

## Union Effect on Safety Management and Safety Culture in the Construction Industry

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CPWR has collaborated with Dodge Data & Analytics to conduct a biennial online Construction Safety Management Survey (CSMS) using Dodge's member contractor panel (~3,000) since 2012. The most recent survey was conducted in 2017. Besides continuing to track a wide variety of practices in safety management and safety culture among construction companies, the 2017 survey collected information on emerging issues, such as the awareness and practice of Prevention through Design (PtD) and the use of new technologies to improve safety (Dodge Data & Analytics, 2017). A total of 334 construction firms completed this survey.

Information on the union status of a company was collected for the first time in the 2017 CSMS. Respondents were asked whether their company employed union workers. Union status plays an important role in workplace safety and health (Amick et al., 2015; Mahan et al., 2018; Mahan et al., 2013; Okun et al., 2017; Verma, 2015; Yi et al., 2011). To better understand the potential union effect on occupational safety and health in the construction industry, in this Quarterly Data Report we compared the differences in safety management and safety culture between union and non-union construction firms by analyzing the 2017 CSMS data.



### KEY FINDINGS

- Union and non-union construction firms differed in employee size, type of businesses, and projects.
- Three out of four union firms believed that their firms practiced PtD based on the definition provided.
- Nearly 80% of union firms conducted job hazard or job safety analysis before construction began.
- Nearly nine in ten (87%) union firms had site-specific safety and health plans.
- About 83% of union firms considered jobsite workers' involvement the most essential aspect of a world-class safety program.
- More than 63% of union firms required their jobsite workers to have the OSHA 10-hour training.

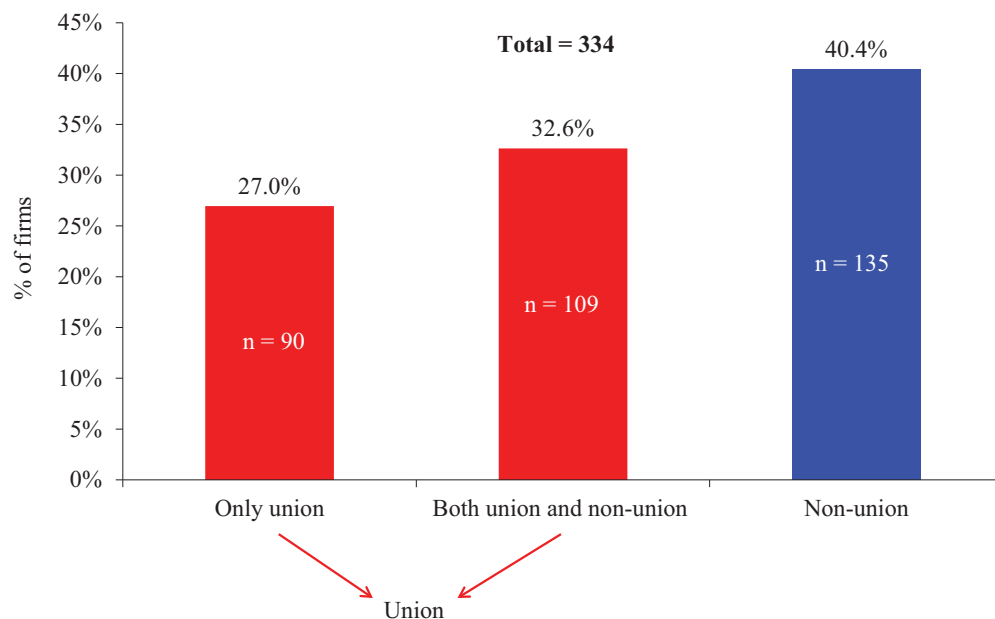
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## SECTION 1: Characteristics of Construction Firms

In 2017, a total of 334 construction firms completed the CSMS; of these, 90 firms (27.0%) employed only union workers, 109 firms (32.6%) employed both union and non-union workers, and the rest (135 firms; 40.4%) had only non-union workers (chart 1). Given no substantial differences in the major measures reported by firms with only union workers and by firms with both union and non-union workers, these two types of firms are collectively referred to as “union firms” in this report. Firms with only non-union workers are referred to as “non-union firms” in this report.

1. Number and percent of construction firms by union status, 2017



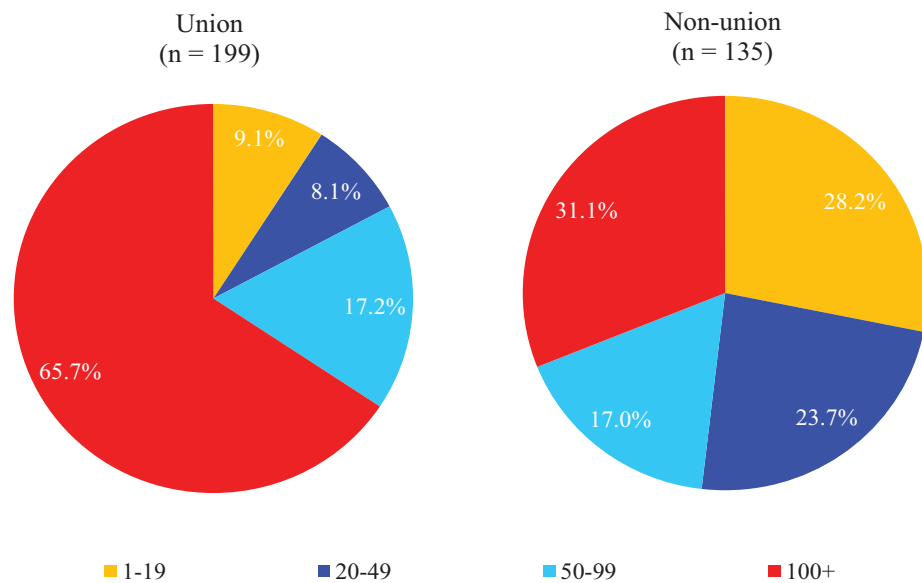
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 1: Characteristics of Construction Firms

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Union firms surveyed generally were larger in employee size than non-union firms. Nearly two out of three (65.7%) union firms had at least 100 employees, more than twice the proportion among non-union firms (31.1%; chart 2). On the other hand, only 9.1% of union firms had fewer than 20 employees, while 28.2% of non-union firms were so small.

