Name: Jathagata Chakraboorty (Groeen Belt)
Roll: DM251081
Sub: Lean Six Sigma
project: LSS implementation (DMAIC) on employee Attorition Reduct
Dep: Human Resource

project Chaorteo

project Leadeo: Tathagata Chakraaboorty (project leadeo 'S' & 'B' in this case
project Sponsoo: AZ
Team Membeos: A,B,C
Busineo Proceeo: Human Resources - New hire Retention & attorition Reduction

Busineo Case: The company has a high new hire attorition Rate of 40% compared to industoial avg of 15%. Reducing attorition & imporoing Retentio the company expects to save $0.81 million annualy.

Busineo Scope: Focus on Reducing Attorition among New hineo
Imporoing the tenuoe of employees
Data collection & proceo improoements to be implemented within a 3 monteo timeline.

CTQ: project leadeo B: Reduce Attorition fom 40% to 15%.
project leadeo S: Increeare the Avg tenuoe

Busineo Impact: Estimated savings of $0.81 million/yeaoo
$30K foo tooatoing, $50K foo SAP changeo

Schedule (milestone & Timeline):

	start date	End date
Define	Daz 1	week 2
Measuoe	week 3	week 5
Analyze	week 6	week 7
Improoe	week 8	week 10
Contoal	week 11	week 12

Approoal: sponsoo Approoal: [signature]
Team Buy-In: completed

Define Phase

Cost Estimation

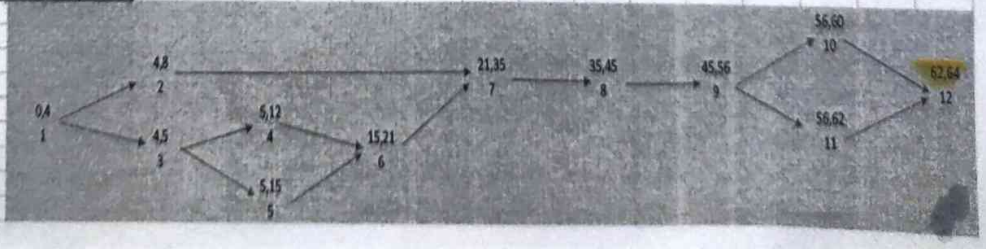
Resource	Hours	Cost/hr
Project Champion	40	$120.00
Project Leader	320	$45.00
Coordinator	80	$25.00
Quality Supervisor	120	$35.00
Finance Team Exe 1	40	$25.00
Subject Matter Expert	80	$30.00
Process Owner	80	$35.00
Technical Support	40	$40.00
MIS Support	120	$35.00

Revenue	$10,00,00,000.00
Total Peoject cost	$1,17,400.00
Percent to revenue	0.12%
Savings	$8,10,000.00
Percent to savings	14.49%

Estimated Project Human Resource cost	
Project Champion	$4,800.00
Project Leader	$14,400.00
Coordinator	$2,000.00
Quality Supervisor	$4,200.00
Finance Team Exe 1	$1,000.00
Subject Matter Expert	$2,400.00
Process Owner	$2,800.00
Technical Support	$1,600.00
MIS Support	$4,200.00
Total HR cost	$37,400.00
Training	$30,000.00
SAP changes	$50,000.00
Total cost	$1,17,400.00

S.No	Task	Predecessor	Duration
1	Identify CTQ and Project Charter		4
2	Detailed Process Map	1	4
3	CTQ Definition Sheet	1	1
4	Measurement System Analysis	3	7
5	Data Collection Plan	3	10
6	Baseline Current Performance	4,5	6
7	Identification of Critical Xs	2,6	14
8	Improvement Plan Design	7	10
9	Implementation of Improvement Plan	8	9
10	Post Improvement Data Collection and Improvement check	9	4
11	Create Control Plan	9	6
12	Handover to Process Owner	10, 11	2

CP = 62, 64



Critical path analysis

Based on the inputs & the stakeholders associated the sipoc diagram is formulated below

