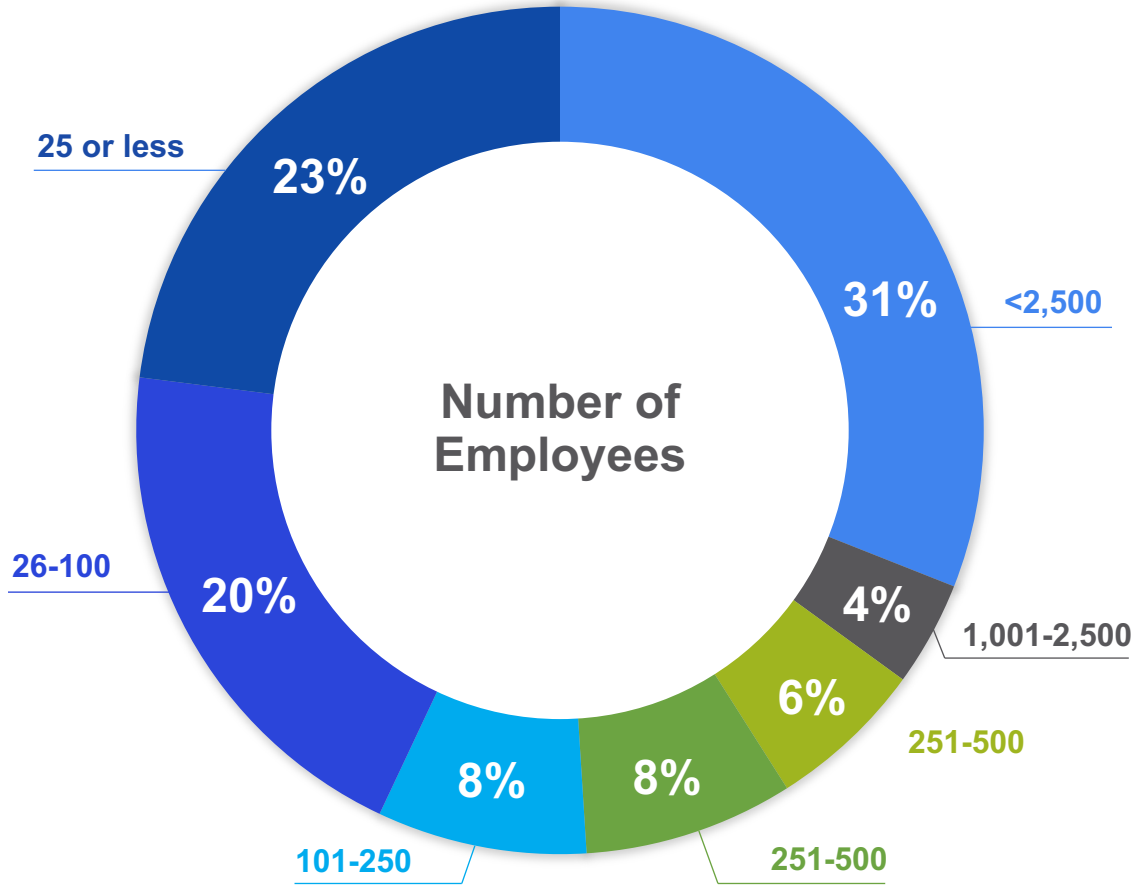
- Consultant (5)
- Academic Research/Research (4)
- R&D (4)
- Sales and marketing (3)
- Advisor (2)
- Business Development (2)
- Machinist (2)
- Advocate to Gov't/Subject Matter Expert
- Business Advisor
- CESMII Leadership
- Controls Technician
- Corporate R&D
- Corporate Venture Capital
- Digitalization
- Division engineering management
- Drilling specialist
- Eco dev consultant
- Economic Development
- Fabrication
- I&C & PLC consultant
- In-House Prototyping Manager
- Innovation
- Manufacturing engineer
- Mechanical Design Engineer
- Process Engineering
- Production/Manufacturing Engineering
- Worker

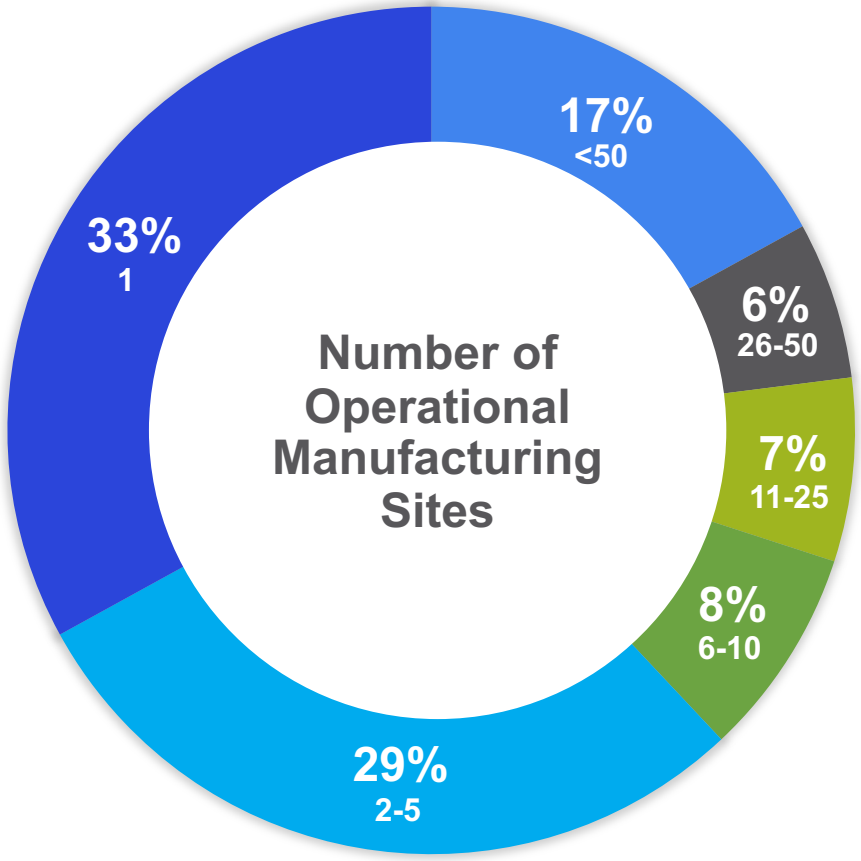
Q2. Which of the following best describes your role?

n=264 | Differences considered significant at a 95% confidence interval are indicated

Number of Employees & operational manufacturing sites

Based on company size





Q3. Including yourself, how many employees does your company employ, including all locations? (Don't know/Unsure removed)
Q4. How many operational manufacturing sites does your company have? (Don't know/Unsure removed)
Q3 n=52; Q4 n=86

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Thank you.

