***ASSOCIAÇÃO DE POLITÉCNICOS DO NORTE* (APNOR)**

INSTITUTO POLITÉCNICO DE BRAGANÇA

"Innovation management in Portuguese and Russian agricultural companies"

Kopeykin Mikhail

Final Dissertation submitted to *Instituto Politécnico de Bragança*

To obtain the Master Degree in Management, Specialisation in Business Management

Supervisors:

Vitaly Aleshchenko

Sofia Cardim

Frederico Branco

Bragança, July, 2017.

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Abstract

Management and increasing of innovative activity of enterprise in current conditions is one of the most important part of management activity. Implementation of new technologies, optimization of costs, entering to the new markets, launching of new production, and many others – all of it should be considered when forming of strategy and plan of an enterprise activity, both on short-term and on long-term prospective. One of the post demanded innovative directions is the use of renewable sources of energy. To the most popular energy sources are refered solar panels, which can be installed on the existing constructions. Reason for development of this direction is the permanent growth of electricity, received from traditional sources, and, as the results, permanent growth of electricity cost for enterprise, and growth of prices of goods for final consumer. In this Master thesis will be considered the opportunity of implementation of renewable energy sources on existing agricultural enterprises. As subjected enterprises will be considered APC “Bolshevik” of Moskalensky district of Omsk region of Russian Federation, and “Company B” LDA of Bragança Municipality of Portuguese Rebuplic. Will be calculated financial and production results, received after implementation of new electricity generating systems on both enterprises. Will be considered the opportunity to sell the surplus of over-produced electricity to the citizens of nearby villages and cities, or to the Government.

Keywords: Innovations, Agricultural Enterprises, Livestock Production, Renewable Energy Sources, Solar Panels.

Resumo

O aumento da atividade inovativa e a gestão da inovação nas empresas, na atualidade, são uma das mais importantes componentes das atividades da administração. A implementação de novas tecnologias, a otimização de custos, a entrada em novos mercados, o lançamento de novos produtos e o desenvolvimento de novas formas de produção, entre outros, devem ser considerados na formação da estratégia e no plano da atividade empresarial, tanto numa perspetiva de curto como de longo prazo. Uma das mais recentes direções da inovação é a procura da utilização de fontes de energia renováveis. Uma das atuais exigências, relacionadas com a inovação, é a utilização de fontes renováveis de energia, sendo uma dessas fontes os painéis solares, que podem ser instalados nas construções já existentes. A razão para a utilização de fontes de energia alternativa relaciona-se com o aumento permanente do preço da eletricidade recebida pelas fontes tradicionais, assim como com o aumento permanente desse custo para as empresas, que se traduz num aumento do preço dos bens que chegam ao consumidor final. Neste trabalho irá ser analisada a possibilidade de implementação de uma fonte energia renovável em duas empresas agrícolas. As empresas consideradas na análise são a APC "Bolchevique", situada no distrito de Moskalensky, na região de Omsk da Federação Russa e a "Empresa B", que se situa no distrito de Bragança, em Portugal. Serão calculados indicadores financeiros e de produção, após a implementação de um novo sistema de geração de eletricidade em ambas as empresas. Será também considerada a oportunidade de venda da energia excedentária, quer a particulares residentes nas imediações das empresas, quer ao Governo.

Palavras-chave: Inovações, Empresas Agrícolas, Produção Pecuária, Fontes de Energia Renováveis, Painéis Solares.

Аннотация

Управление и повышение инновационной деятельности предприятия в современных условиях является одной из наиболее значимых направлений деятельности менеджмента компании. Внедрение новых технологий, оптимизация затрат, открытие новых рынков сбыта, организация производства новой продукции и многое другое – всё это должно быть учтено при формировании стратегии и плана деятельности компании как на краткосрочную, так и на долгосрочную перспективу. Одним из наиболее востребованных инновационных направлений является использование источников возобновляемой энергии. К наиболее популярным источникам энергии относятся солнечные батареи, которые можно устанавливать на уже имеющиеся конструкции. Причиной развития данного направления является постоянный рост электроэнергии, полученной из традиционных источников, и как следствие, постоянный рост затрат предприятия и рост цен на продукцию для конечного потребителя. В данной магистерской работе будет рассмотрена возможность внедрения источников возобновляемой энергии на уже действующих сельскохозяйственных предприятия. В качестве рассматриваемых предприятий были выбраны СПК «Большевик» Москаленского района Омской области Российской Федерации и ООО «Компания Б» муниципалитета Браганса Португальской Республики. Будут произведены расчёты финансовых и производственных результатов, полученных после внедрения новой системы электрогенерации на обоих предприятиях. Будет рассмотрена возможность реализовывать излишки произведённой электроэнергии жителям близлежащих поселений и городов, или Правительству.

Ключевые слова: Инновации, Сельскохозяйственные Предприятия, Животноводство, Источники Возобновляемой Энергии, Солнечные Панели.

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Abbreviations and/or Acronyms

APC – Agricultural Production Cooperative

CCEAT – Common Classificatory of Economic Activity Types

EUR – Euros

h.p. – horse power

ha – hectare

IPB – Politechnic Institute of Bragança

kg - kilogram

kWt - kiloWatt

LDA – Limitada

mm - millimeter

OmSAU – Omsk State Agrarian University

PSRN – Primary State Registration Number

rot./min. – rotation per minute

t – ton

TIN – Tax Individual Number

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Introduction

Nowadays, innovation activity in enterprise is one of the ways to increase the volume of production, to improve the quality of goods and services, and finally survive on the market. Innovative activity became an important part of management strategic decisions. For agricutlrual companies, innovations implemention and using is also important part of activity, because use and following to new technologies can lead the enterprise to success in business.

The most popular innovations in agriculture right now are related with optimization of costs structure of acvitiy and with improving of quality of products. Under optimization of costs structure is considered the decline of cost of resources or remove of non-required costs. One of the trends nowadays is production of electricity by company's own sources, namely alternative energy, such as: wind, sun, biofuel, etc. Among all of the renewable sources, sun is most preferable, because solar panels can be installed on the existing constructions, without providing additional separate squares. Implementing of such a technology leads to decreasing of electricity cost, generating saved funds, and arise of opportunity to invest in other activities or branches.

In this regards the main objective of this Master thesis is searching of theoretical statements and validation measures innovative activity increasing in Russian and Portuguese enterprises.

