

# Technological Market Conjuncture: Risk Assessment Commercialization of Intellectual Property

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## SUMMARY

*This paper deals with the determination of the risk assessment process in market conditions using the method of paired comparisons. The most important factors influencing the level of market appeal of intelligent technology are defined and stipulated. Recommendations are made for reducing the impact of risk factors in course of the commercialization of intellectual property.*

*Keywords: market conditions, risk, market technology, intellectual property, paired comparison*

*Journal of Economic Literature (JEL) code: M15*

## INTRODUCTION

Intellectual property has become one of the most important resources in the 21st century. Companies are increasingly becoming aware of the importance of intellectual property (IP) assets nowadays, as a means to expand their business, to raise capital and to provide financial gain (European IPR Helpdesk, 2012). Just like financial capital or commodities or labor, IP is more than an economic asset – it also forms the basis of a global market. Since 2010, the number and scale of patent and intellectual property transactions worldwide has increased a great deal. Deals such as the Nortel patent sale (US\$ 4.5 billion), and Google's acquisition of Motorola Mobility for its patent portfolio (US\$ 12.5 billion) have propelled the pure intellectual property market into the spotlight (EverEdgeIP, 2014). However, this market is not just for technology giants — given the right advice, small and medium enterprises can participate and profit as well. We frequently encounter the “Rembrandt in the attic” phenomenon, where local companies were previously unaware of hidden intellectual property related value on their balance sheets.

Commercialization is the process of bringing intellectual property (IP) to the market in order for it to be exploited in return of business profits and growth. Commercialization is the end goal of the innovation process — it is the stage at which the strongest innovations, having been carefully selected, assessed and managed, are converted into commercial value.

In the market of intellectual property there are three key models of commercialization: sale, license, and

manufacture & distribution (Figure 1). Risks should also be counted for in any IP commercialization. Although the very nature of risks will depend on the type of commercialization and its arrangement, their preventive identification, assessment and management would give organizations a lower exposure to risks (Fact sheet, 2013).

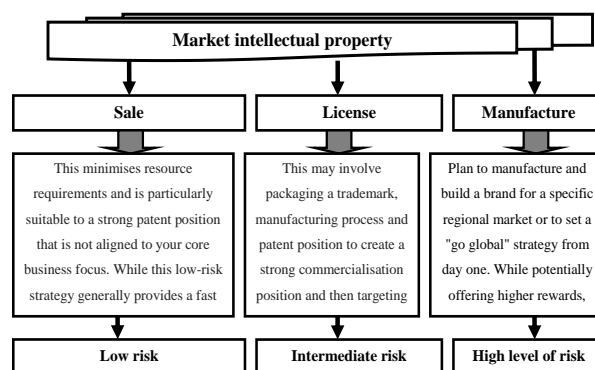


Figure 1 The risk level of market commercialization of intellectual property

Any entrepreneur should then make a start to identify and monitor the IP assets owned and used for their proper accounting, to assess risks, to overcome problems and to assess their commercial value in order to use them strategically and increase the company's revenues.

Recent studies show that a significant number of factors used in assessing the technological conditions of the market (demand, supply, price, quality, effect, etc.) are probabilistic in nature and ultimately lead to uncertainty and lack of validity of the calculated results.

In our opinion, the results of these kinds of indexes need to ensure an appropriate methodological evaluation of the results, the level of which is consistent with the risk assessment calculations based on the full group of disparate phenomena. The lower the level of risk assessment in market conditions, the greater the accuracy of the calculations of the commercial potential of intellectual property, and the better the transfer process will proceed without any problems.

## DESCRIPTION AND METHOD OF FORMATION OF THE FACTORS OF RISK

Quantifying the probability of risk is difficult; the results of the calculations are based on calculations of the frequency of display of certain phenomena, i.e. the presence of certain statistics. Statistical calculations should be considered more objective, since they are based on objective (actual) data. However, their use is difficult for several reasons:

- such data are not always available; in most cases they simply cannot be obtained;
- statistics do not account for sudden changes in market conditions;
- they do not include all elements of the formation of market conditions, as some of them are not quantifiable measurements.

- In such circumstances, the theory and practice of risk assessment recommends the use of expert (subjective, heuristic) methods, which are devoid of the above deficiencies. They are oriented to the average estimates of some experts about the level of opportunistic risk (Kucherenko 2005). We consider it appropriate to study the level of risk of market conditions consisting intellectual property using heuristic methods, including the method of paired comparisons. This is the method adapted by Gerasymchuk & Koschiy (2009) and Kobeleva & Pererva (2012) to market conditions, to evaluate the risk of market operation under limited statistics and the performance of a number of factors that are difficult to measure (Golubkov 2000; Machine 2003).

## METHOD

To assess the risk of opportunistic functioning in the technology market and the electrical industry, according to recommendations in the literature (Gerasymchuk & Koschiy 2009; Kobeleva & Perera 2012), the authors carried out interviews with a group of experts (leading specialists of JSC “Ukrelectromash”, JSC “Electric machine”, JSC “Electric motor”), who were asked a specific set of factors that are media market risks (see Table 1).