Supplier	Input	Process	Output	Customer
Senior Managers	Budget	1. Select Institutes for hiring	Performance assessments	HR Head
Institutes	Selection process	2. Decide selection process	New hires	Department Head
Departments	Job Description	3. Create and communicate career progression plan	Training	New Joinees
HR Department	Policies & Guidelines	4. Conduct selection process	Shortlisted candidates	Hiring Panel
Trainers	Training Materials	5. Conduct Induction and training	Trained employees	New Joinees
Managers	Company Expectations	6. Establish expectations	Defined Performance Criteria	Employees
Supervisors	Training Feedback	7. Evaluate candidates after training	Performance Reports	HR & Managers
Leadership Team	Promotion Criteria	8. Deliberate potential candidates for promotion	Promotion Recommendations	Management
HR & Managers	Performance Reviews	9. Assess new hire performance annually	Annual Performance Review Reports	HR & Department Heads

SIPOC Diagram

Measure

CTQ performance characteristics

CTQ	Data type	Unit of Measure	Operational Definition	LSL	USL	Target
Attrition Rate (B's CTQ)	Attribute	percentage (%)	% of New hires leaving the comp	1%	40%	15%
New Hire Tenure (S's CTQ)	variable	Avg No of months new hire stays (months)	No of months new hire stays	12 month	24 month	18 months

Attribute Agreement Analysis (Minitab implementation)

Appraisers	1	2	3
Repeatability	93.33%	86.67%	90.00%
Accuracy	93.33%	83.33%	86.67%
Reproducibility : p value = 0.000 → Agreement is statistically significant	73.33% (CI : 54.11-87.72)		

(supervisor is taken as standard)

Interpretation

↳ Appraisers show good repeatability with App1 being most consistent

↳ App 2 has lowest self agreement

↳ Poor Reproducibility agreement among appraisers is acceptable but not perfect (variation in decision making)

↳ App1 has highest accuracy closest to standard.

↳ mixed decisions

project leaders want to collect data for 'Y' to baseline performances :

Data collection format :

Operational Definition of project 'Y' : clearly define 'Y'
→ if attrition rate : % of new hires leaving within 1 year
→ if tenure : Avg num of months new hires stay

Data source :
→ HRM database
→ Employee Exit Records
→ payroll & attendance Records
→ past HR surveys / Reports

Data collection Process :
→ Extract reports from HRM systems
→ conduct Exit Interview
→ Review Emp Lifecycle Reports

Data Period : Time frame : Past 24 months of new hire data (2022-2024)

Data collection Analysts : HR Analyst, HRMIS support, project leaders.

Support Required : IT support for data extraction
Finance team for cost validation
process owners for operational insights

Risks & issues : Data inconsistencies across HR DBs
Resistance from emps to share exit reasons.

project leadeo 'S' & project leadeo 'B' selected a sample of 120 hired candidates & checked 'Time in company' for them & whether they left company within 1 year or not.

Find 6 level & Baseline.

For continuous data (Tenure) – project leadeo 'S'

120 samples → Avg tenure in years Months

⋮

120 recoonds

(Minitab implementation)

Mean
↳ 9.847

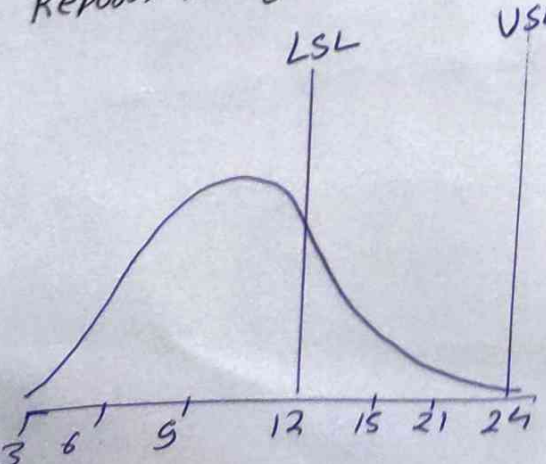
Std Dev
↳ 3.326

Zlt (long term sigma level)
↳ Mean − LSL / 6 | USL − Mean / 6

Zst (short term sigma level)
↳ Zst = Zlt + 1.5

Zlt = 9.847 − 12 / 3.326 | We can use minitab
↳ stat
↳ Quality tools
↳ capability Analysis
↳ Normal