**2. Employment size of construction firms, union versus non-union, 2017**



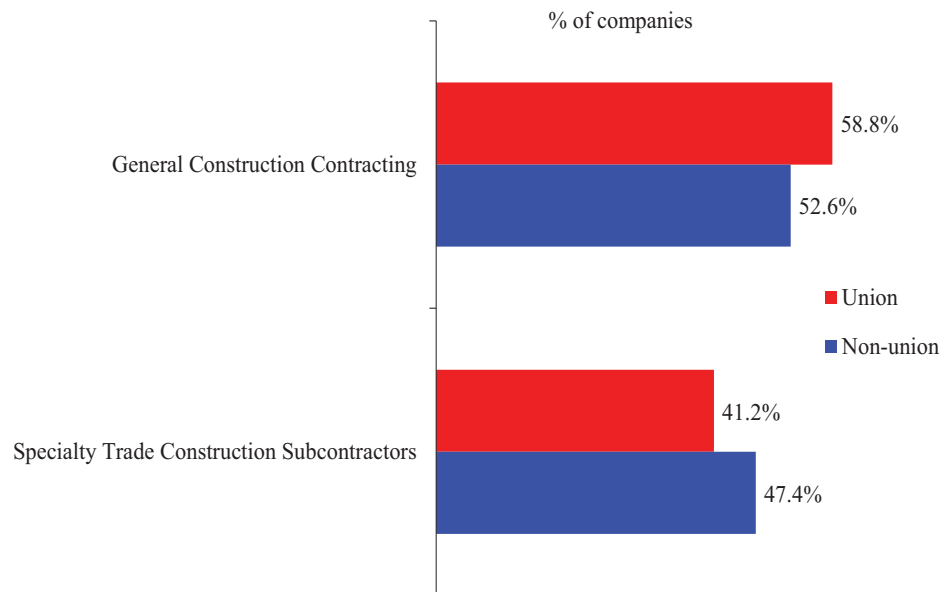
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 1: Characteristics of Construction Firms

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In terms of the types of companies, union firms were more likely to be general construction contracting companies, including general contractors, construction management firms, and design-build contractors. Non-union firms had a higher percentage of specialty trade construction subcontractors, such as specialty trade and engineering contractors. Among union firms, 58.8% were general construction companies, compared to 52.6% of non-union firms (chart 3).

3. Type of companies, union versus non-union, 2017



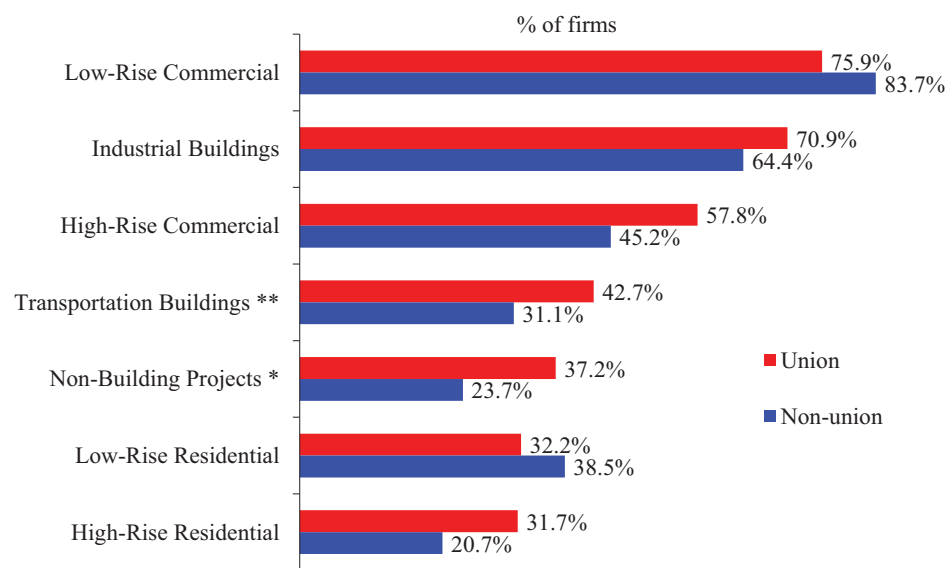
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 1: Characteristics of Construction Firms

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Types of projects also differed by union status. Union firms were often involved with high-rise commercial/residential and industrial building projects. Among union firms, 70.9% worked on industrial buildings and 57.8% worked on high-rise commercial buildings, compared to 64.4% and 45.2% of non-union firms, respectively (chart 4). In addition, union firms were more likely to work on transportation buildings (airports, seaports, train stations, etc.) and non-building projects (highway, street, and bridge; water and sewer; oil and gas pipeline; etc.) than their non-union counterparts.

**4. Type of projects worked on in the last three years, union versus non-union, 2017**



\* Highway, street, and bridge; water and sewer; oil and gas pipeline; etc.

