



## Making the Case for Contractor Management

*Examining the Safety Benefits of 3rd-Party Management*



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# Executive Summary

**This report summarizes the results of the National Safety Council research project on the efficacy of outsourced contractor management systems.** More specifically, this research investigates if contractors and vendors realize improved safety performance as a result of their participation in these types of programs. The purpose of this study is to examine the actual safety benefit of implementing a third-party contractor management system and the safety effect on participating contractors.

The following data analysis was performed independently by the National Safety Council (NSC), utilizing data provided by BROWZ, LLC ([www.browz.com](http://www.browz.com)). The BROWZ Contractor Dataset contains 17,460 contractor companies that have joined BROWZ between 2007 and 2015 (this is a partial data set and does not include all contractor companies being managed by BROWZ). All data was anonymized with company names removed from the dataset and only a unique alphanumeric ID as an identifying piece of information. Primary NAICS industry codes were assigned to each contractor, ranging from three to six digits.

Two types of analyses of the data were performed, one where contractors were grouped by industry code and another where the entire dataset was analyzed as a whole. In the disaggregated analysis, because the number of industry codes in the dataset is quite numerous, we shifted the level of analysis up to the two-digit industry code and focused on the industries that form the core of the BROWZ contractor universe.

The results indicate that registered BROWZ contractors and vendors significantly outperform national safety averages. BROWZ contractors have a Total Recordable Rate (TRR), Days Away, Restricted or Transferred (DART) Rate, and Lost Workday Rate (LWR) that is 33.7 percent, 47.7 percent, and 65.0 percent better (respectively) than the national intra-industry averages. This is true both within individual industries and all industries as a whole.

These same contractors within the BROWZ universe who already outperform industry averages in key metrics continue to improve at or better than the industry averages. BROWZ contractors who joined in 2007 saw an average 56.58 percent improvement in TRR between 2007 and 2015. The BLS reported an average 40.93 percent improvement in TRR between these same years. This indicates that BROWZ contractors experienced an improvement in TRR of almost 16 percent above what all companies experienced between 2007 and 2015.

**Finally, analysis indicates that there is a strong likelihood that those BROWZ contractors who were already performing better than the cross-industry average will have a higher annual rate of improvement than those performing worse across industry averages.**

# Introduction

The issue of managing contractor environmental, health, and safety (EHS) performance is an ongoing concern among organizations of all industries, typically because contractors may be performing non-routine work at sites that are not directly supervised by an EHS manager, or any manager at all. Much research has already been done to determine why safety can be negatively impacted through contractors and how much (or little) attention is paid to managing contractor safety. This research report focuses on the pre-qualification stage of managing contractors – why pre-qualification is important, how third-party pre-qualification companies add rigor to this step, and how the pre-qualifying process enables contractors to become better and safer overall.

The BROWZ process of contractor qualification starts with contractors submitting their data and completing an online questionnaire. BROWZ then verifies and scores compliance data and monitors the changes in these data points over time. Gaps or deficiencies in recordkeeping, communication, work organization, training, safety culture, standards enforcement, etc. are identified by BROWZ to assist contractors in understanding how to become safer and more qualified.

Additional components considered beneficial in a contractor management solution includes a focus on leading indicators such as safety programs and cultural adherence within supply chain organizations, as well as positive reinforcement for meeting and exceeding safety standards. In this case, positive reinforcement is provided in the form of scorecarding and customer reinforcement, hiring those contractors who meet compliance standards.

Ultimately, client organizations in a position to hire will utilize the BROWZ compliance status and scorecarding as a factor in issuing future work opportunities. These client organizations have made a commitment to work with contractors who have a demonstrated commitment to EHS performance.

The National Safety Council partnered with BROWZ, a company specializing in contractor qualification and management. As an NSC member, Campbell Institute member, and sponsor of the Council's Journey to Safety Excellence campaign, BROWZ and its relationship to NSC presented a unique opportunity to delve deeper into the contractor pre-qualification process and understand its effects on contractor safety performance. The objective was to analyze and compare the performance of

contractors in the BROWZ universe to the national performance of companies as reported in the Bureau of Labor Statistics, providing validation of the BROWZ process of pre-qualification and support for the use of third-party pre-qualification companies as a best practice for contractor management.

Previous research produced by BROWZ on its contractor database has consistently shown that BROWZ contractors outperform national safety averages of Total Recordable Incident Rate (TRIR), Days Away Restricted Transfer Rate (DART), and Lost Workday Rate (LWR). In this analysis, we expect to find that BROWZ contractors will have better rates both within and across industries.

Because of the reputation of BROWZ's services, we expect that BROWZ naturally attracts higher performing contractors. This may mean that on an annual basis, BROWZ contractors may find it more challenging to exceed industry improvement rates, as continually improving on smaller rates becomes increasingly difficult. BROWZ contractors that are already performing below a national cross-industry average may see that their annual rate of improvement is weaker than BROWZ contractors with statistics above a national cross-industry average.

Seeing as BROWZ assists contractors in improving their safety performance, we expect to find that the contractors that have been associated with BROWZ the longest will have the greatest gains in improvement as measured by their safety performance records. These assumptions based on previous research and experience have informed the hypotheses put forth in the following section.

## Data and Methods

The BROWZ Contractor Dataset contained 17,460 contractor companies that have joined BROWZ between the years 2007 and 2015. Each contractor had its company name removed from the dataset with only a unique alphanumeric BROWZ ID as an identifying piece of information. There was a primary NAICS industry code assigned to each contractor, ranging from three digits to six digits. In addition to these data, the other columns of data used in the analysis included:

**Table 1A: Variables of original dataset**

Variable Name	Variable Description
Original Registration Date	The date the contractor joined BROWZ (mm/dd/yy)
Experience Modification Rate (EMR)	Contractor EMR for years 2007-2015 (each year a separate data column)
Total Recordable Rate (TRR)	Contractor TRR for years 2007-2015 (each year a separate data column)
Days Away, Restricted, Transferred Rate (DART)	Contractor DART for years 2007-2015 (each year a separate data column)
Lost Work Rate (LWR)	Contractor LWR for years 2007-2015 (each year a separate data column)
National Average TRR	The national average TRR for specified industry code as obtained from BLS, 2007-2015 (each year a separate data column)
National Average DART	The national average DART for specified industry code as obtained from BLS, 2007-2015 (each year a separate data column)
National Average LWR	The national average LWR for specified industry code as obtained from BLS, 2007-2015 (each year a separate data column)

We performed two types of analyses with the data, one where contractors are grouped by industry code and another where the entire dataset is analyzed as a whole. In the disaggregated analysis, because the number of industry codes included in the dataset was quite numerous, we shifted the level of analysis up to the two-digit industry code and focused on the industries that form the core of the BROWZ contractor universe. These eight codes were:

**Table 1B: Two-digit NAICS industry codes for disaggregated analysis**

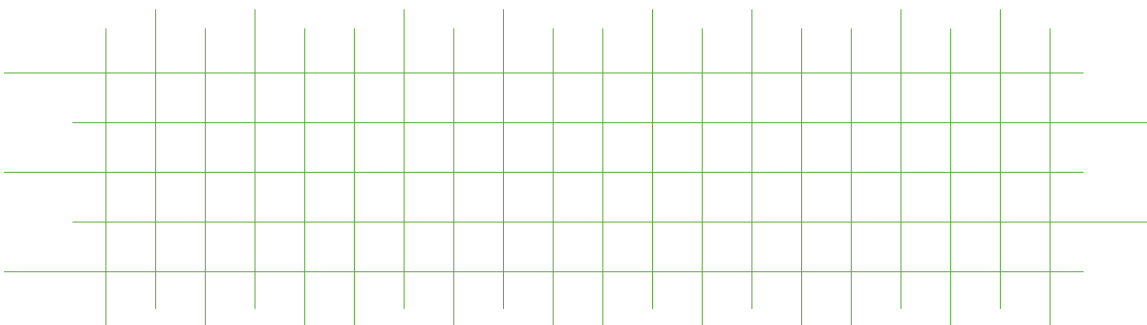
Two-Digit Industry Code	Industry Code Description
23	Construction
31-32	Manufacturing
33	Metal Manufacturing
42	Service Providing Trade, Transportation & Utilities
48-49	Transportation & Wharehousing
54	Professional, Scientific & Technical Services
56	Administrative, Support, Waste Management & Remediation Services
81	Other Services, except Public Administration

To conduct the analysis of TRR of a two-digit industry code, we created a dataset that filtered out all contractors that did not begin with the specified two digits. For each year starting with 2007, we calculated the average TRR for the contractors in the filtered dataset. Because the column containing the national average TRR still had separate entries for more specific industry codes (three-digit and beyond), we also calculated the average of those averages (an intra-industry average) for each year starting with 2007. This left us with two numbers to compare in each year: the average TRR of BROWZ contractors and the intra-industry average of the national TRR from the Bureau of Labor Statistics.

We then repeated the analysis described above for the other two-digit industry codes and for DART and LWR in the years 2007-2015. Table 2A presents a summary of the calculations for each two-digit industry code in the disaggregated analysis.

Because of BROWZ's process of pre-qualifying contractors and helping them improve performance, our hypothesis was that BROWZ contractors in any two-digit industry code will have a better average TRR, DART, and LWR than the industry as a whole.

**Hypothesis 1:** BROWZ contractors in any two-digit industry code will have a better average TRR, DART, and LWR than the industry as a whole.



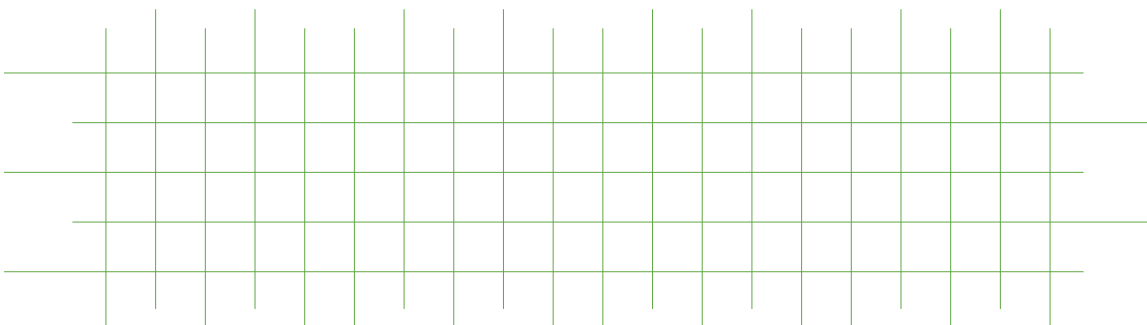
**Table 2A: Calculated variables for disaggregated analysis**

Column A	Column B	Column C	Column D
Average TRR for BROWZ contractors (for each year, 2007-2015)	National Intra-Industry TRR average (for each year, 2007-2015)	Numerical difference between Column A and Column B	Percent difference between Column A and Column B
Average TRR for BROWZ contractors (for each year, 2007-2015)	National Intra-Industry DART average (for each year, 2007-2015)	Numerical difference between Column A and Column B	Percent difference between Column A and Column B
Average TRR for BROWZ contractors (for each year, 2007-2015)	National Intra-Industry LWR average (for each year, 2007-2015)	Numerical difference between Column A and Column B	Percent difference between Column A and Column B

With the dataset still disaggregated by two-digit industry code, we sought to answer the question if BROWZ contractors improve their TRR at a better or worse rate than the industry as a whole. To do this, we calculated the average TRR for BROWZ contractors for each year from 2007 to 2015 and calculated the rate of change between each year. We then calculated the national intra-industry average TRR for each year from 2007 to 2015 and calculated the rate of change between each year. By comparing the rate of change of the BROWZ universe to the rate of change of the industry, we could determine if BROWZ contractors had a better or worse rate of improvement year over year than the industry as a whole. We repeated this analysis to compare the rates of change in DART and LWR year over year.

Our hypothesis was that while the BROWZ universe of contractors will have a better average rate of TRR, DART, and LWR in any given year, the industry as a whole would have a stronger rate of improvement from year to year. This is because as companies become better performing, their opportunity for improvement becomes narrower.

**Hypothesis 2:** The BLS population in any two-digit industry code will have a stronger annual rate of improvement in TRR, DART, and LWR than BROWZ contractors in the same two-digit industry code.



**Table 3A: Calculated variables for disaggregated rate of improvement analysis**

Column A	Column B	Column C	Column D	Column E
Average TRR for BROWZ contractors (for each year, 2007-2015)	Rate of change of average TRR for BROWZ contractors (between each year, 2007-2015)	National Intra-Industry TRR average (for each year, 2007-2015)	Rate of change of Intra-Industry TRR average (between each year, 2007-2015)	Numerical difference between Column B and Column D
Average DART for BROWZ contractors (for each year, 2007-2015)	Rate of change of average DART for BROWZ contractors (between each year, 2007-2015)	National Intra-Industry DART average (for each year, 2007-2015)	Rate of change of Intra-Industry DART average (between each year, 2007-2015)	Numerical difference between Column B and Column D
Average LWR for BROWZ contractors (for each year, 2007-2015)	Rate of change of average LWR for BROWZ contractors (between each year, 2007-2015)	National Intra-Industry LWR average (for each year, 2007-2015)	Rate of change of Intra-Industry LWR average (between each year, 2007-2015)	Numerical difference between Column B and Column D

For the aggregated analyses, we used the full unfiltered dataset that includes not only the eight two-digit industry codes described in Table 2, but all the primary industry codes covered by the BROWZ universe of contractors. Here we wanted to compare the entire BROWZ universe to the national averages for TRR, DART, and LWR. Our hypothesis, like that of the disaggregated analysis, was that BROWZ contractors will have better average TRR, DART, and LWR than the cross-industry averages.