Report Analysis



Z bench	−0.65
Z.LSL (short term sigma)	−0.65
Z.USL (long term sigma)	4.26
Ppk	−0.22

For Attribute data (Attrition Rate) - project leader B

Candidate	Defectives	Assessment
ABC	0	More than 12 months
BCD	0	More than 12 months
CDE	1	Defective
⋮		
120 records		

6-level calculation (Minitab implementation) / we can use sigma level calculator

stat
↳ Quality tools
↳ capability Analysis
↳ Binomial
↳ we get PPK & Zlt = PPK × 3

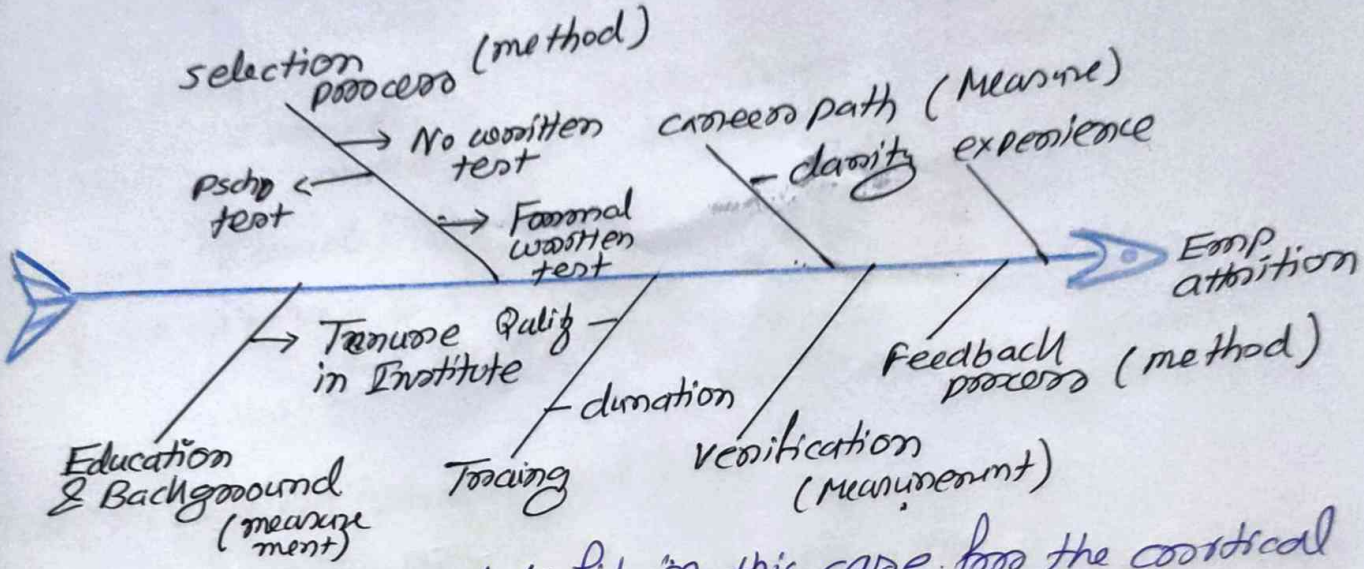
total Defective = 26
Not Defective = 94

Defective Rate = $\frac{26}{120} \times 100 = 21.66\%$ (DPMO = 216600)

$Z_{lt} = \phi^{-1}(1 - D\%)$ = In excel = Norm.S.Inv(1 − 0.2166)
= 0.7837 → long term process performance is low

$Z_{st} = Z_{lt} + 1.5$
= 2.29 → still needs improvement

Analyze

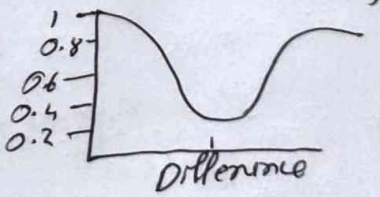


5M ishikawa cannot be fit in this case. for the control X's. some of them belong to → Man, Method & Measurement