\*\*Airports, seaports, train stations, etc.

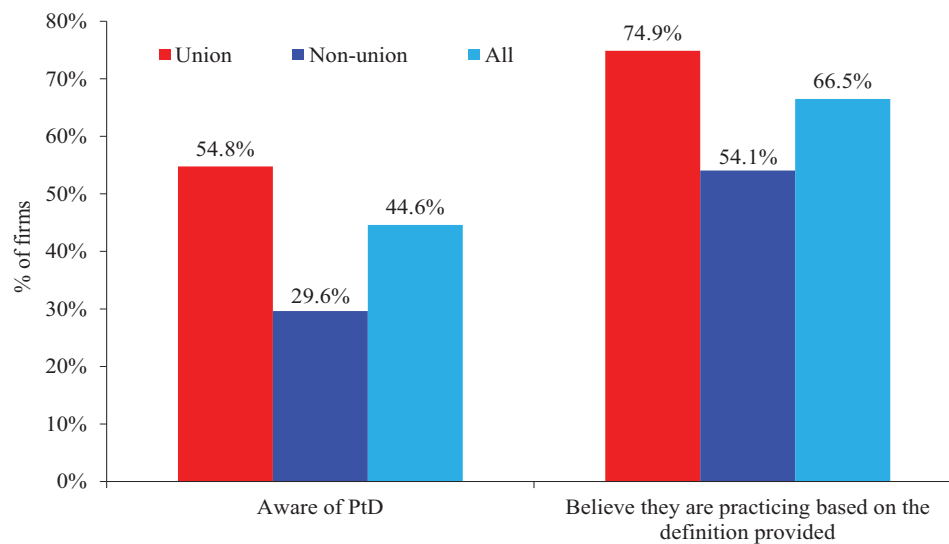
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

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## SECTION 2: Practices Used on Projects to Promote Safety

Respondents were presented with the following definition of Prevention through Design (PtD) from NIOSH: “PtD involves all of the efforts to anticipate and design out hazards to workers in facilities, work methods and operations, processes, equipment, tools, products, materials, new technologies and the organization of work.” Two questions then followed: “Were you familiar with the concept of PtD before reading the definition, and based on the definition, do you believe you are practicing PtD?” Although less than half (44.6%) of responding contractors were aware of PtD before reading the definition, two in three (66.5%) believed that their firms practiced PtD based on the definition provided (chart 5). Union firms were more likely to be aware of and practice PtD than non-union firms. More than half (54.8%) of union firms indicated that they were aware of PtD. Among non-union firms, 29.6% indicated their awareness. Practicing PtD was also more common among union firms than non-union firms (74.9% versus 54.1%).

5. Awareness and practice of Prevention through Design (PtD), union versus non-union, 2017



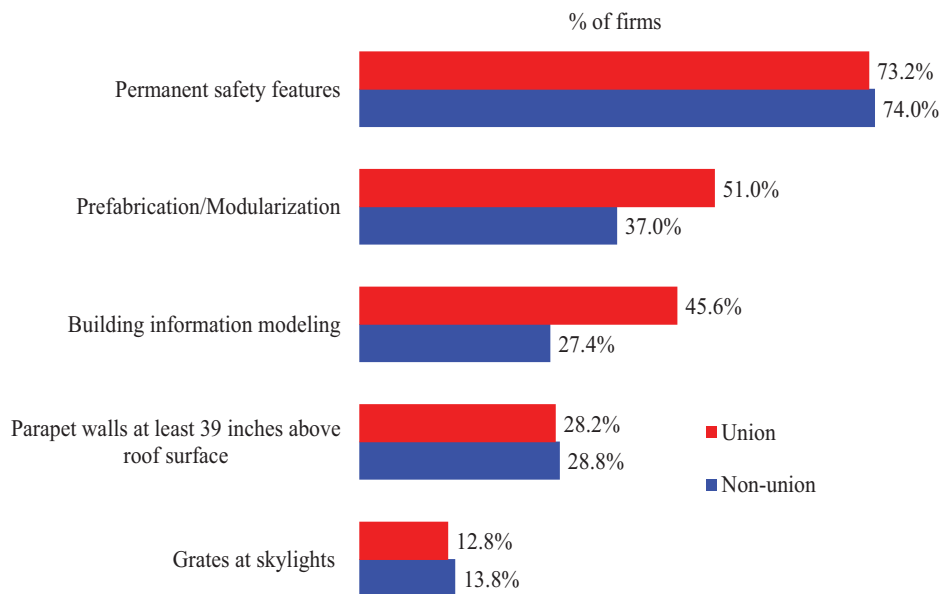
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 2: Practices Used on Projects to Promote Safety

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Among five specific PtD practices listed in the survey, prefabrication/modularization and building information modeling (BIM) were more likely to be practiced by union firms than their non-union counterparts (chart 6). About 51.0% and 45.6% of union firms practiced prefabrication/modularization and BIM, respectively, compared to 37.0% and 27.4% of non-union firms, respectively. Other PtD practices, such as permanent safety features, parapet walls at least 39 inches above roof surface, and grates at skylights, were practiced at comparable percentages by both union and non-union firms.