*Table 1*  
*Factory risks in the Ukrainian market for electrical engineering technology*

| Code | Factors   | Notes   |
|------|---|---|
| F1   | Deterioration nation-Ukrainian market   | Activities of all kinds of markets are closely linked           |
| F2   | Disadvantageous legal support for market processes in Ukraine                       | Transparency and consistency of commercial law                  |
| F3   | The emergence of shortages of electricity for industrial needs                      | No electricity in electrical engineering IP does not make sense |
| F4   | The emergence of alternative intellectual technologies (reducing market size)       | This is one of the integral risk factors                        |
| F5   | Increasing the share of imports in the technological market of Ukraine              | Imports replacing Ukrainian developers                          |
| F6   | Increased political instability in Ukraine  | Political risks directly affect the economy                     |
| F7   | Decrease in the intellectual development of domestic production                     | Quality is an important situational factor                      |
| F8   | Increased fiscal pressures on the state of the IP                                   | There may be unintended consequences                            |
| F9   | The complexities of software production using IP                                    | Leads to a reduction of production                              |
| F10  | Changing target consumers for imported technologies                                 | Leads to a change in market structure in favor of imports       |
| F11  | Rising cost of developing Ukrainian real IP   | Leads to increased prices and reduced sales                     |
| F12  | Turmoil in the banking sector (difficulty getting loans)                            | Difficulties in producing and distributing                      |
| F13  | Decrease in exports of Ukrainian intellectual technologies                          | Increased supply in the domestic market                         |
| F14  | The absence or reduction of state support for innovation activities                 | Difficulties in innovation policy                               |
| F15  | Worsening job market mechanisms for production and marketing of innovative products | Leads to a deterioration in market conditions                   |
| F16  | Unfair trading partners   | Leads to frustration in the market                              |

The experts were asked to identify the importance of risk factors in terms of their impact on the deterioration of the technological market (Gerasymchuk & Koschiy 2009; Kobeleva & Perera 2012). Procedure of the examination is based on the method of pairwise comparison factors. They are compared with each other in pairs, in which each subsequent assessment is not

related to the previous one. These paired scores form the matrix of paired preferences, and special treatment provides numerical indices for priority setting objectives for a particular company.

The responses of the experts were processed, grouped and presented in a table of benefits (Table 2). Evaluation of experts was carried out using a table of criteria, the

construction of which was performed by the following algorithm. When comparing the two risk factors expert at their intersection (the intersection of the column and rows) exhibited one of three predefined ratings (Kobeleva & Perera 2012; Nikitin 2011; Machine 2003):

- grade "1.0" if the factor specified in column had, in his opinion, a greater degree of risk (priority column);
- grade "0.0" if the factor specified in column had, in his opinion, a lower level of risk (priority tape);
- grade "0.5" if the factor specified in column had, in his opinion, the same level of risk (equivalent risk factors).

Responses from all 16 experts are listed in Table 2, which presents the final results of the first stage examination of the importance of risk factors. In forming Table 2 estimates put each expert disposed.

## ANALYSIS OF EXPERT ASSESSMENTS

Analysis of the results allows us to draw several important conclusions. First, Ukrainian developers of intelligent technologies do not care much about

opportunities for financial assistance from the state to support their business. Factor F14 "The absence or reduction of state support for innovation" has been identified by experts as the least risky (Table 2). In our opinion, this is due to lack of such support from the government over the years and the practical adaptation of IP to the situation.

Experts explain the minimal attention to the risk of opportunistic factor F16 "unfair trading partners" by the presence of elements of chaos and lack of signs of a civilized market. The same explanation can be used for factor F15 "Worsening job market mechanisms for the production and marketing of innovative products" (rated 11th) and factor F8 "Strengthening the fiscal pressure on the state of IP" (rated 13th). The low ranking factor F12 "turmoil in the banking sector (difficulty getting loans)", in our opinion, can be explained by the passage of local IP over obstacles of the global financial crisis and the entry in this field specific immunity. Getting credit loans was a challenge for Ukrainian innovative enterprises at the best of times. High grade Ukrainian scientific developments in the domestic market that do not generate a critical state process reduce exports of these products (factor F 13). Ukrainian science in electrical engineering still has an ample supply of technological possibilities for innovation of production.

