

4.2. The managerial decision support in innovation cost management

Labunska S.V.

Current conditions and requests of global socio-economic environment provide a new conceptual framework of human development, that has determined the main priorities of innovation development of the world economy on the basis of scientific and technology platforms formation that ensures the most efficient use of natural, material and technical, financial, intellectual and human resources for the development of the productive forces of national economies. In the context of harmonious entry into the global economy Ukraine faces tasks of ensuring international competitive-ness of the country, which should be based on the use of the latest scientific researches, innovative approaches to the management and production processes and the convergence of intelligent life in the conditions of building partnership relations between regulatory agencies and actors of real sector economy. Innovative changes in the economic system create a so-called internal energy of economic growth [5]. These changes violate the achieved balance and equilibrium; however, create the basis for economic growth of transition to a new qualitative state. In this sense, generalized challenge of innovation activity management (IAD) is to ensure the transition to a new economic system balanced state.

Scientific publications of Aaker D., Atikson A., Wieser F., Kaplan P., Schumpeter J. and Cooper R., Kozachenko G., Rubinstein E., Golov S., Napadovskaya L., Cherep A. et al. perform the base for further researches aimed on definition and further development of conceptual frameworks of organizing and operating of a company cost management system.

While studying the common problems of cost management, the author agrees with the position Kozachenko G. who defines the main purpose of administrative influence on the object not as much the cost minimization and optimization of the process of economic activity but as improving the efficiency of their use [1 p. 8], a similar approach to management objectives follows the vast majority of scientists. Grishko N. considers the organization model of innovation activities cost management (IACM) and emphasizes the lack of scientific unified approaches to models, or at least concepts of operation at the

level of strategic management at the same time as problems of innovation cost management are presented in a large number of scientific surveys.

The author follows the position that the most reasonable at the strategic level model is cost-forming factors model developed mainly by F. Scherer [6], R. Cooper [5], R. Kaplan and Atikson A. This model allows to generalize estimated aggregated expenditures, aimed to ensure the functional and structural manifestations of CMS and IACM as its sub-systems. This structural dependence of the cost in strategic management should play a decisive role as it highlights the dependence of the current and future costs of the enterprise effectiveness of their previous (or planned for the future) periods using structural and performance leverage. Moreover, considered approach makes it possible to consider the conceptual basis for building IACM, distinguishing structural costs in accordance with the defined priority functional manifestations system. Thus, the total cost of the system must equal the total combined costs of the structural subsystems of accumulation.

Socio-economic system inherited tendency of recurrence of development. Noting the presence of both exogenous and endogenous cycles in the dynamic economies, most of scholars focus on the actions of inside company's system. For using a systematic approach in the study of economic phenomena and processes is the social and economic structure it is seen as the first level of the system and all other systems within their existence have a deep level of hierarchy. The common unifying foundation has a basic recognition of endogenous cycles of nature and concentration of causation on the internal dynamics of economic systems of each hierarchical order.

In the plane of innovation of the highest level of the hierarchy, national innovation system has a decisive influence on the internal dynamics of subordinate economies. Analysis of statistical indicators of the national NIS status and development shows that despite of the desire of Ukraine to gain innovative economic development, institutional environment does not provide sufficient incentives and economic leverage to innovative changes implementation, this conclusion is also confirmed by the rating of Ukraine's position regarding the innovation economy, shown in fig. 4.3, built by the author based on data of the World Economic Forum [7].