**Hypothesis 3:** BROWZ contractors will have better average TRR, DART, and LWR than cross-industry averages.

**Table 4A: Calculated variables for aggregated analysis**

Column A	Column B	Column C	Column D
Average TRR for BROWZ contractors (for each year, 2007-2015)	National cross-industry TRR average (for each year, 2007-2015)	Numerical difference between Column A and Column B	Average percent difference of Column C across years 2007-2015
Average DART for BROWZ contractors (for each year, 2007-2015)	National cross-industry DART average (for each year, 2007-2015)	Numerical difference between Column A and Column B	Average percent difference of Column C across years 2007-2015
Average LWR for BROWZ contractors (for each year, 2007-2015)	National cross-industry LWR average (for each year, 2007-2015)	Numerical difference between Column A and Column B	Average percent difference of Column C across years 2007-2015



For another aggregated analysis, we sought to answer the question if companies see a greater improvement in rates the longer they have been with BROWZ as compared to the improvement seen across industry. To answer this question, we separated the dataset according to the year in which contractors joined BROWZ, which could be any year between 2007 and 2014. For all contractors that joined in 2007, we calculated the average TRR in 2007 and compared this to the same group's average TRR in 2015 to determine the percent change/improvement. We then calculated the percent change/improvement in cross-industry TRR as reported in the BLS between the years 2007 and 2015. This gave us leverage to determine if BROWZ contractors that joined in 2007 improved at a rate above and beyond that of U.S. companies between the same years. We repeated this analysis for companies that joined BROWZ between 2008 and 2014. For each analysis, the comparison year was 2015. We also repeated this analysis to calculate the percent change/improvement in DART and LWR. Our hypothesis was that contractors that have been with BROWZ for more years would not experience the most improvement in their lagging rates. The expectation was that BROWZ contractors would see diminishing improvement year over year.

**Hypothesis 4:** BROWZ contractors will not see greater improvement in TRR, DART, and LWR the more years they have been part of the BROWZ universe as compared to the BLS.

**Table 5A: Calculated variables for Years in BROWZ analysis**

Column A	Column B	Column C	Column D
Average TRR for BROWZ contractors that joined in individual year (each year 2007-2014)	Calculated percent improvement in average TRR of BROWZ contractors between year specified in Column A and year 2015	Calculated percent improvement in cross-industry TRR between year specified in Column A and year 2015	Difference between Column B and Column C
Average DART for BROWZ contractors that joined in individual year (each year 2007-2014)	Calculated percent improvement in average DART of BROWZ contractors between year specified in Column A and year 2015	Calculated percent improvement in cross-industry DART between year specified in Column A and year 2015	Difference between Column B and Column C
Average LWR for BROWZ contractors that joined in individual year (each year 2007-2014)	Calculated percent improvement in average LWR of BROWZ contractors between year specified in Column A and year 2015	Calculated percent improvement in cross-industry LWR between year specified in Column A and year 2015	Difference between Column B and Column C

The final aggregated analysis we performed was to determine the proportion of BROWZ contractors that are already performing better than the cross-industry average for TRR (Group A) and the proportion of BROWZ contractors that are performing worse than the cross industry average for TRR (Group B), and then determining which group had a better rate of improvement year over year. The hypothesis going into this analysis was that contractors in Group A would have a smaller rate of improvement in TRR year over year because their margin for improvement is narrower due to being below the cross-industry average from the outset. The accompanying

hypothesis is that Group B would have a greater rate of improvement in TRR year over year because their margin for improvement is larger.

For each year between 2007 and 2015, we separated the BROWZ contractors into either Group A or Group B using the BLS cross-industry TRR average as the separation point between groups. For each group, we looked at the improvement in average TRR between years 2007 and 2015 in one-year increments. We then compared the rate of change for Group A and the rate of change for Group B. We repeated this analysis to calculate the rate of change in DART and LWR for both these groups.

**Hypothesis 5:** BROWZ contractors in Group A (performing better than cross-industry average) will have a smaller annual rate of improvement in TRR, DART, and LWR than BROWZ contractors in Group B. (performing worse than cross-industry average)

## Results

The results of the disaggregated analysis show that BROWZ contractors have better TRR, DART, and LWR than industry average for every two-digit industry code analyzed and for nearly every year. (For full results of all two-digit industry codes, please see Table 2C-2J in the Appendix.) Hypothesis 1 is supported. Table 2B below shows the comparison in every year for NAICS code 23 (Construction). For this industry and across the years 2007 to 2015, BROWZ contractors have a TRR, DART, and LWR that is 33.7 percent, 47.7 percent, and 65.0 percent better (respectively) than the national intra-industry average.

**Table 2B: Difference between BROWZ and national intra-industry TRR, DART, and LWR average, NAICS code 23**

Year	BROWZ TRR Average	Intra-Industry TRR Average	Difference	%Difference
2007	3.28	5.27	1.99	60.49
2008	3.10	5.27	1.56	50.21
2009	2.69	5.27	1.52	56.61
2010	2.73	5.27	1.23	45.14
2011	2.63	5.27	1.21	46.06
2012	2.41	5.27	1.15	47.84
2013	2.36	5.27	1.33	56.28
2014	2.33	5.27	1.13	48.45
2015	2.03	5.27	1.47	72.14

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	1.71	2.67	0.96	55.83
2008	1.54	2.43	0.88	57.31
2009	1.33	2.28	0.94	70.85
2010	1.33	2.07	0.74	55.39
2011	1.36	2.04	0.68	49.88
2012	1.23	1.96	0.73	59.87
2013	1.23	2.13	0.91	73.80
2014	1.20	1.81	0.62	51.32
2015	1.04	2.00	0.96	92.07

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	0.98	1.77	0.79	80.88
2008	0.86	1.67	0.81	94.37
2009	0.83	1.48	0.64	77.45
2010	0.84	1.46	0.62	74.26
2011	0.84	1.40	0.56	67.07
2012	0.78	1.35	0.56	72.00
2013	0.78	1.48	0.70	89.67
2014	0.77	1.21	0.44	56.78
2015	0.63	1.30	0.67	106.80



The following table presents a summary of the average percentage by which BROWZ contractors performed better than industry as a whole on TRR, DART, and LWR.

**Table 2E: Summary of disaggregated analysis results across years 2007-2015**


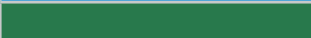
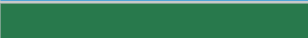



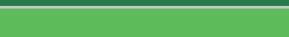
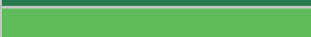
















Two-Digit Industry	Average % Better TRR	Average % Better DART	Average % Better LWR
23	51.39	59.28	76.56
31-32	52.03	53.38	23.46
33	39.52	43.04	22.75
42	12.83	15.83	17.15
48-49	52.35	70.12	63.08
54	40.50	37.54	33.06
56	55.06	53.35	71.06
81	45.38	45.44	55.00

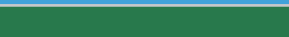
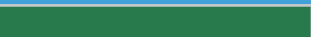
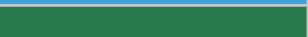



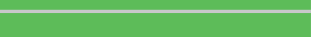












The results for the rate of improvement analysis were a bit mixed. This analysis was conducted to determine if BROWZ contractors have a weaker rate of improvement in TRR, DART, and LWR as compared to the rate of improvement in those statistics of the generalized industry. BROWZ contractors had weaker rates of improvement only for some statistics and between only certain years for the industry sectors analyzed. These results indicate that while BROWZ contractors have better overall TRR, DART, and LWR in any given year, the rate at which these statistics change from year to year is not always lower than how the industry changes year to year. Because we hypothesized that the general BLS population contractors would have a stronger rate of improvement than the BROWZ contractors, Hypothesis 2 is not supported.

To see the numbers from this analysis, please reference Tables 3C-3K in the Appendix.

