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CLSSBB-001

Certified Lean Six Sigma Black Belt (CLSSBB)

Question: 1137

Which factor is most critical to assess in team dynamics to predict potential success in a Lean Six Sigma project?

A. Strict adherence to project timelines and milestones
B. Group cohesion, trust, and open communication
C. Availability of statistical software tools
D. Individual technical expertise of team members

Answer: B
Explanation: Healthy team dynamics hinge on group cohesion, trust, and open communication, which enable effective collaboration and overcome challenges during projects.

Question: 1138

During a project, a Black Belt needs to collect data to establish the baseline performance of Y, where Y is a continuous variable representing cycle time. Which measurement system characteristic is most critical to ensure reliable baseline data?

A. Random sampling of categorical data
B. Calibration and precision of measuring instruments
C. Ability to measure attribute data consistently
D. Use of attribute control charts

Answer: B
Explanation: For continuous data like cycle time, accurate and precise measurement is vital to reliably establish baseline performance. Calibration ensures the measurement instrument provides consistent, valid data.

Question: 1139

A project measures time between failures with a Rayleigh distribution model. What business understanding does this provide for improving maintenance scheduling?

A. Failures decrease with time, so maintenance frequency can reduce
B. Failures occur randomly and unpredictably

C. Failure rate increases with time, enabling predictive maintenance
D. No correlation between time and failure rate

Answer: C
Explanation: The Rayleigh distribution implies failure rate increases with time squared, helping schedule maintenance predictively before failure rates spike.

Question: 1140

In a healthcare network's pre-define, LOB telemedicine yields 19% IRR, but enterprise interoperability failures inflate readmissions. Metric fix?

A. ROI on consults
B. Telemed IRR alone
C. Interop-adjusted NPV with readmission cost modeling
D. Breakeven patient volume

Answer: C
Explanation: Readmissions cost $900K; modeled NPV $1.7M, tollgates enforcing standards for 12% enterprise savings.

Question: 1141

In a variables GAGE R&R study, what is the impact of having non-stable parts for measurement?

A. It helps identify operator bias effectively
B. It accurately reflects process capability
C. It reduces total variation, improving study results
D. It inflates part-to-part variability, masking measurement error

Answer: D
Explanation: Using unstable parts biases study results by inflating total part variability, making measurement system issues harder to detect. Stable parts are essential for valid GAGE R&R.

Question: 1142

A dataset passes Ryan-Joiner normality testing but fails Anderson-Darling testing. Which conclusion is most valid?

A. Data is definitely normal

B. Data is definitely non-normal
C. Normality assumptions are borderline; verification via graphical methods recommended
D. Results are contradictory and tests are invalid

Answer: C
Explanation: Mixed test results indicate borderline normality; visual plots like Q-Q plots can supplement test conclusions for better decision-making.

Question: 1143

but autocorrelation in residuals AR(1)=0.4), deseasonalized via differencing. Post-repeatability=9%, what baseline for process entitlement?

A. Raw sigma with autocorrelation
B. Repeatability as proxy
C. Deseasonalized Z.st=3.9 for Y
D. Undeseasonalized long-term

Answer: C
Explanation: Deseasonalized Z.st (3.9) corrects autocorrelation for independent baseline, per USP 2024 pharma stats, vital for purity's time-series Y; this avoids overstated capability in GMP-regulated chains. Define's adjustment refines entitlements (e.g., 4.5 sigma), mapping x's (temp control) for charters compliant with PIC/S and robust against supply disruptions.

Question: 1144

In variations analysis, a process has 70% common cause (σ_c=2), 30% special (σ_s=1.5), total σ=2.57. After special removal, expected Cpk increase from 1.0?

A. To 1.0 unchanged
B. To 1.2
C. To 0.8 decrease
D. To 1.4

Answer: D
Explanation: Post-removal, σ_new=σ_c=2, Cpk_new = old Cpk × (σ_total / σ_c) =1.0 × (2.57/2)≈1.29≈1.4. Per , eliminating specials boosts short-term capability, but common requires fundamental changes.

