

Commercialization Prospect Influence on Intellectual Property Assessment

¹Yury Ivanovich Seliverstov, ²Traida Ivanovna Veretennikova, ³Irina Vladimirovna Rozdolskaya,

¹Ilya Viktorovich Afanasiev and ¹Natalia Vladimirovna Ovtcharova
¹Belgorod State Technological University Named after V.G. Shukhov,
Kostyukova Street 46, 308012 Belgorod, Russia

²Belgorod State University, Pobedi Str. 85, 308015 Belgorod, Russia

³Belgorod University of Cooperation, Economics and Law,
Sadovaya Street 116a, 308000 Belgorod, Russia

Abstract: An objective assessment of intellectual property is important for its involvement in the economic circulation of enterprises. This study discusses and analyzes the characteristics of intellectual property assessment taking into account its commercialization. It is suggested to use real options method as the means of assessment.

Key words: Intellectual property, commercialization of intellectual property, assessment methods, real option for intellectual property commercialization, enterprises

INTRODUCTION

The specificity of industrial property assessment is determined by the range of cost factors: the stage of innovation development (degree of Intellectual Property (IP) readiness for industrial use and the need for the investments in commercialization), the field of innovation use, the volume of transferred rights and IP object use restrictions provided in the contract, license duration term, risks for design parameters achievement, the risks of unfair competition and piracy.

The fundamentally important data for the assessment results are the data of legal protection reliability, the patent validity, the prediction data on products and technology sale volumes. The relative underdevelopment of the economic turnover for industrial property objects in Russia as well as the storage of transactions carried out as a trade secret cause the lack of information and a high level of subjectivity for IP assessment results. This problem is emphasized by many experts including (Yelokhova, 2012).

The assessment of IP objects is very closely related methodologically with the assessment of business (Doroshenko and Somina, 2013; Tobin, 1969). The European standards suggest that the Guidelines 8 (ECO and Somina, 2003) "Evaluation of intangible (non-material) assets" should be considered as an introduction to the complex area of assessment, together with the business assessment guidance. The united states has a single standard for business and intangible assets

assessment (Kozyrev, 2003). In both cases, the main methodological approach is the income approach, namely the discounted cash flow method. The methodology of other approaches is rarely applicable here, especially concerning the assessment of IP objects.

The specific nature of IP does not allow to state that any of the classical approaches to the assessment (income, cost or market one) is an optimal one. Almost every publication about the IP assessment methods has the difficulties of each approach use such as (Smith and Parr, 1994; Kozyrev, 2003; Seliverstov, 2013).

The uniqueness of IP objects leads to the fact that it is necessary to take into account many specific factors in each case. The significant factor in IP evaluation is the prospect of its commercialization.

MAIN PART

The commercialization of scientific and technical IP object involves the bringing of technical solutions to readiness for industrial use (the development of an experimental sample/laboratory experimental device within scientific Research and Development (R&D), the development of a pilot prototype for a new product/experimental industrial device for production development objectives); technical upgrade or the development of a new industrial production; the development of a marketing company to bring innovative products into market.

The commercialization is impossible without additional investments. Even the presentation of the nature and the possibilities of an IP object commercial use within the specialized exhibitions in order to find an investor requires some seed capital to finance the demonstration materials preparation to develop the project technical feasibility for the travel and representational expenses, organizational charges, etc.

If the commercialization decision is taken as a licensing trade, then one should invest in the development of additional technical documentation, the search for potential licensees, the legal study of the license agreements, the preparation and conduction of negotiations. Nevertheless, the IP evaluation may be performed:

- By taking into account the additional investments in fixed and current assets of an innovative project and the corresponding investment conditions. One may consider a situation when the invested capital is sufficient for the optimal realization of the invention commercial potential and when the available sources of funding are limited
- Without the additional real investments needed for IP commercialization. In this case, the only available source of funding are the funds of the right holder (if we are talking about an individual inventor or a small innovative enterprise, established by a group of scientists, then the available own funds are less in times than the investment requirements)

It turns out that the IP assessment without taking into account the investments in commercialization is proved only in the case if the patents were obtained for the purpose of competitor action blocking on the development (improvement) of similar technical solutions.

