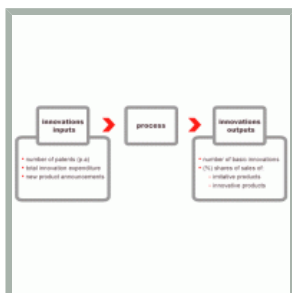


## corporate innovation indicators



### characteristics

author:	Kleinknecht, Alfred
country:	Netherlands
period:	1992
type:	model
role:	consultant, change agent and manager
activity:	analyse, design and reflect
topic:	innovation & risk and finance & accounting
abstr. level:	organisation
perspective:	transformational
status:	under review
module:	innovation
comments:	0

### related models

diffusion of innovations
five generations of innovation
invention innovation diffusion trilogy

### description:

Alfred Kleinknecht graduated in economics at the Free University of Berlin in 1977 and obtained a PhD in economics at the Free University of Amsterdam in 1984 where he was a professor of Industrial Economics from 1994 until 1997, then professor in the Economics of Innovation at TU Delft. His study focuses on economics of innovation and his expertise comprises the determinants of innovation, innovation and economic performance and labor markets.

Kleinknecht was responsible for national surveys on industrial innovation in the Netherlands in 1983, 1988 and 1992. He belonged to the research team that developed the Community Innovation Survey (CIS) that collected microeconomic data of various firms in Europe on innovation and was involved in the development of the OECD Oslo Manual on innovation measurement. In the early 1990s, he also coordinated a European network for the development of 'Literature-based innovation output indicators' (LBIO) supported by the Institute for Prospective Technological Studies at Ispra (Varese, Italy).

In his article, "The Non-Trivial Choice" (2002), Kleinknecht discussed the strengths and weaknesses of most commonly used innovation indicators:

1. R&D spending (measured as a percentage of a firm's total sales) and
2. Number of patent applications per annum.

He stated that using these traditional methods exclusively shows severe weaknesses in assessing innovativeness of organizations since it oversimplifies a firm's actual innovation processes. Instead, he stated the need to unify the existing parameters with new and more insightful ones. He defined these alternative innovation indicators as:

- Total innovation expenditure;
- Shares in sales taken by the imitative products;
- Shares in sales taken by the innovative products;
- New product announcements in trade and technical journals;
- Significant (or basic) innovations.

However, there is a distinction between innovation indicators and innovation success measures. The former is used as an input to measure the innovation activities of the firm while the latter implies the output factors after the introduction of an innovation into the market.

### TOTAL INNOVATION EXPENDITURE

As opposed to annual R&D spending, 'Total Innovation Expenditure' in the given time period is monitored by type of expenditure, by the size of the enterprise, and by its core economic activity (industrial classification). The type of expenditure is comprised of four components:

#### 1. Internal R&D, external R&D results, purchase of machinery and equipment

This parameter is measured in terms of the existence and number of advanced machinery, and computer hardware purchased with a view to new or improved product/process implementation

#### 2. Acquisition of other external know-how

This parameter is measured in terms of the existence and number of patent rights and unpatented inventions, license agreements, trade marks, software and other forms of intellectual property from various entities whose purpose is their utilization in the innovation process.

#### 3. Training

Measured in terms of the existence and number of internal and external education programs for employees directly designated to develop and/or implement innovation

#### 4. Design and other forms of production/delivery support

This parameter is measured in terms of the existence and number of technical support and procedures leading to the actual product and process innovation.

### SHARES IN SALES OF INNOVATIVE / IMITATIVE PRODUCTS

This category assesses the degree to which the innovations made within the firm are radical or incremental. To assess this distinction, the innovations are categorized into three dimensions according to the firm's present product range during the last three years as having:

- remained essentially unchanged;
- undergone incremental change;
- subjected to radical change or introduced to the entirely new.

Next, the total sales of the previous year are compared with the degree of change of products/services within the company offered during the current year.

### NEW PRODUCT ANNOUNCEMENTS

New Product Announcements is considered as an input when measuring the innovativeness of a company. Some consider it as an innovation output because it is a quick and dirty way of presenting numbers. However, until its success is proven by the market, the patents or the product announcements can only be used as an intermediary variable.

On the other hand, collecting new product announcements from trade and technical journals is a fast way of collecting information. The data is relatively cheap to gather, process and present. This variable gives insights into how the differences in firm size, market structure and innovation are related to each other thus providing a comprehensive picture of local innovation activities compared to general R&D figures.

### BASIC INNOVATIONS

The distinction between basic and applied research is made by the diffusion of innovations. Basic research is the

The cluster-hypothesis claims that the diffusion of innovations tends to coincide within the same time frame, thus leading to an overlap between the phases of growth and saturation of major new technologies in their product lifecycle.

Data on fundamental or basic innovations have mainly been used in an historical context since not all the innovations belong to the same category of "newness". The basic innovations such as the railway boom in late 1840s or the petrol engine driven expansion in post WWI period up to 1970s, depart from established systems of production, and in turn open up new linkages to markets and users.

Therefore, counting and clustering the basic innovations that take place within the firm and the industry in which the firm operates, may indicate paradigm changes and can be used as a guide for the technological development in the medium and long term.

Although there is a vast literature available on measuring innovation success on an industry level, explaining innovativeness in a quantitative context on the level of a firm, has been shallow until recently. As the awareness of constructing public policies to steer innovation processes at European firms' increases, quantitative measures are being created and incorporated into conventional innovation indicators. Thus, the innovation output measures on the national level are made operational for monitoring and stimulating innovation activities on the firm level using Kleinknecht's quantitative innovation indicators as a logical next step for companies who wish to sustain their innovativeness.

#### assets:



innovation indicators

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#### pros:

- The new parameters offered by Kleinknecht are useful because they offer a quantitative method to measure innovations at the company level. Furthermore, distinction is made between innovation inputs and outputs to eliminate the vagueness of the innovativeness concept.
- The new parameters integrated with traditional factors show a comprehensive picture of a firm's activities and provide guidelines to managers to set their innovation agenda on the basis of the used measures.
- By offering a better, more detailed understanding of the process of innovation, the new parameters enable greater control over the innovation process as a whole and help close the gap between the firm's innovation strategy and its business performance.

#### cons:

- The model gives insights in controlling the overall innovation process in the firm by looking at innovation inputs and outputs, but fails to open the black box of innovation processes within the firm. It tells what, but not how.
- Many problems arise from measurement issues since many firms either do not systematically keep such records, or are short on selecting the appropriate material and/or experts to structure their innovation processes. Therefore, research may be biased with respect to selected journals' publication policies, to the firm's public relations policies and to the judgments of the experts.
- Figures on shares in sales of innovative products in the firm may be sensitive to the life cycle of a firm's products that tend to be different from one another. Furthermore, the inter-sectoral technology flows are difficult to track especially when the same technology may have different life cycles in different industries.

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