Firm Size and Innovation: A Comment

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The article by Alfred Kleinknecht (1989) on "Firm Size and Innovation: Observations in Dutch Manufacturing Industries" in the third issue of *Small Business Economics* is a very useful piece of scholarship. The central point of the article that central statistical offices underestimate the number of firms performing research and development (R&D) is similar to some calculations I have done for the United States, which will be in a forthcoming article.

However, there is a rather important ambiguity on page 216 of the article where it is stated that, "Response rates to our postal survey seemed to vary positively with firm size .... If our speculation on the relationship between innovativeness and rates of response is realistic, we have to be cautious when making general statements on firm size and innovation." These points are repeated on page 218. Since the article is primarily concerned with R&D and other efforts that are necessary to introduce discoveries into the marketplace, I presume that the author is of the school of thought that defines "Innovation" as the entire process, rather than the result of that process. He certainly has company using such a definition, although I do not think it is a particularly useful one, because the various components of the process are neither necessary nor sufficient, are quite heterogeneous, and often need to be analyzed and discussed separately. The use of the term "innovation" for the result of the process, namely the introduction of a new idea into the marketplace, and use such terms as "R&D" to describe the components of the process.

But even accepting the use of the term "innovation" to describe a process, there is a further ambiguity in the passage, because the term has (and always will have) quantitative connotations. If Kleinknecht only means that the average small firm is *less likely* to perform R&D than the average large firm, this is a documented fact, for the United States as well as The Netherlands. If he means that the average small firm is *less likely* to introduce an innovation into the marketplace, I strongly suspect this is also true, and could be estimated from the Edwards and Gordon (1984) data, by comparing the number of different innovating firms (by firm size) with the total number of firms by firm size in each industry. If Kleinknecht means that the average small firm has a lesser number of innovations, this is also true, and is documented in Edwards and Gordon. But if he means that the *number of innovations per employee* is less in the average small firm, this is contradicted by Edwards and Gordon, who found that innovations per employee are twice as great in small firms as in large firms in the 362 industries in question, regardless of the significance of the innovations and even when the number of employees in firms that did not innovate are included in the denominator.

Here we have four different possible meanings when the term "innovative" is used to describe one component of the process. I suspect that Kleinknecht meant the first, or possibly the second, which was correct in either case. But I urge him and other researchers in the field, to give up the idea of using the term "innovation" to describe the entire process that precedes it. If they want to stress the point that innovation is the result of a process, they can do so by stating it, repeatedly is necessary. Redefinitions of words in order to convey important truth can be confusing, and can make the research less accessible to others.

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