Tasks of Master thesis:

1) Consider the main problem and ways of innovative activity increasing of enterprise generally, and agricultural enterprise particularly;

2) Analyse the activity of Russian and Portuguese enterprises;

3) Analyse the ways of innovation activity increasing of enterprises;

4) Justify measures of innovative activity increasing of Russian and Portuguese enterprises by implementing the renewable source of energy, namely solar panels. Compare the results of implemented projects.

Objects of observation – Agricultural Production Cooperative "Bolshevik" of Moskalensky district of Omsk region of Russian Federation, and "Company B" LDA of Bragança Municipality of Portuguese Republic.

Object of research is innovative activity of APC "Bolshevik" and "Company B" LDA. Subject of research – implementation of renewable source of energy, as the way of increasing of innovative activity of enterprise.

In first chapter will be considered the Methodology of making all of the researches and analysis of data and information collected, related with the main subject of Master thesis. All of the approaches of analysis will be used in third chapter.

In second chapter of Master thesis will be considered various definitions of “Innovation”, and will be named specific features of increasing of innovative activity of agricultural enterprise.

In third and fourth chapters will be made analyses of legal status of APC “Bolshevik” and “Company B” LDA, their managerial structure, production activity, and financial results of activity for 2013 to 2015 years. Also, will be implemented the analysis of potential ways of innovative activity increasing.

In fifth part will be presented the ways of innovative activity increasing in APC “Bolshevik” and “Company B” LDA, by implementing renewable source of energy. Also, will be calculated and compared to each other the total financial and production results obtained after implementation of renewable system.

During making this Master thesis will be used the bookkeeping and managerial statement of APC “Bolshevik” and “Company B” LDA for 2013-2015, open internet sources, related with financial, statistical, managerial and other information; libraries of OmSAU, IPB and international databases and libraries; scientific and specialized online and regular journals of both countries, as well as international ones; data from governmental portals and sources related with the theme of Master thesis; information from the companies-producers of renewable sources of energy.

1. Research methodology.

1.1. Objective of the study and research hypothesis.

The importance of the research problem of the study is to indentify the company's opportunity to increase innovative activity by identifying the main problems in the production process, and implementation of the most recent technologies.

Under the objects of supervision are considered Agricultural Production Cooperative "Bolshevik" of Moskalensky district of Omsk region of Russian Federation, and "Company B" LDA* of Bragança Municipality of Portuguese Republic. The object of research is innovative activity of APC "Bolshevik" and "Company B" LDA, and the process related to that activity. The subject of research is implementation of renewable source of energy, as the way of increasing of innovative activity of enterprise. In this Master thesis will be considered the implementation of the most recent renewable source of energy.

The research hypotheses are the following:

- after implementation of a recent renewable source of energy, the company will decrease the volume of electricity consumed, which was received from generating companies;
- implementation of the recent renewable source of energy can bring additional revenues in total income of a company in form of saved funds, and in form of receiving funds from selling of produced electricity surplus to the citizens of nearby villages or cities, or to the Government.

* The name has been changed according to the request of company's management

1.2. Description of data collection.

Data for theoretical part and literature review will be collected from the various sources, related with the theme of Master thesis and/or giving the explanation of the processes and definition required for understanding the description of enterprise's activity, and proposed electricity generating system.

For searching the theoretical information and data, related to company's innovative activity, will be used:

- Open internet sources, related with financial, statistical, managerial and other information;
- Libraries of OmSAU, IPB and international bases and libraries;
- Scientific and specialized online and regular journals of both countries, as well as international ones;
- Data from governmental portals and sources related with the theme of Master thesis;
- Information from the companies-producers of solar panels, invertors, batteries, and other equipment, required for modern electricity generating system.

For data collection, related to financial reportsand other reports and information of company, will be asked APC "Bolshevik" and "Company B" LDA directly. Necessary to obtain the data for the last 3 years of enterprise activity. For analysis of activity will be necessary to obtain the reports, such as annual financial documents statement (Balance sheet, Income Statement, experts' statements and other reports). Also, will be used data of Rosstat and the National Institute of Statistics in Portugal.

Data about business activity and about the crop production and harvesting processes used in a company were collected during the November – December 2016. Theoretical information was surveyed during the period from November 2016 till January 2017. Current data about results of production process and economic and financial results of companies was collected and analyzed during the January – February 2017. Considering the opportunity of application modern electricity generating system, as well as calculation of proposed revenues and profits were in March-May 2017.

1.3. Description of data analysis.

Firstly, will be given the meanings for the terms, such as: "Innovation", "Inovative potential" and others. Also, will be presented types of inniovative activity and factors, which are affecting on impelementing of new tehcnologies. Additionally, in the thesis will be indicated the special features of innovative acitivty increasing of a company in agribusiness industry.

Further, will be implemented an analysis of business activity of companies in this section will be inspected its legal statutes and management levels. Also, will be analyzed their financial and economic activity. It will be implemented by analyze of bookkeeping statement and other sources with the following indicators:

- Changing of balance sheet structure from year to year;

— Changing in financial results from year to year;

— Dynamics of changes in number and amount of current assets;

— Dynamics of changes in square and quality of lands;

— Dynamics of changes in average number of employees;

— Production of various kinds of agricultural products.

All of these analyses will be implemented in several different types of analysis with usage of comparative method:

— Vertical analysis – for surveying the structure of specified data;

— Year-to-year horizontal analysis – for surveying the dynamic of changes from each year to the following year;

— Year-to-base horizontal analysis – for surveying the dynamic of changes from each year to the base year for comparison the total changes.

In the second and third parts also, will be implemented the evaluation of financial-economic according to the following ratios:

— General ratios;

— Liquidity ratios;

— Profitability indicator ratios;

— Operating performance ratios;

— Turnover ratios.

According to the goods production analysis will be implemented the CVP-analysis for separated kinds of production (if applicable): milk and grain. For both of these kinds will be calculated the breakeven points and financial strength indicators.

In final section of third and fourth chapters will be made the SWOT-analysis, which can help to identify the weakness of a company and to improve the innovative acitivty of enterprises.

In the final chapter of Master thesis will be proposed the ways to improve the innovative activity. Namely: implementation of modern electricity generating system, and receiving the additional revenues from selling the surplus. Will be used the comparative method in the process of selection the most appropriate way to impelement electricity generating system.

All of the data in master thesis will be presented in euros. Data for Russian enterprise will be converted from rubles to euros. Exchange rate is equal to 1 Euro = 74,3888 Rubles (Investing.com, 2017).