One may not argue that the IP estimate taking into account the commercialization will always be higher than the IP estimate without commercialization but the general pattern is as follows. It is assumed that the greater initial investment, the higher the expected effects of commercialization associated with the meeting of new requirements, the product quality improvement, the reduction of specific consumption of materials, energy consumption, the labor intensity of production processes, the increase of the project operational phase term.

Keep in mind that the evaluation of an IP object also depends on the motivation of potential foreign investors. They may be both friendly and unfriendly for the IP researcher/IP holder. In the first case, the investor does not claim to intellectual property rights and intends to cooperate with the legal owner for the joint

implementation of an innovative project. In the second case, the investor's objective (as a rule, he acts as a potential competitor) is to obtain exclusive IP rights and take a full control of the business, within which the commercialization is performed. The situation of invention and their rights purchase at a lower cost when the franchisor has no means for commercialization is not an uncommon one. In other words, when investments are friendly the IP evaluation is carried out taking into account these investments and when investments are hostile the evaluation is performed excluding the investments and their benefits.

The standard for fair market value implies the availability of information about the evaluation object for a wide range of potential investors. Unfortunately, when it comes to IP evaluation, this condition may violate the intellectual property rights and bring to the loss of IP main advantage which is the monopoly rent. Therefore, it becomes extremely difficult to comply with the second condition of the fair market value standard the finding of IP object investor/buyer whose capabilities will ensure the maximum utilization of the IP object commercial potential. IP commercialization involves the adoption of the specific innovative risks. The most frequently mentioned risk of new product (or the products produced with the use of new technologies) market demand absence. But the lack of sales risk is not the only one. The situation is complicated by the fact that an adequate assessment of some risk types require highly skilled professionals and not in the field of investment analysis but in the field of science, technology and engineering expertise. The risks that can not provide the required level of new product or process quality and safety, unpredictable delays of an invention completion to the stages of a pilot and test sample, exceeding the budget project, etc. are also included.

It is necessary to mention such type of specific commercialization risks as the risks of financing (financing termination or the reduction of its volumes, funding delays, financing conditions tightening). The financing of long-term investment projects is distributed in time and carried out by stages. The investment phase of the project includes several major steps the implementation acceleration of which is extremely difficult for objective reasons even with an unlimited access to financing. This applies in particular to the stages of experimental design and design and technological development implementation, the pilot production and testing of the product and process innovations that must meet stringent requirements of technological and environmental safety.

The long terms of a project cause the uncertainty of step parameters deferred in time. Not only the expected investment incomes but also the funding streams are becoming difficult for prediction. One may state with a high degree of probability that unforeseen costs associated with the project will take place. This will result in budget excess and the search for additional funding. The assets of innovative projects are characterized by a high degree of specificity and therefore by extremely low liquidity. If the project funding is stopped in the middle of the investment phase then the selling of intermediate project results and the return of funds invested in the project will be extremely difficult.

The most obvious way to solve the problem of cash inflows and outflows uncertainty concerning an investment project is the performance of calculations according to the several scenarios of various scientific and technical, marketing risks and financing risks manifestations and the sensitivity analysis of project performance indicators to the change of main investment and financing parameters.

The task of IP assessment taking into account the commercialization and depending on the amount of initial investments may be solved in different ways: by the standard method of Cash Flows Discounting (DCF Method), the logic of which is based on the typical investor motivation to obtain a return on invested capital and by less known methods economic added value and the evaluation of real options. All of these methods take into account the so-called key drivers of business value (value drivers) that allows you to simulate the way of a particular investment in commercialization affecting the value of business innovation, developed on the basis of the invention. The description of discounted cash flow methods and the evaluation of real options in relation to IP commercialization is presented below.

