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METHODS USED TO DEFINE PERFORMANCE EVALUATION OF INNOVATIVE PROCESSES AND PRODUCTS

Summary: The article proposes an approach whereby the dynamics of the innovation potential is tracked with two groups of KPIs: innovation process effectiveness KPIs and innovation infrastructure efficiency KPIs. Appraisal of innovation activities, performed via this system of KPIs, allows for an all-embracing analysis and drives effectiveness and efficiency of innovations.

Key words: innovation, evaluation, innovation time to break even, innovation infrastructure.

1. Introduction

An objective evaluation of innovation activities allows gaining the most out of innovation implementation, as it reveals inefficient projects and encourages management to concentrate on those innovation and investment projects that are the most profitable. Thus, according to the research results presented by PricewaterhouseCoopers consulting company [Хомутский 2006], almost half of top management of 355 North American private companies are trying to evaluate innovation using numerical indicators. They measure the success of innovative solutions using the following criteria: the impact of innovation on revenue growth of a company (78%), customers' satisfaction (76%), revenue growth from sales of new products (74%), the increase of productivity (71%) and the increase in profits through implementation of new products (68%).

2. Justifying importance of innovative projects evaluation

Issues related to the development of quantitative indicators of innovation analysis and evaluation are quite relevant as the system of quantitatively measured parameters is a reasonable numerical basis for management decisions at all the stages of

an innovation and investment process. Furthermore, profit growth due to a profitability factor of innovative projects or an increase of company value driven by developing innovative image and positive evaluation of the strategic perspective can be both quantitative guidance and justification for future innovation activity. Quantitatively measured parameters can help reasonably allocate resources for different activities, including an innovative component. And finally, the indicators of innovations presented in a comprehensive form, motivate employees to work effectively, allow introducing innovations in the operating process, and establishing connection between those who generate new ideas, and those who implement them.

However, the methods of the effectiveness of innovation evaluation vary depending on many factors: strategic and operational business objectives, availability of material and technical resources, etc. Accordingly, there are a lot of different approaches to evaluating the effectiveness of innovations (though most scholars and practitioners agree on the necessity to measure a numerical, monetary effect of innovation).

3. An analysis of research in the field of innovation.

A retrospective analysis and an analysis of current approaches to innovation

Exploring the question of assessing innovation, we want to note that this subject was certainly topical and relevant in earlier periods as well. In the 1980s in the Soviet Union conducting the evaluation of the innovation in the following three areas was suggested: the first one included a system of activities and measures aimed at creating scientific and technological momentum driven by research results; the second direction includes the activities of the modernization of products previously released, and the third area – the task of rapid improvement of techniques, technology and organization of main and auxiliary production [Бубнов 1986, pp. 35–36]. The effect of cumulative management of innovation could not be treated as a sum of effects of separate measures, a number of which reach several hundreds or even thousands per year. This entails an urgent necessity of a systematic evaluation of individual directions and groups of organizational and technical measures based on different criteria of the efficiency of production and economic activity of industrial enterprises.

Among the current approaches to the evaluation of innovation used in international practice, special attention should be paid to the methodology developed by Boston Consulting Group, under which the evaluation of the innovation of development is proposed within the following groups of indicators:

- 1) input metrics:
 - number of generated ideas,
 - resources allocated to innovation – people and budget;

- 2) process metrics:
 - average time from idea approval to implementation,
 - numbers of approved and implemented ideas ,
 - stage-gate pass rates,
 - value of the innovation pipeline;
- 3) output metrics:
 - number of new products or services launched,
 - revenue from new products or services,
 - ROI on innovation spend,
 - market perception,
 - number of new customers.

The British Quality Foundation carried out an innovation metrics web survey, which shows that the most common measurements are backward looking, e.g. % of revenue from products released in the last two years. The BCG report recommends that one should select a small number of metrics appropriate for one's business and have some for inputs, processes and outputs.

Research among major multinational corporations shows that international practice most commonly uses the following indicators [Хомутский 2006]:

- an annual budget for new developments (R&D);
- percentage of budget for new development within the annual revenue;
- the number of patents that are received by a company during a reporting period;
- the number of innovative proposals received from employees during a reporting period.

However, the disadvantage of the system's performance is inability to measure the potential of company's innovation. As we can see, these figures are rather focused on measuring effectiveness, but they do not take the innovative potential of enterprises into account. We believe that in the current economic conditions the dynamics of the innovation potential of enterprises should be monitored in the strategic scale, using two sections of indicators: performance evaluation of innovative processes and products, and performance evaluation of innovative infrastructure (see Figure 1).