Sample size estimation

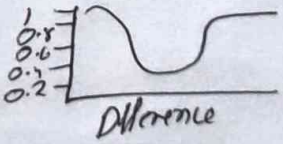
Minitab implementation → stat → power & sample size → 2 sample t / proportion tes

For project S → Min sample size = 3 (power = 0.9)



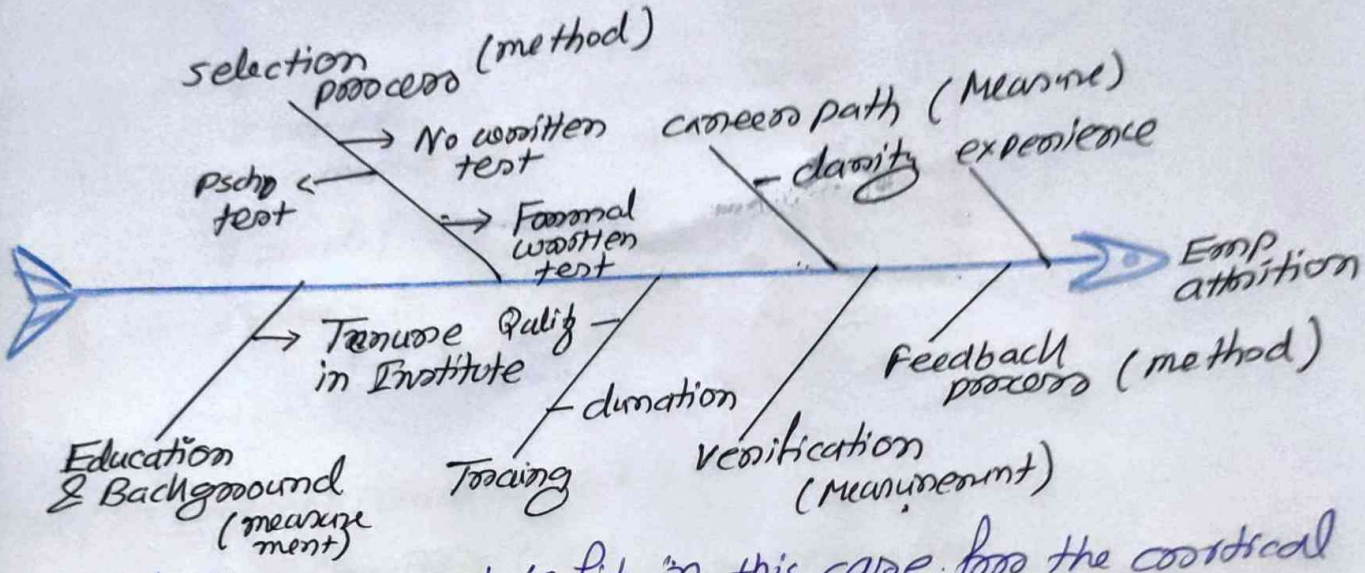
$\alpha = 0.05$
std = 14

For project B → Min sample size = 186 (power = 0.9)



$\alpha = 0.05$
$\sigma = 0.25$

Analyze



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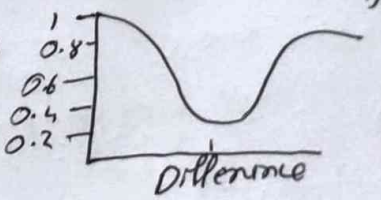

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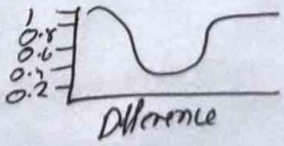

α = 0.05
δ = 0.25

critical x finding out (minitab implementation)

assumption: Data is Normal (Normality test is done)

continuous data
- 2 sample → 2 sample t
- >2 sample → Anova

Discrete Data
- 2 sample → 2 proportion t
- >2 sample → chi square test

Hypothesis testing with a confidence level of = 95%

Tenure (2 sample)
↳ pvalue = 0.000 (<0.05)
↳ reject null hypothesis
↳ its a critical factor