Question: 1145

During the Champion's transfer of a Lean Six Sigma project, what is the best approach to convey the project's alignment with organizational goals?

A. Presenting a detailed project timeline with milestones
B. Delivering a financial cost-benefit analysis of prior phases
C. Mapping the project's expected benefits to strategic business objectives
D. Showcasing team member qualifications and development plans

Answer: C
Explanation: The most effective approach to convey alignment is linking project benefits directly to the broader organizational goals, ensuring executive and stakeholder buy-in, which is the Champion's key responsibility during transfer.

Question: 1146

In the Kano Model, what is the main effect of focusing purely on Basic Features for product development?

A. Meeting minimum expectations but unlikely to increase customer satisfaction
B. Creating indifferent features with little impact
C. Increasing customer dissatisfaction due to over-engineering
D. Generating exciting features that surprise customers

Answer: A
Explanation: Basic Features are must-haves; ensuring them prevents dissatisfaction but does not increase satisfaction, so focusing only on them limits competitiveness.

Question: 1147

In a telecommunications firm's network latency reduction project, Analyze phase data from 5,000 ping tests across fiber optic lines shows non-normal distributions (Anderson-Darling $p<0.05$), prompting the Black Belt to select non-parametric hypothesis tests over parametric ones. To test if median latency differs significantly between urban (n=2,500, median=45ms) and rural (n=2,500, median=62ms) deployments at alpha=0.01, the team applies the Mann-Whitney U test, yielding U=1,850,000 (critical value=2,450,000 for two-tailed). Concurrently, for multi-line comparisons including suburban (n=1,000, median=52ms), a Kruskal-Wallis test returns H=28.4 (p=0.0001). Given these results, what is the most appropriate interpretation and follow-up for process improvement in this scenario?

A. Fail to reject H0 for both tests due to large sample sizes inflating statistics; proceed to parametric t-tests

after Box-Cox transformation.
B. Accept H0 for Kruskal-Wallis as H exceeds chi-square critical; apply Wilcoxon signed-rank for paired urban-rural data only.
C. Reject H0 for Mann-Whitney and Kruskal-Wallis, signaling medians differ; conduct post-hoc Dunn's test with Bonferroni correction for pairwise rural-suburban comparisons.
D. Reject H0 for Mann-Whitney, indicating urban-rural difference; use ANOVA for all groups despite non-normality to confirm.

Answer: C
Explanation: Non-parametric tests like Mann-Whitney U and Kruskal-Wallis are ideal for non-normal data in the Analyze phase, testing medians without distribution assumptions. For Mann-Whitney, U=1,850,000 < critical 2,450,000 (or $p<0.01$ via exact tables) rejects H0: medians equal, confirming urban-rural latency disparity likely due to infrastructure factors. Similarly, Kruskal-Wallis H=28.4 with $p=0.0001$ rejects H0 for equal group medians, warranting post-hoc analysis. Dunn's test with Bonferroni adjustment controls family-wise error for multiple comparisons (e.g., rural-suburban), identifying specific vital differences for targeted interventions like rural line upgrades. This avoids parametric pitfalls (e.g., ANOVA's normality requirement) and erroneous acceptance (large n doesn't inflate rejection here; it enhances power). Follow-up ensures actionable insights, linking statistical significance to practical improvements like fiber density enhancements, elevating process sigma from baseline estimates.