*Table 2*  
*Expert assessments of the risk factors of technological Ukrainian market conditions (market IP)*

| Call risk factor | Call risk factor |      |     |     |      |      |     |      |      |      |      |      |      |      |      |      | Total | Rank |
|------------------|------------------|------|-----|-----|------|------|-----|------|------|------|------|------|------|------|------|------|-------|------|
|                  | F1               | F2   | F3  | F4  | F5   | F6   | F7  | F8   | F9   | F10  | F11  | F12  | F13  | F14  | F15  | F16  |       |      |
| F1               | X                | 10.0 | 7.5 | 3.5 | 7.0  | 12.5 | 6.5 | 12.5 | 11.5 | 10.0 | 8.0  | 13.0 | 14.5 | 15.0 | 11.0 | 15.5 | 158.0 | 5    |
| F2               | 6.0              | X    | 3.5 | 5.0 | 7.5  | 10.5 | 4.0 | 11.5 | 9.5  | 7.0  | 9.5  | 11.5 | 12.0 | 14.0 | 11.5 | 14.5 | 137.5 | 6    |
| F3               | 8.5              | 12.5 | X   | 7.0 | 9.5  | 12.0 | 9.0 | 14.0 | 11.5 | 10.5 | 10.0 | 14.0 | 14.0 | 15.0 | 12.0 | 14.5 | 174.0 | 2    |
| F4               | 12.5             | 11   | 9.0 | X   | 10.5 | 15.0 | 9.5 | 15.0 | 13.0 | 12.5 | 13.0 | 14.5 | 15.0 | 16.0 | 14.5 | 15.5 | 196.5 | 1    |
| F5               | 9.0              | 8.5  | 6.5 | 5.5 | X    | 10.0 | 7.0 | 12.5 | 12.0 | 11.0 | 9.5  | 11.5 | 12.5 | 15.0 | 13.5 | 15.5 | 158.5 | 4    |
| F6               | 3.5              | 5.5  | 4.0 | 1.0 | 6.0  | X    | 3.5 | 9.5  | 8.0  | 7.5  | 5.5  | 8.5  | 10.0 | 13.5 | 8.5  | 14.0 | 113.5 | 10   |
| F7               | 9.5              | 12.0 | 7.0 | 6.5 | 9.0  | 12.5 | X   | 12.5 | 12.0 | 11.0 | 10.5 | 13.0 | 13.5 | 14.5 | 12.0 | 15.0 | 161.5 | 3    |
| F8               | 3.5              | 4.5  | 2.0 | 1.0 | 3.5  | 6.5  | 3.5 | X    | 5.5  | 2.5  | 6.5  | 7.5  | 8.0  | 12.5 | 6.0  | 13.5 | 89.5  | 13   |
| F9               | 4.5              | 6.5  | 4.5 | 3.0 | 4.0  | 8.0  | 4.0 | 10.5 | X    | 8.0  | 8.5  | 9.5  | 10.5 | 15.0 | 12.5 | 14.0 | 123.0 | 9    |
| F10              | 6.0              | 9.0  | 5.5 | 3.5 | 5.0  | 8.5  | 5.0 | 13.5 | 8.0  | X    | 7.5  | 10.0 | 10.5 | 15.5 | 8.0  | 14.5 | 132.0 | 8    |
| F11              | 8.0              | 6.5  | 6.0 | 3.0 | 6.5  | 10.5 | 5.5 | 9.5  | 7.5  | 8.5  | X    | 9.5  | 11.5 | 15.0 | 12.5 | 13.5 | 133.5 | 7    |
| F12              | 3.0              | 4.5  | 2.0 | 1.5 | 4.5  | 7.5  | 3.0 | 8.5  | 6.5  | 6.0  | 6.5  | X    | 8.0  | 14.5 | 7.0  | 13.0 | 96.0  | 12   |
| F13              | 1.5              | 4.0  | 2.0 | 1.0 | 3.5  | 6.0  | 2.5 | 8.0  | 5.5  | 5.5  | 4.5  | 8.0  | X    | 9.0  | 7.0  | 10.5 | 78.5  | 14   |
| F14              | 1.0              | 2.0  | 1.0 | 0.0 | 1.0  | 2.5  | 1.5 | 0.5  | 1.0  | 3.5  | 1.0  | 1.5  | 6.0  | X    | 1.5  | 6.5  | 30.5  | 16   |
| F15              | 5.0              | 4.5  | 4.0 | 1.5 | 2.5  | 7.5  | 4.0 | 10.0 | 3.5  | 6.0  | 3.5  | 9.0  | 9.0  | 14.5 | X    | 14.0 | 98.5  | 11   |
| F16              | 0.5              | 1.5  | 1.5 | 0.5 | 0.5  | 2.0  | 1.0 | 2.5  | 2.0  | 1.5  | 2.5  | 3.0  | 5.5  | 9.5  | 2.0  | X    | 36.0  | 15   |

Using data from Table 2 the 10 most important risk factors of technological Ukrainian market conditions were identified: F4, F3, F7, F5, F1, F 2, F 11, F 10, F9 and F6. However, the data in Table 2 can establish only rank risk factor conditions; they do not allow us to set the "weight" factor in the creation of one or another market

conditions. The theory and practice of paired comparisons to simplify the calculations weighting factors in tabular form recommend swapping columns and rows in Table 2 (Belyaevsky 2007). As a result of these actions an enhanced opportunistic risk factor table can be obtained (Table 3).