	BROWZ contractors had a better rate of improvement between indicated years
	Industry had a better rate of improvement between indicated years

**Table 3B: Summary of rate of improvement analysis by industry sector**

Industry Code	Between years	TRR	DART	LWR
23	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

Industry Code	Between years	TRR	DART	LWR
31-32	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			



Industry Code	Between years	TRR	DART	LWR
33	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

Industry Code	Between years	TRR	DART	LWR
42	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

Industry Code	Between years	TRR	DART	LWR
48-49	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

Industry Code	Between years	TRR	DART	LWR
54	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

Industry Code	Between years	TRR	DART	LWR
56	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

Industry Code	Between years	TRR	DART	LWR
81	2007-2008			
	2008-2009			
	2009-2010			
	2010-2011			
	2011-2012			
	2012-2013			
	2013-2014			
	2014-2015			

The following table summarizes the results of the aggregated analysis comparing average BROWZ contractor lagging rates to the cross-industry average rate in the same year. Here we found that in every year and on every statistic, the BROWZ contractor universe had a better lagging rate than the cross-industry average as reported in the BLS. Hypothesis 3 is supported.

**Table 4B: Aggregated analysis of BROWZ contractors and cross-industry lagging rates by year**

Year	BROWZ average TRR	Cross-industry average TRR	Difference between BROWZ average and cross-industry average
2007	3.21	4.55	-1.34
2008	3.07	4.19	-1.13
2009	2.64	3.78	-1.14
2010	2.65	3.64	-0.99
2011	2.49	3.58	-1.09
2012	2.33	3.38	-1.05
2013	2.22	3.27	-1.05
2014	2.17	3.14	-0.97
2015	1.92	2.39	-0.47

Year	BROWZ average DART	Cross-industry average TRR	Difference between BROWZ average and cross-industry average
2007	1.72	2.39	-0.67
2008	1.57	2.22	-0.65
2009	1.35	2.01	-0.66
2010	1.37	1.98	-0.61
2011	1.30	1.90	-0.60
2012	1.18	1.88	-0.70
2013	1.19	1.86	-0.68
2014	1.14	1.74	-0.60
2015	1.03	1.35	-0.32

Year	BROWZ average LWR	Cross-industry average TRR	Difference between BROWZ average and cross-industry average
2007	1.02	1.52	-0.50
2008	0.95	1.44	-0.49
2009	0.82	1.23	-0.41
2010	0.84	1.26	-0.42
2011	0.79	1.24	-0.44
2012	0.75	1.21	-0.46
2013	0.74	1.21	-0.47
2014	0.70	1.10	-0.39
2015	0.61	0.85	-0.24

The following table presents the results of the aggregated analysis to determine if contractors improve on TRR, DART, and LWR the longer they remain with BROWZ. To do this, we compared BROWZ contractors' rates in the year in which they joined BROWZ with their rates in 2015. In reading Table 5B, we can see that contractors that joined BROWZ in 2007 saw an average 56.58 percent improvement in TRR between 2007 and 2015. The BLS reported an average 40.93 percent improvement in TRR between 2007 and 2015. This indicates that BROWZ contractors experienced an improvement in TRR of almost 16 percent above what all companies experienced between 2007 and 2015.

There were several years and statistics where BROWZ contractors did not experience an improvement, or did not see an improvement greater than the cross-industry average (highlighted in green boxes). For instance, BROWZ contractors that joined in 2011 experienced an improvement in DART from 2011 to 2015 of 21.37, yet the BLS cross-industry average shows an improvement in DART of 31.72 percent between 2011 and 2015. BROWZ contractors that joined between 2007 and 2010 show a greater improvement on TRR, DART, and LWR between the year they joined BROWZ and 2015 than all the nation's companies.

In looking at the average rate of improvement of BROWZ companies, one can see that the largest rates of improvement in TRR, DART, and LWR come from the companies that joined BROWZ in earlier years. This seems to affirm the supposition that companies experience more improvement in lagging rates the longer they are associated with BROWZ. While the results of Hypothesis 4 were mixed, there were many years where the BROWZ rate of improvement on TRR, DART, and LWR were better than the rate of improvement of industry as a whole.



**Table 5B: Years in BROWZ rate of improvement versus cross-industry rate of improvement**

Year Joined		BROWZ average rate of improvement from year joined to 2015	Cross-industry average rate of improvement
Joined in 2007	TRR	-56.58	-40.93
	DART	-58.28	-37.74
	LWR	-65.29	-37.49
Joined in 2008	TRR	-47.10	-25.80
	DART	-51.06	-23.02
	LWR	-47.88	-31.30
Joined in 2009	TRR	-25.89	-12.25
	DART	-15.75	-21.55
	LWR	-27.39	-17.38
Joined in 2010	TRR	-28.32	-14.10
	DART	-8.59	-15.76
	LWR	-17.58	-15.85
Joined in 2011	TRR	-19.46	-37.11
	DART	-21.37	-31.72
	LWR	-14.92	-33.38
Joined in 2012	TRR	-23.35	-34.24
	DART	-16.36	-33.71
	LWR	-22.13	-35.06
Joined in 2013	TRR	1.51	-34.24
	DART	1.06	-35.26
	LWR	-10.64	-37.82
Joined in 2014	TRR	-18.98	0.12
	DART	-21.56	-27.63
	LWR	-31.27	-27.67

The final aggregated analysis we performed was to determine the proportion of BROWZ contractors that are already performing better than the cross-industry average for TRR, DART, and LWR (Group A) and the proportion of BROWZ contractors that are performing worse than the cross industry average for TRR, DART, and LWR (Group B), and then determining which group had a better rate of improvement year over year. Table 6 shows the results of this analysis.

The results here are mixed. In some cases, and between some years, Group B has a better rate of improvement than Group A, which is what we had hypothesized. In most cases, however, Group A (which encompasses those

BROWZ contractors who are already performing better than the cross-industry average) has a better annual rate of improvement than Group B. Therefore, Hypothesis 5, which stated that Group B would have more significant annual improvements than Group A, is not supported. In fact, these results tend to support the opposite of our stated hypothesis.

**Table 6: Rate of annual improvement of Group A (performing better than cross-industry average) and Group B (performing worse than cross-industry average)**

Between Years	Rate of improvement in TRR of Group A	Rate of improvement in TRR of Group B
2007-2008	-2.21	0.32
2008-2009	-26.57	-12.12
2009-2010	-8.85	0.24
2010-2011	-4.24	-4.28
2011-2012	-8.28	-6.01
2012-2013	-5.64	0.02
2013-2014	-3.35	-1.72
2014-2015	17.33	-3.80

Between Years	Rate of improvement in DART of Group A	Rate of improvement in DART of Group B
2007-2008	-15.25	-6.39
2008-2009	-30.83	-6.92
2009-2010	-1.39	5.35
2010-2011	0.59	-2.27
2011-2012	-7.00	-6.28
2012-2013	2.25	2.53
2013-2014	-10.43	-5.10
2014-2015	103.50	13.46

Between Years	Rate of improvement in LWR of Group A	Rate of improvement in LWR of Group B
2007-2008	-13.07	1.22
2008-2009	-22.31	-8.44
2009-2010	-7.65	5.24
2010-2011	-9.11	-7.39
2011-2012	-1.28	0.81
2012-2013	-3.86	2.21
2013-2014	-6.72	-4.44
2014-2015	-62.25	-34.59

Also of note is that we calculated the percentage of contractors who comprise Group A and Group B by year and TRR, DART, and LWR. We found that the vast majority of BROWZ contractors are in Group A and already perform better than cross-industry average on lagging rates. This finding could be inferred from the previous analyses but is evidenced in greater depth in Table 7. This finding also indicates the selection bias that is inherent in the BROWZ contractor database – those contractors who join BROWZ tend to be higher-performing companies in general.