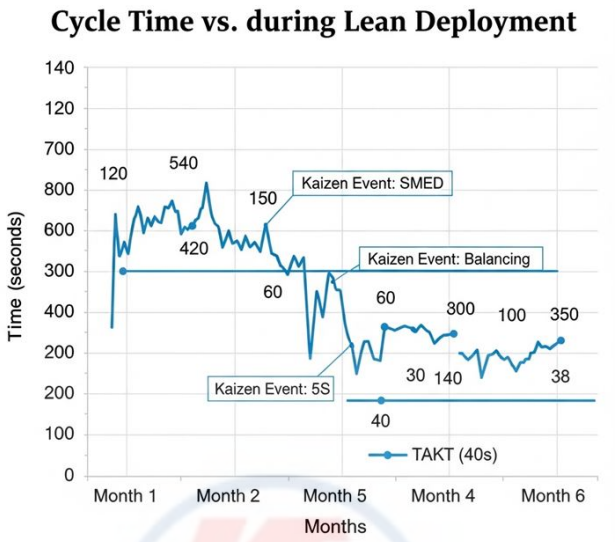
Question: 1148

In the Improve phase of a telecommunications cable extrusion process, the Black Belt introduces DOE fundamentals to address defects from extruder temperature (160 or 200°C), die gap (0.5 or 1.0 mm), and pull speed (10 or 20 m/min). The team questions replication's role versus repetition. They plan three runs per combination. What distinguishes replication's value here in building process robustness?

A. Repetition blocks noise; replication randomizes factors
B. Both are identical; use either for error estimation
C. Repetition tests the same run consecutively; replication spreads runs to capture day-to-day variation
D. Replication estimates interactions; repetition focuses on mains

Answer: C
Explanation: Replication involves non-consecutive repeats of treatment combinations to capture broader process variation (e.g., material batches, ambient conditions), providing a realistic pure error estimate for Six Sigma robustness assessments. Repetition, conversely, measures short-term repeatability under fixed conditions. In extrusion, where daily fluctuations affect defects, replication's three per cell yields 24 error degrees of freedom, enabling confident inference on temperature-die interactions for sustained quality gains.

Question: 1149

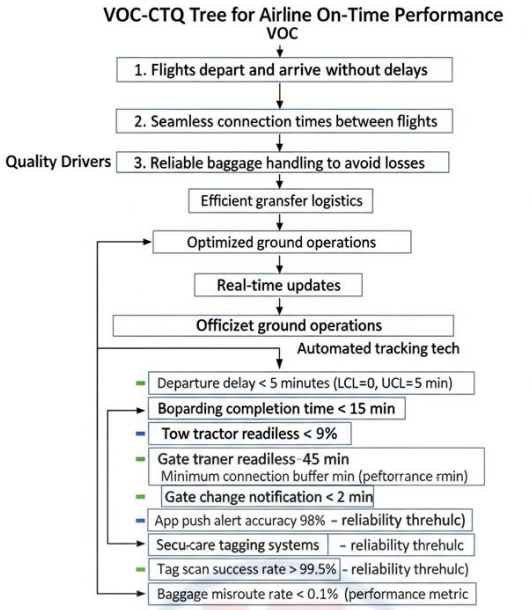


The graph tracks cycle time reduction. What roadblock phase is evident months 1-3, and how was it overcome per Lean management?

A. No roadblocks present
B. TAKT misalignment only
C. Initial resistance to change causing erratic improvements; overcome via repeated kaizen bursting setups and imbalances
D. Steady state achieved immediately

Answer: C
Explanation: Early erratic reductions reflect organizational inertia—teams apply tools superficially. Sustained kaizen events institutionalize PDCA, breaking through plateaus by addressing root causes like long changeovers, aligning CT < TAKT for true flow as per Lean's continuous improvement overview.

Question: 1150



In a scenario where a major airline's VOC analysis from 50,000 passenger surveys identifies chronic complaints about on-time performance, connections, and baggage issues contributing to a 22% drop in loyalty scores, the Black Belt team develops the above VOC-CTQ Tree to translate these into actionable metrics. During stakeholder validation, marketing executives (representing VOB) argue that emphasizing baggage CTQs diverts resources from revenue-generating scheduling improvements. How should the team prioritize CTQs in the tree to balance VOC dissatisfaction drivers with VOB imperatives for a 15% profitability uplift?