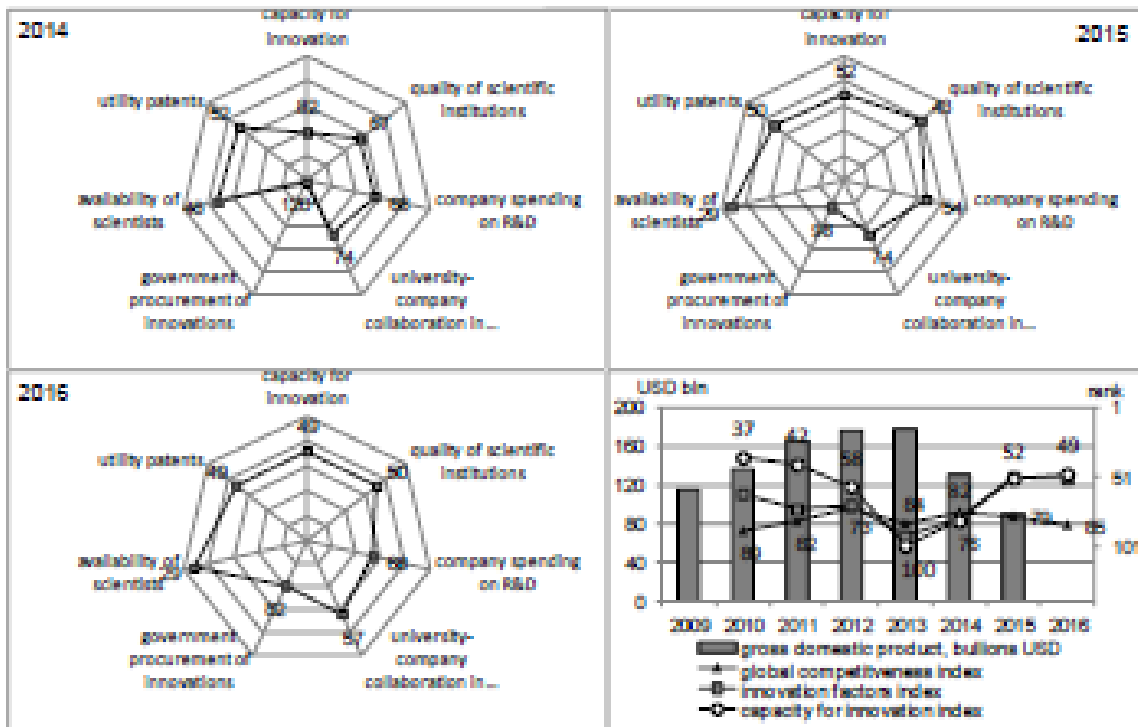


Figure 4.3. Global ratings of Ukraine by economy competitiveness innovative factors

The sizes of polygons, shown on fig. 4.3, underpin conclusion about the gradual increase of innovativeness of the national economy in 2016, as nearly all components of the indexes have positive trends, but their value compared with the characteristics of the most competitive economies in the world remain at a level that requires further improvement. Among the factors affecting the competitiveness of Ukraine's economy in 2016-2017 the experts of the World Economic Forum [8, p. 350] marked the following: corruption (14%), political instability (13,2%), inflation (11,9%), ineffective system of public administration (11,4%), lack of sources of financing (11,2%), poor ability to innovate (1,6%).

In the year of 2015 according to the State Statistics Service of Ukraine 824 (in relative terms – 17,3%) industrial enterprises (for comparison, in 2014 – 16,1% in 2011 – 16,2%) [4] were engaged in innovative activities. Despite of positive growth during 2008-2015, of innovative companies share, their number has not reached the level of 2000-2003's., and in 2014 again demonstrated a decrease, due to external negative factors effected business located on territories that by results of the conducted study [4] were

related to industrialized and innovation active re-gions. Also, the negative trend of the structural development of industrial production in the context of increasing innovation and competitive-ness of domestic enterprises is observed in the analysis of the absolute index and share of innovative products sales (SIP) in the total volume of industrial products (fig. 4.4).

