MEASURING PERFORMANCE

By

HANS BAJARIA
MULTIFACE, INC.
DEARBORN HEIGHTS, MICHIGAN

GREGORY GRUSKA
JOANN GOBLE
GENERAL MOTORS CORPORATION
WARREN, MICHIGAN

ABSTRACT

Rewarding short-term performance of plant managers and line management has become one of the critical elements in the ineffective promotion of quality and productivity as an integral part of the overall business strategy. The reason, at least in part, is due to incompatibility between production systems and accounting systems. These systems have not produced financial indices that can convert quality, productivity and sales performance into meaningful measures.

The authors develop criteria for a set of indices that measure organization performance consistently, including quality, productivity and profit considerations.

INTRODUCTION

The "Bottom line" is how corporations say they measure the performance of their executives. Does this "bottom line" measurement include "quality performance" as well? Apparently not, as judged by the continuous slide and/or loss in the competitive edge in the quality performance of some of the most successful (based on bottom line) companies.

One can perhaps analyze the set of past circumstances and justify the actions taken at that time. However, if such an exercise does not positively influence future actions, further deterioration in the quality performance may be expected.

CRITERIA FOR PERFORMANCE INDICES

If one became convinced that QUALITY is a desirable characteristic to include in the measurement of company and management performance, then a need exists to track those indices that are directed toward this objective. The authors discuss different indices which can incorporate QUALITY as an integral part of performance measurement. On a very broad basis, any company, whether large or small, should be interested in measuring its performance in the following four categories:

(1) Business indices
(2) Productivity indices
(3) Quality of work life indices, and
(4) Quality of life indices.

The purpose of each category of indices and examples follow:

(1) Business indices -- Measurement of financial performance, so called "bottom line":
   a. Percent market share
   b. Profit/employee
   c. Profit/share
   d. Sales/employee
   e. Profit/unit of product
   f. Price/unit

(2) Productivity indices -- Measurement of engineering and production efforts:
   a. Production hours/unit of production
   b. Maintenance costs/total sales
   c. Scrap costs/total sales
   d. Rework costs/total sales
   e. Product liability costs/total sales
   f. Number of design changes/year
   g. Testing costs/total sales

(3) Quality of work life indices -- Measurement of how workers' health is affected by the workplace or in general, how workers feel about their jobs:
   a. Absenteeism/week
   b. Number of employees changing jobs/year
   c. Accidents/month

(4) Quality of life indices -- Measurement of how company policies and products affect the quality of life within the community and/or nation at large:
   a. Noise levels generated by products
   b. Pollutant levels in the air generated by products and/or plants
   c. Pollutant levels in the water generated by products and/or plants

MANIPULATION GAINS

One can see that quality performance is integrated within these four categories. Also some of these categories of indices are closely interrelated. That is, one can show that favorable performance in one category can occur by manipulating other categories. For example, an increase in profits (a favorable business index) can be affected by delaying preventive maintenance on production machines (an unfavorable productivity index). Similarly, one can improve profits/employee (a favorable business, productivity index) by delaying pay raises and/or not paying for overtime work (an unfavorable quality of work life index). Successful company performance is the result of achievements that are made by genuine efforts and outstanding managerial abilities rather than manipulations among different performance measures. Performance manipulations are also possible within each category of indices. For example, one can show a reduction in warranty expenses (a favorable productivity index) by increasing scrap and rework expenses (an unfavorable productivity index). Another example of similar manipulations is the improvement in profits/unit (a favorable business index) by increasing price/unit (an unfavorable business index especially if nonproductivity is folded into the price increase). Companies should be interested in measuring "true" successful performance rather than manipulated successful performance.

LARGE AND SMALL COMPANY CONSIDERATIONS

One has to make distinctions between successful performance of large and small companies. Large companies should be interested in looking at all four categories of indices, since their visibility extends to employees, shareholders, consumers and government. On the other hand, small companies are run by entrepreneurs, who may be more interested in looking at business indices with much less recognition of other indices. A higher degree of manipulation can increase personal wealth quickly, as entrepreneurs keep jumping from one business deal to another. Thus there are two extremes to which measurement of performance criteria would apply in varying degrees. One could say that as small business grows, measurement of successful performance shifts from business indices alone to a much broader definition that includes productivity, quality of work life and quality of life indices.

QUALITY CIRCLES AND MEASUREMENT OF PERFORMANCE

Recently, quality circles are becoming popular, due to their potential for improving productivity indices and/or quality of work life indices. The idea behind these quality circles is that employees as a group can contribute toward the solutions of work related problems. Such solutions become acceptable to the group since they are outcomes of their own actions Thus, successful solutions generated by QC circles help to improve productivity indices. Besides problem-solving, QC circles have a tendency to generate enthusiasm from employees about their participation in decision-making. This enthusiasm usually means an improvement in quality of work life indices. Of course, while some productivity indices and quality of work life indices are improving, the company should be interested in making sure that this improvement is not the direct result of a corresponding decline in other indices. For example, a significant decline in market share (more important business index) can occur while productivity and quality of work life indices are improving as a result of quality circle activities. Also, more difficult problems, which are important for company survival, remain unsolved due to limited ability and/or responsibility of the quality circle groups.