3.1. Level of the development and implementation of product innovations

The analysis of this area is carried out with the following indicators:

- a) ratio of product mix upgrade (share of revenue and profit from the sale of new products (and services), introduced during the last year) – this is one of the most popular KPIs used by the organizations leading in innovations;
- b) duration of development, deployment and market launch of new products;
- c) share of new products, which are returned for rework after initial tests on the market (including the cost of lost sales);
- d) time to achieve the break-even point for a new product.

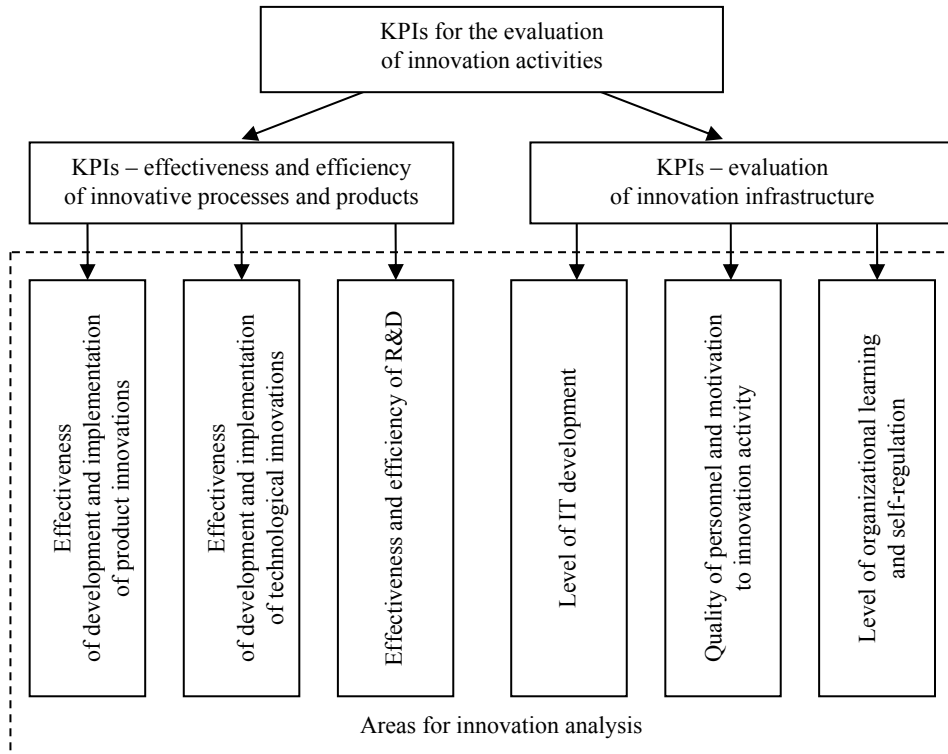


Figure 1. Classification of KPIs for the evaluation of innovation performance

Source: author's own work.

In terms of the evaluation of innovative processes, special attention, in our opinion, should be paid to the time to achieve the break-even point (BET – break even time), developed by Hewlett Packard for the evaluation of the effectiveness of a full cycle of new product development. BET measures the length of time from the start of new product development until revenues from the sale of products start to cover the investment into R&D (see Figure 2).

Thus, BET does not only consider the income from the sale of new products, but also R&D expenditure, i.e. it measures the efficiency of new product development. Furthermore, BET emphasizes product profitability, i.e. the results and efficiency of its design and development, which encourages all functional departments to optimize costs along the entire cycle “design–development–production–distribution”. The third important feature of the BET indicator is that it is measured in time units, which stresses the need for more timely commercialization of products vs. the competition and securing sustainable growth of its sales and profitability as the basic conditions of competitive advantage.