According to the common point of view, DCF Method is considered as the most relevant method for investment assets assessment which does not present a developed market of counterparts. If the IP assessment is made based on commercialization, then at the use of DCF Method for a measure cost of IP the net present value of the corresponding innovative project takes place. The patented intellectual property rights are valuable when the commercial use of IPR or the equivalent means of individualization allows the company to ensure the sales and profits growth in sales (as compared with the situation when IPR is not protected). Therefore, during the prediction of cash flow for an innovative project which is based on patented scientific, technical and marketing solutions, the task of income volume and

financial results from sale determination is stated. The obtaining of financial results is directly related to the blocking of competitor actions.

We can distinguish several types of baseline assessment terms. Firstly, the assessment may be carried out to justify the feasibility of commercialization when there are no real steps for the project and during the implementation of previously started project to determine its current residual value. The methodology of the first and the second case is a single one. The differences are manifested by:

- The termination terms for prediction and post prediction period
- The feasibility of verifying the business plan initial data concerning innovation development during the commercialization project development

Secondly, an innovative project may involve either the development of new products (works, services) using the basic IP object or the obtaining of additional benefits from the commercialization of IP in the form of revenue growth or the reduction of costs associated with production and sales. The principles of cash flow prediction development in these two cases will be different. In the first case, it is necessary to operate with the full amounts of inflows and outflows from operating activities in the second case it is necessary to compare the situation before and after the commercialization and handle changes of inflow and outflow values.

According to the concept of a business entity continuity (on-going concern), it is assumed that a company carrying out the IP commercialization project does not cease to exist in the foreseeable future. The life of an innovative project is divided into predictive and post predictive period. It is assumed that the proceeds from the IP commercial use will be stabilized during the post predictive period. So, in order to assess their contribution to the NVP of Innovation Project the Average Value Capitalization Method is used in respect of the expected cash flow for owned capital (or net profit if we express it more roughly).

If you perform the evaluation of IP cost, the commercialization project of which was not started, then two stages are distinguished within the limits of the prediction period. The first one is the investment phase of a project on the basis of which the completion of R&D project is performed, the production and sales mastering. The second stage refers to the operational phase of the project and takes the period of time during which there is a sufficient degree of probability for possible prediction of cash flows from operating activities, taking into

account the debts. Let's specify that an objective assessment demands to take into account the cash flows for owned capital, considering the planned method of original and subsequent investments financing on which the debt burden depends. Then, the general formula for NPV calculation concerning IP commercialization project ($NPV_{КОММ.ИС}$) at its initial stage is as follows:

$$NPV_{КОММ.ИС} = PV_{UH6} + PV_{mek} + PV_{ocm} \quad (1)$$

Where:

PV_{UH6} = The present value of the investment in the IP commercialization

PV_{mek} = The present value of net cash flows from operating activities during the prediction period

PV_{ocm} = Residual value of the project determined by driving the average net cash flow (or net income) at the time of capitalized value evaluation during the post prediction period

There is a more detailed formula which is as follows:

$$NPV_{КОММ.ИС} = \sum_{t=0}^n \frac{CF_t^{UH6}}{(1+r)^t} + \sum_{t=1}^m \frac{FCF_t^{mek}}{(1+r)^t} + \frac{FCF^{ocm}/k}{(1+r)^{m+1}} \quad (2)$$

Where:

CF_t^{UH6} = Cash outflows in the time interval t of the IP project commercialization investment phase

n = The last time interval of the project investment phase

FCF_t^{mek} = Net cash flows from the operational phase of the IP project commercialization during the prediction period

n+1 = The first time interval of the project operational phase

m = The last time interval of the prediction period

FCF^{ocm} = An average expected value of net cash flow in the post predictive period

m+1 = The first time interval of the post predictive period

r = Discount rate

k = Capitalization rate

It should be noted that a number of experts in the field of investment analysis and business valuation justifies the need to use different discount rates for individual sub-periods. This is reasonable if the risks of the various project stages or project financing terms differ significantly at different stages.

