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The Economics of Project Management

by John J. Flaig, Ph.D.

I have discussed this issue numerous times in presentations all over the country and my conclusion is, based on the response to my message, that many people just don't get it. So let me again sound the wake up call with a quote from Dr. Liebhold.

"One major point has been overlooked in most quality engineering publications: the overriding goal of companies within an industry is the maximization of profit to allow for reinvestment and further growth and profits. Indeed, whereas most research focuses on quality improvement and its related cost, it does not take into account the impact of quality on quantities sold and the sale price. Because the survival and development of a company depends on profit generation, reduction in costs is useless if it is not compared to its direct impact on revenues" [Liebhold, 2001].

To see where this insight leads us it is necessary that the relationship between the variables be established. The basic economic relationship is that profits equal revenues minus costs. In symbolic form: P = R – C. Assuming R and C are random variables and applying the variance operator to both sides of this equation yields:

$$Var(P) = Var(R) + Var(C) - 2\,Cov(R, C)$$

That is, the variance in profits equals the variance in revenues plus the variance in costs minus twice the covariance of revenue and cost. This simple equation will lead us to some interesting and perhaps surprising results. But first it is necessary to understand the covariance relationship. The covariance formula is:

$Cov(R, C) = \rho(R, C)\,\sigma(R)\,\sigma(C)$, where ρ is the correlation coefficient of the two variables and σ is the standard deviation. What does this equation tell us? First, since σ is nonnegative, $\sigma(R)$ and $\sigma(C)$ are both non-negative. Second, $-1 \le \rho(R, C) \le 1$. Therefore, if $\rho < 0$ then Cov(R, C) is negative, which implies that Var(P) will increase. Further, if $\rho > 0$ then Cov(R, C) is positive, which implies that Var(P) will decrease.

Now what does all this tell us about how to manage projects? The key insight derived from this analysis is that whatever projects are undertaken within a company it is critical that the relationship between them be evaluated. If they are synergistic (i.e., have a strong positive correlation, then success on one project will benefit the other projects, and it will increase profits and simultaneously reduce variation in profits.

On the other hand, if the projects are antagonistic to one another (i.e., negatively correlated), then the effect on overall profits is uncertain and the variation in profits will increase.

A recent issue of Quality Progress discusses the project management process and recommends that worthwhile projects should focus on management's Holy Grail – cost reduction or revenue increases [George, 2003]. However, there is absolutely no mention in the article that the relationship between the projects must be considered. In fact, based on thirty years of experience the author has never heard of an improvement team where the issue of project synergy was discussed. This is, of course, a fundamental flaw in the project management process and perhaps one reason why many projects fail to achieve their goals or have significant unplanned and undesirable consequences. For example, the project management team might find that one project that reduces cost also improves yield (e.g., Taguchi's tile DOE where the effects were synergistic) or they might find just the opposite. That is, a cost reduction project and a yield improvement project share a common variable (e.g., part tolerance) and using this variable to reduce cost causes the defect level to go up.

Two of the primary causes of the poor project management results are the silo effect of having projects run within functions rather than across them and the lack of understanding with respect to the importance of the functional, variance, and covariance relationships that form the basis of robust project management. Hopefully understanding the covariance relationship will improve project management results.

References:

Liebhold, V. S., Kimbler, D. L., and Gramopadhye, A. K. (2001). A Profit-Based Model Allowing for Quality Achievement and Manufacturing Process Selection. Quality Engineering, Marcel Dekker, Vol. 14, No. 1, pp. 25-32.

George, S. (2003). How to Speak the Language of Senior Management. Quality Progress, American Society for Quality, Vol. 36, No. 5, pp. 31-36.

Flaig, J. J. (2003). Improving Project Selection Using Expected Net Present Value Analysis. To appear in Quality Engineering.

John J. Flaig, Ph.D.
Managing Director
Applied Technology
Tel: 408-266-5174
E-mail: johnflaig@yahoo.com
Website: www.e-AT-USA.com