2. Theoretical bases of innovative activity management in agricultural complex

2.1. Concept and essence of innovation. Types, classification and functions of innovations

During the last few years most of economic and social trends existed during the centuries, were broken.

The best examples for that are:

- decrease of price for the energy sources, such as: crude oil of all marks (average decrease is on more than 70%), as well as on the raw materials, such as aluminum (over 40%), plumb (over 40%) and gold (over 30%) (Investing.com, 2017);
- reduction in prices of flights into space: Space X made the world's first successful return of the carrier-rocket's first stage (Spacex, 2017);
- classic manned vehicles will be replaced by unmanned vehicles (Google, 2017);
- practical experience on growing up new human and animal organs, which can give the hope to people who are diagnosed with a chronic illness, or for any reasons have lost their internal or external organs (FGBE "FSCTAO named after V.I. Shumakov" of Health Ministry of Russia , 2017);
- widespread use of biofuel instead of traditional energy sources and many-many other examples (Bioenergy International, 2017) (Choren, 2017).

Such serious changes are playing the main role in development of a human civilization. In their fields of activity and dimensions they are different, but the one thing unites these trends – all of them are innovations.

Innovation is an implemented novelty, providing qualitative increase in the efficiency of processes or products demanded by the market (Bernar. I., 1997). Is the end result of human intellectual activity, his imagination, creative process, discoveries, inventions and rationalization (Abalkin, 1999). An example of innovation is the market launch of products (goods and services) with new consumer properties or qualitative increase the efficiency of production systems.

The term "innovation" comes from the Latin "novatio", which means "update" (or "change"), and the prefix "in", which translates from Latin as "direction", if translated literally "Innovatio" — "in the direction of change." The very notion of innovation was first introduced in the scientific researches of the XIX century. New life the concept of "innovation" was in the beginning of XX century in the scientific work of the Austrian economist J. Schumpeter in the analysis of "innovative combinations" and changes in the development of economic systems (Academic, 2017).

In his work “The Theory of Economic Development” Schumpeter wrote: “The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers’ goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.” (Schumpeter J. , 1976). Entrepreneurial actions are the main mechanism in the process of economic development and the disturbance of the economic system is impossible without them (Schumpeter J. , 1934).

The concept of “new combination” covers the following five cases (Schumpeter J. , 1934):

1. The introduction of a new good – that is one with which consumers are not yet familiar – or a new quality of a good.
2. The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.
3. The opening of a new market that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before.
4. The conquest of a new source of supply or raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.
5. The carrying out of the new organization of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position.

Innovation is the result of investing the intelligent solutions into development and obtaining of a new knowledge, not previously used ideas for updating spheres of life (technology; products; organizational forms of existence of society, such as education, management, organization of work, service, science, informatisation, etc.) and the subsequent process of implementation (production) of this, with a fixed additional value (profit, proactive, leadership, priority, radical improvement, qualitative superiority, creativeness, progress) (Economic and law, 1998) (Zaichenko, 2011).

Thus, the required process is: investments – development – implementation process – obtaining of qualitative improvement.

Innovation is such a process or result of the process, in which (Azgaldov, 2008):

- uses partially or completely the protectable results of intellectual activity;
- (and/or) ensures the production of patentable products;
- (and/or) ensures the production of goods and/or services, with its quality corresponding to world standard or higher;
- (and/or) achieves high economic efficiency in production or consumption of the product.

Because of the diversity of changes in a person's life it is not equitable to compare the degree of their influence, they must be classified according to some common characteristics, namely (Kalenskaya, 2012):

- Technological innovations;
- Ecological innovations;
- Economic innovations;
- Socio-political innovations;
- Innovations in spiritual aspect.

Classification of innovations can be implemented by the different scheme, by using various classification features. In economic literature are presented various approaches to classification of innovations, as well as to the indentifying of criteria.

Innovations are classified by the following features (Kalenskaya, 2012):

1. Importance: basis, improving, pseudo-innovations;
2. Directivity: replacing, streamlining, extending;
3. Place of realization: industry of origin, industry of implementation, industry of consumption;
4. Depth of changes: regeneration of initial methods, modifying of quantity, regrouping, adaptive changes, new version, new generation, new species, new genus;
5. Developer: developed by the enterprise, external forces;
6. Distribution scale: for creation of a new industry, for using in all industries;
7. Position in production process: major product and technological, complementary product and technological.
8. Features of satisfying needs: new needs, existing needs;
9. Degree of novelty: based on scientific discoveries, based on new methods applied to long time ago discovered phenomenon;
10. Period of market entry: innovation leaders, innovation followers;
11. Reason of appearance: reactive, strategic;

12. Field of application: technical, technological, organizational and managerial, informational, social, etc.

By the position of innovation in a system (in a company) can be selected (Kalenskaya, 2012):

- innovations “on the input” (changing in selection of raw materials, fabrics, machineries and equipment, information, etc.);
- innovations “on the output” (products, services, technologies, information, etc.);
- innovations of enterprise’s system structure (managerial, production, technological).

Regardless of the method of classification of innovations, necessary to consider the fact that not every novelty is an innovation. In order to be called an “innovation”, implemented novelty should possess a number of properties (Kalenskaya, 2012):

- scientific-technical novelty – all introduced products, services, and process should be new (or sufficiently upgraded);
- production application – presence of certain conditions and opportunities to implement of this novelty into a specific product;
- commercial feasibility – created product should meet to the market demand, be commercially feasible, and, after all, generate profit to manufacturer.

Innovation is the performed result on the market, accepted from the investments of the capital into a new product of operation (technology, process). Based on this fact, we can say that innovation is implementing the following functions (Kalenskaya, 2012):

- reproductive function;
- investment function;
- stimulating function.

Reproductive function (Kalenskaya, 2012) means, that innovation is an important source of financing of extend production. Cash revenue obtained from selling of innovation on the market, make the entrepreneurial profit, which turns into the source of financial resources and simultaneously the measure of efficiency of innovation process. It can be transferred to the increasing of the volume of production, trading, investment, innovative, and financial activity, which is the content of the reproductive function of innovations.

Profit obtained from selling of innovation can be used in different ways, as well as the capital. This capital can be directed to the financing of all investments, or particularly the new kinds of innovations, which is the content of the *investment function* (Kalenskaya, 2012) of innovation.

