EVOLUTION OF R&D FUNDING: INTERNATIONAL PRACTICE REVIEW

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Keywords: R&D, innovations, R&D funding, innovation development, funds, corporate venture funds, innovators, crowdfunding, open innovations.

Innovations are a multi-factor process, with a significant role played in this process by looking for required financial resources, arrangement of financing, distribution of financial risks. Moreover, international experts assess various countries' competitiveness on the basis, particularly, of the amounts of expenditures for financing R&D activities. Taking into account today's trend in growth of the small and medium-size innovative business, and risks inherent in the innovative developments, an efficient arrangement of financing innovative programs as a whole and corporate programs in particular is thought to be actual and deserving a serious investigation.

According to the polls arranged by the International Industrial Institute (IRI) and R&D Magazine on the innovations financing problem, a majority (77%) of respondents, representatives of companies and research centers mention an increase, during the period of 2012-2015, in the R&D expenditures, and just 8% say that their budgets have been cut [1]. Such responses reflect the world's general trend to a growth in innovations, first of all R&D, financing. Nevertheless, this trend is not always the same in some countries. The innovative asymmetry, that is uneven development of technologies and researches in various countries, still exists [2], although its proportions are gradually changing. Asian countries, particularly, China are leaders of the process, ever strengthening their positions, and making 40% of the world's total expenditures in innovations, with 30% held by North America, and about 20% by Europe [3].

In the process of measuring innovative asymmetry, countries' and companies' competitiveness is largely depending on the already existing innovative potential, particularly in the leading technological spheres. Mainly because of this reserve, and despite a relative reduction of share in the world's flow of investments in innovations, the US are still the established technological leader. According to an investigation of the European Commission, the US' expenditures for innovations are largely concentrated in the so-called "highly saturated industrial sector" [4], including pharmaceuticals industry, those connected with biotechnologies, software development and computer services, process equipment manufacturing. The US companies in the industries above mentioned at least doubled their expenses recently.

The technological leadership is protected by the level of development of innovations financing, its flexibility and adaptability to the changing conditions and the aggressive behavior demonstrated by competitors. Such financing is still sensibly higher in the developed countries. The most dynamic forms of financing and motivating innovations include: research centers, including corporate scientific centers, corporate venture funds, business angels. Nevertheless, the greatest activity is now concentrated in the sector of so-called open investments, which are a tool for significant expansion of limits and "density" of knowledge in a technological field. Such investments help to include a tangible innovative item into a wider and continuous innovative process [5]. They include joint industry/inter-industrial projects (JIP), crowdfunding, corporate venture funds.

A great deal of successful JIP's exist, including DeepStar, COSIA (Canadian Oil Sands Innovation Alliance), Gulf of Mexico Gas Hydrates Joint Industry Project, Global Industry Response Group, GIRG, etc. Due to JIP's, the teams, experience and resources of technological

leaders, i.e. the companies interested in joint solving important industry-wide problems, are combined.

Crowdfunding is a method of attracting a wide range of private and other investors to solving the problems of innovative operational activities. This method is used, *inter alia*, to get an independent external assessment of an invention, and its future in the market. Future consumers of the developed product often act as investors. Crowdfunding allows a small firm or even an individual to generate a startup capital to produce a pilot series of innovative products. A lot of programs exist to stimulate crowdfunding/open innovations development, including Dell Social Innovation Challenge, General Mills Worldwide Innovation Network(G-WIN), Anheuser-Busch, MIT Clumate CoLab, Zooniverse, The Cairo Transport App Challenge, Innovation Exchange, Co-contest, GE Ecomagination, My Starbucks idea, Idea connection, etc.

Corporate venture funds are an important and efficient format of resources concentration for financing innovations. They allow a concentration of resources to finance breakthrough and venturous developments, and help to attract outside investments. E.g., the US National Venture Capital Association records an increase in the share of corporate players in the venture market as one of the most remarkable trends of the industry. Corporate venture funds provided 10.5% of the total capital involved in venture transactions in 2013, and took part in 16.9% of the total number of transactions [6]. A like trend also exists in Europe. Corporate investors' participation in venture transactions in 2012-2013 demonstrated a drastic growth from 0.5% to 8.6%. The total amount of venture financing of more than 7,500 companies was equal to 69.1 billion US dollars in 2016. The number of companies that use this tool grew more than twice during the period between 2009 and 2016 [7].

The purpose of creating corporate venture funds is not only to finance the most speculative ideas and developments and to share risks connected with their implementation, but also a method of "democratization" of the innovative activities, attraction of the widest range of novel ideas and developments, which can be supported by the funds. E.g., establishment of venture funds helped Philips to increase significantly the flow of novel ideas, particularly from its employees. A like purpose is pursued by the annual Innovators' Cup as a competition of talented inventors. The same tools are used by Boeing, Adobe Systems, UPS, Ball Aerospace and others. Various names are used, such as "innovation group" or "green house", but they have the same function to finance and to provide relevant resources to the projects proposed by a wide range of talented inventors, including the companies' employees.

Corporate funds often become a link between a corporation's budget financing of projects, research laboratories and collective investments in innovations (crowdfunding) to stimulate individual inventions and innovative activities. A number of companies arrange special sites and tools to support young talented innovators, researchers and entrepreneurs, e.g., each IBM employee may propose an idea and elect a team for its further development. If the idea is successful, such team can establish its own ventures company. Entrepreneurial Leave Program is also rather popular, many research universities and national laboratories in the West offer to their researchers a job-protected leave to establish a new company or to join an existing business entity that develops technologies. Such an opportunity helps, as practice shows, to transform rather quickly a mature lab technology into commercial product. It is very important that this process allows a maximum possible utilization of employees' experience.

The above examples demonstrate a general wish of innovative companies to build a system of cooperation and internal communication to enhance employees' creativeness and interest in initiating novel ideas and projects and ensuring their implementation. It is the very way to lay a trend to development of network innovations, i.e. their considerable democratization, to making talented specialists and inventors the real idea generating centers. Internet and up-to-date communications allow an ongoing reduction in the costs of innovations, and, first of all, increasing the availability of innovations, and making this process open and comprehensive. Anybody may become innovator and generator of ideas in today's world. E.g., such major projects as Google, Yahoos and Facebook have not been created by major research

laboratories with a million-grade financing, but by teenagers at hostels. Today's world makes it unnecessary to request for a permission and for huge financing amounts to create a really novel idea or innovation, and a majority of the most innovative ideas would never be approved by any level of the bureaucratic system (budget and investment committees, etc.) It affects the general process of "democratization" of the tools and methods of financing innovations, and such tools, as today's social communications system as a whole, become really network-based.

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