

4.0 Research Results

Data gathered from the survey questionnaire will be analyzed and presented in this section. This includes respondent understanding of concept, perception and perceived improvement with Lean Construction Systems & Tools.

4.1 Questionnaire Part 1

Question 1: How much do you know about Lean Construction?

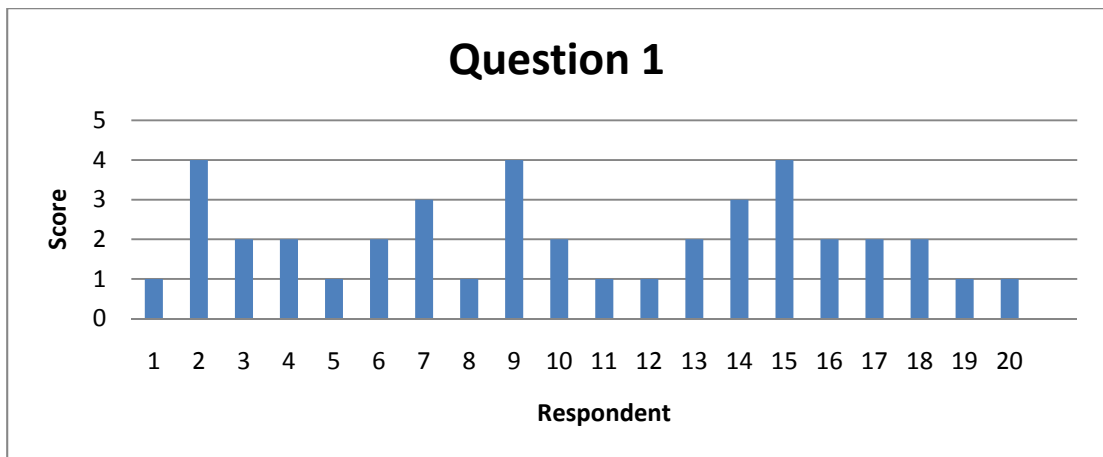


Figure 5: Question 1 Response Summary

<i>Q1: Descriptive Statistics</i>	
Mean	2.05
Standard Error	0.2348
Median	2
Mode	2
Standard Deviation	1.0501
Sample Variance	1.1026
Kurtosis	-0.3595
Skewness	0.8008

<i>Q1: Descriptive Statistics (cont)'</i>	
Range	3
Minimum	1
Maximum	4
Sum	41
Count	20
Confidence Level(95.0%)	0.4914

Table 5: Question 1 Descriptive Statistic

Table 5: Question 1 Descriptive Statistic shows result of mean and standard deviation, 2.05 ± 1.05 , in the range of 1.0 to 3.1, suggest that the respondent on average are not knowledgeable toward Lean Construction.

A Positive Skewness of 0.8, median and mode of 2, further suggest majority and most of the respondent know very little about Lean Construction.

Question 2: If the company is going to implement Lean to improve operational performance, do you think this will success?

