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Features of the Transition to the Second Stage of Commercialization of Scientific Research

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Abstract — The article presents the results of the analysis of successful implementation by small enterprises of various projects on the commercialization of scientific research. Three enterprises LLC "Video3", LLC NPP "Kristall" and LLC "Penzaplav" were co-founders of the informal holding, whose work predetermined the successful course of implementation of innovative projects. The initiative groups that created the three enterprises had previously conducted experiments and had significant scientific potential on the basis of which work was carried out to commercialize the results of scientific research. The main projects carried out by enterprises are related to different branches of the national economy and do not compete for Customers. Enterprises were created at different times. LLC "Video3" was created two years earlier. All enterprises have won grants for co-financing innovative projects by the Russian state budgetary institution "Foundation for the Promotion of Small Forms of Enterprises in the Scientific and Technical Sphere". Errors made earlier by LLC "Video3" were taken into account when planning the implementation of innovative projects LLC "Penzaplav" and LLC NPP "Kristall". The preferences of LLC "Video3" from participation in an informal holding company are an opportunity to attract specialists of LLC "Penzaplav" and LLC NPP "Kristall" on preferential terms for carrying out design work, training personnel and participating in promotional activities. As a result, three companies have successfully completed the Start Up phase and are currently looking for a General Investor who can start mass production and sale of new products.

Keywords— implementation of innovative project, stage Start Up, R&D, serial production, business association, General Investor

I. INTRODUCTION

Analysis of the activities of 9 enterprises that carry out projects for the commercialization of scientific research results and received support, in the form of grants of 750,000 rubles. up to 1 million rubles. from the Russian state budgetary institution "Foundation for the Promotion of Small Forms of Enterprises in the Scientific and Technical Sphere" (hereinafter referred to as the "Fund") [1], showed that only three of them managed to successfully complete the first, initial stage of Start Up [2]. The rest ceased their activities and were closed [3]. The reasons for the unsuccessful operation of the remaining 6 enterprises - in the wrong planning of the implementation of the project [4] and the fulfillment of a number of fatal mistakes in the management of the enterprise [5]. The management of the three remaining enterprises planned production activities differently. As a result, the three companies completely fulfilled the first state contracts with the "Fund" [6,7,8] and entered the stage of joint work on the organization of serial production of new products jointly with the General Investor [9]. The reliability of the results obtained is based on the access of the authors of the article to the documents accompanying the production processes at all enterprises, including the accounting records that were outsourced to the accountants of LLS "Video3". The article analyzes successful decisions on planning the process of commercialization of an innovative project.

II. FORMULATION OF THE PROBLEM

A. Description of the conditions for the implementation of a number of enterprises phases Start1[1] Start2[2]

When analyzing the successes and failures of enterprises implementing innovative projects that can be classified as the commercialization of scientific research results, it was decided to focus on projects co-financed by the "Fund") [9,10]. All enterprises have a OKVED, which defines the main type of activity - 73.10 "Scientific research and development in the field of natural and technical sciences" [11,12]. On the part of the "Fund" [13], the decision to support these enterprises was made on the basis of competitive selection [14], which indicates good conditions for new enterprises to start the process of commercialization of scientific research results [15]. At this stage "Before the Start Up", the members of the initiative group [16], who also entered the management of small enterprises, proved that:

- The established enterprise has intellectual property, which gives advantages when seizing the market with a new product (it is difficult for competitors to enter the market with an analogue of a new product) [17];
- The members of the initiative group that created the enterprise offer a new technology for the production of a demanded product, which has scientific novelty [18]. The introduction of the new technology significantly increases the consumer qualities of the new product and reduces the cost. This should allow in the future to easily resolve issues of mass production, including the formation of a new market;
- Employees of the newly established enterprise have the qualification, which allows to successfully execute the project;
- Members of the initiative group that created the enterprise are aware of the possible risks that may lead to the termination of the project [19]. They outlined and implement a plan of measures that eliminate the consequences of emergence of undesirable situations;
- The members of the initiative group that created the enterprise represent the stages of the development of the innovative project from Start Up to the start of mass production and know how they will operate at each stage: 1) at the first stage they will create a stable operating enterprise and conduct experiments that confirm the main hypothesis about the possibility of mass production of new products, while they know where to find additional sources of financing for an enterprise in the amount not less than the amount of the grant received from the Fund for Promoting Innovation on this stage (in the documents this stage is called "Start1") [20]; 2) at the second stage, of the series sample will be produced, conclude a contract with the General Investor on the preparation of the Technical Documentation for the organization of the release of new products on the areas specified by the General Investor [21] (in the documents this stage is called "Start2"); 3) at the third stage, two options are considered: 3.1) the work performed at the stages "Start1" and "Start2" is not sufficient and the third stage "Start3" is required, during which the created sample of the new product will be modernized at the request of the General Investor in order to accelerate it entering the market and the second option; 3.2) the created sample suits the General Investor and the parties (General Investor and members of the initiative group) begin to prepare a contract for the purpose of selling to the General Investor all the rights to a new product (often at this stage again turn to the Fund for Promoting Innovation and receive additional funding for this stage under the program "Development[3]").