**Table 7: Percentage of BROWZ contractors in Group A (performing better than cross-industry average) by year and selected lagging indicator**

Year	TRR	DART	LWR
2007	75.38	67.99	86.44
2008	74.87	68.84	87.34
2009	76.29	70.88	87.57
2010	75.51	71.78	87.55
2011	76.13	72.82	87.25
2012	76.10	73.58	88.14
2013	77.26	74.26	88.43
2014	77.42	73.70	88.57
2015	73.79	78.14	82.86

## Discussion

We found support for Hypothesis 1, which stated that by industry, BROWZ contractors have better average TRR, DART, and LWR than industry as a whole. When we performed the same analysis looking at all industries together, we found that BROWZ contractors have better average TRR, DART, and LWR than the cross-industry averages. We therefore also found support for Hypothesis 3.

We did not find support for Hypothesis 4, which stated that BROWZ contractors would not have better rates of improvement on TRR, DART, and LWR the longer they were a registered contractor. There were many years where the BROWZ rate of improvement on TRR, DART, and LWR did exceed the rate of improvement of industry as a whole. It should be noted, however, that the rate of BROWZ improvement was greatest for those companies that joined BROWZ earlier. This suggests that BROWZ helps its contractors to continually improve on their rates over time without seeing stagnation.

We did not find support for Hypothesis 2, which stated that BROWZ contractors would show a weaker rate of annual improvement in TRR, DART, and LWR than industry as a whole. The results of this analysis were mixed, with industry showing better rates of annual improvement about half the time, and BROWZ contractors showing better rates of annual improvement about half the time.

We did not find support for Hypothesis 5, which stated that those BROWZ contractors performing above the cross-industry average on TRR, DART, and LWR have weaker rates of annual improvement. The results of this analysis seem related to the analysis for Hypothesis 2. In each case, the “better performers” seem to do just as well if not better on their annual rates of improvement of lagging indicators.





**Table 8: Summary of hypotheses, data analysis performed, and findings**

Hypothesis	Data Analysis	Findings
<b>#1:</b> BROWZ contractors in any two-digit industry code will have a better average TRR, DART, and LWR than the industry as a whole.	Filter by two-digit industry code and calculate the average TRR, DART, and LWR of BROWZ contractors. Compare to the intra-industry average of the national TRR, DART, and LWR from the BLS.	Supported: The results of the disaggregated analysis show that BROWZ contractors have better TRR, DART, and LWR than industry average for every two-digit industry code analyzed and for nearly every year.
<b>#2:</b> The BLS population in any two-digit industry code will have a stronger annual rate of improvement in TRR, DART, and LWR than BROWZ contractors in the same two digit industry code.	Filter by two-digit industry code and calculate the average TRR, DART, and LWR for BROWZ contractors for each year from 2007 to 2015 and calculated the rate of change between each year. Compare to the national intra-industry rate of change in TRR, DART, and LWR for each year between 2007 and 2015.	Not Supported: 54% of the time, BROWZ contractors had a stronger annual rate of improvement for TRR, Dart, and LWR as compared to the BLS.
<b>#3:</b> BROWZ contractors will have better average TRR, DART, and LWR than cross-industry averages.	Compare the cross-industry averages of TRR, DART, and LWR of BROWZ contractors to the national BLS averages for TRR, DART, and LWR.	Supported: In every year and on every statistic, the BROWZ contractor universe had a better lagging rate than the cross-industry average as reported in the BLS.
<b>#4:</b> BROWZ contractors will not see greater improvement in TRR, DART, and LWR the more years they have been part of the BROWZ universe as compared to the BLS.	Calculate the average TRR, DART, and LWR for BROWZ contractors in each year between 2007 and 2014. Compare to the average TRR, DART, and LWR in 2015 to determine the percent change/improvement. Compare to the percent change/improvement in cross-industry TRR, DART, and LWR as reported in the BLS between the years 2007 and 2015.	Not supported: While the results of Hypothesis 4 were mixed, there were many years where the BROWZ rate of improvement on TRR, DART, and LWR did exceed the rate of improvement of industry as a whole. In fact the rate of BROWZ improvement was greatest for those companies that joined BROWZ earlier. This suggests that BROWZ helps its contractors to continually improve on their rates over time without seeing stagnation.
<b>#5:</b> BROWZ contractors in Group A (BROWZ contractors outperforming industry) will have a smaller annual rate of improvement in TRR, DART, and LWR than BROWZ contractors in Group B (BROWZ contractors underperforming industry).	For each year between 2007 and 2015, separate BROWZ contractors into either Group A or Group B using the BLS cross-industry TRR, DART, and LWR average as the separation point between groups. Calculate average TRR, DART, and LWR between years 2007 and 2015 in one-year increments. Compare rate of change for Group A and rate of change for Group B.	Not supported: In some cases and between some years, Group B has a better rate of improvement than Group A. In most cases, however, Group A has a better annual rate of improvement than Group B. Smaller organizations are more prone to variability in their safety performance rates, and therefore may not see a steady improvement in rates to the same degree as larger organizations that are performing better than cross-industry average.

To speculate on the reasons why we see these results, we turn to the last analysis that calculated the percent of BROWZ contractors who performed better than cross-industry average on TRR, DART, and LWR between 2007 and 2015. The percentage of BROWZ contractors in this group ranged anywhere from 68 to 89 percent, which suggests that contractors who join BROWZ tend to already be high-performing companies upon joining, and tend to remain high-performing companies.

To provide another reason for why we did not find support for Hypothesis 5, we speculate that the companies that comprise Group B, or those that perform below cross-industry average, tend to have fewer employees. Smaller organizations are more prone to variability in their safety performance rates, and therefore may not see a steady improvement in rates to the same degree as larger organizations that are performing better than cross-industry average.

To place the need and importance of thorough contractor pre-qualification in greater context, one can look to research that explains the major ways in which occupational safety and health (OSH) is often compromised by use of contractors. Researchers typically identify three sets of factors explaining why safety outcomes are compromised through outsourcing and subcontracting (Quinlan et al., 2013; Underhill & Quinlan, 2011). First, financial pressures and impending deadlines often lead to contractors cutting corners or engaging in unsafe behavior. Workers in temporary employment often work with minor injuries out of fear of losing employment, making them susceptible to greater injury.

Secondly, hazardous forms of disorganization, such as lax training and supervision and fractured information flows can compromise safety among contractors. Contracted employees may be undertrained and underqualified, and lack of communication and supervision means that they never acquire the needed skills or safety knowledge for the job. Cox and Cheyne (2000) found that contracted workers expressed concern that briefing documents were unclear and ambiguous and that opportunities for their involvement in safety initiatives were low. Additionally, unclear work responsibilities among contractors can lead to higher incident and injury rates (Clarke, 2003; Loosemore & Andonakis, 2007). To compound matters, the potential amount of cultural diversity and different languages can make it difficult to communicate safety and health information (Loosemore & Andonakis, 2007; Schubert & Dijkstra, 2009).

Lastly, insufficient safety standards for contractors and relaxed enforcement of such standards explain why contractor safety performance is lower than owner organizations. These factors contribute not only to the

compromised safety of subcontracted workers, who are more susceptible to risk exposure than permanent employees, but may have spillover effects on product quality and the safety of regular workers (Quinlan et al., 2013).