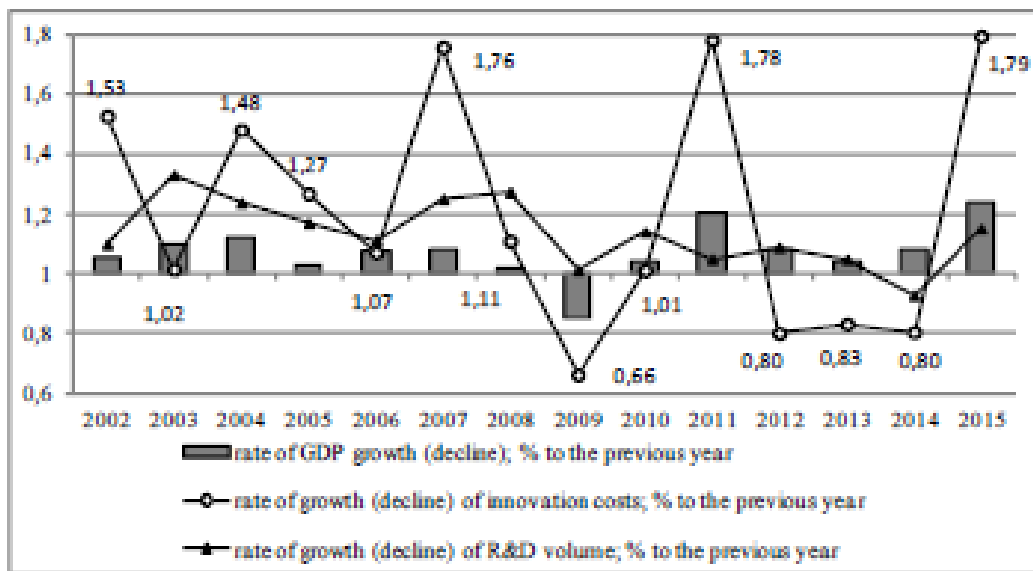


Figure 4.4. The rates of GDP, costs and results of innovations [4]

The analysis of the dynamics of the innovation costs share in GDP total describes existing innovative potential of the country and allows drawing conclusions about Ukrainian economy losing its competitive position in world markets over the past five years. So in 2014 this figure fell to 2,5%, in 2015 – fell to 1,4%. In 2015 the number of companies that have implemented innovative products decreased to 570 entities, the annual rate of the decrease (62,98%) was significantly ahead of the decrease in the total number of industrial enterprises (47,6%). The volume of innovative products sales was 23,1 billion UAH, most enterprises (86,0%) implemented the innovative products, not new to the market, but only for the company. Thus, in 2015 the proportion of SIP in industrial production dropped to a record from 2000 level – 1,4%, down from the previous year to 1,79 times, from the year of 2000 – in 6,7 times.

The increase in total spending on innovation in 2015 was accompanied by significant change in the structure of funding sources (fig. 4.5). The state budget financed 6,25 times less innovation costs than in previous year, the amount of own funds spent on innovation by business increased by 2,05 times and reached UAH 13 427 million, its

share was in 97% in the total cost. In the structure of expenditures for R&D labour costs take the major part (in 2015 – 44,8%), while material costs, capital and other costs are respectively 28,4%, 2,8% and 24,0%.

Thus, own funds of enterprises in Ukraine had become almost the only source of funding innovations, due to this tendency the effectiveness of cost management as the only source aimed at ensuring innovation in the overall system of economic activities of enterprises as a priority.

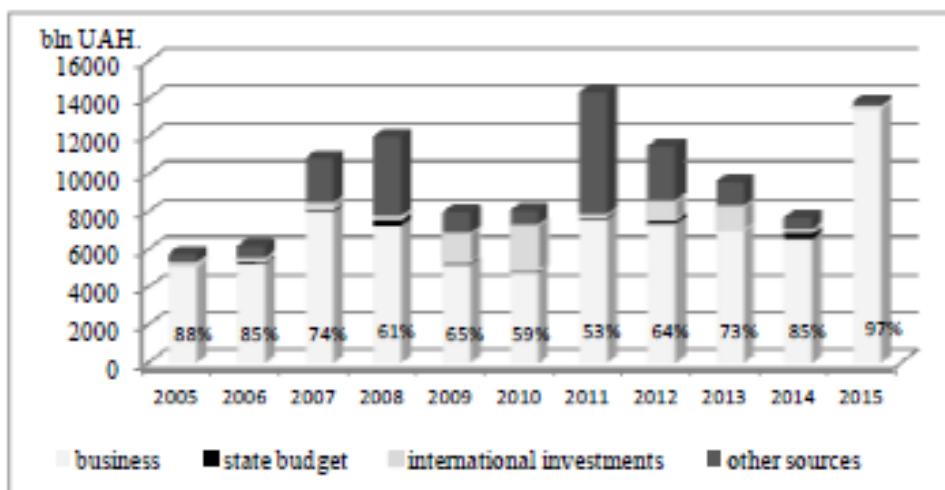


Figure 4.5. Dynamics of spending on innovations by funding sources [4]

Implementation and management company innovation activity is primarily settled in determining the direction of innovation development of the subject, based on the type of election innovative implementations based on its innovative capacity (IC), with the overall objective of the chosen innovation horizon managerial influence business plan, as to other types of economic activity and the formation of the overall portfolio of innovative projects that can be implemented in a specified period.