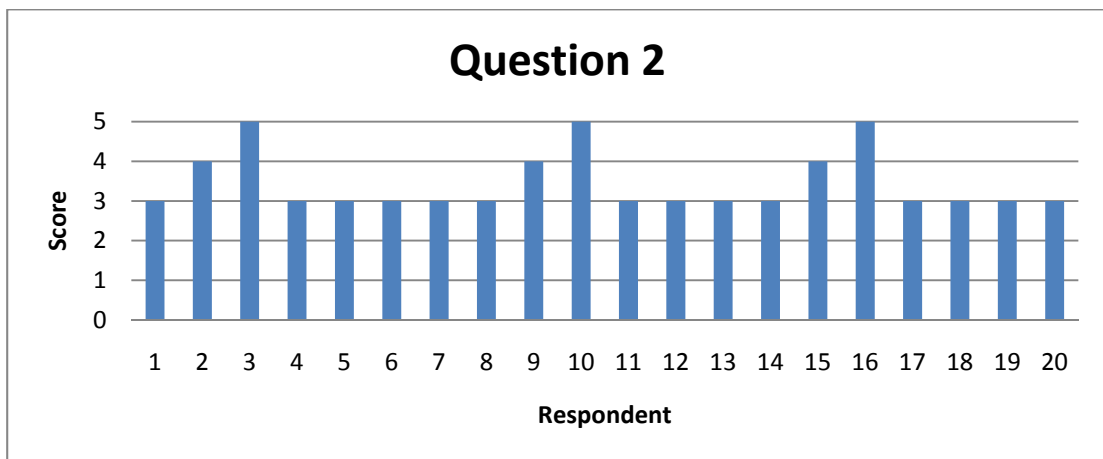


Figure 6: Question 2 Response Summary

<i>Q2: Descriptive Statistics</i>	
Mean	3.45
Standard Error	0.1698
Median	3
Mode	3
Standard Deviation	0.7592
Sample Variance	0.5763
Kurtosis	0.4115
Skewness	1.3894

<i>Q2: Descriptive Statistics (cont)'</i>	
Range	2
Minimum	3
Maximum	5
Sum	69
Count	20
Confidence Level(95.0%)	0.3553

Table 6: Question 2 Descriptive Statistic

Table 6: Question 2 Descriptive Statistic shows result of mean and standard deviation, 3.45 ± 0.76 , in the range of 2.69 to 4.21, with median and mode of 3 further suggest that the respondent on average are neutral toward Lean Construction in improvement of operational performance.

Subsequently a Positive Skewness of 1.38, suggest that the respondent are unsure of the outcome.

Question 3: How much do you know about the Systems & Tools listed:

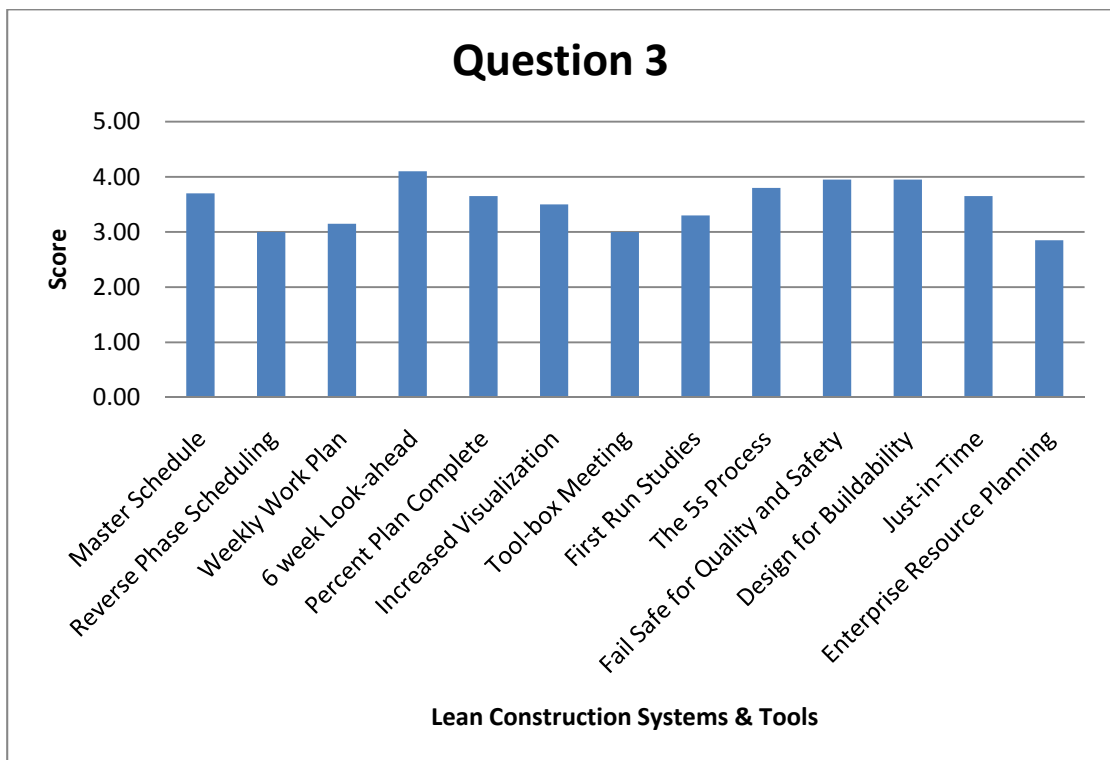


Figure 7: Question 3 Response Summary

Q3: Descriptive Statistic	6 week Look-ahead	Design for Buildability	Fail Safe for Quality and Safety	The 5s Process	Master Schedule	Just-in-Time	Increased Visualization	First Run Studies	Weekly Work Plan	Tool-box Meeting	Reverse Phase Scheduling	Enterprise Resource Planning
Mean	4.10	3.95	3.95	3.80	3.70	3.65	3.50	3.30	3.15	3.00	3.00	2.85
Standard Error	0.10	0.05	0.18	0.16	0.16	0.21	0.28	0.33	0.26	0.28	0.31	0.29
Median	4	4	4	4	4	4	4	3	3	3	3	3
Mode	4	4	4	4	3	4	4	3	3	3	4	2
Standard Deviation	0.45	0.22	0.83	0.70	0.73	0.93	1.24	1.45	1.18	1.26	1.38	1.31
Sample Variance	0.20	0.05	0.68	0.48	0.54	0.87	1.53	2.12	1.40	1.58	1.89	1.71
Kurtosis	2.66	20.00	-1.52	-0.73	-0.83	-0.39	0.59	-1.23	0.19	-0.58	-1.37	-0.89
Skewness	0.55	-4.47	0.10	0.29	0.55	-0.49	-1.12	-0.24	-0.32	0.00	0.00	0.31
Range	2	1	2	2	2	3	4	4	4	4	4	4
Minimum	3	3	3	3	3	2	1	1	1	1	1	1
Maximum	5	4	5	5	5	5	5	5	5	5	5	5
Sum	82	79	79	76	74	73	70	66	63	60	60	57
Count	20	20	20	20	20	20	20	20	20	20	20	20
Confidence Level(95.0%)	0.21	0.10	0.39	0.33	0.34	0.44	0.58	0.68	0.55	0.59	0.64	0.61

Table 7: Question 3 Descriptive Statistic Summary

6 Week Look-ahead

Descriptive Statistic shows result of mean and standard deviation, 4.10 ± 0.45 , in the range of 3.65 to 4.55, median and mode of 4 suggest that the respondent on average are knowledgeable about "6 Week Look-ahead".

A Kurtosis value of 2.66 suggest majority of the respondent have homogeneous or similar response and understanding thus the feedback is reliable.

Design for Buildability

Descriptive Statistic shows result of mean and standard deviation, 3.95 ± 0.22 , in the range of 3.73 to 4.17, median and mode of 4 and a Negative Skewness of -4.47 suggest that the respondent on average are knowledgeable about "Design for Buildability".

A Kurtosis value of 20.00 suggest almost all respondent have homogeneous or similar response and understanding thus the feedback is highly reliable.

Fail Safe for Quality & Safety

Descriptive Statistic shows result of mean and standard deviation, 3.95 ± 0.83 , in the range of 3.12 to 4.78, median and mode of 4 suggest that the respondent on average are knowledgeable about "Fail Safe for Quality & Safety".

The 5s Process

Descriptive Statistic shows result of mean and standard deviation, 3.80 ± 0.70 , in the range of 3.10 to 4.50, median and mode of 4 suggest that the respondent on average are knowledgeable about "The 5s Process".

Master Schedule

Descriptive Statistic shows result of mean and standard deviation, 3.70 ± 0.73 , in the range of 2.97 to 4.43, median of 4 and mode of 3 suggest that the respondent on average are knowledgeable about "Master Schedule".

Just-In-Time

Descriptive Statistic shows result of mean and standard deviation, 3.65 ± 0.93 , in the range of 2.72 to 4.58, median and mode of 4 suggest that the respondent on average are knowledgeable about "Just-In-Time".

Increased Visualization

Descriptive Statistic shows result of mean and standard deviation, 3.50 ± 1.24 , in the range of 2.26 to 4.17 and a Negative Skewness of -1.12 suggest that the respondent on average are somewhat knowledgeable about "Increased Visualization".