Generating of the profit by the entrepreneur from the selling of innovation is the target aim function of each commercial enterprise. This is the incentive for an entrepreneur to new innovations; moves him go deep in the issue, improve the organization of marketing activity, use much more modern approaches of financial management (re-engineering, brand-strategy, benchmarking, etc.), which is the content of the *stimulating function* (Kalenskaya, 2012) of innovation.

Summarizing all mentioned above, we can notice, that in the scientific literature the meaning “innovation” turned into the use not so many time ago, and scientists still do not have the common definition to this term. It is related with the field of application of innovations – it covers all human life, and couldn’t be considered separately from specific filed of activity. But beside of the variety an essential feature of any innovation is scientific and technical novelty, and economic feasibility.

2.2 Innovative potential of a company. Innovative management in agricultural companies. Features of innovative activity in agribusiness industry

Innovative potential (Lukov, Lukov, & Pogorsky, 2012)— description of the organization's ability to achieve the objectives through the implementation of innovative projects. For the convenience of analysis of innovative potential the projects include in descending order of effectiveness, effects and costs are represented as the cumulative sums.

The amount of innovative potential is determined by the available research, design, technological organizations, pilot plants, experimental polygons, educational institutions, personnel and technical resources of these organizations (Lukov, Lukov, & Pogorsky, 2012).

Innovative management in agriculture companies can help to solve the difficulties in organization of the complete and uninterruptable process of agriculture production and delivery of a product by using (for instance) the supply chain management, as the example of solution (Hussain, et al., 2015).

There are several advantages that have resulted from the agricultural relations with the help of technological innovations. These are likely to include cost advantage, time advantage and others. Internal logistics functions have enabled to save transaction costs to a greater extent. Perishable agricultural products, container equipment needed in circulation and cold storage technology to quality and freshness in circulation requires classification, processing, sorting and other operations. Therefore, the internal functions of agricultural product logistics can optimize the allocation of resources, thus saving transaction costs (Tseng, Wu, & Nguyen, 2011).

As the transport distance, refrigeration equipment, insurance function limitations, agricultural supply chain management can supply, production, transportation, plus seamless butt off to achieve "time for space" concept, across the strait of overcoming create competition time advantage. (Gunasekaran, Cheng, & Lai, 2006).

Agricultural production and consumption dispersion determines the spreading of market information, it is difficult to fully grasp the information (including market demand, competitors, collaborators); agricultural production caused by seasonal fluctuations in prices of agricultural information with the seasons; fresh agricultural products perishable agricultural products across the region limits the immediate adjustment (Garbi, 2002). To promote agricultural supply chain

management companies to do the relevant information sharing reduce duplication of effort and waste of resources, avoid uncertainty risk (Ryan, Bernard, Densin, & Lincoln, 2000).

Defining value of development if agribusiness industry and agricultural have the new innovative and investment policy. In the basis of providing of high-developed agriculture and food security - the modern production, technologies, and equipment.

Beside on quite problematic economical statement of Russian agribusiness industry and its enterprises, complicated economical and geopolitical situation formed at last three years, in recent years, innovation process have gradually become more active. Especially it applies to the group of leading agriculture organizations, as well as to the food industry companies, which are intensively acquire in production the new scientific achievements and innovations. And in the conditions of imposed food embargo the innovation activity began to appear in small and medium agricultural enterprises, which had more conservative approach of making business.

But, despite of many difficulties, science is developing in a positive direction and improving communication, both scientists and agro-entrepreneurs from different countries.

Among the most leading projects of world's agricultural industry, which are on the final phase of development, or are completely in performance, can be selected the followings:

1. Agricultural robot (or agrobot). Main field of these robots' application in plant growing – is the period of harvest of grain and leguminous, and also applying robots in picking fruits, autonomous driving tractors / sprayers. Besides that, robots can also implement pruning, weeding, plowing, watering, and monitoring of all agricultural activity of a company (Case, 2017) (The Robot Report, 2017).

   In animal breeding robots are used for feeding, watering, milking, cleaning, castration, shearing (sheep), collecting eggs (on egg plants), and waste disposal. In addition, agrobots are widely used in the field of agricultural products processing and packing. An example of the use of robots, namely the rotary milking parlor of the type "Carousel" company DeLaval (DeLaval, 2017) is presented in figure 1.

Figure 1. Rotary parlor milking «Carousel» of "DeLaval" company (USA)

Source: (DeLaval, 2017)

2. Precision farming. On the base of scientific concept of precision farming are ideas about the existence of non-homogeneity within a single field. For estimation and detecting of these non-homogeneities are using the newest technologies, such as Global Positioning Systems (GPS, GLONASS), special sensors, air photos and photos from satellite, as well as special programs for agricultural management based on the geo-information systems (GIS). Collected data is used for planning of seeding, calculation of the norms of fertilizers and plant protection agents (PPA), more accurate forecasting of crop yield, and financial planning (NASA Earth Observatory, 2001).

3. Vertical farms. It's a general name of highly automated agriculture industry, placed in specially designed high-rise building, and the name of this building. Main difference of vertical farms from traditional greenhouses and livestock farms – is an intensive approach to the use of the territory, vertical multi-tiered placement of plantings. In fact, the farm is a multi-storey greenhouse. The prerequisite for developing of such projects was the constant growth of the world's population, which in foreseeable future will lead to a shortage of territories for agricultural purposes (Plantagon, 2017). An example of a vertical farm "Plantagon" presented in picture 2.

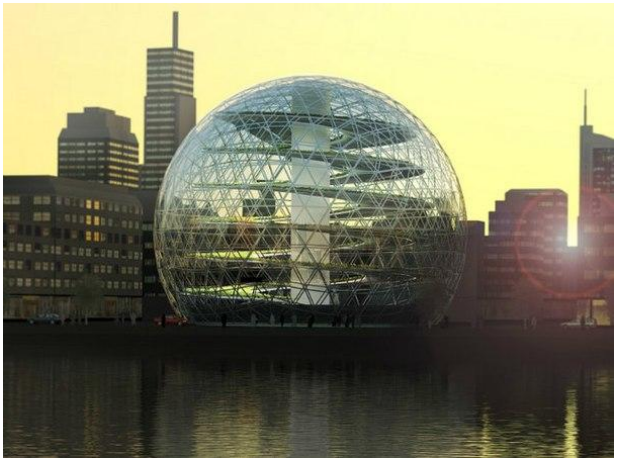

Figure 2. Vertical farm «Plantagon».

