ON THE VARIANCE ANALYSIS OF OVERHEAD COST

Ting—Wong Cheng
Dean, Graduate School of Accountancy
National Chengchi university

Among the primary functions of standard cost are the cost control and product-costing. As commonly defined, standard costs are carefully predetermined target costs. When work is done, actual costs incurred are compared with standard costs and the variances are investigated to discover better ways of adhering to standards and to evaluate management performance. Properly determined standard costs are also useful for product-costing purposes. However, the effectiveness of the standard cost in serving as a control tool and product-costing depends, to a great extent, upon the way the standards are set and the variances are analyzed.

How the standards should be set and the variances be analyzed have been well discussed in the accounting literature. However, there still exists some weaknesses which stand to hamper the effective functioning of the standard cost. The purposes of this paper are to critically evaluate the variance analysis of overhead cost and to suggest ways of improving it. Because of the differences in behavior and controllability of costs, it is desirable, where possible, to classify overhead items into variable and fixed categories. This paper examines the overhead items accordingly.

ANALYSIS OF VARIABLE OVERHEAD VARIANCES

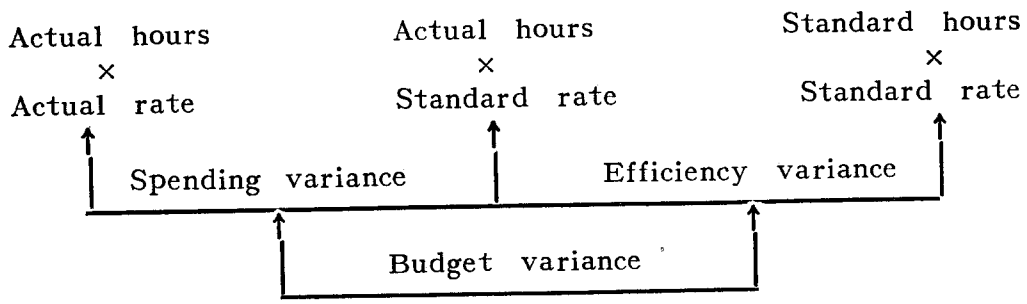
By definition, total variable overhead costs fluctuate in proportion to changes in activity level. In a standard cost accounting system, a variable overhead rate is usually developed with labor or machine hours as the base. The total standard variable overhead cost for the period is arrived at by multiplying this rate to the standard hours allowed for the product manufactured during the period. This standard cost is then compared with actual variable overhead and the difference is called budget variance.

The budget variance does not tell much except that the actual

variable overhead cost exceeds what should have been incurred. Traditionally the budget variance is further analyzed into two subvariances, viz., spending variance and efficiency variance. Exhibit 1 illustrates the analysis.

Exhibit 1

Analysis of Variable Overhead Variances



As indicated in Exhibit 1, the spending variance represents the difference between the actual overhead and the standard overhead allowed at the actual hours worked. It is often interpreted as being the amount that is over spent and is attributable to the loose control of overhead items. On the other hand, the efficiency variance is the difference between the standard cost allowed at actual hours and the one allowed at standard hours. It is due to the efficiency or inefficiency of the workers or machine, depending upon which base is selected.

For some overhead items the above analysis provides a reasonable basis on which to take corrective action. For others it is concealing rather than revealing. The real causes of the variance are misinterpreted and the responsibility for the variances can not be correctly fixed. Following example illustrates this point.

Assume that for every 10 direct labor hours (DLH) worked, one indirect labor hour (ILH) is required to service the machine. The standard indirect labor cost is $20/hour. The standard variable overhead rate is $2/DLH. Assume further that during the period 2,500 indirect labor hours are worked at $25 per hour. The actual and standard direct labor hours are 20,000 and 16,000 respectively. The actual

overhead cost is $62,500 ($25×2,500 ILH) and the standard overhead cost is $32,000 ($2×16,000DLH) . The budget variance is $30,500.