Innovation activity (IA) management on project basis can agree the goals and objectives within the innovation process and between IA and other types of enterprise's economic activity. Moreover its basics has direct signs of different approaches to the management of the impact, including the costs management and «construct» their level of operational management in general innovation activity cost management (IACM) which should be built on linear hierarchical managerial approach influence of the system of innovation activities management (IAM) and the overall management system that makes

the coherent development of systems effective and maximizes consumption expenditures of innovation.

It has to be mentioned that the election towards innovative development involves primarily selection the kind of innovative implementations for which the company forms portfolio of innovative projects. The selection and implementation of such projects should be based on the development and analysis of scenarios, on the terms and commercialization the results of their use within a single innovation management system and its subsystem IACM with the company's peculiarities. The scenarios selection process and determination of the total innovation expenditures in the period visualized in fig. 4.6 and fig. 4.7. Compliance with the selection of innovative projects for implementation and determining total expenditure in the period is realized through consistent application grids selection process for the main unit (fig. 4.6).

The main objective of the company in the implementation of the processes defined in the first block (fig. 4.7) is to select the kind of innovation and innovative projects portfolio formation for each individual type of innovation that can be based on the implementation of assessment and analysis:

- directions, objectives and performance indicators of IA, based on the analysis of external factors and general economic objectives of the enterprise;
- level of innovation capability of the company (IC) that was formed in the previous period (method developed by the author [3]);
- maximum allowable expenditure, based on cost-sharing in the overall object-oriented cost management system of enterprise with the needs of other activities.

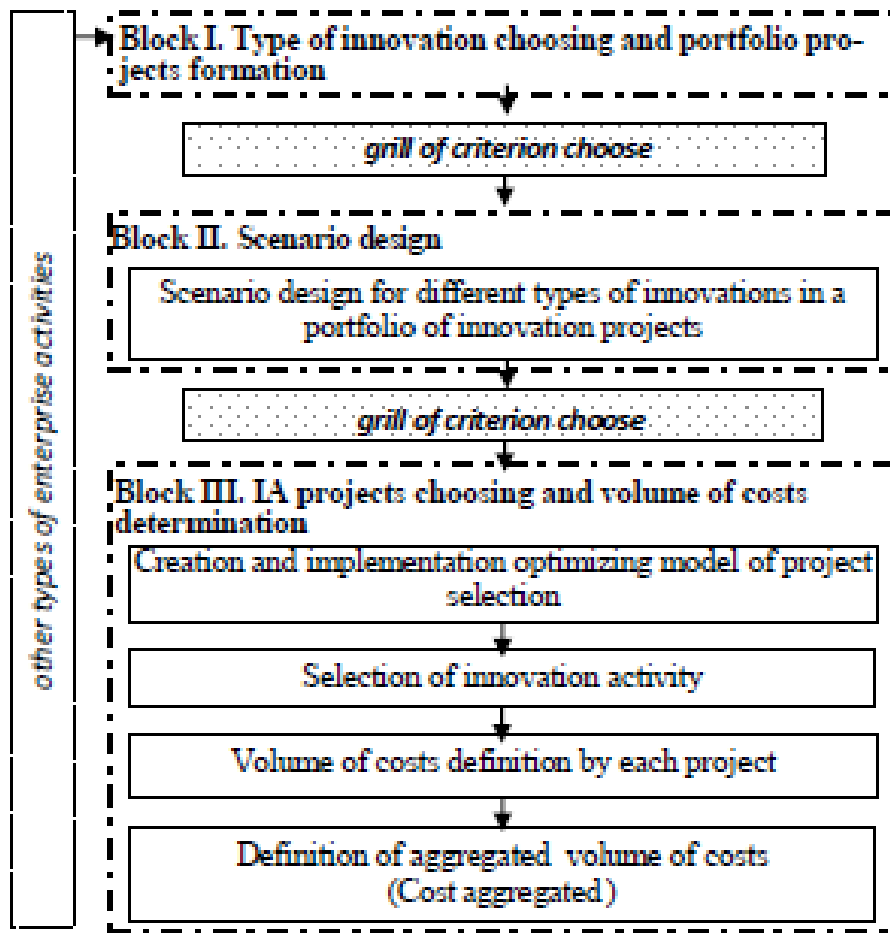


Figure 4.6. Scheme of innovation activity's volume of costs definition in the frame of project management

Enforcement tasks are implemented by the use of lattice selecting a variety of indicators of the implementation of management functions, aimed at the transfer of relevant characteristics of the system innovation in the new state of the results of innovation [3].