**6. Use of specific PtD to promote safety, union versus non-union, 2017**



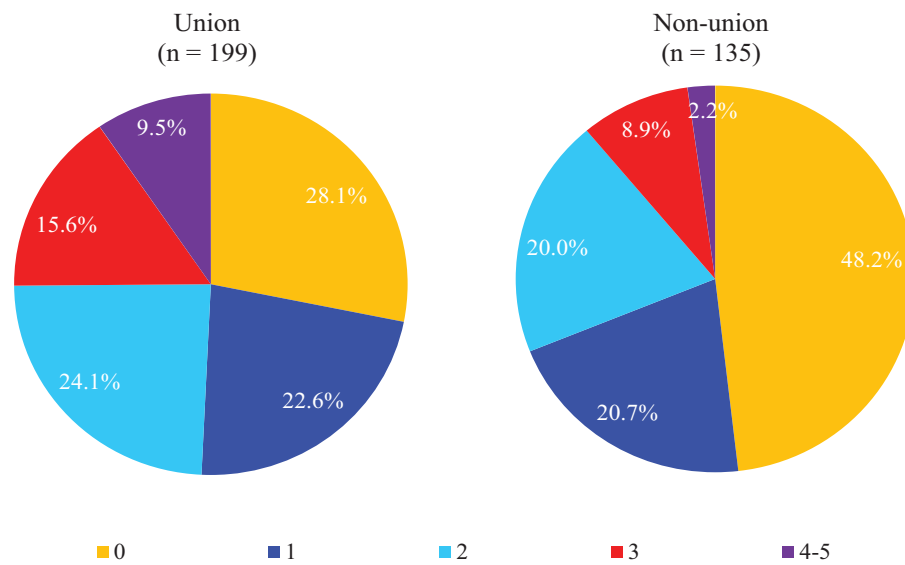
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 2: Practices Used on Projects to Promote Safety

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In terms of the total number of PtD methods practiced, about 72% of union firms adopted at least one PtD listed in chart 6, while 52% of non-union firms did so (chart 7). Moreover, 25.1% of union firms practiced three or more PtDs, as did 11.1% of non-union firms.

7. Percentage of firms by the number of PtD practiced, union versus non-union, 2017

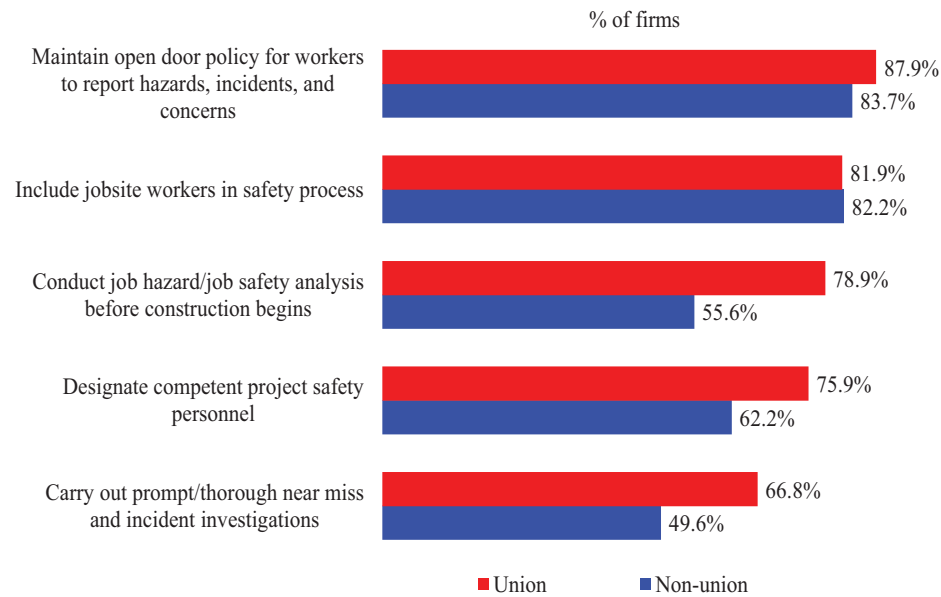


Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.



Among five organizational practices to promote safety included in the survey, about 78.9% of union firms conducted a job hazard or job safety analysis before construction began, while a little more than half of non-union firms did such an analysis (55.6%; chart 8). Similarly, union firms had a notably higher adoption of two other practices, including designating competent project safety personnel, and carrying out prompt and thorough investigations for near-misses and incidents.

**8. Use of specific organizational safety practices, union versus non-union, 2017**



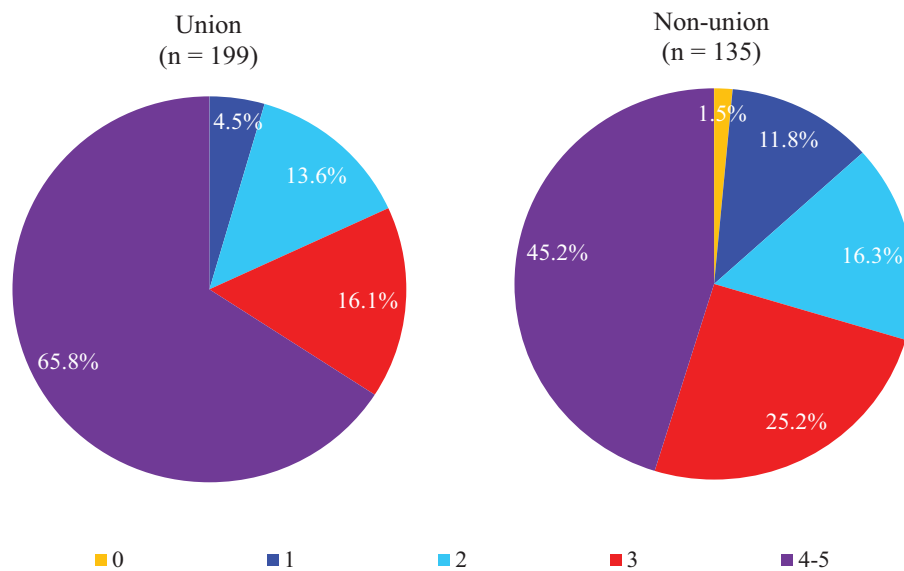
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 2: Practices Used on Projects to Promote Safety

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About 66% of union firms adopted four or more of the organizational safety practices listed in chart 8 (chart 9). All union firms adopted at least one safety practice; less than 5% of union firms adopted only one organizational safety practice. For non-union firms, 11.8% adopted only one organizational safety practice, and a small proportion (1.5%) did not adopt any practices at all.