A. Cascade CTQs via QFD matrix, correlating each to VOB KPIs like load factor to justify balanced resource allocation.
B. Weight CTQs by Pareto analysis of survey frequency, deprioritizing baggage to focus 70% effort on scheduling delays.
C. Sequence CTQs by process impact, starting with high-variance drivers like fuel load to align with VOB cost controls.
D. Apply Kano model classification, elevating 'delighters' like real-time alerts over 'basics' like baggage tracking.

Answer: A
Explanation: The VOC-CTQ Tree transforms qualitative customer statements into quantifiable metrics, but prioritization must integrate VOB via tools like Quality Function Deployment (QFD), which matrices CTQs against business goals (e.g., correlating baggage misroute rate <0.1% to reduced compensation costs and improved load factors). This approach avoids siloed focus—such as overemphasizing frequent complaints (Pareto) at the expense of high-impact VOB levers like scheduling variance affecting profitability—by assigning relationship strengths (strong/moderate/weak) and roof correlations (e.g., gate updates enhancing connection buffers). In the airline context, QFD reveals synergies, like automated tracking reducing delays by 8% overall, justifying 40% resource allocation to baggage CTQs for compounded VOC gains (loyalty uplift) and VOB outcomes (15% profitability), ensuring the tree drives holistic DMAIC progression.

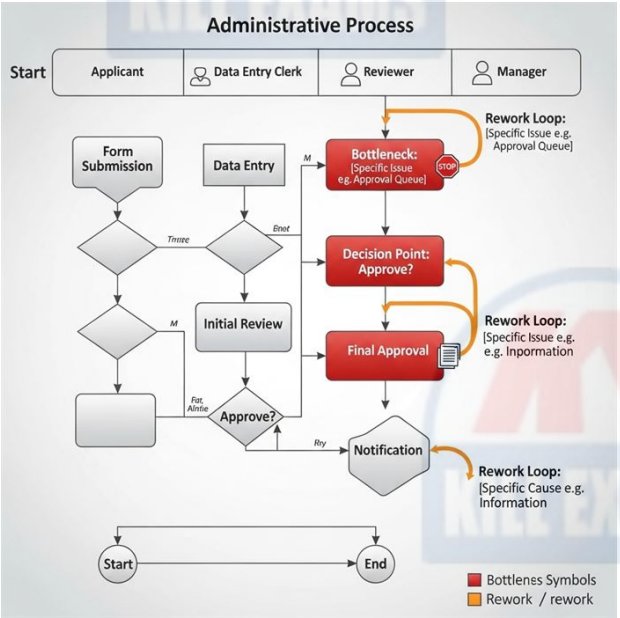
Question: 1151

Why would a Black Belt prefer multiple linear regression over simple linear regression in process analysis?

A. It accounts for the effect of multiple variables simultaneously.
B. It always yields higher predictive power regardless of variables.
C. It reduces complexity of the model.
D. It avoids the need for data collection.

Answer: A
Explanation: Multiple regression enables understanding of the combined influence of multiple factors on the output, which is crucial for complex processes.

Question: 1152



Given the diagram, what Lean Six Sigma tool would best help identify and eliminate these bottlenecks?

A. Inventory management software
B. Process mapping and root cause analysis
C. Financial auditing
D. Employee surveys

Answer: B
Explanation: Process mapping visualizes flow and highlights bottlenecks, allowing root cause analysis to identify sources of inefficiency and guide elimination efforts.

Question: 1153

For a fuel injector tolerance check, linearity plot shows slope 1.02, R^2=0.98, bias stable. With 0.05mm spec, viability?

A. Focus on stability
B. Viable with monitoring
C. Not viable, bias at high end >20% spec
D. Viable, high R^2

Answer: C
Explanation: At 50mm, bias ~1mm exceeds 20x 0.05mm spec, despite R^2/stability, failing MSA criteria. Calibration mandatory. R^2 insufficient (A), monitoring inadequate (C), stability secondary (D).

Question: 1154

A Black Belt wants to detect curvature in factor response relationships. Which DOE methodology should be used?