Using the above variance analysis the budget variance can be broken down into spending and efficiency variances as follows:

(Actual rate-Standard rate) × Actual hours=
($3.125-$2) ×20,000=$22,500·····Spending Variance

(Actual hours−Standard hours) × Standard rate=
(20,000−16,000) ×$2=$8,000·····Efficiency Variance

The $8,000 efficiency variance is apparently due to the inefficiency of the direct labor, for 4,000 extra direct labor hours are worked which require additional 400 indirect labor hours to service the machine. The $22,500 spending variance is, however, not due solely to the higher wage rate for the indirect labor but is partly caused by the inefficiency of the indirect labor. At the 20,000 DLH actually worked, only 2,000 ILH are allowed, whereas the actual ILH is 2,500. (Conversely, at 2,500 ILH the standard DLH would be 25,000) . A more correct variance analysis would run as follows.

(Actual ILH−Standard ILH) × Standard indirect labor rate
= (2,500−2,000) × $ 20= $ 10,000

Alternatively,

(25,000DLH−20,000DLH) × $ 2= $ 10,000.....
.....Indirect labor (Maintenance Dept.)
efficiency variance

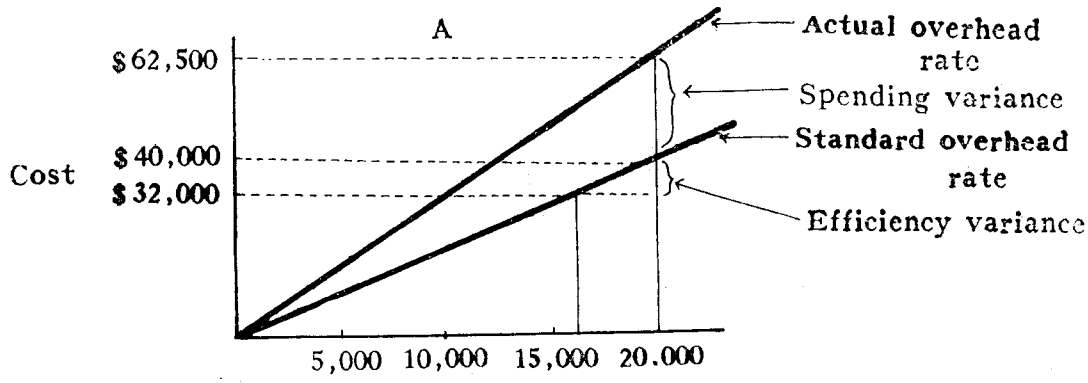
(Actual indirect labor rate−Standard indirect labor rate) × Actual ILH= ($ 25− $ 20) × 2,500= $ 12,500....
..... Spending variance

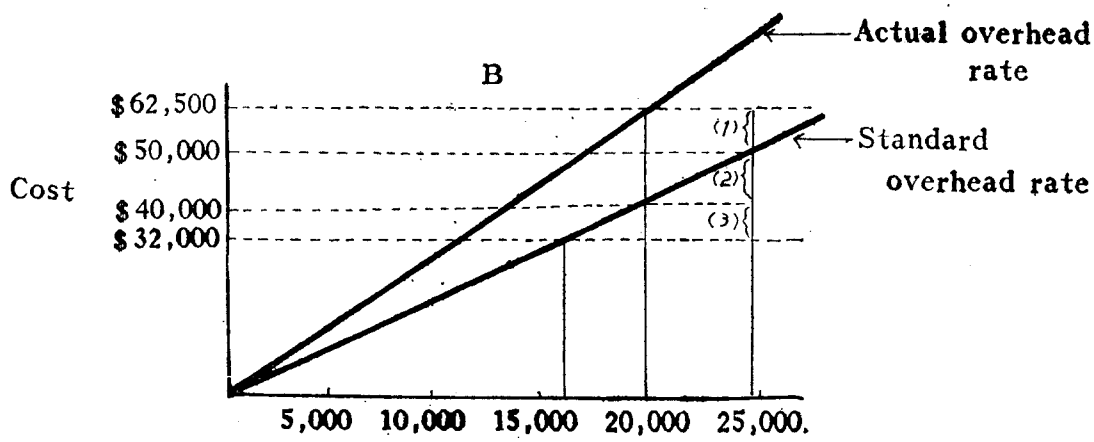
(Actual DLH−Standard DLH) × Standard rate
= (20,000−16,000) × $ 2= $ 8,000.....Direct
labor efficiency variance

Exhibit 2 contrasts the two methods of analysis.