The analysis showed that all 9 initiative groups that created enterprises for the implementation of the innovative project previously conducted scientific research, the results of which allow us to hope that an innovative product will appear on the market. Assessment of the cost of each scientific research showed that the members of the initiative group spent more than 30 million rubles on their conduct.

Always when commercializing the results of scientific research, the question is solved: when will the members of the initiative group be returned to their costs spent at the stage of the previous establishment of the enterprise [22]. This is most successfully is solved in Israel [23]. Communication with Israeli colleagues who successfully completed more than 5 innovative projects showed that the funds invested before the commercialization of scientific research can return only when the project is sold to the General Investor [24]. These costs must be included in the cost of selling technical documentation to the General Investor [25]. Until then, these costs are not taken into account. Analysis of data on 9 innovative projects that received co-financing from the «Fund» showed that this interval was estimated from 11 to 30 years (one of the researchers, described an innovative system

[1] Start1 - the conditional title of the initial sub-step Start Up in terms of the accepted in the Russia state-funded "Fund", assumes a period of time for which a small enterprise claims the right to exist. Assumes mastering by the company management of its responsibilities to manage the production activities of a small enterprise and to find additional projects that will help to attract additional funds for the implementation of the main project (the amount of the grant is up to 2 million rubles).

[2] Start2 - the average sub-stage of the implementation of the investment project according to the rules of the "Fund". The transition of a small enterprise to this sub-step is possible in case of attracting funds for the implementation of an innovative project in the amount larger than that provided by the "Fund " at the first sub-stage. At the end of this sub-step, a small enterprise at least managed to create a sample of a new product and developed a technology for its production and certification (the amount of the grant is up to 3 million rubles).

[3] "Development" is the name of the short-term program of the "Fund", which allows a small enterprise, within a year, to modernize of the technology of production the new product, taking into account the production requirements of the General Investor to start serial production of new products (grant amount up to 30 million rubles).

for balancing the bodies of revolution in his institute project, and hade the title of engineer, but received financial support for the realization of project in the year of retirement by age). Evaluation of the funds spent on the research before the start of the Start Up stage was carried out according to the principle - how many funds are needed now to carry out similar work, taking into account:

- Acquisition, or leasing, of equipment necessary for conducting experiments;
- The minimum possible remuneration for technical specialists participating in the project (without taking into account the means that are necessary for the functioning of the enterprise itself) [26];
- The minimum payment to specialists who conducted a patent search and make documents on the protection of intellectual property;
- Payment of marketing research assigned to consulting firms, including the search for potential General Investors who will be buy the completed project [27].

The analysis showed that all 9 enterprises at the stage of their creation were in equal conditions. However, immediately after the start of production activities, their management began to pursue a different production policy. The management of 6 enterprises established the highest possible salary for the members of the initiative group with funding from the grant from the «Fund». All members of the initiative group believed that it was time to get a return on the work performed earlier. The management of the three remaining enterprises also established the maximum possible salary for the members of the initiative group, so that wages were higher than the average for the region. Employees' salaries consisted of part of the grant from the «Fund», taking into account how the employee works: at full rate, at 0.5 rates or 0.25 rates, and using funds from the production activity of the enterprise, received from projects executed in parallel to the main project. Prior to the start of the project, the members of the initiative group developed in detail the business plan for the implementation of the main project, and developed rules for the implementation of additional projects [28]. As a result, all employees of these enterprises knew that:

- the maximum monetary incentive for the members of the initiative group can be obtained only after the sale of technical documentation to the General Investor;
- the main work of the company is aimed at the speedy implementation of all necessary research, development of a new technological and work on the protection of intellectual property;
- to enter the final stage, it is necessary to create technical documentation suiting the General Investor, this is possible only with the smooth functioning of the enterprise;
- the enterprise receives an advance for the execution of the next sub-step only after approval of all reports on the previous sub-step;
- if it is necessary to attract other specialists, it is necessary to pay well their labor so that they do not leave the project;
- for the implementation of an innovative project, the funds allocated under the grant from the «Fund» are not sufficient, therefore, it is necessary to carry out activities to find additional sources of financing;
- the salary of all employees of the Company depends on their labor participation ratio at this sub-stage of the project implementation;
- The salary consists of two parts: a limited salary paid used by a grant from the Fund for the Promotion of Innovations and an optional monthly allowance received through the implementation of any projects;
- the payment of business trips and all possible small expenses is included in the wages;
- additional projects that require recruitment of new employees can be implemented if the funds received allow to have salaries of the company's employees above the average monthly salary in the region;
- work on the implementation of the main project, supported by the Fund for the Promotion of Innovation, should have priority;
- employee of the Enterprise in the full performance of his duties, it is allowed to work at other enterprises and universities (the total monthly income of an employee should be higher than the average salary for the region);
- enterprises are united in an informal holding, which allows: 1) to take into account mistakes made by another enterprise; 2) Prepare in advance the necessary documentation for another inspection by the monitoring organizations; 3) to search for additional orders, including for partner enterprises.

The results of the analysis made it possible to construct enlarged payroll schedules for quarters in three enterprises that successfully completed the Start1 stage. At enterprises that eventually successfully completed the Start1 stage, wages (2) during all four quarters almost always exceeded the average wage in the region (1) (Figure 1). This was also provided by means of a grant from the Fund for the Promotion of Innovation and funds received from parallel contracts.

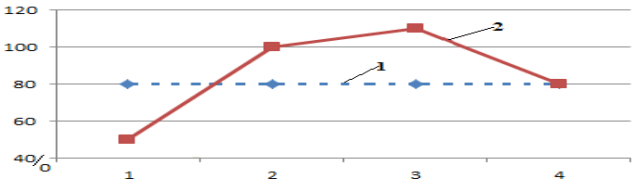

Figure 1 - Schedule payroll (2) and the average wage for the region (1) at enterprises where additional projects were carried out.

At six enterprises that stopped functioning at the stage of Start1 (Figure 2), wages (2) remained unchanged and were less than the average salary in the region (1).

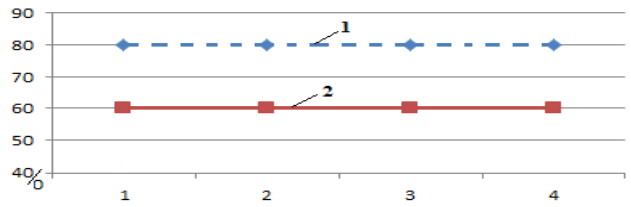

Figure 2 - Schedule payroll (2) in relation to the average wage in the region (1) at enterprises where only the main project was carried out.

Thus, it was established that the successful completion of the Start1 stage is connected with the production policy of the enterprise, oriented to the parallel implementation of additional projects. As a result: 1) the salary plan at such enterprises exceeded the average for the district; 2) management has gained experience in the search and organization of new works; 3) unification into an informal holding allowed to minimize the risks of penalties from various inspection enterprises.

However, one of three enterprises that successfully completed the stage of "Start1" - LLC NPP "Kristall" at the end of this stage found a very highly paid project and all the forces were directed to its implementation. When this project was implemented, the average salary of all employees of this enterprise was at least three times higher than the average wage in the district. This led to a situation where all the resources of the enterprise were directed to the implementation of a new project. The work on the commercialization of the main innovation project was stopped for 8 months. The result was the failure of the Calendar plan schedule and the complexity with the restoration of previously performed work. Some specialists, having got used to receiving high salaries, resigned. The obtained production experience has shown that serial production of products is paid higher than R&D. As a result, all the works were directed to organize the production of new products and their sale. As the launch of new products automatically terminates funding from the Fund, LLC NPP "Kristall" has discontinued cooperation with it. At present, this enterprise continues to seek and fulfill interesting production orders, produces a piece production of new products and is trying to find a General investor for expanding production.

LLC "Penzaplav", after the first stage of Start1, organized a piece production of new products and their sale. Technical characteristics of the wear resistance of new products are many times higher than the known analogues, which significantly reduced the sales market. An aggravating circumstance for LLC "Penzaplav", is the situation with intellectual property. The chief designer of this enterprise, proceeding from personal ambitions, has issued from the individual 6 patents on the features of the designs of new products, which allow to increase wear resistance and simultaneously improve the basic technological process. This turned out to be sufficient for the Customers to be able to start manufacturing such products and to stop working with LLC "Penzaplav". As a result, the enterprise switched over to random, single orders.

