Estimating the success rate and reconciling the variations in success rate between SRLM samples, CTSA samples and the recheck samples

Annexure II gives the method to estimate the success rate when there are only two agencies doing physical sample verification i.e., SRLM and CTSA & sample proportions in the ratio of 80% Placement Verifications (PVs) by SRLM and remaining 20% PVs to be done by CTSA (as per Notification No.15 of 2023), conducting re-checks of 10% by CTSA (see Annexure-I) is to be taken up as an abundant precaution to eliminate errors if any in PVs. If considerable differences are noticed in the success rate between SRLM samples with those of CTSA samples i.e., if the success rates of SRLM samples are larger than the CTSA sample success rate by a predefined margin, then a correction factor is applied to calculate the SRLM sample success rate.

The differences in success rate could be due to sampling errors (assuming that non sampling errors are common to all the samples) or bias. While the sampling process was robust enough to address the sampling errors, the bias should be corrected. In order to correct the bias the following methodology is used:

The success rate arrived from SRLM samples (say Ps) is compared with success rate arrived from CTSA (Pc) samples plus a margin of error (X) (i.e. Ps is compared with $Pc + X$), and the following action is taken:

- If Ps is less than or equal to $Pc + X$ $(Ps =< Pc + X)$, then the results reported by SRLM are considered as unbiased and used as it is to calculate the sample success rate.
- If Ps is greater than $Pc + X$ $(Ps > Pc + X)$, then the results reported by SRLM are considered as biased and a correction factor is applied to calculate the SRLM samples success rate.

Calculation of final success rate

- Let T be the total number of samples.

- Let A be the successful cases from SRLM samples (including recheck samples i.e. sample size is $0.8T$).

- Let B be the successful cases from SRLM samples (excluding recheck samples i.e. sample size is $0.7T$)

- Let C be the successful cases from the CTSA samples (including recheck samples i.e. sample size is $0.3T$).

- Let D be the successful cases from the CTSA samples (excluding recheck samples i.e. sample size is $0.2T$).

- Let E be the successful cases from recheck samples (adjudged as per procedure prescribed in SOP i.e. sample size is 0.1T)

- Let F be the successful cases as per the primary assessment by SRLM out of the samples rechecked by CTSA (i.e. sample size is 0.1T).

- Let G be the successful cases in the recheck samples as assessed by CTSA team (i.e. sample size is 0.1T).

Hence, Success Rate (P) = (B + D + E)/T; if $P_s \leq P_c + X$

Success Rate (P) = ($B_{modified}$ + D + E) / T; if $P_s > P_c + X$

Where

Ps, SRLM success rate = A*(1 / 0.8*T)

Pc, CTSA success rate = C*(1 / 0.3*T)

X is the margin of error and method to calculate is explained in the Annexure II.

Where $B_{modified} = B * (G / F)$

Annexure I: Sample size and distribution of primary and recheck samples between various quality teams

Table 1: Sample size and distribution of primary samples

Sl. No.	Project size (training target)	Sample size for each instalment – S (A)	Sample distribution	
			SRLM (B)	CTSA (C=A-B)
1	Up to 3000	If sample is less than 50 *	Rounded to nearest whole number of 80 % of (A)	A-B
2		50	40	10

Note: * - If total placed candidates are less than 50, then the sample size will be same as the population and total samples will be less than 150, if placed candidates are less than 50 in any instalment.

Table 2: Recheck sample size and distribution of recheck samples

Sl. No.	Project size (training target)	Recheck sample size (D)	Recheck sample distribution
			CTSA (All samples from SRLM samples)(E)
1	Up to 3000	If total primary samples are less than 50 then nearest round number of 10% of sample size	Same as D
2		5	5

Annexure II: Estimating the success rate and Reconciling the variations in success rate between SRLM samples, CTSA samples and the recheck samples

Method for calculating success rate

- Let T be the total number of samples.

- Let A be the successful cases from SRLM samples (including recheck samples i.e. sample size is $0.8T$).

- Let B be the successful cases from SRLM samples (excluding recheck samples i.e. sample size is $0.7T$).

- Let C be the successful cases from the CTSA samples (including recheck samples i.e. sample size is $0.3T$).

- Let D be the successful cases from the CTSA samples (excluding recheck samples i.e. sample size is $0.2T$).

- Let E be the successful cases from recheck samples of CTSA (adjudged as per procedure prescribed in SOP) i.e. sample size is $0.1T$).

- Let F be the successful cases as per the primary assessment of SRLM out of the samples rechecked by CTSA (i.e. sample size is $0.1T$).

- Let G be the successful cases in the recheck samples as assessed by CTSA team (i.e. sample size is $0.1T$).

Step 1: Calculate SRLM and CTSA success rates.

SRLM success rate, $P_s = \dfrac{A}{0.8 \times T}$

CTSA success rate, $P_c = \dfrac{C}{0.3 \times T}$

Step 2: Estimate the margin of error *(X)*

X is statistically determined and is given by the formula $= Z *$ (standard deviation of CTSA sample proportion P_c) + Correction for continuity

Where, Z is the confidence level and committee recommends 95 % confidence using a single sided test. Based on this Z is 1.645.

Standard deviation of *Pc* is given by $\sqrt{(Pc) * (1 - Pc)/(0.3 * T)}$

Correction for continuity is given by *0.5/(0.3*T)*

Note: For statistical details please refer any standard Statistics book or online material like - http://onlinestatbook.com/2/estimation/proportion_ci.html

or https://en.wikipedia.org/wiki/ Binomial_proportion_confidence_interval)

Step 3: Compare *Ps* and *Pc + X*

If P_s is less than $P_c + X$ (i.e. $P_s <= P_c + X$) then no bias is noticed in SRLM samples and the $\text{Success rate} = \dfrac{B + D + E}{T}$

If P_s is greater than $P_c + X$ (i.e. $P_s > P_c + X$) then bias is noticed in SRLM samples and a correction factor is applied to SRLM samples.

Step 4: Calculation of correction factor and modification of number of successful SRLM samples.

Correction factor or say *CF*;

$$CF = \frac{\text{No. of successful cases in the recheck samples as assessed by CTSA team}}{\text{No. of successful cases as per the primary assessment by SRLM out of the samples rechecked by CTSA}}$$

The SRLM successful cases excluding the recheck samples, is corrected as $B_{\text{modified}} = B \times CF$

Step : Calculation of final success rate

$$\text{Success Rate } (P) = \frac{B + D + E}{T}; \text{ if } P_s \leq P_c + X$$
$$= \frac{B_{\text{modified}} + D + E}{T}; \text{ if } P_s > P_c + X$$