Cluster sampling with Stratified Random Sampling

We have encountered a similar problem in Chapter 6 when we considered ratio estimation with stratification. Then we looked at two estimators for μ, the separate and combined estimators. Since we would need to know the M_i values (which is unlikely) to use the separate estimator, we will only consider the combined estimator. Here is an example for estimation of μ as shown in the text for two strata:

$$\overline{y}_c = \frac{N_1\overline{y}_{t1} + N_2\overline{y}_{t2}}{N_1\overline{m}_1 + N_2\overline{m}_2}$$

and

$$\widehat{V}(\overline{y}_c) = \frac{1}{M^2}\left\{N_1^2\left(\frac{N_1 - n_1}{N_1}\right)\frac{s_{c1}^2}{n_1} + N_2^2\left(\frac{N_2 - n_2}{N_2}\right)\frac{s_{c2}^2}{n_2}\right\},$$

where s_{c1}^2 is the variance of the terms $(y_i - \overline{y}_c m_i)$ from stratum 1 and s_{c2}^2 is the variance of the terms $(y_i - \overline{y}_c m_i)$ from stratum 2.