LLC "Video3" also started production of products after the first stage of Start1, where new nodes were used instead of old and very expensive units, allowing to achieve the best consumer properties of new products with minor changes in design. A distinctive feature of the production policy of this enterprise was the development of a number of new products where, with a slight change, new nodes could be successfully used. These insignificant differences demanded new studies, part of the funds for which was allocated from the Foundation for the Promotion of Innovation for the Start2 stage. Upon completion of the Start2 stage, this enterprise began the search for General Investors to organize the serial production of three new products. The aggravating circumstance for the fulfillment of the planned works for Video3 LLC was the bankruptcy of the NPP "Era" and "PKBM" enterprises, which could be General Investors when new products were brought to the market.

B. The situation with the promotion of innovation projects on the market during the serial production stage

As shown by the analysis of production activities of 9 enterprises, the general lack of all of them was the absence of a General Investor after performing R&D. Unlike the R&D rules for the commercialization of research results in Israel, when the Chief Scientist in the Government of Israel, according to the results of the competition, allocates up to 30 million US dollars to the enterprise created by the members of the initiative group, provided that the General Investor also allocates sufficient funds for rapid and successful implementation of the project, the RF Innovation Support Fund does not require a binding agreement with the General Investor. The reason is that at present only two associations can be general investors. This is Gazprom and Kalashnikov's Automatic. But these are highly specialized enterprises and they support a small number of projects. As a result, it becomes problematic not only to profit from the commercialization of scientific results by selling technical documentation to the General Investor, but also corny return the funds invested in the project (taking into account the stage of preliminary research and preparation of documentation for participation in the competition for co-financing from the Fund).

All three companies have been searching for General Investors and abroad participating in the EU Framework Programs. Their experience shows that this is a much more complicated option:

- First, all documentation must be in English. Specialists who are able to translate technical texts and various contracts into English and vice versa into English can be found, but their services are so expensive that such an option becomes ineffective. A possible solution is to train the employees of a technical translation, using the training of additional qualification "Translator in the field of professional communication". A number of employees of initiative groups of all 9 enterprises, while still studying in the university, passed such training and acquired professional translation skills in their field of activity. However, such employees were very much in demand in

our country and abroad, by the end of the first stage, 2 such employees remained at all enterprises.

- Secondly, the organization of the joint project on the EU's 6 framework program showed, according to the rules for granting the grant from the EU, all intellectual property created during the project implementation equally belongs to all members of the initiative group. As a result, it is very possible that when the project is completed, its serial production will not be in Russia, but abroad (and most likely Russian members of the initiative group will be invited to work there, but as experience has shown with a serious wage infringement in comparison with the residents of EU countries);
- Thirdly, we have not developed enough legislation to stimulate international implementation of projects. As a result, an employee of enterprises, when necessary to conduct research abroad, using already developed products, have to pay a high duty for the import of such products to the EU countries, which seriously complicates the implementation of the project.

III. CONCLUSIONS

The analysis of the implemented innovative projects showed that for their successful completion it is necessary at the stage of preparation to:

- to go through the research stage (at the expense of the members of the initiative group), which made it possible to prove the viability of the new product and its significant advantages over the existing analogues;
- presence of the General Investor who will buy out the technical documentation and intellectual property from the members of the initiative group in order to start producing new products to receive super profits;
- stage Start Up, as a rule, on a competitive basis, is co-financed by the state, while, under the rules of the Fund, the financed enterprise must simultaneously conduct works that generate revenue exceeding the size of the grant provided by the Fund;
- to start work on the implementation of an innovative project, the Investor (always co-financing the implementation of an innovative project) should be convinced that the project is being implemented by a strong initiative group who can generally perform all the necessary work and complete the production of a prototype of a new product.

IV. DISCUSSION

This article is the result of research carried out by the heads of small enterprises that carry out innovative projects that are part of the informal holding LLC Video3. Participation in an informal holding, created on the basis of oral agreements between the management of all enterprises, allows enterprises:

- formally remain a small enterprise, which allows them to report on a simplified taxation system;
- be prepared for planned and unplanned inspections (to maintain the necessary documentation on the rules of the inspectors), on the basis of information from partner enterprises that have already have been audited;
- quickly and inexpensively to manufacture components or conduct experiments with the involvement of equipment and specialists of partner enterprises with minimal costs;
- effectively look for additional orders, using not only their own resources, but also the resources of partner enterprises.

Experience has shown that such a form of combining enterprises performing an innovative project that resembles a cartel is effective.

All enterprises that are part of an informal holding, carry out innovative projects do not compete for the customer, since they work in different sectors of the national economy: IT technologies; development of technological lines for utilization of bird litters; development of wear-resistant industrial burners. Unification in an informal holding allows to avoid mistakes made by other enterprises performing other innovative projects.

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