The pre-qualification process for contractors involves numerous steps and variables, with safety and health being just one factor out of many. OSH is often overlooked in contractor relationships and the pre-qualification process because other criteria tend to take precedence during vetting. For example, Watt et al. (2009) found that environment, health and safety ranked only about tenth in a list of important criteria in a literature review, and ranked even lower in a survey of program managers, directors, and general managers.

While it is a rigorous and often drawn-out process, there are many benefits to the pre-qualification process that go beyond mere assurance of occupational safety. In terms of relationships and communication, pre-qualification was found as an opportunity to develop solid relationships between owners and contractors and encourage contractors to modify their behavior in light of a long-term view of the contracting relationship (Baroudi & Metcalfe, 2011). Additionally, because pre-qualification forces contractors to scrutinize their practices and systems, it appears that pre-qualification provides opportunities for continuous improvement (Ibid., 2011).

BROWZ's execution of its services demonstrates not only that thorough contractor pre-qualification and safety management systems are important, but also effective. With better safety performance within and across industry, and greater improvement in safety performance over time, the contractors within the BROWZ database are a testament to the BROWZ process and raising the standard of industry as a whole. The use of third-party contractor management systems can be considered a best practice for all companies using contractor services. **For more information about the BROWZ qualification process please visit [www.browz.com](http://www.browz.com).**

## Works Cited

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- Baroudi, B.M., & Metcalfe, M. (2011). A human perspective of contractor pre-qualification. *Australasian Journal of Construction Economics and Building*, 11(2), 60-70.
- Clarke, S. (2003). The contemporary workforce, implications for organizational safety culture. *Personnel Review*, 32(1), 40-57.
- Cox, S.J., & Cheyne, A.J.T. (2000). Assessing safety culture in offshore environments. *Safety Science*, 34, 111-129.
- Loosemore, M. & Andonakis, N. (2007). Barriers to implementing OHS reforms: The experiences of small subcontractors in the Australian construction industry. *International Journal of Project Management*, 25, 579-588.
- Quinlan, M., Hampson, I., & Gregson, S. (2013). Outsourcing and offshoring aircraft maintenance in the US: Implications for safety. *Safety Science*, 57, 283-292.
- Schubert, U., & Dijkstra, J.J. (2009). Working safely with foreign contractors and personnel. *Safety Science*, 47, 786-793.
- Underhill, E., & Quinlan, M. (2011). How precarious employment affects health and safety at work: The case of temporary agency workers. *Industrial Relations*, 66(3), 397-421.
- Watt, D.J., Kayis, B., & Willey, K. (2009). Identifying key factors in the evaluation of tenders for projects and services. *International Journal of Project Management*, 27, 250-260.

## Appendix

**Table 2C: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 31-32**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	3.27	5.26	1.99	60.84
2008	2.93	4.81	1.88	64.40
2009	2.68	4.04	1.36	50.63
2010	3.53	4.43	0.90	25.45
2011	2.70	4.47	1.77	65.38
2012	3.04	4.07	1.03	33.86
2013	2.45	3.83	1.38	56.52
2014	2.53	4.03	1.50	59.17
2015	2.31	3.30	0.99	42.62

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	2.05	3.14	1.09	53.30
2008	1.65	2.93	1.29	78.10
2009	1.59	2.45	0.86	54.26
2010	2.06	2.68	0.62	30.11
2011	1.68	2.61	0.93	55.46
2012	1.71	2.42	0.72	41.98
2013	1.52	2.33	0.81	52.93
2014	1.58	2.54	0.96	60.94
2015	1.41	2.03	0.62	44.23

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	1.14	1.46	0.32	27.68
2008	0.88	1.33	0.45	51.18
2009	0.91	1.16	0.25	27.31
2010	1.37	1.26	-0.11	-8.03
2011	0.93	1.38	0.45	48.64
2012	1.20	1.16	-0.03	-2.76
2013	0.87	1.09	0.21	24.39
2014	1.06	1.26	0.20	19.28
2015	0.65	0.95	0.30	45.07



**Table 2D: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 33**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	4.13	5.94	1.81	43.70
2008	4.62	5.62	0.99	21.51
2009	3.54	4.60	1.06	29.83
2010	3.24	4.49	1.25	38.72
2011	3.14	4.64	1.50	47.82
2012	3.13	4.45	1.32	42.34
2013	2.85	4.17	1.32	46.48
2014	2.71	3.96	1.24	45.77
2015	2.41	3.83	1.42	58.73

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	2.18	2.96	0.78	35.95
2008	2.33	2.65	0.32	13.68
2009	1.61	2.20	0.59	36.75
2010	1.60	2.20	0.59	36.95
2011	1.49	2.16	0.67	44.77
2012	1.41	2.23	0.82	58.62
2013	1.34	2.10	0.76	56.54
2014	1.25	2.01	0.76	61.07
2015	1.05	2.01	0.96	90.53

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	1.33	1.48	0.15	11.39
2008	1.42	1.29	-0.14	-9.52
2009	0.95	1.09	0.15	15.65
2010	0.96	1.14	0.17	18.10
2011	0.86	1.08	0.23	26.52
2012	0.85	1.12	0.27	31.57
2013	0.80	1.06	0.27	33.41
2014	0.65	1.01	0.36	54.90
2015	0.55	1.00	0.45	83.03

**Table 2E: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 42**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	3.55	4.21	0.66	18.66
2008	3.37	3.89	0.51	15.23
2009	3.01	3.30	0.29	9.50
2010	3.05	3.23	0.18	5.86
2011	2.73	2.99	0.26	9.69
2012	2.79	3.41	0.62	22.06
2013	2.48	2.97	0.49	19.70
2014	2.55	2.60	0.05	1.90
2015	2.09	3.10	1.01	48.20

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	1.94	2.22	0.28	14.40
2008	1.70	2.06	0.36	21.15
2009	1.62	1.72	0.10	6.01
2010	1.72	1.77	0.05	2.65
2011	1.43	1.61	0.18	12.31
2012	1.39	1.83	0.45	32.19
2013	1.33	1.64	0.31	22.96
2014	1.39	1.60	0.21	14.98
2015	1.23	2.00	0.77	62.17

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	1.07	1.32	0.25	23.24
2008	1.06	1.21	0.14	13.38
2009	0.99	1.04	0.04	4.33
2010	0.94	0.98	0.04	3.76
2011	0.84	0.91	0.07	8.31
2012	0.80	1.09	0.29	35.96
2013	0.78	1.00	0.22	27.91
2014	0.77	0.93	0.16	20.35
2015	0.67	0.87	0.20	29.07

**Table 2F: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 48-49**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	4.56	5.10	0.55	12.06
2008	3.40	4.70	1.30	38.23
2009	2.89	4.24	1.35	46.58
2010	2.55	4.48	1.93	75.47
2011	2.94	4.32	1.38	46.69
2012	2.56	3.93	1.38	53.78
2013	2.27	4.07	1.81	79.56
2014	2.38	3.96	1.58	66.45
2015	2.17	4.50	2.33	106.96

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	2.88	3.22	0.33	11.50
2008	2.00	3.06	1.07	53.26
2009	1.87	2.84	0.97	51.50
2010	1.31	2.97	1.66	126.16
2011	1.79	2.88	1.09	61.00
2012	1.62	2.61	1.00	61.48
2013	1.45	2.88	1.43	98.61
2014	1.39	2.75	1.36	97.48
2015	1.36	3.30	1.94	142.97

