

# **The economically profitable investment project is the aspect of the level of economic development of the region**

**Karmokova H.B., Tkhamokova S.M. and Shogenova M.H**

V.M.Kokov Kabardino-Balkaria State Agrarian University, Department of Accounting, School of Accounting and Audit, 360000, Russia, KBR, Nalchik.

**Karmokova H.B.**, Candidate of Economic Sciences, Associate Professor, Institute of Economics, FGBOU VPO "V.M.Kokov Kabardino-Balkaria State Agrarian University" 360000, Russia, KBR, Nalchik, Moskovskaya street, 2a, apt. 129, phone: 8928-690-00-93 email:krb.karm@mail.ru

**Tkhamokova S.M.**, Candidate of Economic Sciences, Associate Professor FGBOU VPO "V.M.Kokov Kabardino-Balkaria State Agrarian University", Department of Accounting, School of Accounting and Audit email:svetatch76@mail.ru

**Shogenova M.H.**, Candidate of Economic Sciences, Associate Professor FGBOU VPO "V.M.Kokov Kabardino-Balkaria State Agrarian University", Department of Accounting, School of Accounting and Audit email: mari-shogenova@yandex.ru

## **ABSTRACT**

### **Annotation**

This article is devoted to analytical survey of investment attraction of the region into the capital by years and its evaluation.

The special importance of the main economic improvements, and specifically the direction of investment policy of the region, the relevance of the choice of the most effective ways of its solution of the region, a necessity arose to solve the problems of improvement of measures for its realization.

In this case, it is in perspective, the investment project of creation of the enterprise, on the basis of plants, not applicable, for the production of electronic equipment, with the purpose of organization and development of production in Kabardino-Balkaria with low cost and high competitive in the world market.

### **Keywords**

The dynamics, money incomes, investments, capital, economic profitability, investment project.

## **1. INTRODUCTION**

Our research is devoted to the substantiation of efficiency of production complex with the purpose of attraction the investors for financing the purchase of the technical equipment.

The researched and proposed investment is a long term project of the assessment of investment attractiveness of the enterprise from the point of view of their posts on the market of high-tech science intensive production.

And here we have a huge value of investments not only for the economy as a whole, but to the future status of certain enterprises, it is important to note that the high-tech equipment will allow to increase output without any costs for the purchase of components or additional units, which improves the efficiency and economic viability of the operation of the enterprise.

For the project, possibly, in the initial stage of repair of an existing building of bankrupt factories, there are 6 of them in the region, as well as acquisition and installation of units, technological equipment and machinery, raw materials of polycrystalline silicon.

## **2. THE DYNAMICS OF THE DEVELOPMENT OF THE REGION AND ITS ANALYSIS**

The comparative analysis of economic development of the KBR showed that in a number of key indicators the Republic is behind other regions of the Russian Federation.

It is determined that the estimated results of activity of bodies of Executive power of RF, executed by the Ministry of regional development of the Russian Federation for the year 2012, revealed that the Kabardino-Balkarian Republic according to the free index is on 66th place out of 83 regions.

However, in recent years there has been negativity in dynamics. Thus, in 2010 the KBR took the 20th place in 2011 – the 41th place, and in 2012 – the 66th place.

Such negative dynamics is determined respectively by negative dynamics for a number of indicators for which the Republic occupies the end of a place among the other subjects of the Russian Federation.

For example: for the volume of tax and non-tax revenues of the consolidated budget of a subject of the Russian Federation it took the 83th place.

For its level it took the 78<sup>th</sup> and for the dynamics, respectively, the 82th (this volume was in 2012 12.6 thousand rubles per capita, which is much lower than the average Russian level (44,5 thousand roubles), having increased during three years only for 11.6%).

It took the 80<sup>th</sup> place according to the actual count of money incomes, the 75<sup>th</sup> - for the level and the 70<sup>th</sup> place for the dynamics (the real money income over 3 years grew by 2.5% (in Russia - by 11.0% and amounted to 149,8 thousand rubles per capita, which is 1.5 times lower than the average Russian level).

For investments in fixed assets, with the exception of budgetary funds per capita, it took the 63<sup>rd</sup>, further the 79<sup>th</sup> for its level and the 54<sup>th</sup> for the dynamics (per capita investment during 3 years grew by 43.8% (in Russia - by 62.8%) and amounted to 24 thousand rubles per capita, which is more than 3 times lower than the average Russian level).

According to the unemployment rate it takes the 50th place, including the 76th place for the level of volume indicator (an unemployment rate makes up 8.8%, which is by 3.3 percentage points higher than the average Russian level).

According to the assessment of public attitudes towards the activities of the head of Executive power of the constituent entity of the Russian Federation, the Republic takes the 80th place.

