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### Factorial Analysis as a Basis for Reducing the Risk of an Investment Project

N. S. Akhmetov<sup>1</sup>, A. S. Tulebekova<sup>2</sup> and M. Kozhakhmet<sup>3</sup>

<sup>1,2,3</sup>L.N.Gumilyov Eurasian National University, Munaitpassov 13 A Str., Astana, Kazakhstan

E-mail: [krasavka5@mail.ru](mailto:krasavka5@mail.ru)

**Abstract:** The paper presented organization and realization of investment project. Discussion of problems and risks might be important for understanding the investment project. The paper includes analyses for control risk in development and developed countries. Also presented features of the algorithm for implementing a system of organizational and technological measures of implementing an investment project on the construction of an industrial complex.

**Keywords:** analyses, risk, project, organization

#### INTRODUCTION

Attracting foreign investment is one of the necessary measures to ensure the development of national economy. The state which is reforming the economy in order to withdraw it from a long crisis uses every opportunity to raise funds. A characteristic feature of the economic crisis is the lack of financial resources or even their complete absence. A country experiencing a systemic economic crisis needs to attract foreign investment. The great reformer Lee Kuan (2000) stated: "We welcomed every investor. We just jumped out of our skin to help start production.

Despite the high degree of risk, foreign investors are interested in investing in the economy of such countries. Since there are some benefits under these conditions, for example, cheap labor force and raw materials, tax and other, including targeted support of the state, government and people to create favorable conditions for attracting investments. However, along with the above-mentioned favorable conditions there are some unfavorable conditions which create uncertain difficulties and the corresponding degree of risks. Such factors include inadequate legislation and industry standards, a low level of culture of production, organization, management and responsibility of economic partners in the implementation of commitments.

The practice of the civilized world has shown that ensuring a stable development of the national economy is determined by the degree of organization of economic relations. Economic difficulties, including economic crisis, mainly arise as a result of the low level of organization way. Unfortunately, the level of economy organization cannot be increased immediately as it depends on many factors. One of the most important factors is the development of external economic integration with developed countries. This investment is aimed at attracting financial benefits, as well as the development of the high culture of the organization of production processes of modern technology and management principles.

### **THE ORGANIZATION OF INVESTMENT PROJECT**

The organization and implementation of the investment project is a complicated technological system of production processes, such as research, design, involvement of partners and contract award, construction and transportation. Therefore, any unforeseen situations in the implementation of realization processes create relative risks. A low level of organization and management culture increases a high probability of unforeseen situations at every step in the realization of a project. This situation inhibits the influx of foreign investors. Therefore, only the most reasonable solution to the problem of unfavorable situations reduces the investor's risks and ensures the successful implementation of the project.

Developed and developing countries are two completely different levels of organization and management of a socio-production system. It defines the basis for the possibility of risks for the successful implementation of investment projects. In developed countries with a high level of culture of organization and management reciprocal correlation of processes of the investment project implementation is simplified. This contributes to a well-established high performing culture of contractual terms between partners and a sustainable mechanism protecting the interests and rights of economic entities. In countries experiencing economic crisis, on the contrary, there is bureaucracy, corruption and a relative executive irresponsibility. The latter and many other factors are not taken into account or are not evaluated adequately enough in defining the risk of the investment project implementation (Basovsky L.E., Protasiev V.B. (2000)).

The method used to assess the risk of the investment project should take into account the conjectural differences of developed countries and countries experiencing economic crisis. In developed countries or in practice in general the discount method used to assess the risk of an investment project. Risks are determined by the market situation and its impact on the future viability of the investment project. The risks that arise during the project are not taken into account. A high degree of the organization of the economic systems of developed countries excludes the occurrence of risks in this period. This is possible in developed countries which have a well-established high level of culture of organization where partners' obligations are carried out on time and with a high quality.

However, as it is noted above, in developing countries there is a high degree of probability of the investment projects risk during their implementation. The discount method does not take into account risks arising from the low level of organization culture in the country, that is, from the influence of operational factors for the investment projects implementation. These factors occur in countries where there is a crisis and the lack of stability in the economy, which accounts for a large (50-70%) share of the countries of the world economy. These are enormous resources which ensure the effective development of the world economy and are actually expected to attract investment and construction of civilized production bases.

Construction is one of the main components of investment in the states of the mentioned category. Since long stagnation and crises in these countries in fact have led to the general uselessness and ineffectiveness of physically and morally outdated production bases. The most significant current disadvantages are energy-intensive uncompetitive and do not meet the requirements of modern production and are uncompetitive.