First Run Studies

Descriptive Statistic shows result of mean and standard deviation, 3.30 ± 1.45 , in the range of 1.85 to 4.75 suggest that the respondent on average are somewhat knowledgeable about "First Run Studies".

However Variance of 1.45 and Platykurtic Kurtosis value of -1.23 suggest that the respondent have rather wide spread response with different perceive level of understanding.

Weekly Work Plan

Descriptive Statistic shows result of mean and standard deviation, 3.15 ± 1.18 , in the range of 1.97 to 4.33, median and mode of 3 and a Negative Skewness of -0.32 suggest that the respondent on average are somewhat knowledgeable about "Weekly Work Plan".

Tool-box Meeting

Descriptive Statistic shows result of mean and standard deviation, 3.00 ± 1.26 , in the range of 1.62 to 4.83, median and mode of 3 and a Skewness of 0.00 suggest that the respondent on average are somewhat knowledgeable about "Tool-box Meeting".

Reverse Phase Scheduling

Descriptive Statistic shows result of mean and standard deviation, 3.00 ± 1.38 , in the range of 1.62 to 4.83 suggest that the respondent on average are somewhat knowledgeable about "Reverse Phase Scheduling".

However Variance of 1.89 and Platykurtic Kurtosis value of -1.37 suggest that the respondent have rather wide spread response with different perceive level of understanding.

Enterprise Resource Planning

Descriptive Statistic shows result of mean and standard deviation, 2.85 ± 1.31 , in the range of 1.54 to 4.16, median of 3 suggest that the respondent on average are somewhat knowledgeable about "Enterprise Resource Planning".

However Variance of 1.71 and Platykurtic Kurtosis value of -0.89 suggest that the respondent have rather wide spread response with different perceive level of understanding.