The assessment by the population of activity of Executive authorities of the subject of the Russian Federation has revealed that the region is on the 58th place, and at the same time, according to the population attitude to the activity of the head of Executive power of the constituent entity of the Russian Federation, the Republic ranked 80th.

As for the results of the monitoring of socio-economic status of subjects of the Russian Federation conducted by the Ministry of regional development of the Russian Federation, the composite index of social-economic development for 11 months of 2013 the Republic was on the 80-th place.

However, according to the Ministry of regions of Russia, the situation for the last three years deteriorated: 2010 – the 31<sup>th</sup> place, 2011 – the 72<sup>th</sup> place, 2012 - the 76<sup>th</sup>, and since the beginning of 2013 – the 80<sup>th</sup> place.

Again, according to the components of this index the Republic occupies the end places: the investment attractiveness takes the 80<sup>th</sup> place, income and employment – the 80<sup>th</sup> place, the budget system – the 70<sup>th</sup> place, the real economy sector – the 67<sup>th</sup> place.

Today, the Republic is characterized by a low level of economic development, and in 2013 the values of the majority of macroeconomic indicators were worse than the average Russian level.

The gross regional product per capita in 2012 was 110,6 thousand rubles, which is almost 4 times lower than the average Russian (436,7 thousand rubles), in 2005 this gap was 2.9 times.

Since the beginning of 2013 the index of industrial production decreased up to 91.6%, and the KBR entered the top four leaders in reduction of industrial production among the subjects of the Russian Federation.

The `investments in fixed capital` per capita over the period of 2005-2012 increased 4.5 times (from 6.4 thousand rubles in 2005 to 29,6 thousand rubles in 2012).

The value of this indicator is almost 3 times lower than the average Russian, who is 87,6 thousand rubles.

### **3. THE PROJECT FOR THE RENAISSANCE OF HIGH-TECH SCIENCE INTENSIVE PRODUCTION IN THE REGION**

Due to the high importance of fundamental economic improvements, and specifically in the system of investment policy of the region, taking into account peculiarities of investment projects, as well as the relevance of the choice of the most effective ways of its solution, a necessity arose to solve the problems of improvement of measures for its implementation.

This can be an investment project of creation of the enterprise, on the basis of plants, already not existing, bankrupt, for the production of electronic equipment, with the purpose of organization and development of production in Kabardino-Balkaria with low cost and high competitive on the world market.

It should be noted that after the implementation of this project, you can plan the next stage, the organization of production of photovoltaic cells, solar modules and light-emitting diodes on the basis of already produced silicon.

So, the full technological chain of production is realized here: ingot monocrystalline silicon of solar and electronic quality; wafers of silicon, photoelectric converters (solar cells), modules of photoelectric converters; light-emitting diodes and lighting on the territory of Kabardino-Balkaria.

At the same time, each created Department is an independent production, whose products are popular on the market. All departments are united by full technological cycle of production of solar modules and led lamps.

This arrangement allows the company to maximize the load of production capacities and reduce the cost of the final product.

However, this project involves the creation of four territorial independent finished productions, with the possibility of concluding them into one technological chain:

1. The production of monocrystalline silicon ingots up to 1920 PCs/year (weighing 400 tons./year).
2. The production of silicon wafers (diameter 300 mm 384 thousand units/year) among them there are 192 thousand photo converters a year.) and (semiconductor devices and integrated circuits) 192 thousand units/year for electronics.
3. The production of solar cells and LEDs.

4. Build photo modules (FEMP) - 10,6 thousand units/year and equipment for light-emitting diodes and lighting.

The implementation of this project will be the beginning of a revival of a high-tech science intensive cost-effective and focused primarily on the global market production in Kabardino-Balkaria.

#### 4. MARKETING PROJECT

High-grade polycrystalline silicon of high purity and of the 5N - 9N grade is used as a raw material for manufacture of silicon single crystals. The product is freely sold at the stock exchange.

The main suppliers of polysilicon in the world are the USA, Russia and China.

The construction of a pilot plant for the production of cheap, in comparison with world prices of polysilicon in our country, in Irkutsk, at the production site and technology Institute of Geochemistry them. A.P. Vinogradov SO RAN is coming to the end.

An investment project OOO "NITOL COMPANY" is also putting into effect in the Irkutsk region, in Usolie-Sibirskoe, on the territory of "Usoliekhimprom".

Further, here is the construction of Russia's first large-scale production complex on manufacture of the basic raw material for solar energy and electronics industries - polysilicon capacity of 3800 tons per year. The cost of one kilogram of polysilicon, according to the purity varies from \$2.3 to \$40.