Source: (Plantagon, 2017)

All of the projects mentioned above basically are related with the agricultural places, where:

— already reached the limit of extensive agriculture, and there is no possibility to increase the area of agricultural plots (the Netherlands, South Korea), and the construction is mainly in height;

— Transportation costs are large enough for delivery of the fresh production from agricultural regions to giant metropolitan areas (USA, China).

For Russian Federation none of these problems exists, because only 40% of all agriculture plots are used in production, and the cities and metropolitan areas do not have such dimensions obstructing to the relatively cheap delivery of the fresh production (FSSA, 2017), as well as for Portuguese Republic, where none of these problems is a serious obstacle for the further intensive

development of agriculture. Sufficiently large area of non-using agriculture plots allows to do so (INE, 2017).

Among the most perspective projects and trends of development for both Russian and Portuguese agribusiness, can be selected the following:

— Implementing of intensive farming. The increase of productivity per unit square through breeding of new sorts or introduction of new technologies in crop production. In animal breeding – breeding of new high-yielding breed of animals, and many others;

— Implementing of a “green energy”. This trend can significantly help to reduce the cost of electricity, because enterprise will produce it from solar or wind energy;

— Using of biofuel. This innovation can reduce the costs on acquisition of fuel, because the required amount can be obtained by the recycling of organic materials, with subsequent obtaining of biogas (biofuel) and recycled organic (fertilizer).

Agriculture and food production is the powerful incentive for development of many areas of science and in general for innovation process, because they completely cover an interrelated system of activity: nature – human – economy. This system uses innovation achievements of all other sectors of science, and at the same time provides the resources for their functioning and development (Stukach, 2007).

In summary, we can conclude that right now in Russian and Portuguese agricultural enterprises innovation and investment activities in agriculture are in their infancy, with only rare interest to leading achievements in leading enterprises. However, because of recent events, namely the extension of the product embargo until the end of 2017, Russian agricultural enterprises obtained the most favorable conditions and opportunities for development and increasing of economic efficiency. For Portuguese enterprises, because of the relatively low cost of the basic production assets and labor, as well as a favorable geographical position at the crossroads of trade routes from Europe, Africa, North and South America, appeared the opportunity for rapid and qualitative economy growth in general, and agricultural enterprises in particular. Final result of their activities will completely depend on the management ability of agricultural enterprises to receive advantages from new opportunities. However, the first priority for companies is to make an inventory of existing capacities, their optimization and modernization. These processes in the future will have a serious impact on their sustainable development.

3. Organizational and economic evaluation of activity of an enterprise.

3.1. Organizational characteristic of Russian enterprise.

Further consideration of practical aspects of organization of innovative activity in agricultural company will be implemented based on the data of Russian company Agricultural Production Cooperative “Bolshevik” (hereinafter – APC “Bolshevik”). This company was selected from the others agricultural enterprises as the most typical representative of industry, according to the following features:

- the type of organizational structure – APC – is common for companies, founded in USSR, and has balanced structure of employees, lands, and quality of production;
- the company is the medium enterprise, which is mostly common for agricultural companies of Omsk region according to the number of employees;
- according to the bookkeeping statements and Omsk Statistics Department, as well as data of the company itself, it’s an innovative company, due to of application of modern agricultural technologies and machineries.

Agricultural production cooperative "Bolshevik" was registered on 25th November 2002 at 646072, Omsk region, Moskalenskiy district, village Ivanovka, Central street, 39A. Main office (accounting, administration) is located in the village of Ivanovka. Production base (the milking parlor, barns, stables, fuel-oil depot storage, etc.) located in the village of Spartak.

The company was assigned the Primary State Registration Number (PSRN) 1025501758600 and issued the Tax Individual Number (TIN) 5521006321. Main kind of activity according to the code of Common Classificatory of Economic Activity Types (hereinafter – CCEAT): 01.21 – the breeding of cattle. Additional kinds of activity – growing of cereals, technical and other agricultural crops, not included in other groups (CCEAT – 01.11).

Since 1991 to the present the head of the enterprise is V.P. Sineoky. Position of the head – chairman of APC. There are 9 people as the shareholders of APC “Bolshevik” (including the chairman of APC) – all of them are citizens of Russian Federation.

For further research of enterprise, it is necessary to make the analysis of organizational structure on the company. Main characteristics of structure’s quality of any economic system are the equilibrium and proportionality of its parts interconnections (subdivisions and employees). Organizational structure of enterprise is the ordered collection of solidity connected subsystems ensuring the functioning and development of organization as an aggregate. (Frolova, 2015) Organizational structure of APC “Bolschevik” is presented on the Figure 3.

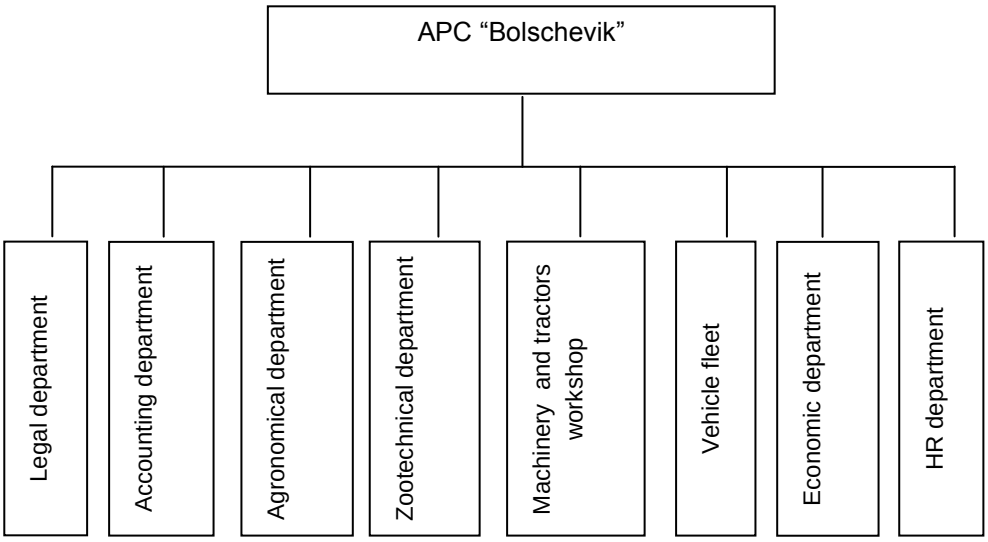

Figure 3. Organizational structure of APC “Bolschevik”.