Test (>3 samples) (stack is used)
↳ pvalue = 0.351
↳ accept null hypothesis
↳ not a critical factor

career path (2 sample)
↳ pvalue = 0.001
↳ ~~reject~~ null hypothesis reject
↳ critical factor

Hours of training (3 sample)
↳ pvalue = 0.000
↳ ~~accept~~ reject null hypothesis
↳ critical factor

Verification (3 sample)
↳ pvalue (0.894)
↳ accept null hypothesis
↳ not a critical factor

Workex (in months) (3 sample)
↳ pvalue (0.412)
↳ accept null hypothesis
↳ not a critical factor

Feedback (2 sample)
↳ pvalue (0.148)
↳ accept null hypothesis
↳ not a critical factor

FMEA analysis

Failure Mode	Effect of Failure	Potential Causes	Severity (S)	Occurrence (O)	Detection (D)	Risk Priority Number (RPN)	Recommended Action
Short tenure (Grade X vs. Grade Y)	High attrition, increased hiring costs	Training quality difference	8	6	5	240	Standardize training
No written test	Unqualified candidates hired	Inconsistent selection process	7	5	6	210	Implement written assessment
Inadequate initial training (40/56/72 hours)	Poor job performance, slow adaptation	Lack of structured training plan	9	7	4	252	Standardize training duration
Unclear career path	Employee disengagement, lack of motivation	Poor career planning communication	8	6	5	240	Define and communicate career paths clearly
No/limited verification	Hiring unfit candidates	Weak background verification process	9	6	4	216	Strengthen verification checks
Hiring candidates with no/low experience	Low productivity, increased training time	Hiring criteria not well-defined	7	5	6	210	Adjust experience requirements
Feedback only at end	Lack of improvement, delayed course correction	No regular feedback system	8	6	5	240	Introduce periodic feedback system

Failure Mode Effective Analysis

This is based on RPN numbers which considers severity, occurrence & detection.

	Defective	Sigma level (LT)	
category A =	286	0.57	2.07
category B =	221	0.77	2.27
category C =	172	0.95	2.45
category D =	129	1.13	2.63
category E =	126	1.15	2.65
category F =	48	1.66	3.16
category G =	17	0.95	2.45

Improve

By Ideating (Note) → Have a preliminary call with students is best (4.2 noted)

Reason (X)	Alternative	Effectiveness	Feasibility	Cost	Impact	Total Score
X1: Institute Grade	Review student databases	1	2	1	1	5
	Define criteria for batch approval	2	1	0	2	5
	Mistake-proof key elements	2	0	-1	2	3
Best Solution	**Define criteria for batch approval**					
X2: Induction Training	Schedule 72-hour training	2	0	-1	2	3
	Initial job training approach	1	2	1	2	6
Best Solution	**Initial job training approach**					
X3: Career Path	Chart out 18-month career plan	2	1	0	2	5
	Follow up with supervisors	1	2	1	2	6
Best Solution	**Follow up with supervisors**					
X4: Feedback	Quarterly feedback for trainees	2	1	0	2	5
	Online performance documentation	1	2	1	2	6
Best Solution	**Online performance documentation**					

→ yellows are the selected solution under each reason

This is a custom one done by me.

Pugh Matrix for alternative solution choice

checking the results after deploying solution & comparing it with previous value

CTQ	Zst (Before)	Zst (after)
Tenure (prospect leaders)	-0.65 (LSL)	1.73 (LSL)
Attrition Rate (prospect leaders)	Zst = 2.29 (Zlt = 0.78)	Zst = 1.71 (Zlt = 0.21)

(*) Attrition Rate (defectives) got Reduced.

(*) Avg tenure has been increased to 18 months from 9 with less 6

Control

Both are of count data (number of defectives) for a fixed sample size (50/week) so we used NP chart