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	2.26	2.27	0.01	0.42
2008	1.54	2.23	0.68	44.16
2009	1.49	2.02	0.54	36.23
2010	0.97	2.14	1.17	121.11
2011	1.36	2.08	0.72	53.28
2012	1.08	1.83	0.75	69.17
2013	1.17	1.99	0.82	69.69
2014	0.97	2.04	1.07	110.59
2015	0.94	1.90	0.96	102.62

**Table 2G: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 54**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	1.09	1.38	0.30	27.29
2008	1.02	1.41	0.39	38.38
2009	0.85	1.21	0.36	42.26
2010	0.93	1.20	0.27	29.33
2011	0.75	1.01	0.25	33.74
2012	0.61	0.86	0.25	40.35
2013	0.67	0.89	0.22	32.53
2014	0.52	0.94	0.42	80.15
2015	0.57	0.90	0.33	57.12

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	0.47	0.67	0.20	43.33
2008	0.46	0.55	0.09	18.95
2009	0.37	0.51	0.14	38.57
2010	0.43	0.48	0.05	11.19
2011	0.36	0.43	0.07	19.21
2012	0.29	0.42	0.13	44.25
2013	0.35	0.39	0.04	12.41
2014	0.25	0.53	0.28	112.41
2015	0.30	0.30	0.00	1.63

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	0.29	0.35	0.07	22.84
2008	0.35	0.37	0.03	8.24
2009	0.21	0.30	0.08	39.77
2010	0.25	0.27	0.03	10.26
2011	0.23	0.30	0.08	33.81
2012	0.20	0.22	0.01	6.91
2013	0.21	0.27	0.06	26.70
2014	0.16	0.35	0.19	115.92
2015	0.20	0.31	0.11	56.25

**Table 2H: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 5**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	2.72	4.63	1.91	70.42
2008	2.97	4.11	1.14	38.34
2009	2.67	3.95	1.28	47.91
2010	2.66	3.87	1.20	45.07
2011	2.84	3.89	1.04	36.67
2012	2.06	3.97	1.91	92.76
2013	2.25	3.66	1.41	62.51
2014	2.30	3.38	1.08	46.84
2015	2.10	2.40	0.30	14.41

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	1.57	2.64	1.07	68.33
2008	1.73	2.41	0.68	39.02
2009	1.69	2.22	0.53	31.55
2010	1.56	2.32	0.77	49.16
2011	1.74	2.19	0.45	25.77
2012	1.17	2.40	1.23	105.49
2013	1.40	2.24	0.84	59.76
2014	1.45	2.14	0.69	47.75
2015	1.37	1.30	-0.07	-4.93

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	0.82	1.79	0.97	117.70
2008	1.15	1.56	0.41	35.60
2009	0.95	1.39	0.44	45.71
2010	0.90	1.64	0.74	82.75
2011	1.01	1.47	0.46	45.87
2012	0.72	1.65	0.92	127.49
2013	0.93	1.45	0.52	56.51
2014	0.92	1.44	0.52	56.83
2015	0.85	1.23	0.38	44.10

**Table 2J: Difference between BROWZ and national intra-industry TRR, DART, and LWR averages, NAICS code 81**

Year	BROWZ DART Average	Intra-Industry TRR Average	Difference	%Difference
2007	3.45	4.01	0.56	16.11
2008	3.01	4.19	1.18	39.21
2009	2.71	4.45	1.74	63.94
2010	2.93	4.12	1.19	40.53
2011	2.49	4.21	1.72	68.86
2012	2.36	3.33	0.97	40.94
2013	2.23	2.66	0.43	19.15
2014	1.86	3.24	1.38	74.29
2015	2.02	2.30	0.28	14.00

Year	BROWZ DART Average	Intra-Industry DART Average	Difference	%Difference
2007	1.98	2.23	0.25	12.68
2008	1.69	2.18	0.49	28.86
2009	1.41	2.17	0.76	54.13
2010	1.66	2.53	0.87	52.47
2011	1.16	2.05	0.89	76.94
2012	1.18	1.92	0.74	63.33
2013	1.19	1.39	0.20	16.80
2014	1.00	1.59	0.59	58.33
2015	1.07	1.20	0.13	11.66

Year	BROWZ DART Average	Intra-Industry LWR Average	Difference	%Difference
2007	1.19	1.69	0.50	42.36
2008	1.00	1.72	0.73	73.22
2009	0.84	1.11	0.28	32.91
2010	1.01	1.29	0.27	27.20
2011	0.78	1.44	0.67	85.95
2012	0.72	1.30	0.58	79.50
2013	0.68	0.95	0.26	38.56
2014	0.57	0.91	0.34	60.33
2015	0.64	0.90	0.26	39.76



**Table 3C: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 23**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-5.43	-11.48	-9.91	-9.05	-12.10	-5.55
<b>08-09</b>	-13.48	-9.80	-13.60	-6.17	-3.23	-11.65
<b>09-10</b>	1.67	-5.77	0.01	-9.03	0.51	-1.30
<b>10-11</b>	-3.83	-3.22	1.97	-1.65	-0.04	-4.17
<b>11-12</b>	-8.26	-7.16	-9.78	-3.77	-6.51	-3.74
<b>12-13</b>	-2.23	3.34	0.09	8.81	-0.09	10.17
<b>13-14</b>	-0.98	-5.93	-2.34	-14.97	-1.54	-18.62
<b>14-15</b>	-12.81	1.13	-13.18	10.22	-18.28	7.81

**Table 3D: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 31-32**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-10.46	-8.48	-19.57	-6.56	-22.71	-8.49
<b>08-09</b>	-8.24	-15.93	-3.70	-16.59	2.92	-13.33
<b>09-10</b>	31.47	9.49	29.65	-16.59	51.24	9.26
<b>10-11</b>	-23.48	0.88	-18.26	-16.59	-32.30	9.41
<b>11-12</b>	12.68	-8.80	1.55	-16.59	28.57	-15.88
<b>12-13</b>	-19.57	-5.96	-10.89	-16.59	-27.08	-6.73
<b>13-14</b>	3.32	5.07	3.82	-16.59	21.35	16.37
<b>14-15</b>	-8.50	-17.92	-10.87	-16.59	-38.14	-24.59

**Table 3E: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 33**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	11.90	-5.38	6.85	-10.65	7.36	-12.80
<b>08-09</b>	-23.38	-18.13	-31.04	-17.05	-33.57	-15.09
<b>09-10</b>	-8.52	-2.25	-0.03	0.11	1.69	3.84
<b>10-11</b>	-3.17	3.18	-7.02	-1.72	-10.79	-4.43
<b>11-12</b>	-0.26	-3.96	-5.75	3.27	-0.96	2.99
<b>12-13</b>	-8.98	-6.34	-4.56	-5.81	-6.00	-4.69
<b>13-14</b>	-4.71	-5.17	-6.91	-4.21	-18.22	-5.05
<b>14-15</b>	-11.10	-3.07	-15.56	0.00	-16.37	-1.12

**Table 3F: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 42**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-5.04	-7.78	-12.51	-7.35	-0.36	-8.33
<b>08-09</b>	-10.62	-15.06	-4.71	-16.61	-6.63	-14.09
<b>09-10</b>	1.24	-2.11	6.23	2.85	-4.96	-5.48
<b>10-11</b>	-10.72	-7.50	-16.86	-9.03	-11.07	-7.17
<b>11-12</b>	2.37	13.92	-3.16	13.99	-4.86	19.42
<b>12-13</b>	-11.05	-12.77	-4.00	-10.70	-2.03	-7.82
<b>13-14</b>	2.77	-12.51	4.60	-2.19	-1.45	-7.27
<b>14-15</b>	-17.97	19.36	-11.37	25.06	-12.61	-6.15

