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MAY 2009

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The Metrics Pyramid

**PRIORITIZING
WHAT TO MEASURE
WILL IMPROVE DECISIONS
AND PROFITS**

BY TODD CREASY

So there we were with sodas, chips, pizza and the NFL playoffs on television. Some guys were smiling and some were not. Some guys were talking about various players and things like yards after catch, quarterback ratings, and yards after initial contact. I wondered on what planet had I landed. What happened to plain, old football?

Football has changed dramatically. It is a multi-billion-dollar business and with that change comes an intense curiosity about player performance, trends and statistics. All of this new football lingo is metrics.

But which football metric most accurately and frequently pointed to the most important metric of all—winning the game. The position coaches look at different metrics than the head coach. Yet, they all have the same goal: make it to the Super Bowl.

Everyone in the aggregate industry wants to be successful—owner, regional vice president, quarry superintendent, foreman, haul truck driver and frontend loader operator all have the same end goal. Winning in this world is making a healthy profit with no one getting hurt. However, some pay attention to a certain metric while others attend to a different metric.

Some ignore them completely. And some professionals are unfortunately monitoring the wrong metrics.

Ideally, an executive would like to view a set of metrics and know those people

working for the company were pulling the same rope in the same direction and that everyone's metrics were aligned, correctly measuring the pertinent processes and giving good information.

Those who manage by the numbers often are frustrated because they feel good about one number (such as availability) and feel bad about another (such as tons per hour). The lingering question continues: What metric will, with greater frequency and accuracy, indicate future profitability or success? While net income or the bottom line at the end of the year is the point of greatest interest, an early bellwether of that success may be the capstone metric.

A capstone metric, if monitored and managed, should produce healthy profits. Aggregate professionals measure costs such as fixed costs, variable costs and labor costs as a cost per ton. However, they should measure margin per ton and profit per ton. This is a central theme in getting to the ultimate answer of which metric will indicate future success.

Aggregate producers need an early-warning system and a capstone metric can be part of that system. Profit per ton can be that capstone metric for a quarry or group of quarries. Once established, the mine operator must determine which metrics have the greatest correlation with the capstone metric.

After studying more than 50 quarries on a monthly basis for a year and compiling more than 600 data points, it appears the best metric to indicate future profitability is tons per man-hour. This metric carried the highest correlation with bottom line profitability as measured by the capstone metric profit per ton. Top managers should pay particular attention to that metric if they are to maximize income.

These data points were subjected to correlation analysis and assigned a Pearson coefficient. The metrics with the highest absolute value, or Pearson coefficient, had the greatest relationship to profit per ton. The rankings were: tons per man-hour, .619; tons per hour, .387; plant availability, .339; downtime, -.317; and variable production costs, -.366.

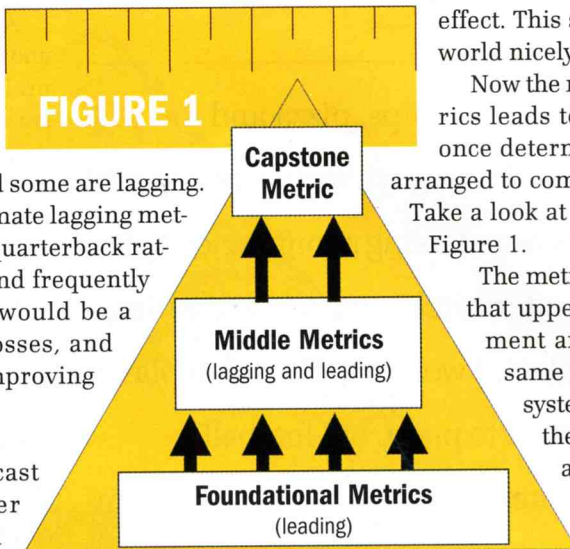
THIS DOES NOT mean that they should ignore other measures such as availability, downtime and overtime as a percent of total hours. These should be no more ignored than oil pressure, battery charge and water temperature on your vehicle in favor of the fuel gauge when making a cross-country trip.

Some aggregate executives swear by tons per hour, others attest to tons per man-hour, while still others

say availability or labor costs per ton are the greatest predictors of future profitability. Mathematically speaking, it's tons per man-hour.

Some metrics are leading and some are lagging. In the football example, the ultimate lagging metric is wins versus losses. If the quarterback rating indicates most accurately and frequently if a team wins or loses, that would be a leading metric for wins and losses, and teams would concentrate on improving it continuously.

BUT WHAT METRIC can forecast the quarterback rating? After some analysis it is determined that quarterback sacks per game is highly correlated to quarterback rating. If we concluded that quarterback sacks per game led to poor quarterback ratings, and those poor ratings led to more losses than wins, the natural response would be to decrease quarterback sacks per game and begin the positive domino



effect. This same model can fit the aggregate world nicely.

Now the next question is, which of the metrics leads toward tons per man-hour? And, once determined, how can those metrics be arranged to communicate and manage by them? Take a look at the metrics pyramid pictured in Figure 1.

The metrics pyramid is a system to ensure that upper management, middle management and operators are all pulling the same rope in the same direction. This system of metrics is broken down into the capstone metric, middle metrics and foundational metrics. Some are lagging, some are leading and some are both. Understanding the system, will help executives

see problems forming at the outset, respond to them and ultimately improve performance. This system is a proactive approach to management rather than a story-based, reactive management style.

The capstone metric should be included in a manage-

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