The company which fails to recognize this limitation may, in the long run, find itself in trouble in the marketplace. The idea is to first solve problems and/or prevent those situations that affect market share rather than just solve problems. There is no doubt that quality circles (or equivalent) have a place in American organizations' culture, however, their value in reversing recent downward trends remain debatable. There are many other powerful problem-solving and prevention techniques that can readily be applied to improve performance indices quicker rather than to depend on relatively new sets of words such as "quality circles" and "participation" for productivity gains.

STATISTICAL PROCESS CONTROL AND MEASUREMENT OF PERFORMANCE

Concepts of Statistical Process Control have a direct relationship with the performance indices of the company. However, if this concept is incorrectly and/or expensively applied, one can see a decline in performance indices rather than an improvement. The basic idea of statistical process control is to control any process within its natural performance bounds. When the yield of such a process shows any recognizable pattern on the statistical process control chart, it must be interpreted and appropriate action must be taken to guard against incipient problem conditions.

Since the early 1950's, every low economic cycle in the U.S. has forced the examination of statistical process control as a viable method of reducing defects and improving productivity. However, its roots are not very deep. Resources are spent in training the work force during every economic downturn. Before they begin to show profitable results an economic upturn has wiped out the enthusiasm and dissolved the influence of training. Companies need to have an appropriate set of performance indices to measure the results derived from the application of statistical process control if they are to continue regardless of economic conditions.

With appropriate indices to evaluate the effects of statistical control one can measure training dollars/month, implementation cost/month, maintenance cost/month, downtime/month, total production units/month, usable production units/month, scrap cost/month, reject cost/month, warranty cost/month, etc. If statistical process control methods are working successfully some of the preceding indices must change. However, the net gain must be positive in order for statistical methods to remain cost effective. There is no doubt that one can measure the cost effectiveness of statistical methods by the use of productivity indices. Simultaneous examination of business indices may reveal whether or not statistical methods should be a priority for the corporation or not.

AUTOMATION AND MEASUREMENT OF PERFORMANCE

Automation, if wisely applied, can boost productivity significantly. However, one must examine the side effects of automation to assure that while productivity in a single operation is being boosted, productivity of other operations is not being jeopardized. Automation for a single machine is well-proven with respect to its potential in raising productivity. On the other hand, the application of automation in a continuous process requires a careful control of defects. That is, if the number of defects rise outside of expected bounds, it may require that the entire automated line be shut down. Therefore, to evaluate the performance of automation one must track: automation cost/month, units produced/month, downtime/month, maintenance cost/month, and production cost/month. All of these indices must be compared with the option of not having automation. A careful comparison may reveal that in many instances, automation will not increase the productivity.

EVALUATING PERFORMANCE

Table I provides a means to evaluate any new concepts and/or hardware to be used before implementation and allows it to monitor their cost effectiveness on a continued basis. It has an inherent usefulness of measuring performance of managers and employees who are instrumental in applying new concepts, tools, methods and technology. Most of all, one can determine whether people in the plant and/or company are truly doing a good job. It is an illusion to believe that a single number should determine the "bottom line" for the company and that this number should be used to reward performers.

It is understandable that top executives are tempted to deal with single numbers. But the issue at hand is so complex that any single number might do more harm than help in evaluating performance. The least we can expect from corporate leaders is that they be able to interpret multiple indices and to direct a course of action which is meaningful for business, its employees and for the nation. This situation can be easily compared with a patient in the hospital wherein a doctor looks at several indices, such as blood pressure, temperature, pulse, weight, x-rays, etc. to determine a course of action that is best for the health of the patient. They do not insist on a single number to determine their actions.

TABLE - 1

MEASUREMENT OF PERFORMANCE

	January	February	March	Etc.
1. Business Indices				
a. Percent market share				
b. Profit/employee				
c. Profit/share				
d. Sales/employee				
e. Profit/unit of product				
f. Price/unit				
2. Productivity Indices				
a. Production hours/unit of product				
b. Maintenance costs/total sales				
c. Scrap costs/total sales				
d. Rework costs/total sales				
e. Product liability costs/total sales				
f. Number of design changes/year				
g. Testing costs/total sales				
3. Quality of Work Life Indices				
a. Absenteeism/week				
b. No. of employees changing jobs/year				
c. Accidents/month				
4. Quality of Life Indices				
a. Noise levels generated by products				
b. Pollutant levels in the air generated by products and/or plants				
c. Pollutant levels in the water generated by products and/or plants				

SUMMARY

The quality performance of a company and its management is difficult to assess by conventional "bottom line" measures, since they tend to describe short-term rather than long-term performance. Multiple sets of indices are recommended to adequately measure short- and long-term results. The authors have discussed these indices in four categories, namely, (1) Business Indices, (2) Productivity Indices, (3) Quality of Work Life Indices, and (4) Quality of Life Indices. It is necessary to simultaneously examine all of these indices to separate truly improved performance from manipulated improvements.

The three most popular approaches to improve quality and productivity are discussed, namely, the use of quality circles, statistical process control, and automation. A set of performance indices is included to determine their cost effectiveness on a continuous basis.

If any industry wants to begin the process of recovery from apparent setbacks in the marketplace /or prepare itself to face an oncoming momentum of foreign competition, it must learn to evaluate the true performance of its engineering and technological efforts. Corporate leaders are likely to act responsively once they know that "bottom line" definitions for reward have changed.

LCS: 344 10 000