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## WHAT IS MEASUREMENT?

Mention “measurement” to someone, and they will usually think of some physical unit of measure such as feet, degrees, or grams. That is one type of measurement, but just what is measurement and what other types of measurement are possible?

Measurement consists of assigning a numerical scale to the size, value, or other characteristic of a tangible or intangible object. The scale could be as simple as 0 to 1 (bad or good), 0 to 10 (as in athletic competitions), or a logarithmic scale like the Richter Scale used to measure the magnitude of earthquakes.

The first characteristic to note about measurement is that all measures are relative. A measure that is not referenced to something else has no meaning. For example, assume a sales representative’s performance is measured by the percentage of prospects from a given group that make a purchase each month. For the first month he achieves a 53% score. What does this mean? Is this good or bad performance?

What if I tell you that six months ago, his score was 32%? The 53% figure now seems like a respectable score, doesn’t it? But what if I now tell you that the average score for everyone else in the sales force is 88%? The 53% score that seemed good a few seconds ago, now looks pretty sorry, doesn’t it? Clearly, without a reference for comparison, all measures are meaningless numbers. Consequently, if something is to be measured, one of the first considerations is what to use as a basis for comparison.

*“Nothing is good or bad but by comparison.”*

**Thomas Fuller**

## Measurement Standards

When the reference for comparison is an internationally recognized standard, such as grams, meters, seconds, or volts, the measurement will be called *standardized* measurement. Countable items such as dollars, defects, or late deliveries can also be considered standardized because everyone agrees what a given number represents. (This does not apply, of course, in the Land of Elastic Numbers, otherwise known as Washington, D.C.).

It should be noted that all of the international standards are purely arbitrary and have become accepted by custom and law. At one time, the standard for the yard was from the tip of the king's nose to the end of his outstretched hand. That supposedly worked quite well until the king died and was replaced by Shorty the Ninth, causing fortunes to be made and lost overnight. Eventually the English and metric systems of standards were developed to provide the stability necessary for trade. They are equally valid standards, although only a few backward countries like the United States still use the English system.

Where no accepted standard exists, the measure will be called a *relative* measure. A relative measure can be compared to itself at some other point in time or to the same measure in another system. For example, a customer satisfaction index will indicate a change in satisfaction with a company's products over time. If the products were toasters, a valid comparison could be made between different models, assuming the index was derived the same way at the same time. Trying to compare a company's satisfaction index with some other company's satisfaction index would be quite another matter, unless identical techniques and closely similar sample populations were used.

When using something other than a recognized standard as a basis for measurement, care must be taken to be sure any comparisons are valid. For example, a measured change in customer satisfaction would be questionable if the sample of customers used in the first survey had a much different income level than those in the second.

## Measurement Methods

Once a reference for comparison has been established, how the measurement is going to be accomplished must be determined. If the object or condition itself is measured, the measurement is called *direct* measurement. Measuring the length of a board and counting rejected parts are direct measurements.

The other way something can be measured is to measure its effect rather than the item itself. This is called *indirect* measurement. For example,

employee turnover and absenteeism can be indirect measures of morale. Even some physical qualities are measured indirectly. In a practical sense, using a meter to measure voltage is a direct measurement, but what is really being measured is the effect of the electricity, not the electricity itself.

Most indirect measures could more accurately be called *indicators*, because while they will show a change in a variable, they may not provide a reliable measure of the degree of change. For example, if a satisfaction index goes from 10 to 20, we can be quite sure customers are more satisfied, but it would not be correct to say they are now twice as satisfied as they were before. To avoid unnecessary complication, the term “measure” will be used for any number, including indicators, that relates to the size, quantity, or other property of anything.

### Measurement Techniques

The possible combinations of measurement reference and measurement method are shown by Figure 2-1. The standardized-indirect combination is interesting, because at first glance, it seems to be an impossible combination. However, scientists commonly use indirect techniques to measure physical parameters with magnitudes that stretch the imagination.

Which technique should be used? That all depends on what you need to know. If you have a piece of pipe about fifty feet long and need to know if it is longer than another piece located 1000 miles away, a standardized measure is needed (although you could use a relative measure

REFERENCE	METHOD	
	Direct	Indirect
<b>Standardized</b>	Measures of physical parameters and countable items	Determining physical measures by effects — deriving a planet’s weight from its effect on another’s orbit
<b>Relative</b>	Measures derived from countable items — complaints/sale, defects/car, inventory turns	Measures of qualities and abstract attributes— satisfaction, morale, helpfulness, kindness, honesty

Figure 2-1 Measurement Techniques

by sending a very long fax!). However, if the pieces are about two feet long and in the same room, all you have to do is hold them side-by-side to determine which is longer.