**The Global polysilicon market.** Silicon dioxide (silica) serves as a raw material for polycrystalline silicon. Silica is widely distributed in nature in the form of sand, quartz and clay. The production and consumption of silicon in the world is more than 125 thousand tons per year. Polycrystalline silicon (PCS polysilicon) and monocrystalline silicon (Monokini, monosilicon) belong to the category of high-purity (crystal, chemical) silicon. Polysilicon is a raw material for the production of more perfect silicon - monocrystalline, and can be also used in pure form along with monocrystalline in some applications (for example, in the production of solar modules).

Polycrystalline silicon production for the needs of the solar industry is growing steadily. So, only for 2 years, its consumption has doubled (from 23 in 2011 up to 46 thousand tons in 2013). Annual growth is about 30 %, but there was a serious shortage of silicon for the needs of the solar industry.

In the end, by 2015, all manufacturers is planned to produce about 100 thousand tons of polycrystalline silicon.

The average production cost of 1 kg of polysilicon according to the traditional technology is \$30.

**The Russian market of solar energy.** In Russia solar energy hardly developed till the last time, although solar cells are made for the space industry from 1950-ies.

On the territory of our country there are several manufactures of solar modules, including 3 large-scale, each with a capacity of not less than 10 MW per year in Moscow, Ryazan and Krasnodar. For example, in the Ryazan metal ceramics instrumentation plant (RZMKP) an american line on 15 MW per year is mounted. Most of the products of the plant till recently were exported. From all Russian manufacturers of solar batteries only OAO RZMKP has the certificates "Rostest" and ISO. Exactly, 2 lines of Ryazan plant in 2010 worked in normal mode, Krasnodar "solar wind" has brought its production in Spain recently.

The total production capacities of Russian producers of photovoltaic modules exceed 50 MW of finished products per year (evaluation of OAO NPP Kvant"). Despite the fact that in Russia it is sold not more than 5 % of this amount, about 200 companies declare their main activities - sales and installation of solar power plants and photovoltaic systems on the territory of Russia.

At present, more than 13 companies in Russia produce photovoltaic cells for solar systems:

LLC "Firm "Solar wind" (Krasnodar);  
ZAO "OKB of the plant "Krasnoe Znamya" (Ryazan);  
OOO NPF "Quark" (Krasnodar);  
OAO NPP "Kvant" (Moscow);  
OOO NPF "Sunenergy" (Moscow);  
OOO "Solar Energy" (Moscow);  
AOZT "AMEX" (Zelenograd);  
OAO "Podolsk chemical and metallurgical plant" (Podolsk);  
ZAO "Telecom-STV (Zelenograd);  
OAO "Saturn" (Krasnodar);  
OAO "Ryazan metal ceramics instrumentation plant" (Ryazan);  
OOO "Soltek" (Nizhny Novgorod).

Currently we are building new plants of photovoltaic cells in the Stavropol region (by 2015), and in the Irkutsk region (since 2009, for 7.5 billion rubles) and others.

The companies OAO Kvant, Nitel solar, the Continent's energy, Solar wind, Solar flux, Hevel, Podolsky chemical & metallurgical plant (PCMP) said about their projects on production of photo power engineering in Russia.

Opening of new manufactures of solar cells in Russia is connected with the creation of integrated structures with the beginning of the production chain, at least for polycrystalline silicon.

The organization of polysilicon production is the most expensive stage in the chain. Besides, this stage takes the longest time to organize the production.

ROSNANO manifests itself most actively in the creation of solar cells in Russia, the company participates, at least in 3 applied projects.

ROSNANO is interested in solar panels, based on the polysilicon technology and thin-film technologies.

So, according to analytical studies it is revealed that of all the projects of organization of production of solar batteries in Russia, five of them are realized, another three also have very high chances. The main obstacle for the remaining projects is the global financial and economic crisis, which reduced the investment activity of the participants.

**The world market of silicon.** The main feature of the silicon market is that only a few countries in the world have the capability to produce them, and the appropriate technologies are not for sale. The Technological chain silicon production, including raw quartz - polycrystalline silicon, monocrystalline silicon, silicon wafers, requires sophisticated equipment. The complete technology for the production of silicon are now only in the USA, Japan, Germany, Italy and Russia. There are only six corporations - vertically-integrated

holding companies control almost the entire world market of silicon: Wacker Siltronic (Germany), Toshiba Ceramics, Mitsubishi Materials, Silicon, Komatsu Electronic Metals (Japan), MEMS (Italy), Shin-Etsu Semiconductors (USA).

The world's supply of silicon wafers with a diameter of at least 200 mm is about 4,5 million pieces annually, with a diameter of 300 mm - 6 million units per year. At the same time there has been a steady increase in demand.

**The Russian market of silicon.** The most part of Russian-made technical silicon ( 100-105 thousand tons annually, for over \$60 million) is exported. 25 thousand tons supplied to EU countries, more than 30 thousand tons - to the USA.