Source: Author’s own elaboration based on managerial data of APC “Bolshevik”,

APC "Bolshevik" is characterized by linear-functional type of organizational structure. Linear-functional management structure ensures such a diversification of managerial work, in which the linear managerial elements provide overall leadership and coordination, and the functional ones – consult and develop specific questions (Goldstein, 2003).

First managerial level of APC “Bolshevik” is presented on the figure 4.

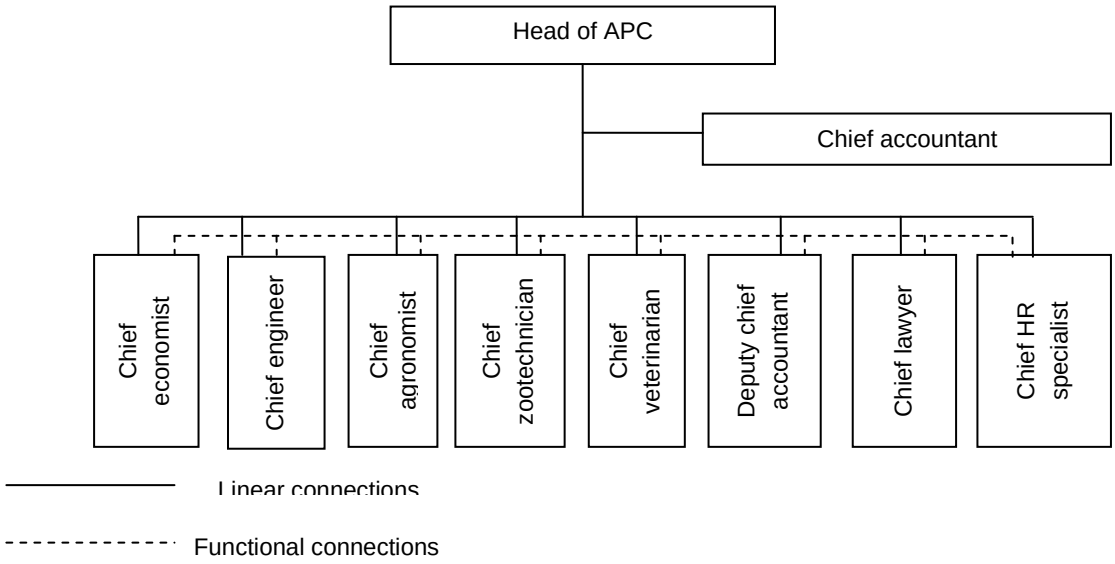

Figure 4. First managerial level of APC “Bolshevik”.

Source: Author’s own elaboration based on managerial data of APC “Bolshevik”

As can be seen from the figure 4, the top-managerial level is presented by the head of APC. In direct subordination is the chief accountant. In linear subordination are chief engineer, chief agronomist (deputy head of APC), chief zootechnician, chief veterinarian, and deputy chief accountant, chief economist, chief lawyer, and chief HR specialist. Chiefs are in functional subordination to chief accountant. This managerial structure eliminates the duplicated and inconsistent orders. If the inconsistent orders exist, employees should follow to the linear manager’s orders. Schematically the second managerial level of APC “Bolshevik” is presented on the figure 5.

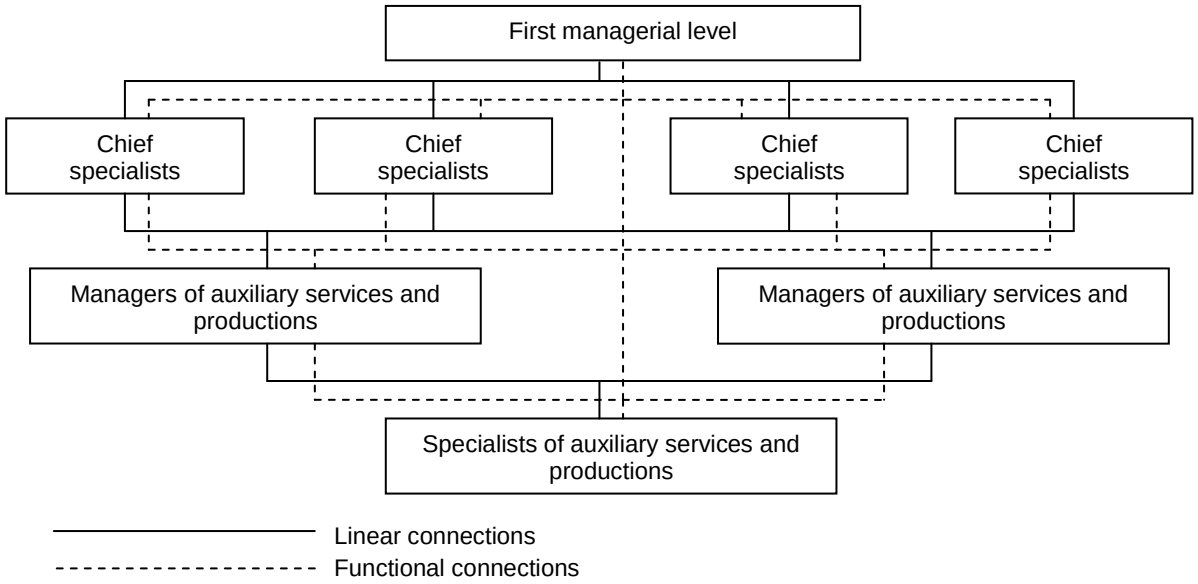

Figure 5. Scheme of the second managerial level of APC “Bolshevik”.

Source: Author’s own elaboration based on managerial data of APC “Bolshevik”

Second managerial level of APC “Bolshevik” is presented by the managers of auxiliary services and productions and specialists linearly subordinated to chief specialists. Under the subordination of auxiliary services and productions managers are specialist of these services and productions. To each chief specialist subordinates the manager of particular auxiliary service or production. That avoids dual subordination and duplication of orders. The third managerial level of APC “Bolshevik” is the structure of sections’ management. By each of sections leads the section manager, which linearly subordinates to chief accountant, and functionally – to chief specialists. Managerial structure of each section is nearly similar.

As follows from the aforesaid, the structure of APC "Bolshevik" is linear with direct subordination, balanced in terms of number of services and departments, as well as a number of linear managers.

