

Furthermore, we know that research ideas are of no value until they are used by someone--in other words until they are communicated somewhere. The question is, where? In this regard, we must carefully examine the objectives or mission of the research organization in question. Is its objective to produce ideas that get into the basic fund of knowledge in a scientific discipline, or is its objective to produce ideas that can be quickly translated into applications in development or production segments of a larger organization? Or both? This question about organizational objectives seems obvious, and yet I would point out that it is often confused and not clearly specified by management in many organizational contexts.

Having determined the objectives that a research organization is supposed to accomplish, we can then begin to measure the extent to which it actually is accomplishing these objectives. Of course, one cannot measure ideas directly like one can measure tangible objects, but, insofar as we assume that ideas must be communicated somewhere before they are of any value, then we can begin to measure communications. The most obvious and common way to measure basic research productivity is to count publications contributed to the professional literature from an individual or laboratory group, assuming of course, that each paper accepted for publication by an editorial review board of a respectable scientific journal must contain at least one scientifically good idea, and maybe even two or three. But many will be quick to point out that this system has its faults, the main one being that it provides a crude indication of quantity of research productivity, but not necessarily of quality. There are additional ways to measure quality of research output, however. These include determining the number of times that research papers, once published, get cited by other scientists in papers that are published later, and also calculating the numbers of papers published in journals that are uniformly recognized by scientists as being top quality journals in their scientific fields, in comparison with numbers of publications in journals considered to be of lesser quality. In contrast, an indicator of applied research output may be obtained by examining the quantity and quality of in-house research reports. We are now investigating the usefulness of several of these measures of research productivity for laboratories in one part of the defense establishment.

The point I wish to make here is not that any of these admittedly crude measures is adequate by itself to measure either quantity or quality of research productivity, but rather that, in combination,

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