Exhibit 2

Comparison of Variable Overhead Variance Analyses





(1) Spending variance
(2) Indirect labor efficiency variance
(3) Direct labor efficiency variance

The foregoing comparison points out that for certain variable overhead items the traditional variance analysis often results in

misinterpretation of the variances. Such overhead items as repair and maintenance labor, materials handling and inspection are examples where the analysis could go wrong. Consequently, the control function of the standard cost is hampered by the traditional variance analysis.

ANALYSIS OF FIXED OVERHEAD VARIANCES

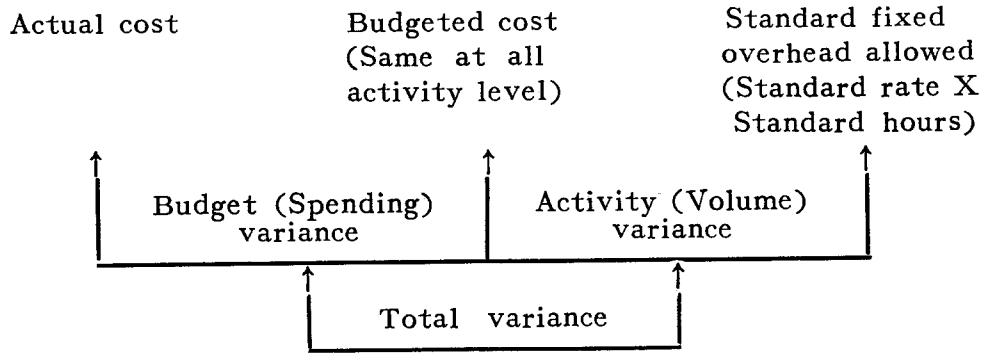
One of the distinguishing features of fixed overhead is its fixity. Total fixed overhead costs do not change over wide ranges of activity. However, unit costs do change; the higher the production volume, the lower the unit cost, and vice versa.

For product-costing purposes, an activity level is preselected. The annual budgeted fixed overhead is divided by the preselected activity level to arrive at a standard fixed overhead rate which is then used to calculate the standard fixed overhead allowed during the period. In other words, the fixed overhead costs are treated as though they were variable in nature for product-costing purposes, and the variance analysis performed accordingly. Exhibit 3 shows the common variance analysis of fixed overhead.

In Exhibit 3, the amount of activity variance will vary depending on the activity level selected. For example, if the expected actual activity is selected, the activity variance would be zero. Therefore, how the activity level should be selected is a critical problem faced by management. We shall evaluate various activity levels in terms of their usefulness for cost control and product-costing purposes.

Exhibit 3

Analysis of Fixed Overhead Variances



Variance Analysis for Cost Control and Performance Evaluation Purposes

Four activity levels are mentioned in the accounting literature. The ideal capacity represents the volume of production which would be attained if the plant were in continuous operation at peak efficiency at all times. The practical capacity is the ideal capacity with allowances for certain unavoidable idleness of men and machinery. The third capacity is the normal capacity which is the average annual volume that will satisfy average consumer demand over a span of time that includes seasonal, cyclical and trend factors. Finally, the expected actual capacity is the anticipated level of production for the coming year.

Of the above four capacity levels, Crowningshield and Gorman rule out the Ideal capacity and the expected actual capacity as either too demanding or demands too little for control purposes.[1] They favor the practical capacity although normal capacity is the base most often used in practice.[2]

When normal capacity is used, the activity variance is bound to

---

1. Crowningshield, Gerald R. and Kenneth A. Gorman, *Cost Accounting* (Boston, Mass.: Houghton Mifflin Company, 1974), p. 129.

2. Ibid

be favorable in some years and unfavorable in other years if the business is cyclical in nature. It would be unreasonable to conclude that management performs well in some years and badly in other years when such fluctuations are already anticipated. As Horngren[3] points out, normal capacity is a long-range concept. It is not compatible with the evaluation of current management performance.