Table 3

Improved table reviewing the most important factors of the technological risk opportunistic market

| Call risk factor | Call risk factor |      |      |      |      |     |      |     |     |      |
|------------------|------------------|------|------|------|------|-----|------|-----|-----|------|
|                  | F1               | F2   | F3   | F4   | F5   | F6  | F7   | F9  | F10 | F11  |
| F1               | X                | 6.0  | 8.5  | 12.5 | 9.0  | 3.5 | 9.5  | 4.5 | 6.0 | 8.0  |
| F2               | 10.0             | X    | 12.5 | 11.0 | 8.5  | 5.5 | 12.0 | 6.5 | 9.0 | 6.5  |
| F3               | 7.5              | 3.5  | X    | 9.0  | 6.5  | 4.0 | 7.0  | 4.5 | 5.5 | 6.0  |
| F4               | 3.5              | 5.0  | 7.0  | X    | 5.5  | 1.0 | 6.5  | 3.0 | 3.5 | 3.0  |
| F5               | 7.0              | 7.5  | 9.5  | 10.5 | X    | 6.0 | 9.0  | 4.0 | 5.0 | 6.5  |
| F6               | 12.5             | 10.5 | 12.0 | 15.0 | 10.0 | X   | 12.5 | 8.0 | 8.5 | 10.5 |
| F7               | 6.5              | 4.0  | 9.0  | 9.5  | 7.0  | 3.5 | X    | 4.0 | 5.0 | 5.5  |
| F9               | 11.5             | 9.5  | 11.5 | 13.0 | 12.0 | 8.0 | 12.0 | X   | 8.0 | 7.5  |
| F10              | 10.0             | 7.0  | 10.5 | 12.5 | 11.0 | 7.5 | 11.0 | 8.0 | X   | 8.5  |
| F11              | 8.0              | 9.5  | 10.0 | 13.0 | 9.5  | 5.5 | 10.5 | 8.5 | 7.5 | X    |

In order to establish the weight of the highest rated risk factors of the opportunistic technological market, we assume that the factor obeys the normal law of distribution (Kucherenko 2008; Obolentseva 2010), and thus the number of experts who consider a certain factor more risky, in their opinion, and give it a higher (or lower) risk factor should be taken into account. Based on this premise, it is possible, knowing the appropriate proportion of experts, to establish the relative importance (preference) Factor  $i$  to factor  $j$ .

## DETERMINATION OF THE MOST SIGNIFICANT RISK FACTORS

According to the enhanced opportunistic risk factor table (Table 3) we find the benefits of HIV symptoms (factor)  $i$  on criterion (factor)  $j$ . Thus, we look at the total points received by each factor in a pairwise comparison of the 16 experts. This means that the maximum score that could get the most important risk factor is 16 (one of

the experts in this factor compared to the other would give an advantage to it). In this case, the proportion of cases benefits would be equal to unity ( $16 : 16 = 1$ ), where there is full agreement of expert opinion as to the advantages of this opportunistic risk factor over another. The results of the calculations are summarized in Table. 4.

In a mathematical model that underlies the scale by the method of paired comparisons, it is assumed that the number of cases is subject to the normal distribution law and is described by the Laplace integral function  $F(Q_{ij})$ :

$$F(Q_{ij}) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Q_{ij}} e^{-\frac{Q_{ij}^2}{2}} dQ, \quad (1)$$

where  $Q_{ij}$  is a random variable, which then determines the specific location of each trait and can be interpreted as a quantitative assessment of the relative advantages of variable (factor)  $i$  on criterion (factor)  $j$ ;  $F(Q_{ij})$  - the probability of favoring signs  $i$  and sign before  $j$ .

Table 4

Calculation of particle instances of expert preferences factor  $i$  and to factor  $j$

| Call risk factor | Call risk factor |       |       |       |       |       |       |       |       |       |
|------------------|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                  | F1               | F2    | F3    | F4    | F5    | F6    | F7    | F9    | F10   | F11   |
| F1               | X                | 0.375 | 0.531 | 0.781 | 0.562 | 0.219 | 0.594 | 0.281 | 0.375 | 0.500 |
| F2               | 0.625            | X     | 0.781 | 0.687 | 0.531 | 0.344 | 0.75  | 0.405 | 0.562 | 0.405 |
| F3               | 0.469            | 0.219 | X     | 0.562 | 0.405 | 0.25  | 0.437 | 0.281 | 0.344 | 0.375 |
| F4               | 0.219            | 0.312 | 0.437 | X     | 0.344 | 0.062 | 0.405 | 0.187 | 0.219 | 0.187 |
| F5               | 0.437            | 0.469 | 0.594 | 0.656 | X     | 0.375 | 0.562 | 0.25  | 0.312 | 0.405 |
| F6               | 0.781            | 0.656 | 0.75  | 0.937 | 0.625 | X     | 0.781 | 0.500 | 0.531 | 0.656 |
| F7               | 0.405            | 0.25  | 0.562 | 0.594 | 0.437 | 0.219 | X     | 0.25  | 0.312 | 0.344 |
| F9               | 0.719            | 0.594 | 0.719 | 0.812 | 0.75  | 0.500 | 0.75  | X     | 0.500 | 0.469 |
| F10              | 0.625            | 0.437 | 0.656 | 0.781 | 0.687 | 0.469 | 0.687 | 0.500 | X     | 0.531 |
| F11              | 0.500            | 0.594 | 0.625 | 0.812 | 0.594 | 0.344 | 0.656 | 0.531 | 0.469 | X     |