Practice shows that construction of buildings and structures on the basis of modern technological solutions formed the basis for the development of the economies of Southeast Asia, Russia, Kazakhstan and others. The result is a modern city built, scientific and technological and manufacturing facilities. Construction has become the most international area of economy. A considerable share is occupied by foreigners and foreign companies.

Attracting foreign investments, especially those assigned for the construction of large infrastructural and industrial facilities, is under the direct supervision of the state and government. This considerably reduces bureaucratic acrimony in project implementation. It is obvious that all these things are positively expressed in providing favorable conditions for attracting foreign investments, and to some extent reduces the risk, but the problem cannot be removed completely and this is confirmed by the practice of the Republic of Kazakhstan, Russia and other countries.

### **REALIZATION CONSTRUCTION PROJECT**

Construction and construction industry in the former Soviet countries have been evolving successfully enough until recently. As a result, the industry has a sufficient number of highly qualified professionals who are now easily mastering the latest technology and production in foreign construction companies and building large unique well-designed technological facilities. Therefore, taking into account professionals' assessment in the evaluation of project investment would help reduce the risk. For the time being they are directly involved in the implementation of project investment only in the construction process. The assessment on the implementation of project investment at the construction stage is valuable and contributes to the objective identification and assessment of unfavorable organizational and technological factors (Leontiev V(1997)).

Figure 1 shows the algorithm for implementing a system of organizational and technological measures of implementing an investment project on the construction of an industrial complex. Each of them represents a separate operating segment (subsystem). The implementation of the project for the construction of an industrial complex is typical for most countries, and mainly contains similar organizational and technological measures. They differ in the quality of performance (timeliness, frequency, level of bureaucracy, etc.) depending on the condition and content of the regulatory legal norms and their execution order. Successful implementation of the project for the construction of an industrial complex is directly determined by the adequate and qualitative performance measures for each operational site.

The content of this sphere of investment processes and its problems are difficult to understand by foreign investors and often cause their dissatisfaction with the current state of affairs. Therefore, there is a constant possibility of risks in the implementation of the investment project at this production site. This concern requires a careful approach and risk assessment by local professionals who have sufficient practice of construction management in the implementation of investment projects (O. Obraztsova (1994)).

The evaluation of opinions and determination of their quantitative values are to be done on the basis of the expert method. The objective assessment depends on the knowledge (expertise, experience, etc.) of experts, as well as on the structure and content of evaluating operating segments (L.E. Basovsky(2005)).

It is clear that production process is determined by many factors and objective assessment of risks depends on the scale of coverage. It is also known that not all production areas pose risks. In every country they are very different depending on the level of development and culture of organization and management. Therefore, at the first stage production areas and their risk degree ranking are defined. Practice and theoretical basis of expert methods have a sufficiently tested and solid base and the solution to this problem will not be particularly difficult. Using the method of exclusion, which presents a low probability of risks in industrial sites, we exclude further assessment.

### **PROBLEMS AND RISKS**

It is significant to define and study the problems causing fears of investors and relevant factors that increase the risk of project implementing. It is obvious that foreign investors make project decisions in accordance with the main macroeconomic indicators, reducing the significance of operating areas which are direct production costs (A.V. Milov, E.V. Raevneva (1996)).

Therefore, the initial selection of experts should be carried out on the basis of their knowledge of the operational areas in which there is a risk of project implementation depending on its capabilities (financial, logistical, technological, time, etc.) and problem solving.

Selected experts evaluate the rank of each production process according to the probability and scale of problems in a production site. For example, designers often make errors that hinder the approval and permission of the authorities construction. Expert questionnaire consists of several significant issues of industrial sites (M.G. Lapusta L.G. Sharshukova (1998)).

For an investment project on construction a building materials plant the sites are as follows:

- development of project feasibility;
- development and evaluation of design and estimate documentation of a plant;
- obtaining permits and construction of a plant.
- acquisition of plant engineering and technological facilities, equipment and start-up processes;
- recruitment of engineers and technicians, skilled personnel and commissioning.

Consistency of expert evaluation can be measured by the coefficient of concordance:

$$W = \frac{12S}{n^2(m^3 - m)} \quad (1)$$

where

$S$  – sum of squared deviations of all evaluation ranks of each industrial site of average evaluation value;

$n$  – number of experts;

$m$  – number of evaluated industrial sites.

The coefficient of concordance changes in within the range  $0 \leq W \leq 1$ , where 0 – full expert inconsistency, 1 – full expert consistency.

Table 1 presented expert evaluation of any problems for the above production sites.

$$Q_{cp} = (19+16+7+11+22) / 5 = 15$$

$$W = \frac{12S}{n^2(m^3 - m)} = 12 \times 146 / 25 \times (125 - 5) = 0,6$$

Concordance coefficient  $0 < 0,6 < 1$  satisfies the consistency of expert evaluation. At the same time production site 3 “Obtaining permits and construction of a plant” is the most problematic with the high risk degree. This site requires investors’ attention and a more detailed special development of organizational and technological measures for effective implementation of a project.

