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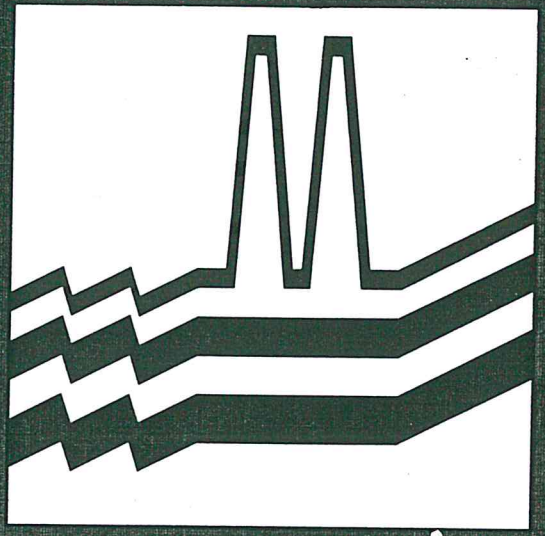

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V. Orpana
A. Lukka
(Editors)

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New Performance Measurement Systems: The Adoption of an Integrated Model

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Abstract

The authors have developed an advanced Performance Measurement System (PMS), based on an integrated model, able to examine simultaneously several performances and the activities which determine them. The steps are: 1. evaluation of performance costs, 2. comparisons of actual and desired performances, 3. identification of the activities responsible of the major differences between actual and desired performance levels, for the reallocation of the resources. The test of the proposed model is in-progress.

1. EVALUATION OF PERFORMANCE COSTS

The developed model of PMS considers seven performances which are important for world-class manufacturers: efficiency, speed of delivery, reliability, time required for the introduction of new products or substantial changes, volume flexibility, mix flexibility, quality capability, quality conformance. Data from an existing Activity-Based Cost (ABC) System are utilized. Both top managers and heads of department are involved. They are requested for judgements upon performances, on the basis of the operational measures derived from the Manufacturing Planning and Control System (MPCS).

a. A weighted-ranking technique is used: it considers every single performance versus every other single performance, for each activity, and assigns a value of "one" to the performance considered more important or that has the priority and a value of "zero" to the other; if a decision can not be made regarding relative importance/priority, then each performance is assigned a value of "one-half". After all the performances have been compared, the sum of the values must be equal to N*(N-1)/2, where N is the number of examined performances. This is made for all activities.

b. The same technique is used for comparisons between activities, regarding the importance/priority of a particular performance (e.g. the relative importance of efficiency in activity A, activity B, etc.). If the number of activities is M, the sum of the values for each performance must be equal to M*(M-1)/2. The comparison between activities is made for all the N-performances.

The results are two matrixes, respectively X'_{ij} and X''_{ij}, where rows "i" are the N-performances and columns "j" are the M-activities. Matrix X'_{ij} has been made by column, according to a.; matrix X''_{ij} has been made by row, according to b.. In other terms, X'_{ij} derives from an "intra-functional" analysis (i.e. between the performances of an activity),

while X''_{ij} derives from an "inter-functional" analysis (i.e. between the activities regarding a single performance).

The next step is to build a matrix Y'_{ij} (N-rows and M-columns) that considers the X'_{ij}-results and the costs of activities Cj (with "j" from 1 to M), derived from the ABC System: each column of the matrix X'_{ij} is multiplied by the cost of the activity Cj. As a consequence, values Y'_{ij} become activity-cost weighted performance ranks.

Now:

$$P'_i = \sum_{j=1}^{M} Y'_{ij} \quad ; \quad P''_i = \frac{P'_i}{\sum_{k=1}^{N} P'_k} 100 \quad ; \quad T = \sum_{j=1}^{M} C_j \quad ; \quad P'''_i = \frac{P'_i}{\sum_{k=1}^{N} P'_k} T$$

where: P'_i is the actual aggregate performance rank, P''_i is the normalized-to-100 actual aggregate performance rank, T is the total activities cost, P_i''' is the cost of the performance "i".

The performance profile P'_i is more accurate than a correspondent profile derived from a direct evaluation of the performances, without the weighted two-by-two comparisons.

2. COMPARISONS BETWEEN ACTUAL AND DESIRED PERFOMANCES

In this step, for each performance, a difference (D_i) between actual (P''_i) and desired (P^{**}_i) performance is calculated.

Because of the lower number of people involved in interviewing -only top managers-, a more sophisticated weighted-ranking technique is used, similar to a. but with weights: 0, 0.25, 0.33, 0.50, 0.66, 0.75, 1.00, in order to obtain P^*_i (i.e. the optimum performance rank scale) and P^{**}_i, that is P^*_i normalized-to-100.

3. REALLOCATION OF THE RESOURCES

The proposed model of PMS permits to point out the activities responsible of the major differences (D_i) between actual and desired performances, in order to redirect energies and resources: for example, if D_q is the greatest value among D_i, we look at the row "q" in matrix X''_{ij} (see b.) to find the activity "j" with the highest values X''_{qj} (i.e. the activity with the greatest impact on the performance "q").

4. CONCLUSIONS

The proposed model is innovative because it uses ABC-data in order to obtain performance costs and to reallocate the resources of the firms on the basis of the difference between the actual and desired levels of performance. Some enterprises of Northern Italy are testing the proposed model; the managerial implications seem to be interesting.