In this case, the value of  $F(Q_{ij})$  can be interpreted as the proportion of cases with a comparative advantage of one feature over another. Relative advantages and features to feature  $j$  can be determined from the tables of integral Laplace function (normal distribution functions

normalized distribution). Table 5 allows you to find the value function of Laplace for the values of the argument, or, alternatively, by the values of the Laplace function you search for the value of the argument that will work in this case. This means that during this study we have to

know the probability of occurrence (percentage of cases of preferences) we estimate the value of a random variable (numeric value of comparative advantage).

However, the feature table of the integral Laplace function is that it is built for argument values between 0 and  $Q_{ij}$ , and not for the range of values from  $-\infty$  to  $Q_{ij}$ , as required by Equation (2). The table of values of the integral Laplace function can determine the value of  $Q_{ij}$  (relative advantage factor and to factor  $j$ ), only in cases where the proportion of cases favoring factor and to factor  $j$  is greater than or equal to 0.5 ( $F(Q_{ij}) \geq 0.5$ ). Positive values correspond to probabilities  $Q_{ij}$   $F(Q_{ij}) \geq 0.5$ . Therefore, to find the probability of occurrence for negative values  $Q_{ij}$  when using this table based on the principle of symmetry ( $Q_{ij} = -Q_{ij}$ ), take in the first table  $F(Q_{ij})$  larger than 0.5, subtract the difference [ $F(Q_{ij}) - 0.5$ ], and then calculate the function in the table. The symmetrical number  $Q_{ij}$  has a negative sign and the same absolute value. Based on these provisions of the probability of occurrence for negative values  $Q_{ij}$  is based on the symmetry of the normal distribution (Feschur et al. 2009; Gerasimchuk & Koschiy 2009; Nikitin 2011):

$$F(-Q_{ij}) = 1 - F(Q_{ij}) \quad (2)$$

Using the table of Laplace integral function (Gerasymchuk & Koschiy 2009; Kobeleva & Perera 2012) and using Equation (2) will determine the numerical value of relative advantage. The calculation results are summarized in Table 5.

The next stage of calculation of weighting coefficients opportunistic risk factors is to convert the particular instances of the expert preferences factor and to factor  $j$  (Table 4)  $F(Q_{ij})$  in the value of the argument  $Q_{ij}$  using Equation (3) and Table 5. The calculation results are given in Table 6, which is based on the asymmetric

principle that is the accepted premise  $Q_{ij} = -Q_{ij}$ , and diagonally the table exhibited zero.

*Table 5*  
*Table (numeric) value of relative advantage, by using the integral function of the Laplace proportion of cases in Table 4*

| Probability of the benefits, $F(Q_{ij})$ | The numerical value of the relative advantages, $Q_{ij}$ | Probability of the benefits, $[1 - F(Q_{ij})]$ | The numerical value of the relative advantages, $-Q_{ij}$ |
|--|--|--|---|
| 0.500                                    | 0.00   | 0.500  | 0.00  |
| 0.531                                    | 0.08   | 0.469  | -0.08   |
| 0.563                                    | 0.16   | 0.437  | -0.16   |
| 0.594                                    | 0.24   | 0.405  | -0.24   |
| 0.625                                    | 0.32   | 0.375  | -0.32   |
| 0.656                                    | 0.41   | 0.344  | -0.41   |
| 0.687                                    | 0.49   | 0.312  | -0.49   |
| 0.719                                    | 0.58   | 0.281  | -0.58   |
| 0.750                                    | 0.67   | 0.250  | -0.67   |
| 0.781                                    | 0.78   | 0.219  | -0.78   |
| 0.813                                    | 0.89   | 0.187  | -0.89   |
| 0.875                                    | 1.15   | 0.125  | -1.15   |
| 0.937                                    | 1.54   | 0.062  | -1.54   |
| 0.9997                                   | 4.00   | 0.000  | -4.00   |

Using the data of Table 6 is necessary to determine the significance of factors that affect the level of the situation of the Ukrainian market of intellectual property in the direction of deterioration. It has been proposed to solve this problem using selection criteria better option (Gerasymchuk & Koschiy 2009; Kobeleva & Perera 2012), which gives the most "weight" in the deterioration process as market factors, which will be the largest amount relative advantages provided by experts. The importance of other (already less important) factors is determined by a similar scenario.