4.2 Questionnaire Part 2

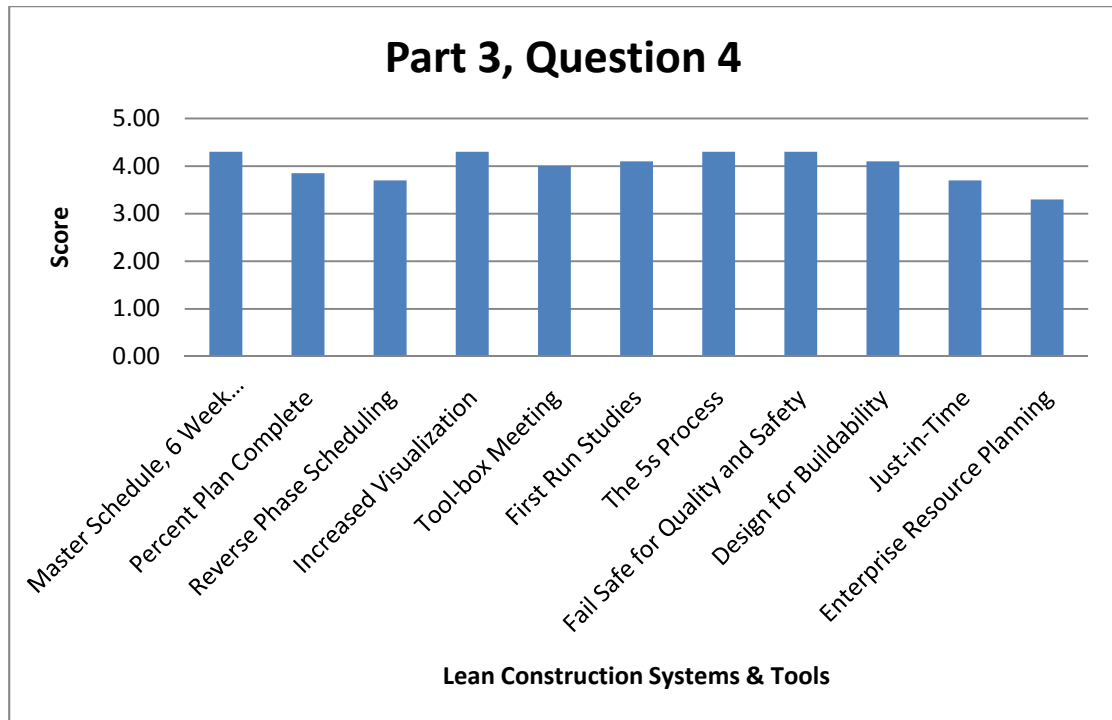


Figure 8: Question 4 Response Summary

Q7: Descriptive Statistic	Master Schedule, Weekly Work Plan, 6 Week Look-ahead	Fail Safe for Quality and Safety	Increased Visualization	The 5s Process	First Run Studies	Design for Buildability	Tool-box Meeting	Percent Plan Complete	Reverse Phase Scheduling	Just-in-Time	Enterprise Resource Planning
Mean	4.30	4.30	4.30	4.30	4.10	4.10	4.00	3.85	3.70	3.70	3.30
Standard Error	0.21	0.22	0.24	0.16	0.16	0.16	0.18	0.20	0.18	0.24	0.16
Median	5	5	5	4	4	4	4	4	4	4	3
Mode	5	5	5	5	4	4	4	3	4	3	3
Standard Deviation	0.92	0.98	1.08	0.73	0.72	0.72	0.79	0.88	0.80	1.08	0.73
Sample Variance	0.85	0.96	1.17	0.54	0.52	0.52	0.63	0.77	0.64	1.17	0.54
Kurtosis	-1.55	1.30	1.06	-0.83	-0.88	-0.88	-1.37	-1.67	-0.27	-1.23	2.78
Skewness	-0.68	-1.43	-1.51	-0.55	-0.15	-0.15	0.00	0.32	-0.05	-0.16	2.12
Range	2	3	3	2	2	2	2	2	3	3	2
Minimum	3	2	2	3	3	3	3	3	2	2	3
Maximum	5	5	5	5	5	5	5	5	5	5	5
Sum	86	86	86	86	82	82	80	77	74	74	66
Count	20	20	20	20	20	20	20	20	20	20	20
Confidence Level(95.0%)	0.43	0.46	0.51	0.34	0.34	0.34	0.37	0.41	0.38	0.51	0.34

Table 8: Question 4 Descriptive Statistic Summary

Master Schedule, Weekly Work Plan, 6 Week Look-ahead

Descriptive Statistic shows result of mean and standard deviation, 4.30 ± 0.92 , in the range of 3.38 to 5.22, median and mode of 5 and a Negative Skewness of -0.68 suggest that the respondent on average highly agree that "Master Schedule", "Weekly Work Plan" and "6 Week Look-ahead" improve operational performance.

However Platykurtic Kurtosis value of -1.55 suggest that the respondent have rather wide spread response with different perceive degree of improvement.

Fail Safe for Quality and Safety

Descriptive Statistic shows result of mean and standard deviation, 4.30 ± 0.98 , in the range of 3.32 to 5.28, median and mode of 5 and a Negative Skewness of -1.43 suggest that the respondent on average highly agree that "Fail Safe for Quality and Safety" improve operational performance.

Increased Visualization

Descriptive Statistic shows result of mean and standard deviation, 4.30 ± 1.08 , in the range of 3.22 to 5.38, median and mode of 5 and a Negative Skewness of -1.51 suggest that the respondent on average highly agree that "Increased Visualization" improve operational performance.

The 5s Process

Descriptive Statistic shows result of mean and standard deviation, 4.30 ± 0.73 , in the range of 3.57 to 5.03, median of 4 and mode of 5 and a Negative Skewness of -0.55 suggest that the respondent on average highly agree that "The 5s Process" improve operational performance.

First Run Studies

Descriptive Statistic shows result of mean and standard deviation, 4.10 ± 0.72 , in the range of 3.38 to 4.82, median and mode of 4 and a Negative Skewness of -0.15 suggest that the respondent on average agree that "First Run Studies" improve operational performance.

Design for Buildability

Descriptive Statistic shows result of mean and standard deviation, 4.10 ± 0.72 , in the range of 3.38 to 4.82, median and mode of 4 and a Negative Skewness of -0.15 suggest that the respondent on average agree that "First Run Studies" improve operational performance.