3.2. Financial and production characteristic of activities of APC "Bolshevik".

APC "Bolshevik" of Moskalensky district of Omsk region is located in a steppe zone. The climate is typically continental. Unhindered penetration of cold Arctic air masses from the North and dry from Kazakhstan and Central Asia leads to a sharp and rapid weather changes, and leads to overall instability of the climate. The climate is characterized by dryness, lack of precipitation, low clouds. The average temperature in January is (-19)- (-20) degrees. The average temperature in July is +17-19 degrees. Annual precipitation is 300-430 mm. Stable snow cover forms in late October – early November; the height of it by the end of winter reaches 35-50 cm. Directions of prevailing winds are western and south-western, and only in summer period appear northern and north-western winds. The positive side of the climate – lots of sunshine and heat during the growing season that largely compensates the short period of positive temperatures and accelerates vegetation of plants. The territory is a vast plain with numerous lakes.

For making the estimation of economic and business efficiency of enterprise’s activity, it is necessary to make the analysis of the following indicators (Horngren, Harrison, & Oliver, 2012):

- Changing of balance sheet structure from year to year;
- Changing in financial results from year to year;
- Dynamics of changes in number and amount of current assets;
- Dynamics of changes in square and quality of lands;
- Dynamics of changes in average number of employees;
- Production of various kinds of agricultural products.

Firstly, we need to inspect the Balance sheets and the Income statements of APC “Bolshevik” as the most important and reliable source of information. Also, need to make the vertical and horizontal analyses to get more information about the trends of enterprise development. The analysis of balance’s structure made for 3 accounting years – 2013-2015. These years were chosen because of availability information in the year 2016.

Data obtained from accounting statements (Form 1), and presented in the table 1 (vertical analysis) and 2 (year-to-year horizontal analysis). “Year-to-year” analysis means, that all years will be

compared in the sequence of ascending. Results are presented in tables 1 and 2. All of the data will be presented in Euros.

Table 1. Balance sheet of APC “Bolshevik” for 2013-2015, vertical analysis.

Parameter	2013		2014		2015	
ASSETS						
Noncurrent assets						
Fixed assets	1 755 439	45,0%	2 217 417	49,1%	2 454 576	46,9%
Financial investments	13	0,0%	13	0,0%	13	0,0%
Other assets	55 775	1,4%	40 907	0,9%	0	0,0%
Total noncurrent assets	**1 811 227**	**46,5%**	**2 258 337**	**50,0%**	**2 454 590**	**46,9%**
Current assets						
Inventory	1 846 420	47,4%	2 021 608	44,8%	2 243 483	42,8%
Accounts receivable	207 948	5,3%	226 150	5,0%	523 708	10,0%
Cash and cash equivalents	618	0,0%	2 783	0,1%	10 015	0,2%
Prepaid expenses and other current assets	30 542	0,8%	3 428	0,1%	3 898	0,1%
Total current assets	**2 085 529**	**53,5%**	**2 253 968**	**50,0%**	**2 781 104**	**53,1%**
Total assets	**3 896 756**	**100,0%**	**4 512 306**	**100,0%**	**5 235 694**	**100,0%**
LIABILITIES AND EQUITY						
Equity						
Common stock	13 792	0,4%	13 792	0,3%	13 792	0,3%
Revaluation of non-current assets	479 494	12,3%	479 494	10,6%	479 494	9,2%
Reserved capital	133 999	3,4%	133 999	3,0%	133 999	2,6%
Accumulated profit	3 225 580	82,8%	3 830 751	84,9%	4 545 738	86,8%
Total equity	**3 852 865**	**98,9%**	**4 458 037**	**98,8%**	**5 173 023**	**98,8%**
Long-term liabilities						
Long-term debt	0	0,0%	0	0,0%	0	0,0%
Other long-term liabilities	0	0,0%	0	0,0%	0	0,0%
Total long-term liabilities	**0**	**0,0%**	**0**	**0,0%**	**0**	**0,0%**
Current liabilities						
Accounts payable	43 891	1,1%	54 269	1,2%	62 671	1,2%
Short-term debt	0	0,0%	0	0,0%	0	0,0%
Total short-term liabilities	**43 891**	**1,1%**	**54 269**	**1,2%**	**62 671**	**1,2%**
Total liabilities and equity	**3 896 756**	**100,0%**	**4 512 306**	**100,0%**	**5 235 694**	**100,0%**

Source: Author’s own elaboration based on bookkeeping data of APC “Bolshevik” for 2013-2015

Table 2. Year-to-year horizontal analysis of APC "Bolshevik" Balance sheets.

Parameter	Year			2014 to 2013		2015 to 2014	
	2013	2014	2015	In amount	% of previous	In amount	% of previous
ASSETS							
Noncurrent assets							
Fixed assets	1 755 439	2 217 417	2 454 576	461 978	126,3%	237 159	110,7%
Financial investments	13	13	13	0	100,0%	0	100,0%
Other assets	55 775	40 907	0	-14 868	73,3%	-40 907	0,0%
Total noncurrent assets	**1 811 227**	**2 258 337**	**2 454 590**	447 110	124,7%	196 253	108,7%
Current assets							
Inventory	1 846 420	2 021 608	2 243 483	175 188	109,5%	221 875	111,0%
Accounts receivable	207 948	226 150	523 708	18 202	108,8%	297 558	231,6%
Cash and cash equivalents	618	2 783	10 015	2 164	450,0%	7 232	359,9%
Prepaid expenses and other current assets	30 542	3 428	3 898	-27 114	11,2%	471	113,7%
Total current assets	**2 085 529**	**2 253 968**	**2 781 104**	168 439	108,1%	527 136	123,4%
Total assets	**3 896 756**	**4 512 306**	**5 235 694**	615 550	115,8%	723 388	116,0%
LIABILITIES AND EQUITY							
Equity							
Common stock	13 792	13 792	13 792	0	100,0%	0	100,0%
Revaluation of non-current assets	479 494	479 494	479 494	0	100,0%	0	100,0%
Reserved capital	133 999	133 999	133 999	0	100,0%	0	100,0%
Accumulated profit	3 225 580	3 830 751	4 545 738	605 172	118,8%	714 987	118,7%
Total equity	**3 852 865**	**4 458 037**	**5 173 023**	605 172	115,7%	714 987	116,0%
Long-term liabilities							
Long-term debt	0	0	0	0	0,0%	0	0,0%
Other long-term liabilities	0	0	0	0	0,0%	0	0,0%
Total long-term liabilities	0	0	0	0	0,0%	0	0,0%
Current liabilities							
Accounts payable	43 891	54 269	62 671	10 378	123,6%	8 402	115,5%
Short-term debt	0	0	0	0	0,0%	0	0,0%
Total short-term liabilities	**43 891**	**54 269**	**62 671**	10 378	123,6%	8 402	115,5%
Total liabilities and equity	**3 896 756**	**4 512 306**	**5 235 694**	615 550	115,8%	723 388	116,0%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

As we can see, the most impressive growth in year-to-year horizontal analysis in percentage showed by the item "Cash and cash equivalent" – 450% (2 164 Euros in money) from 2014 to 2013, and in cash – by the item "Accumulated profit" –714 987 Euros (118,7%) from 2015 to 2014. In general, mostly all the items showed the positive trend, except the item "Other assets" – decline from year to year until total disappearance. Graphically it's presented on the figures 6-9.

