SEMBIT328

Applying hypothesis testing

Overview

This standard covers the competences required for applying hypothesis testing. It involves calculating the correct sample size to ensure the statistical validity of the hypothesis test, and producing a suitable sampling plan to reduce systematic errors. The tests should be conducted on a variable or process in a Six Sigma project, where the actual statistics from data collected is compared with the calculated statistics, so that a decision can be reached as to which hypothesis is true. Typically tests that can be carried out could be F-Test, Chi-Square test, normality tests, T-test, Levene's test, Bartlett's test, contingency table, one-way ANOVA (analysis of variation). You will be required to produce a hypothesis test report on the variable or process studied.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the activities that you cannot solve, or that are outside your responsibility, to the relevant authority. You will need to ensure that all the necessary documentation and/or visual representation are completed accurately and legibly. You will be expected to take full responsibility for your own actions within the activity, and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a good understanding of hypothesis testing, and will provide an informed approach to the techniques and procedures used. You will need to understand the principles and application of hypothesis testing, in adequate depth to provide a sound basis for carrying out the activities to the required criteria.

Applying safe working practices will be a key issue throughout.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. utilise sample size selection to ensure the statistical validity of a hypothesis test, and calculate the correct sample size required for the test
3. produce a suitable sampling plan to reduce systematic errors
4. conduct a hypothesis test on a variable or process in a Six Sigma project
5. calculate the actual statistic from data collected
6. use the appropriate test to compare the calculated statistic against actual statistic, and decide which hypothesis is true
7. produce a hypothesis test report on the variable or process studied

Knowledge and understanding

You need to know and understand:

1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. hypothesis testing, why we need to use it, and how this benefits a Six Sigma improvement project
3. why we need to identify a suitable sample size
4. how to calculate a suitable sample size
5. the meaning of Alpha risk, Beta risk and Delta/Sigma ratio
6. the meaning of practical difference' andstatistical difference'
7. how to conduct a hypothesis test
8. how to calculate test statistics such as mean, median, mode, standard deviation, range and variance
9. the meaning of a population' and asample'
10. the meaning of `null hypothesis'
11. the meaning of `alternate hypothesis'
12. how to determine the correct statistic from the following: F-test, Chi-Square test, normality tests, T- test, Levene's test, Bartlett's test, contingency tables, one way ANOVA
13. the extent of your own authority within the project, and to whom you should report in the event of problems that you cannot resolve

Scope/range related to performance criteria

1. Determine **all** the following for a hypothesis test:
   1.1 the Delta/Sigma ratio
   1.2 the Alpha risk
   1.3 the Beta risk
2. Determine **all** the following:
   2.1 null hypothesis
   2.2 alternative hypothesis
   2.3 test statistic
3. Determine the correct statistic from **one** of the following:
   3.1 F-test
   3.2 Chi-Square test
   3.3 normality tests
   3.4 T-test
   3.5 Levene's test
   3.6 Bartlett's test
   3.7 contingency table
   3.8 one-way ANOVA

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