Formally, the overall process of innovative implementations selection (block 1, figure 4.6) can be described as a tuple:

$$U^x \{ \tilde{\eta}0: (K0, E0, N0, \Omega0) \} \rightarrow P1 \{ \tilde{\eta}1: (K1, E1, N1, \Omega1) \} \quad 4.3$$

where U – set of functional impact of the subject-oriented enterprise management systems, aimed at the set of objects, which makes dynamic response and transfer facilities in the new state at the end of the period;

$P1$ – grill selection parameters that characterize the new state of enterprise;

$\tilde{\eta}0, \tilde{\eta}1$ – feature that reflects the set of states of object-oriented plane (OOP) management influence at the beginning and at the end of the period;

$K1,0$ – OOP indicators that can be clearly reliably estimated on the basis of statements and selected on the basis of cognitive approach, systematization of which is made by processing the results of expert analysis of experienced professionals at the beginning and end of the period, respectively;

$N0, N1$ – OOP indicators that can be clearly and reliably estimated on the basis of statements and selected on the basis of normalized (formalized by the method) selection at the beginning and end of the period, respectively;

$E0,1$ – indicators that include verbal characteristics of the system and can be included in the proceedings of the plane, based on the use of fuzzy logic methods beginning and end of the period, respectively;

$\Omega0,1$ – the level of influence of random factors unpredictable threats of external and internal environment at the beginning and at the end of the period, respectively.

The final step of processes as summarized in fig. 4.6. is the process of determining the total cost that company has to accumulate for implementing each of the innovation according to its IC, which may vary depending on the innovation changes.

To determine and compare IC by product, process, organizational and marketing innovations, it is suggested to use matrix (*Mic*) or, for more detailed analysis, the expanded matrix (*Mrisp*):

$$Mic = \begin{pmatrix} IC_{prod} \\ IC_{pr} \\ IC_{org} \\ IC_{mark} \end{pmatrix} \quad 4.4$$

where *IC_{prod}... IC_{mark}* – indicators of innovation capability level of the company

$$Mrisp = \begin{pmatrix} IP_{prod} & IP_{pr} & IP_{org} & IP_{mark} \\ IO_{prod} & IO_{pr} & IO_{org} & IO_{mark} \\ SP_{prod} & SP_{pr} & SP_{org} & SP_{mark} \end{pmatrix} \quad 4.5$$

where *IP_{prod}... IP_{mark}* – signs of innovation potential;

IO_{prod}... IO_{mark} – signs of innovation opportunities;

SP_{prod}... SP_{mark} – level of safety power of the enterprise's economic security system