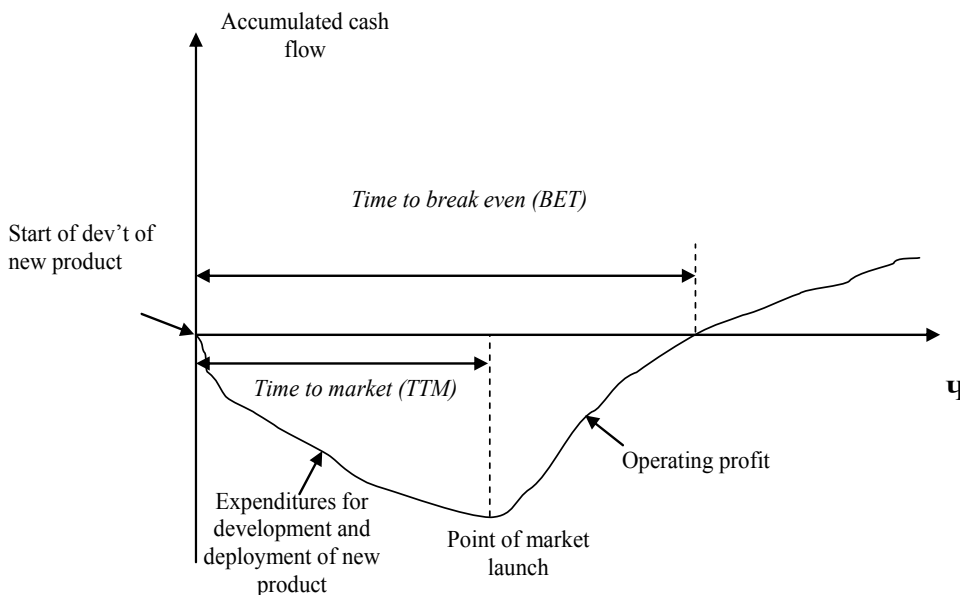


Figure 2. Graphic representation of BET measure

Source: Atkinson [1997, p. 566].

Since the actual meaning of the time to break-even for a project only becomes known after the completion of the process of the development and market launch of a product, the BET measure is more appropriate to be used as a diagnostic, leading rather than resultant, lagging indicators. It is difficult to obtain a consolidated value BET on numerous projects, since this value can be significantly distorted by a single unsuccessful project. It is also noteworthy that the breakeven point can be fast-tracked by sales of existing products with slight modifications rather than through a technological breakthrough; hence, it is recommended to balance BET with KPIs of the level of product innovativeness (e.g. by monitoring the share of the sales of gross margin generated by brand-new products, or the timing pattern of newly launched products;) as already noticed, small product modifications experience a short life cycle and fast decline in sales dynamics).

3.2. Level of development and implementation of technical and technological innovations

This area of analysis is related, primarily, to study the effectiveness of innovative technologies, which depend heavily on the quality of assets involved in a technological process. Thus, we propose, in this context, examining the following indicators:

- a) rate of technology upgrade (percentage of processes that correspond to the world level of technological progress);
- b) proportion of obsolete equipment;
- c) rate of the upgrade of the active part of fixed assets;
- d) percentage of progressive equipment in the structure of fixed assets.

3.3. Effectiveness and efficiency of R&D

The analysis of the area is done with the following measures:

a) Return on Innovation Investment (ROI I) can be used both as a measure of success for completed projects and projects that are in a preparation stage for implementation provided that projections are available for revenue growth or cost reduction. In general, the formula for calculating this indicator looks as follows:

$$\text{ROI I} = \text{Income from innovation} / \text{Cost of innovation.}$$

We should note that the financial result can be reflected, e.g. in incremental income received by a company from the sale of new products, or the reduction in transaction costs of production or services, or profit from the penetration of its products into a new market segment, etc. Using this indicator emphasizes the importance of not only a technical but also financial side of innovation.

b) Indicator of the utilization of own developments is the ratio between the number of won developments implemented vs. The total amount of developments

c) Ratio of own and purchased developments.

d) Innovations spend per one patent.

Apart from the analysis of the indicators related to innovative processes and products, a full assessment of innovation requires an analysis of the performance of innovation infrastructure, which will be done in future research. We must note that innovation infrastructure certainly is an important prerequisite and foundation of effective innovation activities.

4. Conclusions

It is recommended to analyze innovation activity with the two groups of indicators: KPIs of innovation process effectiveness and KPIs of the level of innovation infrastructure. This approach will allow for a comprehensive analysis of innovation activities.

Particular attention should be paid to the indicator of achieving the break-even point for new projects and the indicator of innovation time to market. Most companies also consider as important the profitability of innovative activity, whose calculation specifics largely depend on particular activities, the length of project implementation, the cost of funding involved, etc. Most of other indicators suggested in this article are advisory by nature and can be applied in business enterprises as presented or in a partially modified form.

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METODA OCENY SYSTEMU WSKAŹNIKÓW FUNKCJONOWANIA INNOWACYJNYCH PROCESÓW I PRODUKTÓW

Streszczenie: W artykule zaprezentowano badanie oceny innowacyjnej aktywności i zaproponowano podejście zakładające, że innowacyjna aktywność jest analizowana w dwóch grupach wskaźników, tj. w grupie wskaźników oceniających wydajność procesów innowacyjnych i w grupie oceniającej innowacyjność infrastruktury. Ponadto w artykule zaproponowano metodę obliczania niektórych parametrów z pierwszej grupy i udowodniono ich znaczenie analityczne.

Słowa kluczowe: innowacja, ocean, czas do osiągnięcia progu rentowności przez innowację, infrastruktura innowacji.