The choice of the measurement technique to use should be based on the following factors:

1. What questions must be answered?
2. What techniques are feasible for producing the measure?
3. What is the most economical and reliable method of making the measurement?

Regarding the questions to be answered, the more important questions managers have to address are

- How are we doing — are we getting better or worse?
- What are the short and long-term trends in performance?
- Did the changes we made improve performance?
- What's not working as it should?
- Which departments, managers, or supervisors need some help?
- Where are the largest opportunities for improving performance?
- Where should we be applying our resources for the most return?
- Which departments need additional people? Which ones have a surplus?
- Where can we expect to be in the next 3 to 6 months?
- What are the bottlenecks or limiting factors in our key processes?
- Where do we need to make radical changes to the way we do things?

For these and most operating questions facing managers, the change and trend in the value of a variable or its value relative to other variables is all that is needed to provide the answer. For that, relative measures will do the job very well. Whether direct or indirect measurement is used depends on the variable, the process, and the economics of the situation. Direct measurement is possible for most technically oriented measures. Both direct and indirect measures are generally applicable for softer parameters such as morale, attitudes toward various issues, and satisfaction.

Highly accurate, standardized measures are simply not necessary for the practical application of performance measures in the typical business environment.

## Measuring the Unmeasurable

Given the options available for measuring something, is it possible to measure anything? If the objective of measuring is to provide a precise, unequivocal number that will tell a manager everything he needs to know, the answer is “no.” But if the objective is to provide reliable and meaningful information, which will improve the quality of managers’ decisions, the answer is definitely “yes.”

Measuring intangible concepts is far more common than most people appreciate. The “quality” or “appeal” of television programs is measured by the Nielsen index; various surveys and indices measure “attitudes” of organizations, and customer satisfaction with a variety of products and services is measured every day. Obviously, most of this information must be useful to someone or they wouldn’t keep doing it. Even highly subjective factors like the quality of ice-skating and movies are routinely measured by knowledgeable judges in these fields. While someone may find fault with any particular instance, these measures are reliable guides once the user understands what they represent. For example, I find Siskel and Ebert’s “thumbs up” measure of movie quality to be generally on the mark for my tastes. Someone else may not find that to be true for their tastes.

In a broad sense, “measurement” means assigning a number to a property of an object. In the simplest case, a measure could have two values, zero or one. The values assigned to a variable can be established by means such as counting, measuring with instruments, panels of judges, and other methods. In addition to the characteristics already described, performance measures can be put into the following categories:

- **Qualitative or subjective** — When numbers on a scale are assigned by human judgment. This does not necessarily imply there is any bias in the measure.
- **Quantitative or objective** — When measures are derived from physical measurements or countable units.
- **Attribute** — When a characteristic, such as a defect, is measured as either being present or not.
- **Variable or continuously variable** — When the degree or extent of a variable is measured on a continuous scale. The dimensions of a table top are variables; dents are attributes since they are counted as either being present or not.

It cannot be proven, but I believe anything can be measured to a useful degree, especially in a business environment. If something can’t

be measured directly, it must have an effect, which can be measured. If a process has no intended effect, it is clearly not worth measuring in the first place. More specifically, any production process can be measured if what it is supposed to accomplish and how it works are understood. As a minimum, every process must have at least one customer whose satisfaction can be determined. How far beyond this point measurement can be taken depends on the process and other factors.

What do you want to measure in your business? Customer satisfaction? Employee satisfaction with management? Administrative productivity and quality? Productivity of research and development? Inventory system performance? Performance of a sales organization? Competitive position of products? Service department performance? Scheduling effectiveness? Employee buy-in to management initiatives? These and other outcomes are currently being measured by companies on a routine basis. However, as will be explained, it is necessary to measure more than outcomes to improve performance.

The real question is not whether something can be measured, but whether it is worth the effort and money to do it. It may require some creative thinking and changes in the way things are done in order to acquire the necessary data, but these are not insurmountable barriers.

*“Count what is countable,  
measure what is measurable,  
and what is not measurable,  
make measurable.”*

Sound advice, but these words did not come from some modern management guru. Their source is Galileo Galilei (1564–1642), who was apparently ahead of his time in more ways than one.

## SUMMARY

We usually think of measurement in terms of direct, standardized measures of physical properties such as length or weight. However, for the purpose of providing managers with information they can use to improve the timeliness and quality of their decisions, precise measurements are not required. For virtually all business decisions, direct and indirect relative measures are sufficient.

If a business activity is supposed to accomplish anything, its performance can be measured — providing how the process works and what it is supposed to accomplish are well understood. In the real world,

however, the understanding of customer requirements and how processes work is often very superficial. That is why implementing performance measures is, to a large extent, a learning process.

Measuring performance in a business is not always easy. It can be challenging, may require some creativity, and will probably involve some trial and error, but it can always be done.