**Table 3G: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 48-49**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-25.39	-7.96	-30.66	-4.68	-31.83	-2.14
<b>08-09</b>	-14.94	-9.81	-6.26	-7.34	-3.75	-9.04
<b>09-10</b>	-11.76	5.63	-30.02	4.47	-34.94	5.59
<b>10-11</b>	15.44	-3.49	36.26	-3.00	40.47	-2.62
<b>11-12</b>	-13.16	-8.96	-9.46	-9.19	-20.16	-11.88
<b>12-13</b>	-11.28	3.59	-10.46	10.12	7.99	8.32
<b>13-14</b>	4.98	-2.69	-4.01	-4.55	-17.22	2.73
<b>14-15</b>	-8.72	13.60	-2.36	20.27	-3.26	-6.86

**Table 3H: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 54**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-6.02	2.17	-1.82	-18.52	20.13	5.85
<b>08-09</b>	-16.89	-14.55	-19.50	-6.21	-38.59	-20.70
<b>09-10</b>	9.55	-0.41	16.69	-6.37	16.35	-8.22
<b>10-11</b>	-19.07	-16.32	-15.74	-9.66	-8.67	10.84
<b>11-12</b>	-18.42	-14.38	-20.61	-3.93	-9.64	-27.80
<b>12-13</b>	9.43	3.34	20.17	-6.35	3.68	22.87
<b>13-14</b>	-21.98	6.04	-28.34	35.41	-23.47	30.42
<b>14-15</b>	9.39	-4.58	18.40	-43.34	22.54	-11.32

**Table 3J: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 56**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-5.43	-11.48	-9.91	-9.05	-12.10	-5.55
<b>08-09</b>	-13.48	-9.80	-13.60	-6.17	-3.23	-11.65
<b>09-10</b>	1.67	-5.77	0.01	-9.03	0.51	-1.30
<b>10-11</b>	-3.83	-3.22	1.97	-1.65	-0.04	-4.17
<b>11-12</b>	-8.26	-7.16	-9.78	-3.77	-6.51	-3.74
<b>12-13</b>	-2.23	3.34	0.09	8.81	-0.09	10.17
<b>13-14</b>	-0.98	-5.93	-2.34	-14.97	-1.54	-18.62
<b>14-15</b>	-12.81	1.13	-13.18	10.22	-18.28	7.81

**Table 3K: Comparison of rate of improvement on TRR, DART, and LWR, NAICS code 81**

Between years	TRR		DART		LWR	
	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry average % change	BROWZ average % change	Cross-industry % change
<b>07-08</b>	-5.43	-11.48	-9.91	-9.05	-12.10	-5.55
<b>08-09</b>	-13.48	-9.80	-13.60	-6.17	-3.23	-11.65
<b>09-10</b>	1.67	-5.77	0.01	-9.03	0.51	-1.30
<b>10-11</b>	-3.83	-3.22	1.97	-1.65	-0.04	-4.17
<b>11-12</b>	-8.26	-7.16	-9.78	-3.77	-6.51	-3.74
<b>12-13</b>	-2.23	3.34	0.09	8.81	-0.09	10.17
<b>13-14</b>	-0.98	-5.93	-2.34	-14.97	-1.54	-18.62
<b>14-15</b>	-12.81	1.13	-13.18	10.22	-18.28	7.81

# NOTES

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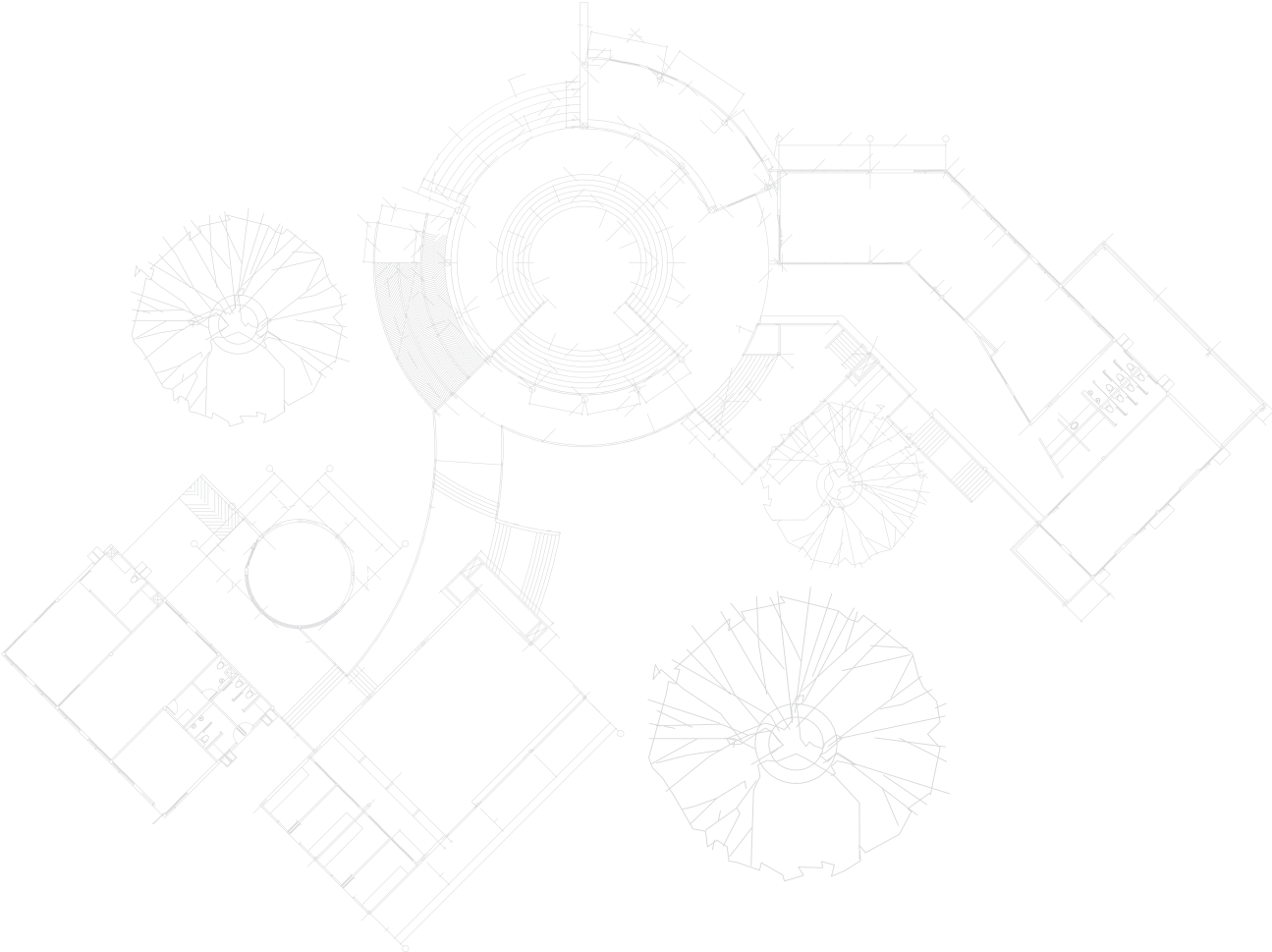
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