

The Council for Six Sigma (CSSC)



Certified LEAN Six Sigma Green Belt



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your organization's bottom line

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Certification from EFFORTS CONSULTING is considered a mark of quality excellence in many industries. It helps you advance your career, and boosts your organization's bottom line through your mastery of quality skills. Becoming certified as a Six Sigma Green Belt confirms your commitment to quality and the positive impact it will have on your organization.

Information

Certified Lean Six Sigma Green Belt

The Lean Six Sigma Green Belt operates in support or under the supervision of a Lean Six Sigma Black Belt, analyzes and solves quality problems, and is involved in quality improvement projects.

A Green Belt has to demonstrate his or her knowledge of Six Sigma Tools and Process

Examination

Each certification candidate is required to pass Case study based question analysis examination to measure comprehension of the Body of Knowledge. It is offered in the English language only.

Required Experience

Lean Six Sigma Green Belts are employees who spend some of their time on process improvement teams. They analyze and solve quality problems, and are involved with Six Sigma, lean, or other quality improvement projects. The Lean Six Sigma Green Belt certification requires few months of work experience in one or more areas of the Six Sigma Green Belt Body of Knowledge however it is not mandatory.



Minimum Expectations for a Certified Six Sigma Green Belt

- Operates in support of or under the supervision of a Six Sigma Black Belt
- Analyzes and solves quality problems
- Involved in quality improvement projects
- Participated in a project, but has not led a project
- Has at least three years of work experience
- Has ability to demonstrate knowledge of Six Sigma tools and processes

Body of Knowledge

Certified Six Sigma Green Belt

The topics included in this Body of Knowledge (BOK) are explanations (subtext) and cognitive levels for each topic or subtopic in the test. These details will be used by the Examination Development Committee as guidelines for writing test questions and are designed to help candidates prepare for the exam by identifying specific content within each topic that can be tested.

Except where specified, the subtext is not intended to limit the subject or be all-inclusive of what might be covered in a case study but rather is intended to clarify how topics are related to the role of the Certified Six Sigma Green Belt (SSGB). The descriptor in parentheses at the end of each subtext entry refers to the highest cognitive level at which the topic will be tested. A complete description of cognitive levels is provided at the end of this document.



1 Overview: Six Sigma and the Organization (15 Questions)

A. Six Sigma and Organizational Goals

1. Value of Six Sigma

Recognize why organizations use Six Sigma, how they apply its philosophy and goals, and the origins of Six Sigma (Juran, Deming, Shewhart, etc.). Describe how process inputs, outputs and feedback impact the larger organization. (Understand)

2. Organizational drivers and metrics

Recognize key drivers for business (profit, market share, customer satisfaction, efficiency, product differentiation) and how key metrics and scorecards are developed and impact the entire organization. (Understand)

3. Organizational goals and Six Sigma projects

Describe the project selection process including knowing when to use Six Sigma improvement methodology (DMAIC) as opposed to other problem-solving tools. (Understand)

B. Lean Principles in the Organization

1. **Lean concepts and tools** Define and describe concepts such as value chain, flow, pull, perfection, etc., and tools commonly used to eliminate waste, NVA, including kaizen, 5S, error-proofing, etc. (Understand)

2. Value-added and non-value-added activities

Identify waste in terms of excess inventory, space, test inspection, rework, transportation, storage, etc., and reduce cycle time to improve throughput. (Understand)

3. Process failure mode and effects analysis (PFMEA)

Define process (PFMEA) and interpret associated data. Detailed example of PFMEA and its importance (Analyze)

4. Road maps for DFSS

Describe and distinguish between DMADV (define, measure, analyze, design, verify) and IDOV (identify, design, optimize, verify), and identify how they relate to DMAIC and how they help close the loop on improving the end product/process during the design (DFSS) phase. (Understand)

II Six Sigma—Define

A. Process Management for Projects

1. Process elements

Define and describe process components and boundaries. Recognize how processes cross various functional areas and the challenges that result for process improvement efforts. (Analyze)

