

Hippel: Sources of innovation

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Von Hippel: “It has long been assumed that product innovations are typically developed by product manufacturers. Because this assumption deals with the basic matter of who the innovator is, it has inevitably had a major impact on innovation related research, on firms' management of research and development, and on government innovation policy. However, it now appears that this basic assumption is often wrong. “

1. Overview

The functional source of Innovation involves categorizing firms and individuals in terms of the functional relationship through which they derive benefit from a given product, process or service innovation. For example Boeing is a manufacturer of aircrafts, but it is also a user of machine tools. In this context, Boeing has a functional role of manufacturer, but considering innovations in metal forming machinery, the same firm would be categorized as a user.

There are quite some variations in the source of innovation between the several innovations categories studied.

To understand the cause of the variations, an Economic Explanation can be made; it appears that innovating firms could reasonably anticipate higher profits than non-innovating firms.

Understanding the distributed Innovation Process: Know-how trading between Rivals in a general and significant mechanism, that innovators can use to share (or avoid) innovation-related costs and profit with rivals.

Managing the distributed innovation Process: Predicting and shifting the sources of innovation. Prediction of sources of promising commercially innovation is possible. By shifting managers may shift sources by manipulating variables under their control, such as product design.

Implications for Innovation Research: firms may join others to develop innovation cooperatively. Others can be vertically integrated or have multiple functional roles in the same organization.

Implications for Innovation Management: R&D departments in-house (including market research department) or not (when there is another supplier) Firms organize around the assumption that new products are developed by the firm that will manufacture them for commercial sale.

Implications for Innovation Policy: attempts to direct or enhance innovation must be based on an accurate understanding of sources of innovation. Policies have to be changed if some categories start falling behind. If equipment builders start falling behind and if the user-categories themselves fill this up, equipment makers should start helping the users to start innovating at the edge again.

2. Users as innovators

The sources of scientific Instrument innovations: Hippel studied four important scientific instruments and their innovations. Out of his study came that 77% the developers were users (based on the First-

of-type), not the manufacturers etc. So users are indeed the innovators. Innovating users were mostly researchers employed by universities (given the instruments users were university scientists).

The sources of semiconductor and printed circuit board assembly process innovations. To see this was not only the case in this very specific instrument field, Hippel conducted a second study in the more “normal” field in semiconductors and PC boards. Also here users developed all the process machinery innovations involved in the initial process steps and more than 60% major and minor improvements, but there is a modest amount of joint user/manufacture innovation activity. In contrast to the scientific innovations, users of process equipment innovations may have an incentive to hide their achievements for a competitive advantage.

The user dominated innovations Process: The product user, not the manufacturer, recognizes the need, solves the problem through an invention, builds the prototype and proves the value of it. This is in contrast with the literarily findings that the development process is directed to manufacturers....

3. Variations in the functional source of innovation

Users as innovators: Pultrusion (a valuable process for manufacturing fiber-reinforced plastic products of constant cross-section)

Hippel found that users sometimes innovate and studies the question if they always do, or if it is an innovation vary between users, manufacturers, suppliers or others. All pultrusion process machinery innovations are made by machinery users. These firms did not have R&D departments and most innovations were made by low tech people inspired to innovate when a large order came in to make the process more efficient.

Manufacturers as innovators: The Tractor Shovel

In this field most of the innovations were made by the manufacturers. Those were the firms who would make special attachment to the tractor shovels and similar machines.

Manufacturers as innovators: Engineering Thermoplastics

In this field there is a strong manufacturer-as-innovator pattern. Most of the plastics were developed by plastic manufacturers. More than 90% of the plastic additives innovations in Hippels study were developed by firms that manufactured them.

Suppliers might develop an innovation that they did not expect to use or sell if that innovation would result in a large increase in demand for something they did want to sell. Two categories are candidates:

1. Supplier/Manufacturer as innovator: Wire termination equipment
The machine builders were de developers of almost all process machine innovations that did not involve attaching a connector to a wire. Those were developed (and manufactured) by the major connector suppliers
2. Suppliers as innovators: Process equipment - Utilizing industrial gases and thermoplastics
Two types of process machinery for evidence of supplier innovation i) process machinery that used a large amount of an industrial gas as oxygen or nitrogen as input and ii) process machinery that used a large amount of thermoplastic resin as input. Firms, materials

suppliers, had only a materials-supply link to the process innovations, they did not manufacture or use the machinery they had developed.

Additional evidence on Nonmanufacturer Innovation

Hippels study finds that the functional source of innovation differs across several types of product and process innovation. But also in studies from Corey, Shaw Everett M. Rogers give evidence on nonmanufacturer innovation.