**9. Percentage of firms by the number of organizational safety practices adopted, union versus non-union, 2017**



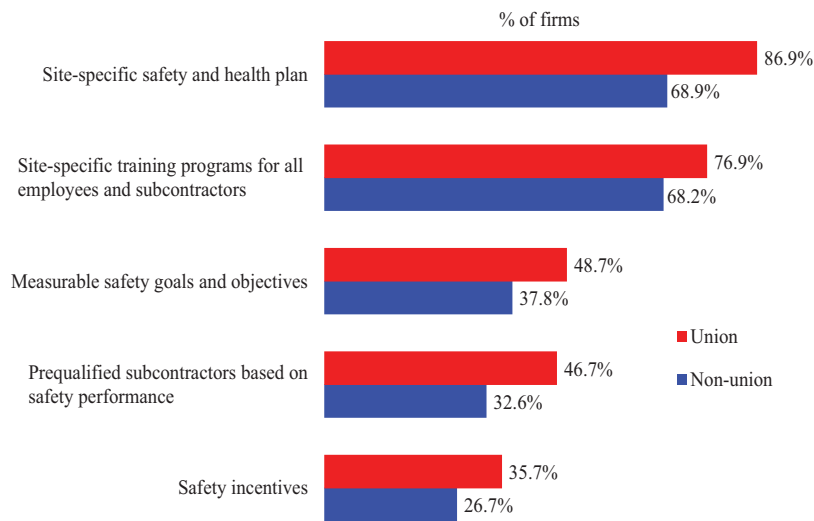
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 2: Practices Used on Projects to Promote Safety

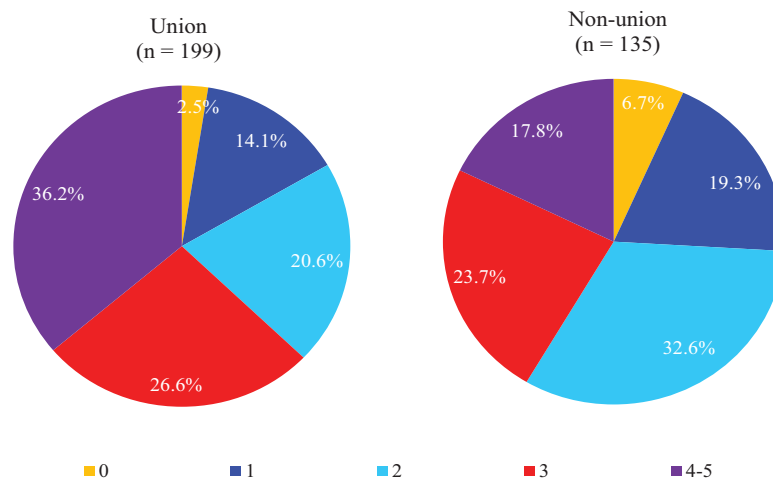
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Respondents were asked whether they used one or more of the five specific safety policies listed in chart 10 to promote safety at their firms. Nearly nine in ten (86.9%) union firms had site-specific safety and health plans, and seven in ten (68.9%) had these plans among non-union firms (chart 10). Similarly, 76.9% of union firms had site-specific training programs for all employees and subcontractors, compared to 68.2% of non-union firms. Overall, 36.2% of union firms implemented four or more safety policies, and 17.8% of non-union firms adopted similar numbers of policies (chart 11).

**10. Use of specific safety policies, union versus non-union, 2017**



**11. Percentage of firms by the number of safety policies implemented, union versus non-union, 2017**



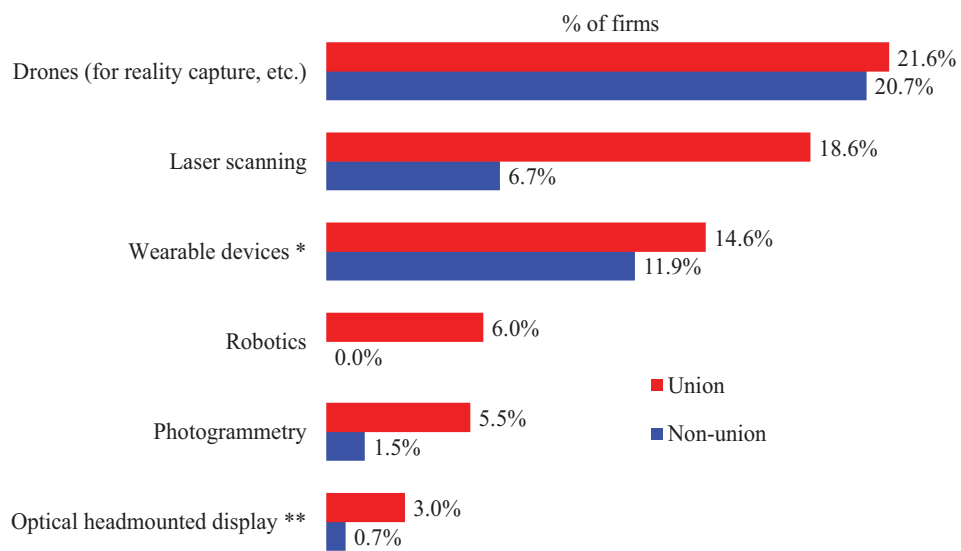
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 2: Practices Used on Projects to Promote Safety

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Six emerging technologies to enhance jobsite safety were included in the 2017 survey. The most commonly used emerging technology was drones, with more than 20% of firms adopting them, regardless of union status (chart 12). In addition, about 18.6% of union firms used laser scanning to promote safety, and 6.7% of non-union firms did so.