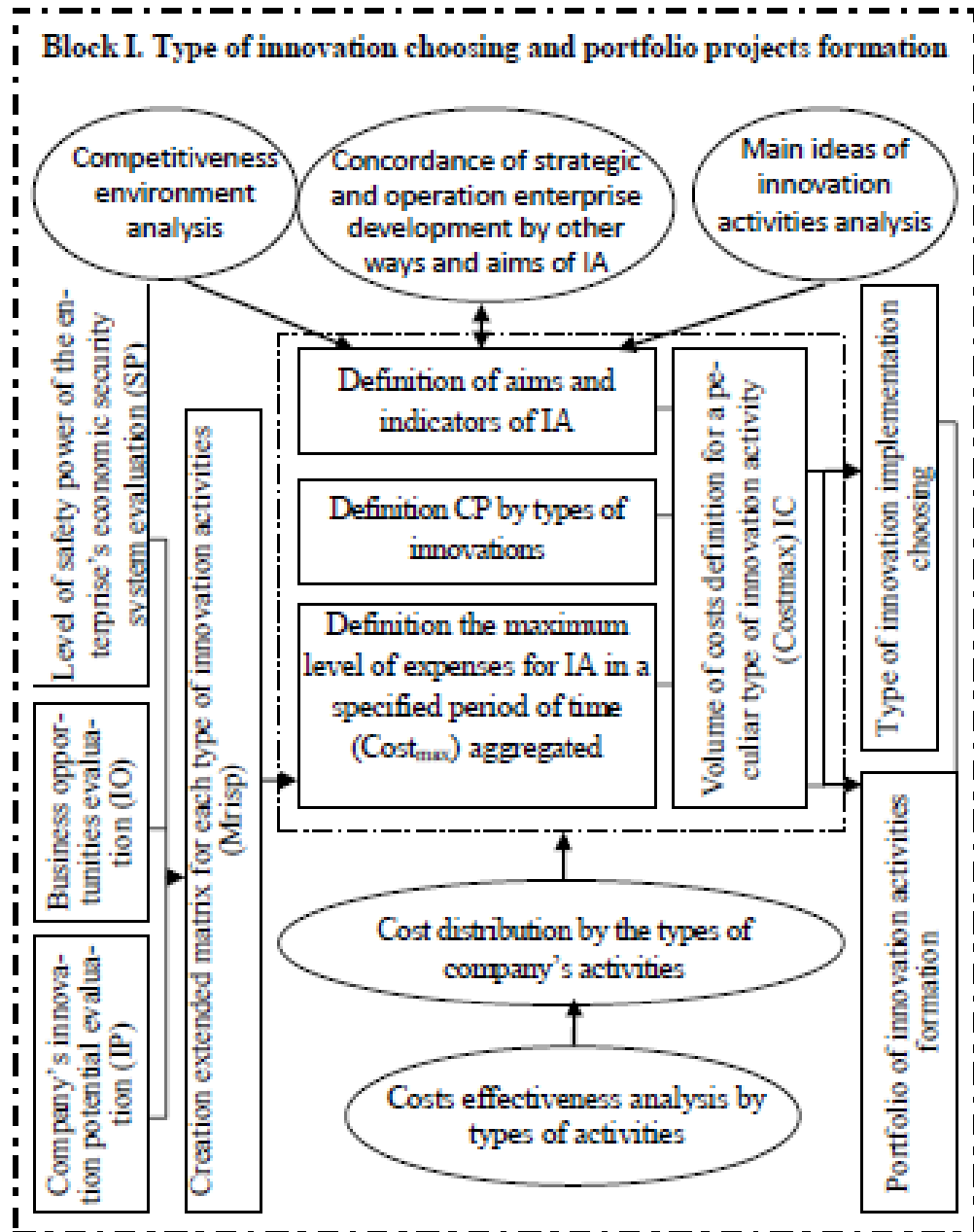


Figure 4.7. Scheme of type of innovation choosing and portfolio projects formation

So, by described set of parameters $R0$, the company may choose for themselves the desired direction of innovation development by type of innovation. Forming a portfolio of innovation projects should be conducted for each individual type of innovation. Scenario modelling implementation and distribution costs that the company plans to allocate within the overall system management costs should be implemented by the lattice of criteria selection and is based on the account limits of innovations directed to the portfolio.

The general criterion is the assumption that the total volume of direct non-system (design) and system costs associated with additional costs to support the increase of ICs, by terms of its components, at a level acceptable to the company, should be less than the total planned spending levels IA results in period. By criterion selection of innovative projects, after passing through the grid 1 selection (fig. 4.6) it is necessary to make modelling scenarios project implementation in order to its effective management, block 2, (fig. 4.6). a third process, – defining costing innovation of the period is a synthesis of the full costs of selected projects, the final (specified) definition of system costs and expenses included in the opportunity costs as a result of the filtration process of selecting innovative projects. It should be mentioned that the total costs IACM can be adjusted for company's profit arising from the accumulation of experience by IA recognition of internally generated goodwill as company assets.

So structuring process of selecting the type of innovative implementations, the formation of a portfolio of innovative projects and determination of the volume and direction of cost innovation should be implementing by taking into account the criterion of grids selection that ensures the transfer of characteristics of the general state of IACM to the level defined now as desired, according to the introduction of some innovative projects period. The use of the suggested process of determining appropriate expenditure increases the efficiency of innovation activities project management and provides creation of platform for sustainable competitiveness.

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