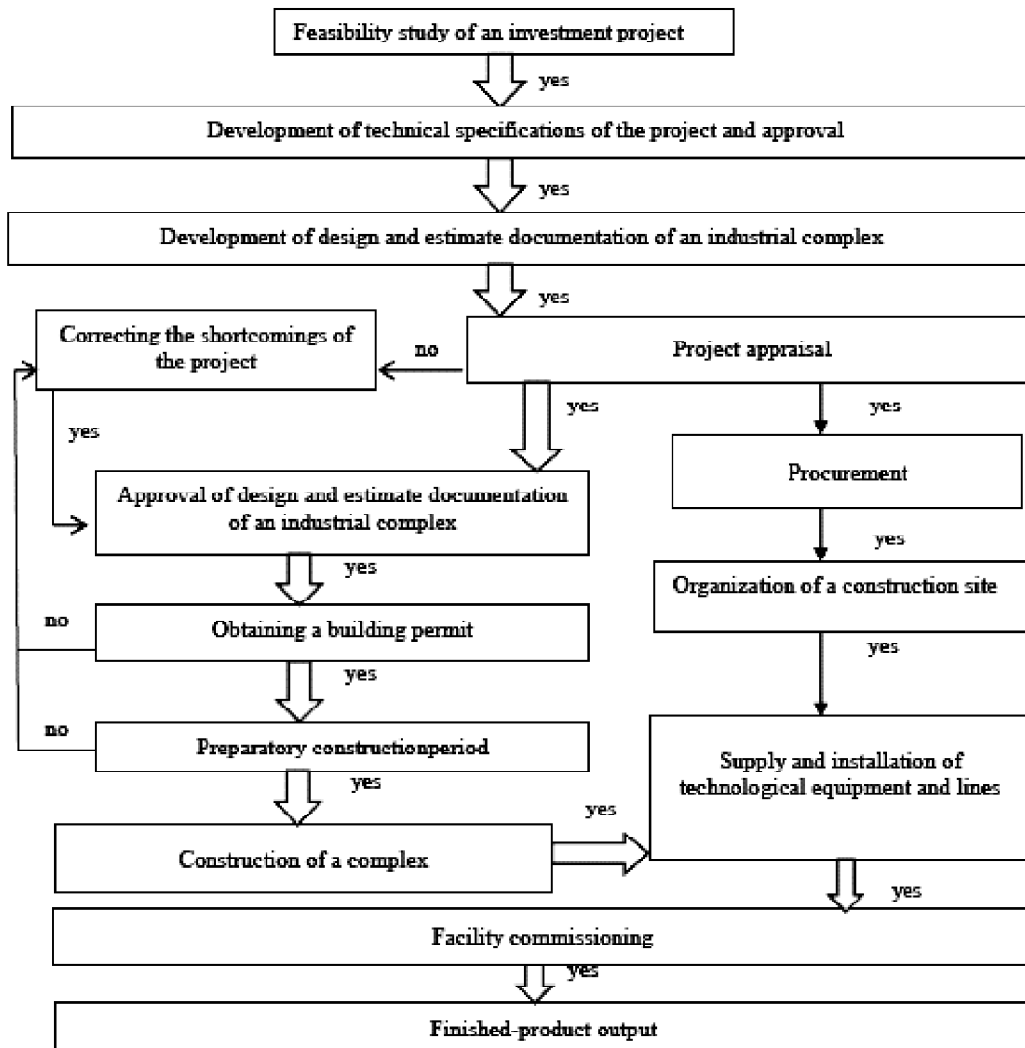


Figure 1: The algorithm for implementing a system of organizational and technological measures of implementing an investment project on the construction of an industrial complex

**Table 1**  
**Assessment of expert evaluation consistency**

Industrial sites	Expert evaluation					Ranks	Deviations	Squared deviation
	1	2	3	4	5			
1	4	5	5	3	2	19	4	16
2	3	1	4	4	4	16	1	1
3	1	2	1	2	1	7	-8	64
4	2	3	2	1	3	11	-4	16
5	5	4	3	5	5	22	7	49

### CONCLUSIONS

Nowadays many international projects are realized in Kazakhstan moreover, for realization unique project is required analyze for reducing the risks. Organization include of using leading foreign high-tech, economic, ecological and energy-efficient technology. Factorial analysis is basis for reducing the risk of an investment project. And so research of algorithm of system of organizational and technological measures of implementing an investment project is important for the future Kazakhstan development projects.

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