*Table 6*  
*The value of the relative merits of factor  $i$  in front of factor  $j$*

| Call risk factor | Call risk factor |       |       |      |       |       |       |       |       |       |
|------------------|------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|
|                  | F1               | F2    | F3    | F4   | F5    | F6    | F7    | F9    | F10   | F11   |
| F1               | 0                | -0.32 | 0.08  | 0.78 | 0.16  | -0.78 | 0.24  | -0.58 | -0.32 | 0.00  |
| F2               | 0.32             | 0     | 0.78  | 0.49 | 0.08  | -0.41 | 0.75  | -0.24 | 0.16  | -0.24 |
| F3               | -0.08            | -0.78 | 0     | 0.16 | -0.24 | 0.25  | -0.16 | -0.58 | -0.41 | -0.32 |
| F4               | -0.78            | -0.49 | -0.16 | 0    | -0.41 | -1.54 | -0.24 | -0.89 | -0.78 | -0.89 |
| F5               | -0.16            | -0.08 | 0.24  | 0.41 | 0     | -0.32 | 0.16  | 0.25  | -0.49 | -0.24 |
| F6               | 0.78             | 0.41  | 0.75  | 1.54 | 0.32  | 0     | 0.78  | 0.00  | 0.08  | 0.41  |
| F7               | -0.24            | 0.25  | 0.16  | 0.24 | -0.16 | -0.78 | 0     | 0.25  | -0.49 | -0.41 |
| F9               | 0.58             | 0.24  | 0.58  | 0.89 | 0.75  | 0.00  | 0.75  | 0     | 0.00  | -0.08 |
| F10              | 0.32             | -0.16 | 0.41  | 0.78 | 0.49  | -0.08 | 0.49  | 0.00  | 0     | 0.08  |
| F11              | 0.00             | 0.24  | 0.32  | 0.89 | 0.24  | -0.41 | 0.41  | 0.08  | -0.08 | 0     |

The results of the corresponding calculations quantitative evaluation values of the factors in the

deterioration of operating conditions of technological intellectual property market are presented in Table 7.

*Table 7*  
*Defining opportunistic risk factors of loss*

| Call risk factor  | Call risk factor |       |       |      |       |       |       |       |       |       |
|---|------------------|-------|-------|------|-------|-------|-------|-------|-------|-------|
|   | F1               | F2    | F3    | F4   | F5    | F6    | F7    | F9    | F10   | F11   |
| F1  | 0                | -0.32 | 0.08  | 0.78 | 0.16  | -0.78 | 0.24  | -0.58 | -0.32 | 0.00  |
| F2  | 0.32             | 0     | 0.78  | 0.49 | 0.08  | -0.41 | 0.75  | -0.24 | 0.16  | -0.24 |
| F3  | -0.08            | -0.78 | 0     | 0.16 | -0.24 | 0.25  | -0.16 | -0.58 | -0.41 | -0.32 |
| F4  | -0.78            | -0.49 | -0.16 | 0    | -0.41 | -1.54 | -0.24 | -0.89 | -0.78 | -0.89 |
| F5  | -0.16            | -0.08 | 0.24  | 0.41 | 0     | -0.32 | 0.16  | 0.25  | -0.49 | -0.24 |
| F6  | 0.78             | 0.41  | 0.75  | 1.54 | 0.32  | 0     | 0.78  | 0.00  | 0.08  | 0.41  |
| F7  | -0.24            | 0.25  | 0.16  | 0.24 | -0.16 | -0.78 | 0     | 0.25  | -0.49 | -0.41 |
| F9  | 0.58             | 0.24  | 0.58  | 0.89 | 0.75  | 0.00  | 0.75  | 0     | 0.00  | -0.08 |
| F10   | 0.32             | -0.16 | 0.41  | 0.78 | 0.49  | -0.08 | 0.49  | 0.00  | 0     | 0.08  |
| F11   | 0.00             | 0.24  | 0.32  | 0.89 | 0.24  | -0.41 | 0.41  | 0.08  | -0.08 | 0     |
| $\sum F_{ij}$   | 0.74             | -0.69 | 3.16  | 6.18 | 1.23  | -4.07 | 3.18  | -1.71 | -2.33 | -1.69 |
| $\bar{F}_{ij} = \frac{\sum F_{ij}}{16}$   | 0.04             | -0.04 | 0.19  | 0.38 | 0.07  | -0.25 | 0.19  | -0.10 | -0.15 | -0.10 |
| $\bar{F}_{ij}^{mp} = \frac{\sum F_{ij}}{16} - (-0,25 - 1)$  | 1.29             | 1.21  | 1.44  | 1.63 | 1.32  | 1.0   | 1.44  | 1.15  | 1.10  | 1.15  |
| $\sum \bar{F}_{ij}^{mp}$  | 12.73            |       |       |      |       |       |       |       |       |       |
| Нормування вагомості факторів кон'юнктурного ризику:  |                  |       |       |      |       |       |       |       |       |       |
| $F_{ij}^{eaz} = \frac{\bar{F}_{ij}^{mp}}{\sum \bar{F}_{ij}^{mp}} = \frac{\bar{F}_{ij}^{mp}}{12,73}$ |                  |       |       |      |       |       |       |       |       |       |
| $F_i^{eaz}$   | 0.10             | 0.09  | 0.12  | 0.13 | 0.11  | 0.07  | 0.12  | 0.09  | 0.08  | 0.09  |