Tool-box Meeting

Descriptive Statistic shows result of mean and standard deviation, 4.00 ± 0.79 , in the range of 3.21 to 4.79, median and mode of 4 suggest that the respondent on average agree that "Tool-box Meeting" improve operational performance.

However Platykurtic Kurtosis value of -1.37 suggest that the respondent have rather wide spread response with different perceive degree of improvement.

Percent Plan Complete

Descriptive Statistic shows result of mean and standard deviation, 3.85 ± 0.88 , in the range of 2.97 to 4.73, median of 4 suggest that the respondent on average agree that "Tool-box Meeting" improve operational performance.

However Platykurtic Kurtosis value of -1.67 suggest that the respondent have rather wide spread response with different perceive degree of improvement.

Reverse Phase Scheduling

Descriptive Statistic shows result of mean and standard deviation, 3.70 ± 0.80 , in the range of 2.90 to 4.50, median and mode of 4 and a Negative Skewness of -0.55 suggest that the respondent on average agree that "Reverse Phase Scheduling" improve operational performance.

Just-In-Time

Descriptive Statistic shows result of mean and standard deviation, 3.70 ± 1.08 , in the range of 2.62 to 4.78, median of 4 and mode of 3 and a Negative Skewness of -0.16 suggest that the respondent on average somewhat agree that "Just-In-Time" improve operational performance.

However Platykurtic Kurtosis value of -1.23 suggest that the respondent have rather wide spread response with different perceive degree of improvement.

Enterprise Resource Planning

Descriptive Statistic shows result of mean and standard deviation, 3.30 ± 0.73 , in the range of 2.57 to 4.03, median and mode of 3 and a Negative Skewness of -0.16 suggest that the respondent on average are neutral toward "Enterprise Resource Planning" in improving operational performance.

Subsequently a Positive Skewness of 2.12, suggest that the respondent do not agree of the improvement.

4.4 Questionnaire Part 3

In this part of the questionnaire; respondents profile such as age, gender, education level, job tenure, job position, department, company size and trade are gathered and presented.