According to the Ministry of economic development the share of import silicon on the Russian market is 36 % (about 30 thousand tons a year), and 90 % of them are supplied from China. The import silicon is necessary because the silicon, produced in Russia, is of low quality and may not be used in electronic industry. The Russian technical silicon is used mainly in metallurgy for special alloys and chemical industry.

Polycrystalline silicon is an intermediate product in obtaining the single-crystal silicon. The technical or metallurgical silicon serve as the main raw material for producing the polysilicon. It is produced by carbothermic reduction of electric arc method of quartzites, which, as a rule, contain not more than 98 % of silica. In the process of carbothermic reduction not only the quartzite mineral impurities the melting point of which is lower than the melting point of quartz but also the chemical elements transfer into the technical silicon melt, which are passed from heterogeneous minerals via the gas phase, adsorbed on the surface of quartz grains or entering into its crystal lattice. As a result, the technical silicon obtained in this way contains various impurities, the total amount of which may reach more than 5%. So in order to produce the polycrystalline silicon with high degree of purity, which is further used for getting the single crystals they do the chemical cleaning of technical silicon. Usually with the help of hydrochloride the silicon is transferred into trichlorosilane, which is rectified and restored by hydrating. This polycrystalline silicon is deposited on the silicon seed in the furnaces of hydrogen recovery. This process is not only very expensive, labour-intensive and time consuming, but also explosive (it uses  $N_2$  and  $HSiCl_3$ ) and heavily polluting the environment (one of the products of recovery of  $HSiCl_3$  is  $HCl$ ).

Currently the USA, China and other countries are developing the method of direct obtaining of pure polycrystalline silicon from quartz raw materials. In Russia such method is developing by the Institute of Geochemistry of V. Vernadsky in Irkutsk and by FGUP "Centrquartz" in Moscow. The technologies of direct reception of the pure polycrystalline silicon from quartz raw materials which are offered by them are made one stage and environmentally safe.

The cost of the existing production of polycrystalline silicon is high enough that primarily affects the price of monocrystalline silicon for photovoltaic industry and, consequently, the price, and hence the possibility of wide use of solar power plants for production of environmentally clean electricity.

The cost of production of polysilicon by the trichlorosilane technology exceeds \$21 per kilogram.

Each stage of sequential processing of silicon increases its cost significantly. Thus, the cost of technical silicon is \$2,3, of polycrystalline silicon 5N - \$40, and monocrystalline silicon from \$50 to \$200 per kilogram.

## 5. CONCLUSION

The Commercial idea of the project is to create a mass competitive product of silicon ingots on the global market with a low cost price.

The maximally wide range of product features, its high quality, uniqueness, availability and low cost- all these things determine the economic profitability of the project.

The uniqueness of this commercial idea is also based on 100 % use of the best technological process in the world and of the main technological equipment developed for this technology.

The proposed project supposes the building of the plant only for the final product, monocrystalline silicon ingots and wafers, bypassing the technological processes of synthesis and purification of silicon. The materials in the form of polycrystalline silicon of high purity, which costs much lower than monocrystalline are purchased for the production.

The study of the experience of a number of foreign firms-manufacturers, exchange of information, allow to state the fact of the advantages of the proposed production on a number of qualitative characteristics of a product, its mass character, flexibility of production, and the main thing - the cost of production, its nomenclature and assortment.

## 7. REFERENCES

1. Asaul A.N. Modernization of the economy on the basis of technological innovation / A.N. Asaul. - St. Petersburg: ANO IPEV, 2013. – 606 p.
2. 2. Deskovski V.B. The contours of a new model of Russia's economic development. - M: Canon-plus, 2013. - 591 S.
3. The investment passport of the Kabardino-Balkarian Republic (<http://kbr-invest.ru/>).
4. H.B. Karmokov, S.M. Tkhamokova, 2014, The impact of the investment effect on the process of implementation of the technological chain of production // Actual problems of the Humanities and natural Sciences. № 3. 23-29 p.
4. Kuznetsov B.T. Investment. Textbook. - Moscow: Unity-Dana, 2014. - 624 p.
5. Kabardino-Balkaria in numbers. - Nalchik: Kabardino-Balkaria stat. - 2013.
6. Short-term economic indicators of the Republic of Kabardino-Balkaria. Nalchik: Kabardino-Balkaria stat. - 2013. - №12.1. Books and monographs
7. Neudachina, Yu. G. Tools of management of sustainable development of the region [Text]/ V.U. Ashotov, U.G. Neudakhina // New technologies.- Maykop. - 2011. - № 2. - 0,6 p. 1. (aut.. 0,4 p.1.)
7. The official site of the rating agency "Expert RA" (<http://www.raexpert.ru/>)
8. Tumusov F.S. Economic development management. - Moscow: Economics, 2013. – 394 p.
9. Sheogev H.V, Pashtova L.G. The formation of investment policy in modern Russia. Nalchik: Elbrus, 2013. -184 p.