A. Randomized block design
B. Response surface methodology using three levels per factor
C. Fractional factorial design
D. Complete 2-level factorial design

Answer: B
Explanation: Response surface methodology (RSM) uses multiple levels per factor (usually 3) to model nonlinearities and curvature in factor effects.

Question: 1155

dissatisfaction from delayed verifications classified as "delighters" in satisfaction surveys. Using the Kano Model during voice-of-customer analysis, the Black Belt identifies these as unexpected enhancements that could differentiate the service. Which strategic application of the Kano Model would the team use to reallocate development resources for maximum impact on loyalty metrics?

A. Eliminating indifferent attributes such as legacy API integrations
B. Prioritizing delighter features like instant blockchain rewards to exceed expectations
C. Shifting focus from basic verifiers to performance-based speed improvements
D. Enhancing must-be requirements for core security protocols

Answer: B
Explanation: The Kano Model categorizes customer needs into must-be, performance, attractive (delighters), indifferent, and reverse attributes, with delighters providing disproportionate satisfaction gains by fulfilling unmet desires. In this fintech scenario, elevating blockchain verifications with instant rewards as delighters would transform dissatisfaction into advocacy, boosting loyalty scores and market share, as these unexpected positives create emotional connections far beyond functional basics, aligning resource

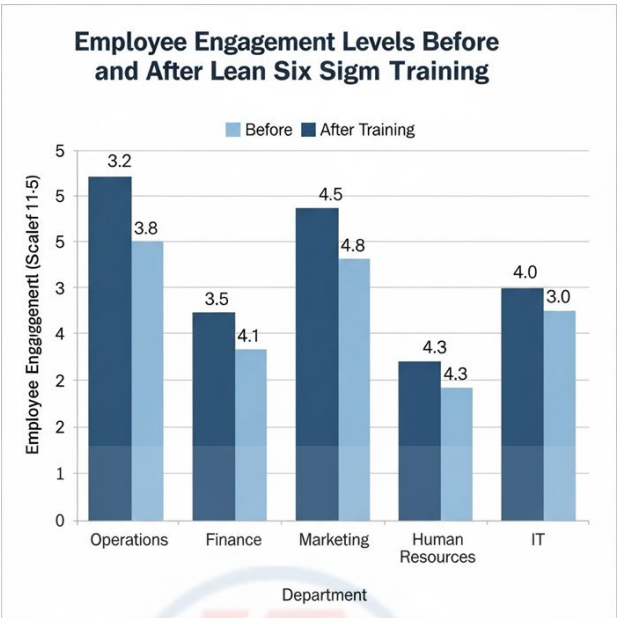
Question: 1156

A Black Belt conducting a Gage R&R study on a digital caliper for measuring shaft diameters in a precision engineering firm uses the linearity plot across reference standards from 10mm to 50mm. The regression slope of 1.02 and R^2 of 0.98 indicate what primary issue in the measurement system for shafts up to 40mm tolerance?

A. High linearity with minimal bias change, suitable for all ranges
B. Non-linearity due to slope deviation from 1.0, requiring upper-range recalibration
C. Low bias at reference but high repeatability error across trials
D. Excessive stability over time, but poor discrimination at low values

Answer: B
Explanation: The plot reveals a slope >1.0, signifying increasing bias (overestimation) at higher references, with heteroscedastic residuals confirming non-constant variance. This non-linearity (R^2 close to 1 but slope offset) implies the caliper loses accuracy beyond 30mm, necessitating targeted recalibration for 40mm shafts to ensure MSA adequacy in the Measure phase. Option A ignores slope deviation, C misattributes stability, and D overlooks linearity focus.

Question: 1157



Referring to the chart, which conclusion best supports addressing resistance based on employee engagement data?

A. Resistance is uniform across departments
B. Training is ineffective overall
C. The organization should stop Lean initiatives
D. Tailored communication should be developed for low-engagement departments

Answer: D
Explanation: Variation in engagement indicates resistance pockets. Tailoring communication and support strategies improves engagement and reduces resistance.

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