To calculate the weight of opportunistic risk factors in Table 7, the calculations of the arithmetic mean of the relative advantages was carried out, and then transformed to obtain only positive values and normalized (the sum of normalized values of weighting factors analyzed is equal to one).

The next action is a quantitative assessment of risk

deterioration of the Ukrainian market of intellectual property generated by each of the above mentioned factors. The evaluation displayed was performed by the same expert group on a 10-point scale (10 points – the strongest impact factor on the deterioration of market conditions). Results of expert risk assessment by each factor are shown in Table 8.

*Table 8*  
*Expert assessment of the impact of situational factors on the deterioration of the conditions for the functioning of the Ukrainian market of intellectual property*

| Number of experts | Call risk factor |      |      |      |      |      |      |      |      |      |
|-------------------|------------------|------|------|------|------|------|------|------|------|------|
|                   | F1               | F2   | F3   | F4   | F5   | F6   | F7   | F9   | F10  | F11  |
| №1                | 4                | 5    | 5    | 6    | 5    | 4    | 6    | 3    | 6    | 5    |
| №2                | 3                | 3    | 6    | 8    | 4    | 3    | 9    | 4    | 5    | 6    |
| №3                | 5                | 4    | 8    | 5    | 6    | 5    | 6    | 3    | 7    | 7    |
| №4                | 4                | 2    | 3    | 6    | 3    | 2    | 7    | 3    | 5    | 5    |
| №5                | 3                | 5    | 4    | 9    | 5    | 5    | 9    | 4    | 6    | 6    |
| №6                | 2                | 4    | 7    | 7    | 4    | 3    | 7    | 2    | 5    | 4    |
| №7                | 1                | 2    | 5    | 5    | 7    | 4    | 5    | 5    | 8    | 8    |
| №8                | 5                | 3    | 8    | 9    | 5    | 6    | 9    | 6    | 6    | 5    |
| №9                | 4                | 5    | 3    | 8    | 4    | 4    | 8    | 4    | 6    | 8    |
| №10               | 4                | 3    | 6    | 7    | 6    | 3    | 6    | 2    | 8    | 6    |
| №11               | 3                | 4    | 4    | 9    | 4    | 2    | 8    | 3    | 9    | 4    |
| №12               | 2                | 5    | 6    | 8    | 7    | 5    | 6    | 5    | 5    | 7    |
| №13               | 5                | 6    | 8    | 6    | 5    | 3    | 8    | 3    | 7    | 5    |
| №14               | 2                | 3    | 3    | 9    | 3    | 4    | 7    | 2    | 8    | 6    |
| №15               | 3                | 5    | 5    | 7    | 6    | 5    | 7    | 5    | 5    | 8    |
| №16               | 2                | 3    | 6    | 5    | 4    | 3    | 8    | 2    | 6    | 5    |
| Total points      | 52               | 62   | 87   | 114  | 78   | 61   | 116  | 56   | 102  | 95   |
| Mean score        | 3.25             | 3.87 | 5.43 | 7.12 | 4.87 | 3.81 | 7.25 | 3.50 | 6.37 | 5.93 |

Using data from Table 7 and 8 we have the opportunity to conduct a quantitative assessment of risk measures leading to a deterioration process of the market. For this purpose we use the following formula (Belyaevsky 2007):

$$O_{risk} = \sum_{i=1}^{i=n} (F_i^{risk} F_i^{imp}), \quad (3)$$

where

$O_{risk}$  - risk deterioration of the Ukrainian market of intellectual property;

$F_i^{imp}$  - The weight of  $i$  factor opportunistic risk;

$F_i^{risk}$  - The degree of opportunistic risk and expense, the  $i$  factor.

The corresponding calculations for determining the quantitative assessment of the risk of worsening market conditions are summarized in Table 9.