2. Owners and stakeholders Identify process owners, internal and external customers, and other stakeholders in a project. (Apply)

3. Identify customers

Identify and classify internal and external customers as applicable to a particular project, and show how projects impact customers. (Apply)

4. Collect customer data

Use various methods to collect customer feedback (e.g., surveys, focus groups, interviews, observation) and identify the key elements that make these tools effective. Review survey questions to eliminate bias, vagueness, etc. (Apply)

5. Analyze customer data

Use graphical, statistical, and qualitative tools to analyze customer feedback. (Analyze)

6. Translate customer requirements

Assist in translating customer feedback into project goals and objectives, including critical to quality (CTQ) attributes and requirements statements. Use voice of the customer analysis tools such as quality function deployment (QFD) (Apply)



B. Project Management Basics

1. Project charter and problem statement

Define and describe elements of a project charter and develop a problem statement, including baseline and improvement goals. (Apply)

2. Project scope

Assist with the development of project definition/scope using Pareto charts, process maps, etc. (Apply)

3. Project metrics

Assist with the development of primary and consequential metrics (e.g., quality, cycle time, cost) and establish key project metrics that relate to the voice of the customer. (Apply)

4. Project planning tools

Use project tools such as Gantt charts, critical path method (CPM), and program evaluation and review technique (PERT) charts, etc. (Apply)

5. Project documentation Provide input and select the proper vehicle for presenting project documentation (e.g., spreadsheet output, storyboards, etc.) at phase reviews, management reviews, and other presentations. (Apply)

6. Project risk analysis & Closure

Describe the purpose and benefit of project risk analysis, including resources, financials, impact on customers and other stakeholders, etc. (Understand). Apply the lessons learned to identify additional opportunities (Apply)



C. Management and Planning Tools

Gant Chart, Detailing of Management of project, Activity detailing, Process Detailing, SIPOC, Calculation of Sigma Value, Controlling the project.

D. Business Results for Projects

1. Process performance Calculate process performance metrics such as defects per unit (DPU), rolled throughout yield (RTY), cost of poor quality (COPQ), defects per million opportunities (DPMO) sigma levels and process capability indices. Track process performance measures to drive project decisions. (Analyze)

2. Failure mode and effects analysis (FMEA)

Define and describe failure mode and effects analysis (FMEA).

Describe the purpose and use of scale criteria and calculate the risk priority number (RPN). (Analyze)



E. Team Dynamics and Performance

3. Team stages and dynamics Define and describe the Team members. Team Member's Roles and Responsibilities. Ownership of the activities based on Project parameter. Importance of Team Work. Working on Project Responsibility.

4. Six Sigma and other team roles and responsibilities

Describe and define the roles and responsibilities of participants on six sigma and other teams, including black belt, master black belt, green belt, champion, executive, coach, facilitator, team member, sponsor, process owner, etc. (Apply)

5. Team tools

Define and apply team tools such as brainstorming, nominal group technique, multi-voting, etc. (Apply)

6. Communication

Use effective and appropriate communication techniques for different situations to overcome barriers to project success. (Apply)

III Six Sigma—Measure

A. Process Analysis and Documentation

1. Process modeling

Develop and review process maps, written procedures, work instructions, flowcharts, etc. (Analyze)

2. Process inputs and outputs

Identify process input variables and process output variables (SIPOC), and document their relationships through cause and effect diagrams, relational matrices, etc. (Analyze)

B. Probability and Statistics

1. Drawing valid statistical conclusions

Distinguish between enumerative (descriptive) and analytical (inferential) studies, and distinguish between a population parameter and a sample statistic. (Apply)

2. Central limit theorem and sampling distribution of the mean

Define the central limit theorem and describe its significance in the application of inferential statistics for confidence intervals, control charts, etc. (Apply)

3. Basic probability concepts

Describe and apply concepts such as independence, mutually exclusive, multiplication rules, etc. (Apply)

C. Collecting and Summarizing Data

1. Types of data and measurement scales

Identify and classify continuous (variables) and discrete (attributes) data. Describe and define nominal, ordinal, interval, and ratio measurement scales. (Analyze)