**12. Application of emerging technologies to promote safety, union versus non-union, 2017**



\* Smart helmet, badges with coded electronic information, etc.

\*\* Google Glass, Microsoft Hololens, etc.

Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

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### SECTION 3: Safety Culture Indicators

In the 2017 survey, safety culture was measured by the eight indicators listed in chart 13. All eight indicators were considered to have a high impact by a larger percentage of union firms than non-union firms (chart 13). However, both union and non-union firms considered “training at all levels” to have the highest impact on jobsite safety (77.9% and 75.6%).

13. Safety culture indicators, union versus non-union, 2017



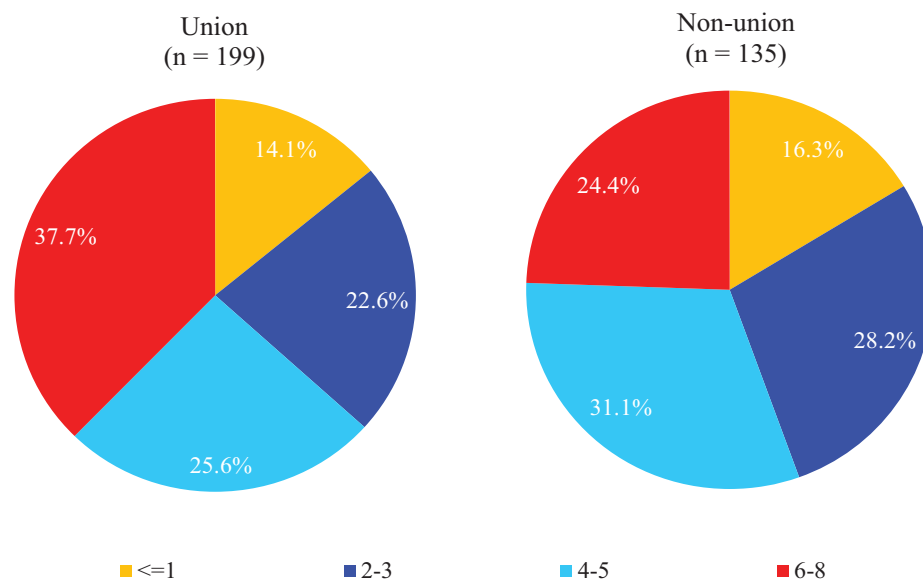
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 3: Safety Culture Indicators

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Regarding the total number of safety culture indicators practiced, more than one third (37.7%) of union firms adopted six to eight safety culture indicators, while 24.4% of non-union firms adopted the same number of practices (chart 14).

**14. Percentage of firms by the number of safety culture indicators adopted, union versus non-union, 2017**



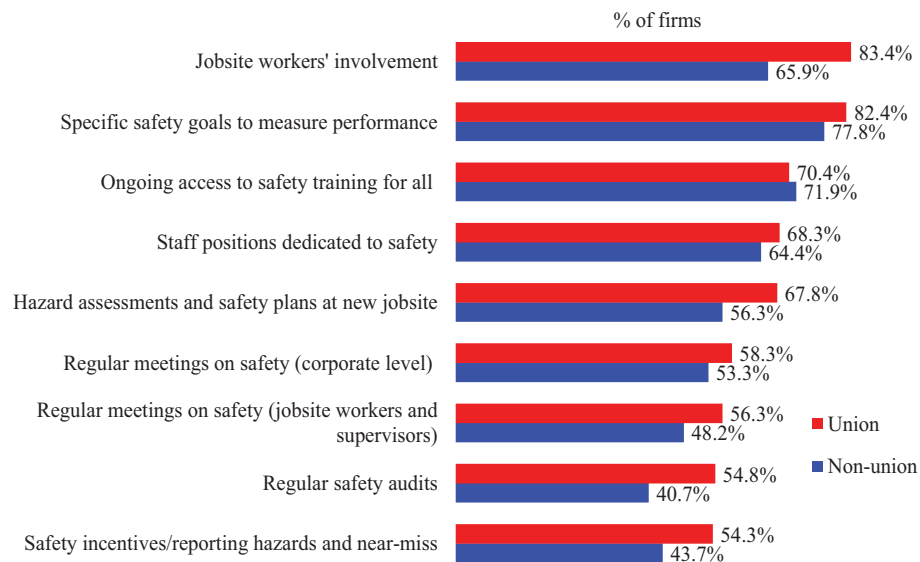
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 3: Safety Culture Indicators

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Respondents were asked to select all the options that they believed to be the most essential aspects of a world-class safety program. Nine aspects were selected and presented in chart 15. About 83.4% of union firms considered jobsite workers’ involvement the most essential aspect of a world-class safety program, as did 65.9% of non-union firms (chart 15).