*Table 9*  
*Calculation of the quantitative evaluation of the risk of deterioration of the Ukrainian market of intellectual property*

| Code   | What are the factors  | $F_i^{imp}$ | $F_i^{risk}$ | $\Phi_i^{imp} \Phi_i^{risk}$ |
|--------|---|-------------|--------------|------------------------------|
| F1     | Deterioration of Ukrainian market   | 0.10        | 3.25         | 0.325                        |
| F2     | Disadvantages legal support market processes in Ukraine                       | 0.09        | 3.87         | 0.348                        |
| F3     | The emergence of shortages of electricity for industrial needs                | 0.12        | 5.43         | 0.652                        |
| F4     | The emergence of alternative intellectual technologies (reducing market size) | 0.13        | 7.12         | 0.926                        |
| F5     | Increasing the share of imports in the technological market of Ukraine        | 0.11        | 4.87         | 0.536                        |
| F6     | Increased political instability in Ukraine                                    | 0.07        | 3.81         | 0.267                        |
| F7     | Decrease in the intellectual development of domestic production               | 0.12        | 7.25         | 0.870                        |
| F9     | The complexities of software production using IP                              | 0.09        | 3.50         | 0.315                        |
| F10    | Changing your target consumers for imported technologies                      | 0.08        | 6.37         | 0.510                        |
| F11    | Rising cost of developing Ukrainian real IP                                   | 0.09        | 5.93         | 0.534                        |
| Total: |   | 1.00        |              | 5.283                        |

To evaluate the results obtained (Table 9) it necessary to make the criteria of interpretation of quantitative assessments of the risk of deterioration of the Ukrainian market of intellectual property. Based on the processing and completion of research proposals in this area

(Belyaevsky 2007) appropriate recommendations were given, the use of which enables us to provide an economic interpretation of the quantitative results presented in Table 9. Suggestions in this regard are summarized in Table 10.

*Table 10*  
*Guidelines for assessing opportunistic risk*

| The value of an interval of Powers line |      | General description of the risk | Detailed description of the risk of worsening market conditions   |
|---|------|---------------------------------|---|
| beginning                               | end  |                                 |   |
| 0                                       | 0.5  | Missing risk                    | The market is under development. The level of competition is low. Technology dominates the preferences of consumers.                                    |
| 0.5                                     | 2.8  | Minimal risk                    | The market is almost formed. A healthy level of competition. No specific threat of deterioration.   |
| 2.8                                     | 5.5  | The risk increased              | Market in the stage of commercial success. Threat of increased competition. Technology should be modernized or replaced by a more progressive approach. |
| 5.5                                     | 7.5  | Critical risk                   | Market in the early stages of decline. Threats of competition intensified. An urgent need to diversify the market and technological policy.             |
| 7.5                                     | 10.0 | Unacceptable risk               | The critical state of the market. The technology is not competitive. Need replacement technology or to change segment.                                  |

## CONCLUSIONS

Estimation of the risk of opportunistic suggests that the domestic market of intellectual property in the field of electrical production is at high risk (5.283 points out of

maximum 10) of deterioration in the conditions of its operation. The most important risk factors for conditions of the market are defined as follows: a decrease in the production of Ukrainian intellectual technologies and the emergence of alternative national scientific developments (reduction of market size).

## REFERENCES

- BELYAEVSKY, I.K. (Ed.)(2007). Statistics of market goods and services. Moscow: Finance and Statistics.
- European IPR Helpdesk (2012). Fact sheet: IP due diligence: assessing value and risks of intangibles. Available at: [http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/IP\\_due\\_diligence\\_0.pdf](http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/IP_due_diligence_0.pdf)
- European IPR Helpdesk (2013). Fact sheet: Commercializing Intellectual Property: Joint Ventures, Available at: [http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/Commercialising\\_Intellectual\\_Property\\_Joint\\_Ventures\\_0.pdf](http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/Commercialising_Intellectual_Property_Joint_Ventures_0.pdf)
- EverEdgeIP (2014). Transactions. Available at: <http://everedgeip.com/transactions/>
- FESCHUR, R.V., BARVINSKYI, A.F. & KICHOR, V.P. (2009) Statistics. Lviv : "Intelligence-West".
- GERASYMCHUK, Z.V. & KOSCHIY, O.V. (2009). Risk assessment of functioning domestic market for dairy products in Ukraine. Available at: [http://194.44.242.244/portal/soc\\_gum/vcndtu/2009\\_38/7.htm](http://194.44.242.244/portal/soc_gum/vcndtu/2009_38/7.htm)
- GOLUBKOV, E.P. (2000). Marketing research: theory, methodology and practice. Moscow: Fynpres, 2000.
- KOBELEVA, T.O. & PERERVA, P.G. (2012). Determining the risk assessment of the situation of the domestic market asynchronous motors. Management and Marketing Innovation, 1, 79-88.
- KUCHERENKO, V.R. (2005) Problems market research on markets for goods and services. Research publication. Odessa.
- KUCHERENKO, V.R. (2008). Conditions of scientific and technical products / V.R.Kucherenko / / Investing in Ukrainian economy market conditions. - Odessa: Institute of Market Problems.
- MACHINE, N.I. (2003). Economic risk and methods of measurement / N.I.Mashyna. - Kiev, 188 p.
- NIKITIN, A.V. (2011). Marketing in Banks. Kiev: MBK.
- OBOLENTSEVA, L.V. (2010) Opportunistic market research industry.