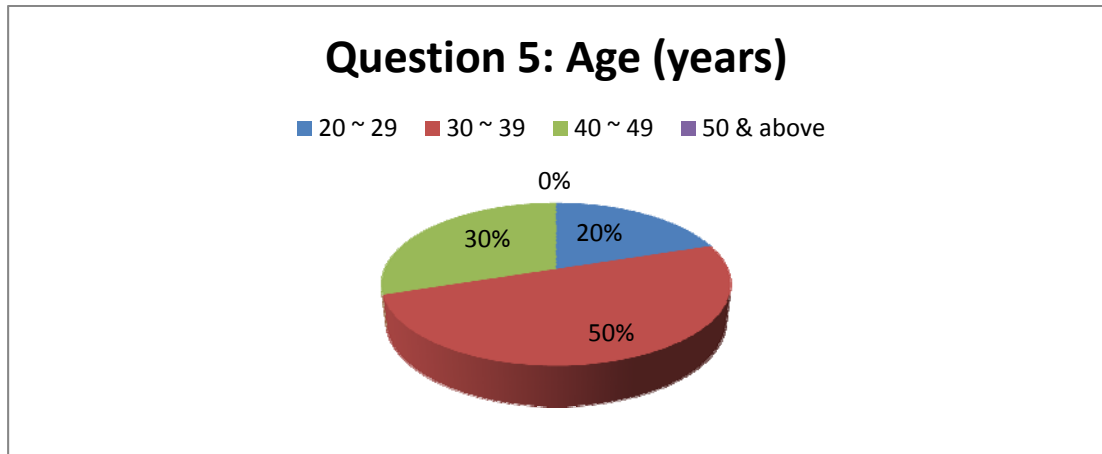


Figure 9: Question 5 Respondent Age Group

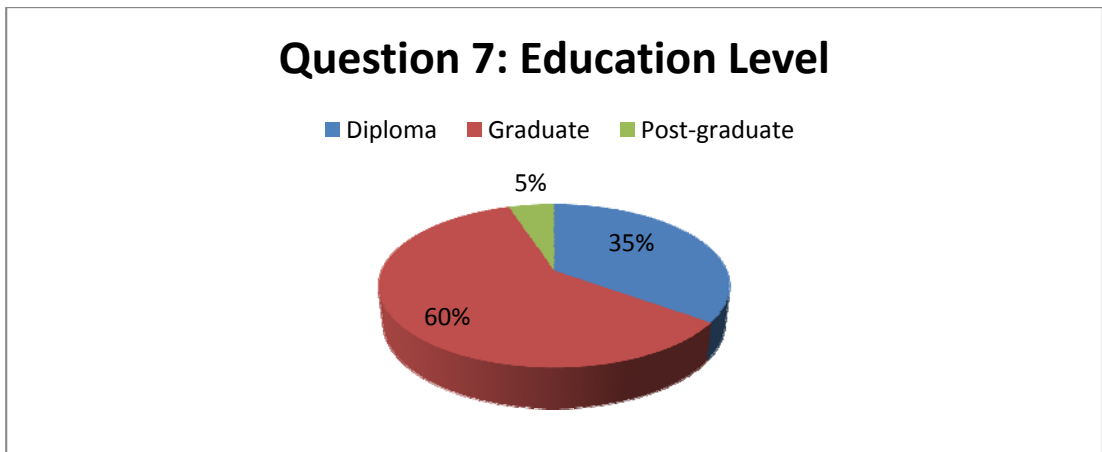


Figure 10: Question 7 Respondent Education Level

Question 8: Experience (years)

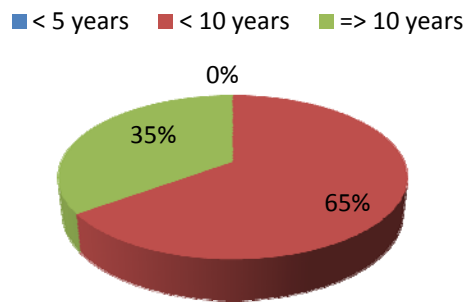


Figure 11: Question 8 Respondent Years of Experience

Question 9: Job Position

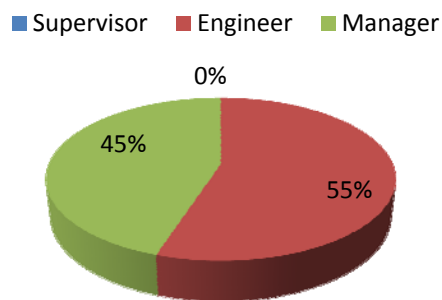


Figure 12: Question 9 Respondent Job Position

Question 10: Department

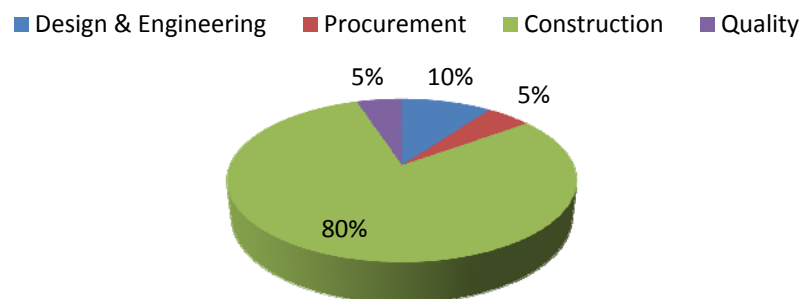


Figure 13: Question 10 Respondent Department

Question 11: Company Size

■ <25 employee ■ <50 employee ■ =>50 employee

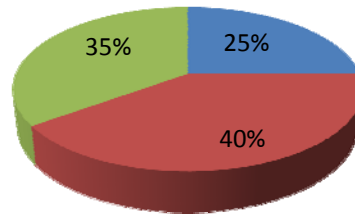


Figure 14: Question 11 Respondent Company Size

Question 12: Company Trade

■ General Construction ■ Electrical ■ Plumbing ■ Others

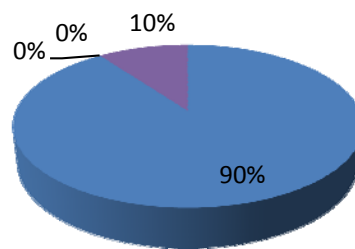


Figure 15: Question 12 Respondent Company Trade