**15. Aspects of a world-class safety program, union versus non-union, 2017 (Selected)**



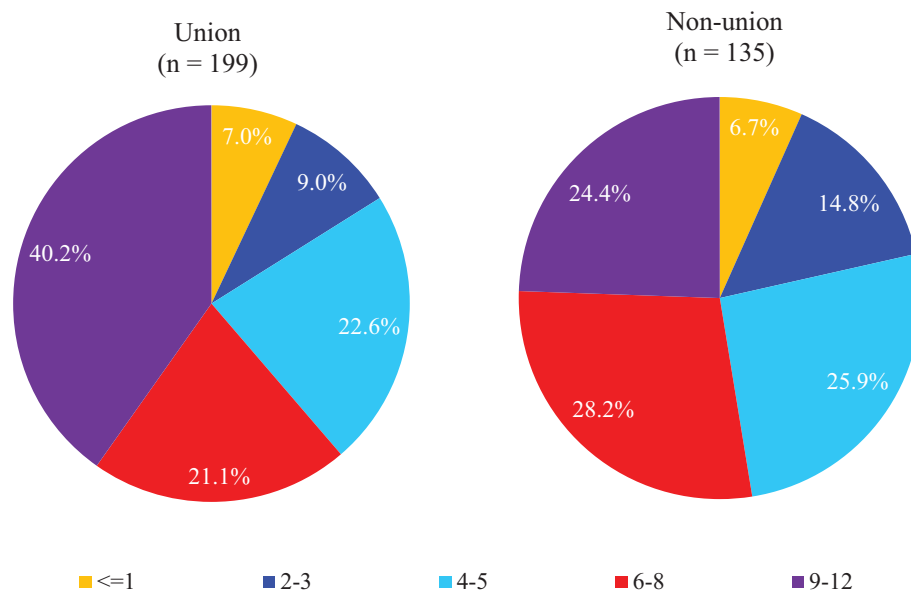
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 3: Safety Culture Indicators

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About 40.2% of union firms surveyed implemented nine to twelve of the safety programs, compared to 24.4% among non-union firms (chart 16). On the other hand, 21.5% of non-union firms practiced three or fewer safety programs, compared to 16% of union firms.

**16. Percentage of firms by the number of safety programs practiced, union versus non-union, 2017**



Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

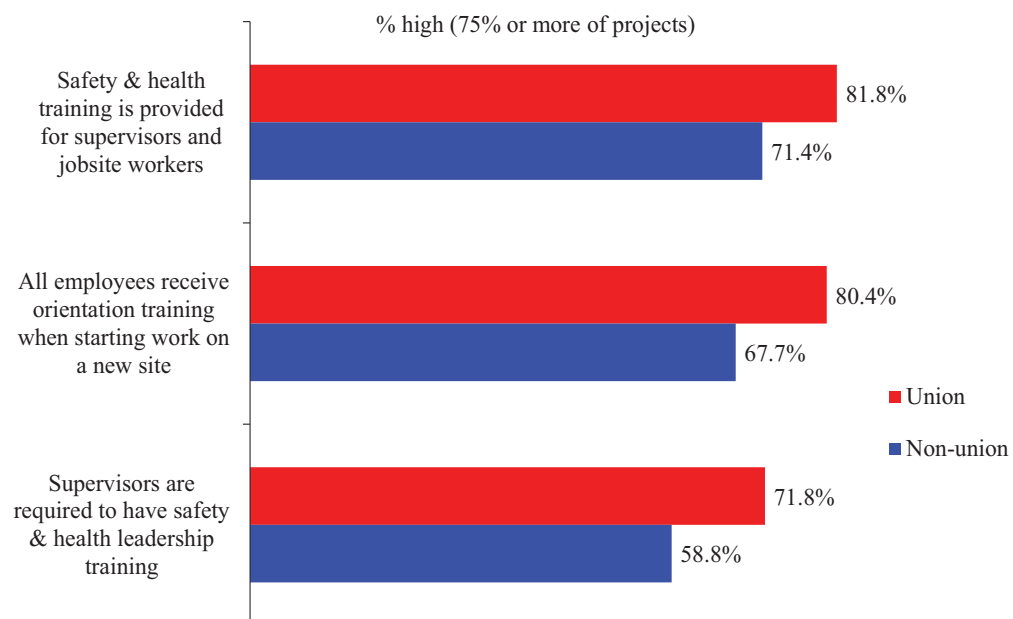


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## SECTION 4: Safety and Health Training

General safety and health training discussed in the survey included the three aspects listed in chart 17. When asked whether “all employees receive orientation training when starting work on a new site,” 80.4% of union firm respondents said that they required such training on 75% or more of their projects, while 67.7% of non-union firms had such requirements (chart 17).

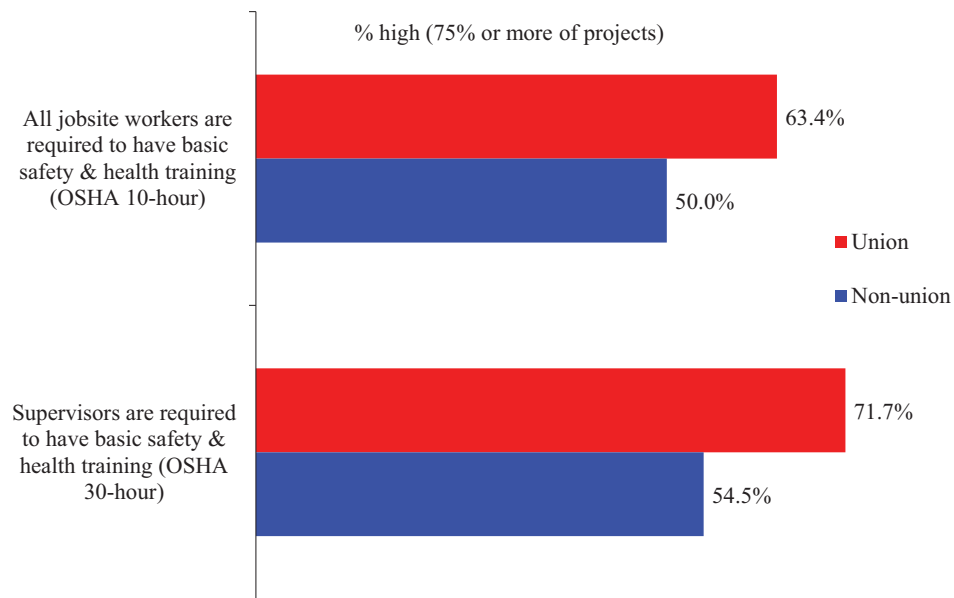
17. General safety and health training, union versus non-union, 2017



Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

About 63.4% of union firms required their jobsite workers to receive the OSHA 10-hour training, while 50% of non-union firms had such a requirement (chart 18). Likewise, 71.7% of union firms required supervisors to receive basic safety and health training (OSHA 30-hour), as did 54.5% of non-union firms.

**18. OSHA training, union versus non-union, 2017**



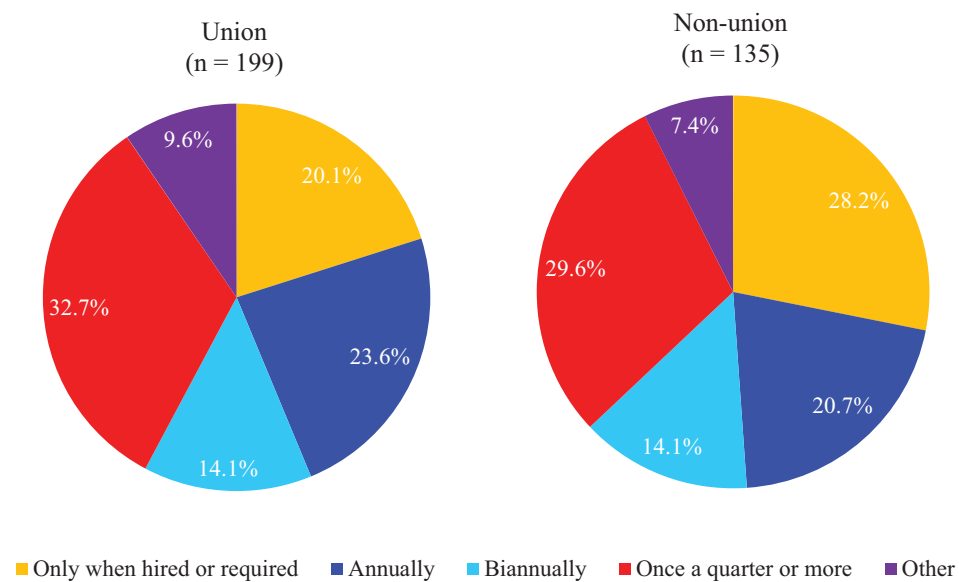
Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

Section 4: Safety and Health Training

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In 2017, nearly one in three (32.7%) union firms provided training to their employees at least once a quarter, compared to 29.6% of non-union firms (chart 19). In addition, 28.2% of non-union firms provided training only when employees were hired or when it was required, as did 20.1% of union firms.

**19. Frequency of general safety and health training, union versus non-union, 2017**



Source: Dodge Data & Analytics, 2017 Construction Safety Management Survey. Calculations by the authors.

## Conclusion

This analysis found that union and non-union construction firms differed in employee size, type of businesses, and projects. Compared to non-union firms, unionized construction firms are larger, more likely to be general contractors, and involved in industrial buildings, high-rise commercial buildings, and non-building projects.

The results indicate that union firms reported better performance of safety management and safety culture than non-union firms. Union firms were more likely to be aware of and practice PtD than non-union firms. Union firms also adopted most of the organization safety practices, safety policies, and safety culture indicators included in this report. Moreover, union firms were more likely and frequently to offer and require general safety and health training, and OSHA 10-hour and 30-hour training to their employees. The results confirm that labor-management cooperation is a win-win solution for improving safety management and safety culture at workplaces (Mahan et al., 2018), which benefits not only construction workers, but also construction contractors.

The findings were based on analysis of the 2017 Construction Safety Management Survey (CSMS) conducted by Dodge & Data Analytics. Information on the survey design and methodology can be found on page 68 of the Dodge report (Dodge Data & Analytics 2017).

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## About the CPWR Data Center

The CPWR Data Center is part of CPWR – The Center for Construction Research and Training. CPWR is a 501(c)(3) nonprofit research and training institution created by NABTU, and serves as its research arm. CPWR has focused on construction safety and health research since 1990. The Quarterly Data Reports – a series of publications analyzing construction-related data, is part of our ongoing surveillance project funded by the National Institute for Occupational Safety and Health (NIOSH).

Please visit CPWR's other resources to help reduce construction safety and health hazards:

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Construction Solutions ROI Calculator <http://www.safecalc.org/>

The Electronic Library of Construction OSH <http://www.elcosh.org/index.php>

Falls Campaign <http://stopconstructionfalls.com/>

Hand Safety <http://choosehandsafety.org/>

Work Safely with Silica <http://www.silica-safe.org/>

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CPWR is the research and training arm of NABTU. Production of this Quarterly Data Report was supported by cooperative agreement OH 009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

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