2. Data collection methods

Define and apply methods for collecting data such as check sheets, coded data, etc. (Apply)

3. Techniques for assuring data accuracy and integrity

Define and apply techniques such as random sampling, stratified sampling, sample homogeneity, etc. (Apply)

4. Descriptive statistics

Define, compute, and interpret measures of dispersion and central tendency, and construct and interpret frequency distributions and cumulative frequency distributions. (Analyze)

5. Graphical methods

Depict relationships by constructing, applying and interpreting diagrams and charts such as Fishbone Diagram, Why-Why scatter diagrams, Pareto charts, etc. Depict distributions by constructing, applying, and interpreting diagrams such as histograms, normal probability plots, etc. (Create)



- D. Probability Distributions** Describe and interpret normal distribution. How to calculate Standard Deviation, Mean and Mode and their usage (Apply)
- E. Measurement System Analysis** Calculate, analyze, and interpret measurement system capability using repeatability and reproducibility (GR&R), measurement correlation, bias, Linearity, Repeatability and Reproducibility (Evaluate)
- F. Process Capability and Performance**
- 1. Process capability studies** Identify, describe, and apply the elements of designing and conducting process capability studies, including identifying special characteristics, identifying special specifications and tolerances, developing few sampling plans, and verifying stability and normality. (Evaluate)
 - 2. Process capability indices** Define, select, and calculate C_p and C_{pk} , and assess process capability. (Evaluate)
 - 3. Process performance vs. specification** Distinguish between natural process limits and specification limits, and calculate process performance metrics such as percent defective. (Evaluate)
 - 4. Process performance indices** Define, select, and calculate P_p , P_{pk} , C_{pm} , and assess process performance. (Evaluate)
 - 5. Short-term vs. long-term capability** Describe the assumptions and conventions that are appropriate when only short-term data are collected and when only attributes data are available. Describe the changes in relationships that occur when long-term data are used, and interpret the relationship between long- and short-term capability as it relates to a 1.5 sigma shift. (Evaluate)



IV Six Sigma—Analyze

A. Exploratory Data Analysis

1. Multi-vari studies

Create and interpret multi-vari studies to interpret the difference between positional, cyclical, and temporal variation; apply sampling plans to investigate the largest sources of variation. (Create)

2. Simple linear correlation and regression

Interpret the correlation coefficient and determine its statistical significance (p-value); recognize the difference between correlation and causation. Interpret the linear regression equation and determine its statistical significance (p-value). Use regression models for estimation and prediction. (Evaluate)

B. Hypothesis Testing

1. Basics

Define and distinguish between statistical and practical significance and apply tests for significance level, power, type I and type II errors. Determine appropriate sample size for various tests. (Apply)

2. Tests for means, variances, and proportions

Define, compare, and contrast statistical and practical significance. (Apply)

3. Paired-comparison tests

Define and describe paired-comparison parametric hypothesis tests. (Understand)

V Six Sigma—Improve and Control

A. Statistical Process Control (SPC)

1. Objectives and benefits Describe the objectives and benefits of SPC, including controlling process performance, identifying special and common causes, etc. (Analyze)

2. Rational subgrouping

Define and describe how rational subgrouping is used. (Understand)

3. Selection and application of control charts

Identify, select, construct, and apply the following types of control charts: \bar{X} -R, \bar{X} -s, individuals and moving range (ImR/XmR), median (\bar{x}), p, np, c, and u. (Apply)

4. Analysis of control charts Interpret control charts and distinguish between common and special causes using rules for determining statistical control. (Analyze)

B. Implement and Validate Solutions Use various improvement methods such as brainstorming, main effects analysis, FMEA, measurement system capability re-analysis, and post-improvement capability analysis to identify, implement. (Create)

C. Control Plan

Assist in developing a control plan to document and hold the gains, and assist in implementing controls and monitoring systems. (Apply)



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CERTIFICATION**



Efforts for Excellence!!!

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