Granted the practical capacity has more appeal to the persons who are completely "sold" on standards. However, they ignore the fact that activity variance has limited significance for control purposes. Most companies consider this variance to be beyond immediate control, although sometimes the top sales executive has to do some explaining or investigation. It is hard to pinpoint the responsibility for the idle capacity. In addition, the activity variance may have no opportunity cost at all.

In summary, for cost control purposes, attention should be focused on the budget (spending) variance, bearing in mind that at the lower levels of management, almost no fixed costs are under direct control. For evaluating management performance, the expected actual capacity is more useful than the normal capacity or practial capacity because the latter two capacities are not so pertinent to current operating problems,

Variance Analysis for Product-Costing Purposes

The fixed overhead rate is primarily developed for product-costing purposes. Again, the most commonly used basis is normal capacity. It is claimed that the use of normal capacity will avoid capricious changes in unit costs and will facilitate more reasonable pricing. While it is true that using the normal capacity results in more stable unit cost of inventory from year to year, it also results in greater fluctuations in income as compared to the expected actual capacity. Consider the following example.

Assume that the fixed overhead is $5,000 per year. The normal capacity is 1,000 hours which can produce 1,000 units of product.

---

[3]. Horngren, Charles T., *Cost Accounting* (Englewood Cliffs, N. J.: Prentice-Hall, Inc. 1972), p. 323

Assume further that the under- or over-applied overhead is closed to income. (It could be prorated to work in process, finished goods inventory, and the cost of goods sold. However, in that case the result is exactly equal to the use of expected actual capacity). Following is a comparison of the results of normal capacity and expected actual capacity under various production levels.

	Normal Capacity	Expected Actual Capacity
Year 1.		
Units produced: 800		
Units sold : 700		
Applied overhead	$4,000	$5,000
Cost of sales - Product cost	$3,500	$4,375
Cost of sales - Underapplied overhead	1,000	-0-
Total cost of sales	$4,500	$4,375
Finished goods inventory	$ 500	$ 625
Year 2.		
Units produced: 1,200		
Units sold : 1,100		
(Use first in, first-out method)		
Applied overhead	$6,000	$5,000
Cost of sales - product cost	$5,500	$4,792
Cost of sales - Overapplied overhead	(1,000)	-0-
Total cost of sales	$4,500	$4,792
Finished goods inventory	$1,000	$ 833

From the above example it can be seen that when the business is slow, the net income under the normal capacity is less than the one under the expected actual capacity. On the other hand, during the boom period, the net income under the normal capacity is greater than the one under the expected actual capacity. For income determination purposes, such an fluctuation is certainly undesirable.

SUMMARY

The purposes of this paper were to evaluate the variance analysis of overhead cost and to suggest ways of improving it. It was concluded that the traditional variance analysis of variable overhead may conceal the real causes for the variances, particularly for those cost items that are affected by both the direct and indirect labors. For those cost items care must be taken to compute the efficiency variance of the indirect labor.

As to the fixed overhead, this paper evaluated the various capacity concepts in terms of their merits in cost control and product-costing. It was argued that the expected actual capacity is well suited to the determination of fixed overhead rate for both control and product-costing purposes. This is somewhat contrary to the common belief that the normal capacity or the practical capacity is superior to the expected actual capacity.

BIBLIOGRAPHY

Crowningshield, Gerald R. and Gorman, Kenneth A., *Cost Accounting, Principles and Managerial Applications*, third edition, Boston, Mass.: Houghton Mifflin Co., 1974.

Horngren, Charles T., *Cost Accounting, A Managerial Emphasis*, third edition, Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1972.

Matz, Adolph and Usry, Milton F., *Cost Accounting, Planning and Control*, sixth edition, Cincinnati, Ohio: South-Western Publishing Co., 1976.

Solomons, David, "Flexible Budget and the Analysis of Overhead Variances," in *Contemporary Issues in Cost Accounting*, Hector R. Anton and Peter A. Firmin (eds), Boston, Mass.: Houghton Mifflin Co., 1966.