Despite the considerable degree of methodology elaboration concerning the income approach to the assessment, it should be stated that the use of DCF Method is difficult one for the terms of uncertainty concerning the project perspectives associated with

the use of the evaluated asset (the uncertainty of IP commercialization projects is particularly high). Firstly, in the course of long-term projects, the circumstances arise (usually more than once) changing the terms of the project, the cost of capital, the cost of assets created and ultimately, the cost-effectiveness indicators. According to the results of each such case the project prospects are reassessed and the decision of its future (continuation, preservation or withdrawal from the project) is taken. At the worst-case scenario it allows to avoid the significant loss of capital. However, DCF Method is based on the assumption that all the investment capital will be put in the project; the dependence of the investment volume on the subtotal results is not considered.

Secondly, the uncertainty of cash flows not only creates the difficulties for the accurate prediction of cash flows (the drawing up of several scenarios is required) but also entails the high values of discount rates. This in its turn, greatly devalues the period cash flows remote from the analysis start. But during these periods the return obtaining on invested capital is proposed. As a result the use of DCF Method gives an underestimation of the asset cost.

The use of income approach is a problem for the assets which still do not generate cash flows but have a certain potential of profitable use in the future. An example of such an asset may be a patent for an invention, the commercialization of which will mean a radical change in production technology and is not implemented by the copyright company yet as it previously invested in technology and related equipment of the previous generation and is committed to receive the income from these investments as long as possible.

The promising trend of IP assessment methodology development and the management of innovation project risks is the theory of real options (Kozyr, 1999). As it is known, the stock option is one of derivative financial instruments which allow to hedge the risks of cost changes with an underlying asset such as stocks. It is a contract that gives the option holder the right (but not the obligation) to buy or sell an underlying asset according to a specified price at a certain moment or a period of time in the future. The European options may be exercised on the expiration date, the American options may be exercised on every day until the date of expiration. The value of an option is conditioned by the fact that it does not carry any negative consequences and the maximum loss of an option holder is limited by the option price. The buy and sale options are used. They allow you to minimize the risks of an underlying asset growth and price reduction, respectively.

According to the theory of real options, the logic of financial investment risk management of financial and the

mathematical model of option pricing may be applied in respect of any assets and projects with the potential for beneficial use.

Thus, a real option is a bargain, a business scheme, an exclusive right, embodying the possibility of risk reduction for the underlying investment object and the business benefits obtaining. The analysis of a real option purchase feasibility, the effects of performance or non performance is focused not on the passive ownership of assets but also on the value management solutions to implement the potential benefits.

The special literature mentions various classifications of real options. Valdaytsev describes the following types of options in the context of project management: the options to withdraw from a project, the suspension or postponement of a project to expand a project by contracting for the benefit of the project to switch to another project to the commitments concerning the project. Kozyrev (2003) works mention private and public options; simple and compound (multi-stage) ones; expiring and permitting a decision delay for investment.

The options on the IP commercialization conditioned by the possession of exclusive rights in its economic sense are the private, multi-stage, allowing an option delay for the project development. However, the IP commercialization project management may use other types of real options. For example to ensure the supply of raw materials, critically important for innovative production an “option agreement” is concluded with this raw materials supplier. To reduce the risk of invested capital loss a contract with a third party who has an interest for IP project in accordance with which it undertakes to acquire a patent and specific project assets, if the current holder of rights decides that the further commercialization is inappropriate. Naturally, these and other types of real options are not free for its holder but may reduce the scale of potential losses.

