THE PROTOCOL AND FORMULATION FOR 95 PERCENT ASSURANCE OF THE *TESGE* RATINGS:

1st STEP: Choose the Sampling Error Factors.

For these two types of sampling errors there are two corresponding 'correction' factors, and also assigned 'A' and 'B':

(A) (B)

FIGURE 9.8
Risk Coefficients

Acceptable Level of Risk	Incorrect Acceptance Coefficient	Incorrect Rejection Coefficient
1.0%	2.33	2.58
4.6	1.68	2.00
5.0	1.64	1.96
10.0	1.28	1.64
15.0	1.04	1.44
20.0	0.84	1.28
25.0	0.67	1.15
30.0	0.52	1.04
40.0	0.25	0.84
50.0	0.00	0.67

- 1st Column of Table 9.8 – Acceptable Level of risk for Type (A) and Type (B) sampling errors.
- (A): 'Incorrect Acceptance of the overall *TEPUI* Ratings Population' Coefficient – 2nd column of Table 9.8.
- (B): 'Incorrect Rejection of the overall *TEPUI* Ratings Population' Coefficient – 3rd column of Table 9.8.

For our case we will select 5% Rejection (Acceptable Level of Risk) Level of Risk for both types of sampling errors, which will yield an 'Incorrect Acceptance Error' coefficient (A) of 1.64, and an 'Incorrect Rejection Error' coefficient (B) of 1.96.

2nd STEP: Chose a Tolerable Misstatement for the sum-total of *TESGE* ratings, and determine the Planned

Allowance for Sampling Risk (PAS).

For this step we:

a) For the entire overall *TEPUI* rating population determine:

- The total number of overall *TEPUI* ratings in the population from users.
- The Sum-Total value of the overall *TEPUI* ratings.
- The Mean Value of the entire overall *TEPUI* Population: μ_{Pop}
- The Standard Deviation of the entire *TEPUI* Population: σ_{Pop}

b) Choose a 'Tolerable Misstatement for the overall *TEPUI* population. For example, say there are a total of 20,000 *TEPUI* ratings, with a sum-total value of 140,000, with a $\mu_{Pop} = 7.0$ and $\sigma_{Pop} = 1.5$. For this population we aim for a Tolerable Misstatement no larger than 5% of the sum-total value … 5%x140,000 = 7,000.

c) Use your selected (A) sampling error factor (here, 1.64) and the (B) sampling error factor (here, 1.96), and compute for the Planned Allowance for Sampling Risk (PAS).

$$Planned\ Allowance\ for\ Sampling\ Risk\ (PAS) = \frac{Tolerable\ Misstatement}{1 + \frac{A}{B}}$$

For our example:

$$Planned\ Allowance\ for\ Sampling\ Risk\ (PAS) = \frac{7{,}000}{1 + \frac{1.64}{1.96}} = 3{,}811$$

3rd STEP: Determine the Minimum Sample Size to take of the population, and the mean, μ_{Sample} , and standard Deviation, σ_{Pop}, of the sample taken:

For the given Population Size (in our example, 20,000), a σ_{Pop} (in our example, $\sigma_{Pop} = 1.5$), an (B) Sampling Incorrect Rejection Coefficient (in our example, B=1.96) and the computed PAS (in our example, 3,811):

$$Minimum\ Sample\ Size \geq \left[\frac{Population\ Size\ x\ Sampling\ Incorrect\ Coeffient\ (B)\ x\ \sigma_{Pop}}{PAS}\right]^2$$

For our example:

$$Minimum\ Sample\ Size = \left[\frac{20{,}000\ x\ 1.96\ x\ 1.5}{3{,}811}\right]^2 \geq 238$$

In our example, for a running total of overall 20,000 *TEPUI* ratings we just need to sample and test at least 238 of the ratings. For this example, say that we find that $\mu_{Sample} = 6.3$ and $\sigma_{Sample} = 1.3$.

4th STEP: Determine the 'Audit-Estimated *TEPUI* Total Value', the 'Adjusted Allowance for Sampling Risk' and the 'Acceptance Interval for the Population Value'.

a) **Audit-Estimated *TEPUI* Total Value** = μ_{Sample}x Population Size

For our example: Audit-Estimated *TE* Total Value = 6.3 x 20,000 = 126,000

b) $$\boldsymbol{Adjusted\ Allowance\ for\ Sampling\ Risk} = Tolerable\ Misstatement - \frac{\left(Population\ Size\ x\ \underset{Coefficient.A}{\overset{Sampling}{AIncorrect\ Acceptance}}\ x\ \sigma_{Sample}\right)}{\sqrt{Sample\ Size}}$$

For our example: $\underset{Sampling\ Risk}{\overset{Adjusted}{Allowance\ for}} = 7{,}000 - \frac{(20{,}000\ x\ 1.64\ x\ 1.3)}{\sqrt{238}} = 4{,}236$

c) $$\boldsymbol{Acceptance\ Interval\ for\ the\ Population\ Value} = \boldsymbol{Audited\text{-}Estimted\ TEPUI\ Total\ Value} \pm \mu_{Sample}\ \boldsymbol{x\ Adjusted\ Allowance\ for\ Sampling\ Risk}$$

For our example: $\boldsymbol{Acceptance\ Interval\ for\ the\ Population\ Value} = \mathbf{126{,}000 \pm 6.3\ x\ 4{,}236 = 126{,}00 \pm 26{,}687}$

$$= [\mathbf{99{,}313\ ,\ 152{,}687}]$$

So for our example, with an *TEPUI* population of 20,000 ratings; for a sample taken to value statistically of 238, the Total *TEPUI* Ratings Value of 140,000 falls withing the range [99,313 , 152,687], we can accept the 140,000 value at a 95% confidence level – and thus accept with 95% Assurance the mean TEPUI rating of the company or industry of 7.0.