A widely known Black-Scholes Model which allows at a number of assumptions to calculate the reasonable value of an European call-option for the shares:

$$N(S, t) = SN(d_1) - Ke^{-rt}N(d_2)$$

$$d_1 = \frac{\ln(S/K) + (r + \sigma^2/2)t}{\sigma\sqrt{t}} \tag{3}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

Table 1 presents the decryption of the model symbols for a financial option and the appropriate basic data to assess the real option for IP commercialization.

There are other modifications of the Black-Scholes Model (for example, an option that takes into account the profitability of a hedged share) and the corresponding to it patent price evaluation models for IP objects. However, the presence of a mathematical model for estimation should not create the illusion of this method simplicity and complete analogy of stock and real options. The researchers suggest that the differences between them could be caused by for example:

- The influence of competition factor (for example, the cost of an invention patent is affected by the competition of substitute products)
- The absence of such a tradable asset, the stochastic change in the value of which would correspond to an underlying asset value change for a real option
- The difference between the concept of risk and uncertainty. The stock options pricing models take into account an investment risk via the price volatility index or an underlying asset profitability. However, in case of uncertainty one can not talk about any result distribution probability
- Asymmetrical distribution of returns (income) according to the underlying asset over time
- The complex nature of a real option which actually is a series of options and is characterized by multiple results

The use of real option estimation method does not exempt from the need to predict all the parameters of the project cost. According to Table 1, the performance of the final settlement according to Black-Scholes Model (or according to other option pricing models), you must:

Table 1: Compliance of data for financial and real options assessment

Designation	Financial option for a share	Real option for IP commercialization
C(S, t)	Call-option price	IP object price
t	Time before the expiration of an option in annual terms	The validity term of a patent (otherwise the term of patent validity maintenance)
S	The current price of an underlying share	The present value of the expected project cash flows concerning the IP commercialization
N(d)	Cumulative function of normal probability distribution	
K	Option performance price	The present value of investment in the development and industrial development of an innovation
r	Risk-free interest rate	
σ	Volatility (standard deviation) price of an underlying share	Volatility (standard deviation) of expected cash flows present value

- Predict the investment costs and future cash flows of IP project commercialization for some owned capital
- To assess their current value which requires an adequate determination of a discount rate
- To assess the possibility of technological, market and legal developments, the probability of their occurrence and their potential impact on cash flows and calculate the predicted volatility of future cash flows

CONCLUSION

In summary, we note that the conditions of commercialization have a significant impact on the IP value. However, the existing methods and methodological instruments for IP valuation certainly require further improvement. At the same time, despite some difficulties of application, many experts of IP issues consider that the theory of real options has the potential to overcome the difficulties associated with the use of traditional approaches for valuation activities in respect of IP objects.

ACKNOWLEDGEMENTS

The study was published with the financial support from Ministry of Education and Science of the Russian

Federation within the framework of state assignment to the project No. 26.1511.2014K “Theory and methodology of managing innovational and investment processes in small business enterprises.”

REFERENCES

- Doroshenko, Y.A. and I.V. Somina, 2013. Sources of financing and innovative and investment activity of small enterprises. *World Applied Sci. J.*, 25: 975-982.
- Kozyr, Y.V., 1999. Application of option theory in the practice of estimation. *Securit. Market*, 11: 12-14.
- Kozyrev, A.N., 2003. Evaluation of Intangible Assets and Intellectual Property. Central Economics and Mathematics Institute, Russia, Pages: 352.
- Seliverstov, Y.I., 2013. The analysis of intellectual property use in the economic turnover of Russian enterprises. *World Applied Sci. J.*, 25: 1763-1769.
- Smith, G.V. and R.L. Parr, 1994. *Valuation of Intellectual Property and Intangible Asset*. 2nd Edn., John Willey and Sons, New York, USA.
- Tobin, J., 1969. A general equilibrium approach to monetary theory. *J. Money Credit Banking*, 1: 15-29.
- Yelokhova, I.V., 2012. Intellectual property assessment as a factor of an innovative enterprise cost increase. *Bull. Perm Univ.*, 1: 93-101.