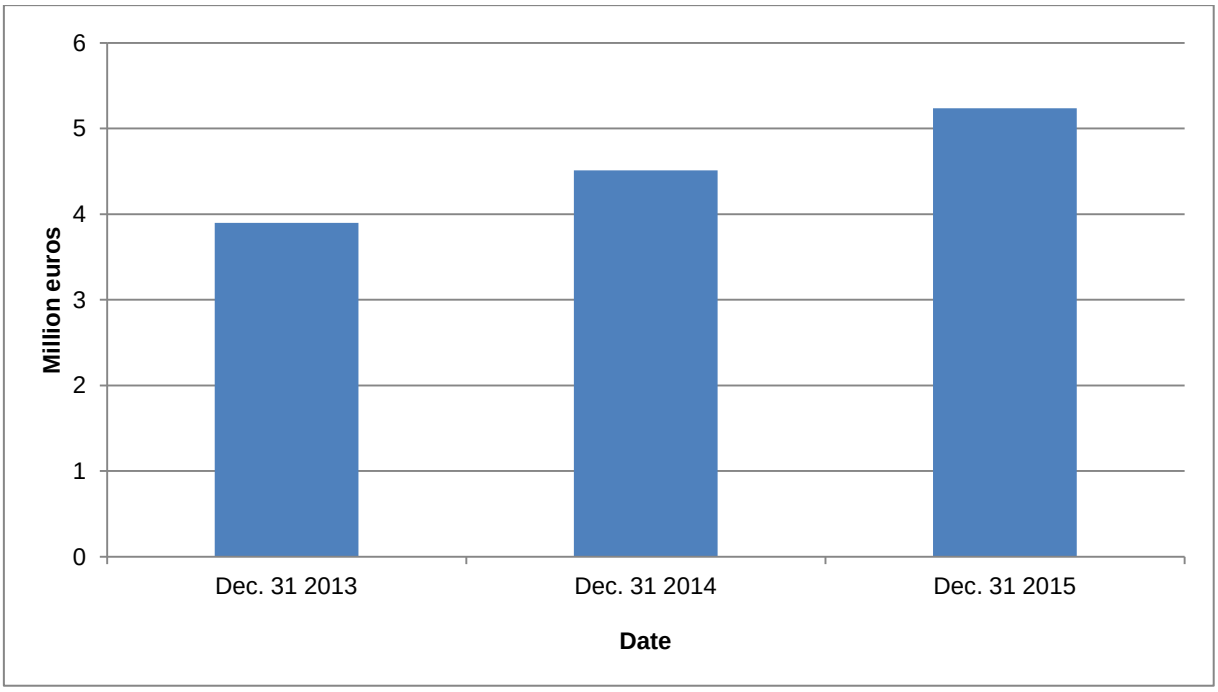

Figure 6. Dynamic of balance sheet's total results changing.

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

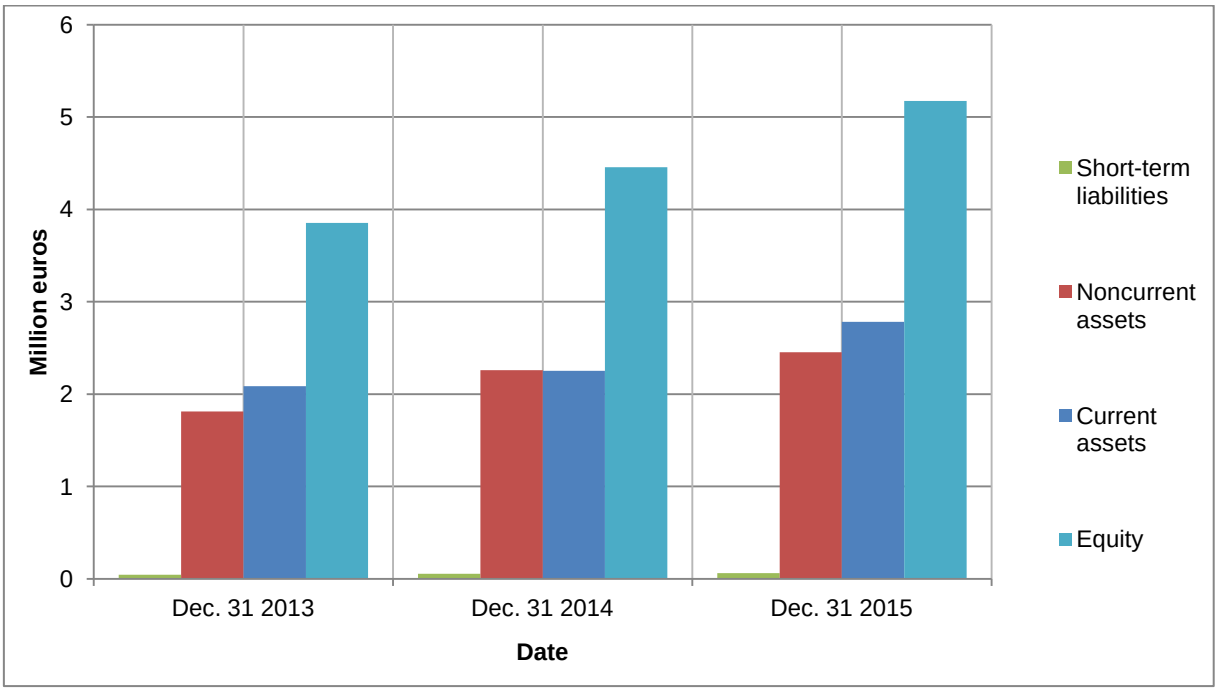

Figure 7. Comparison of the balance sheet's items for 3 years.

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

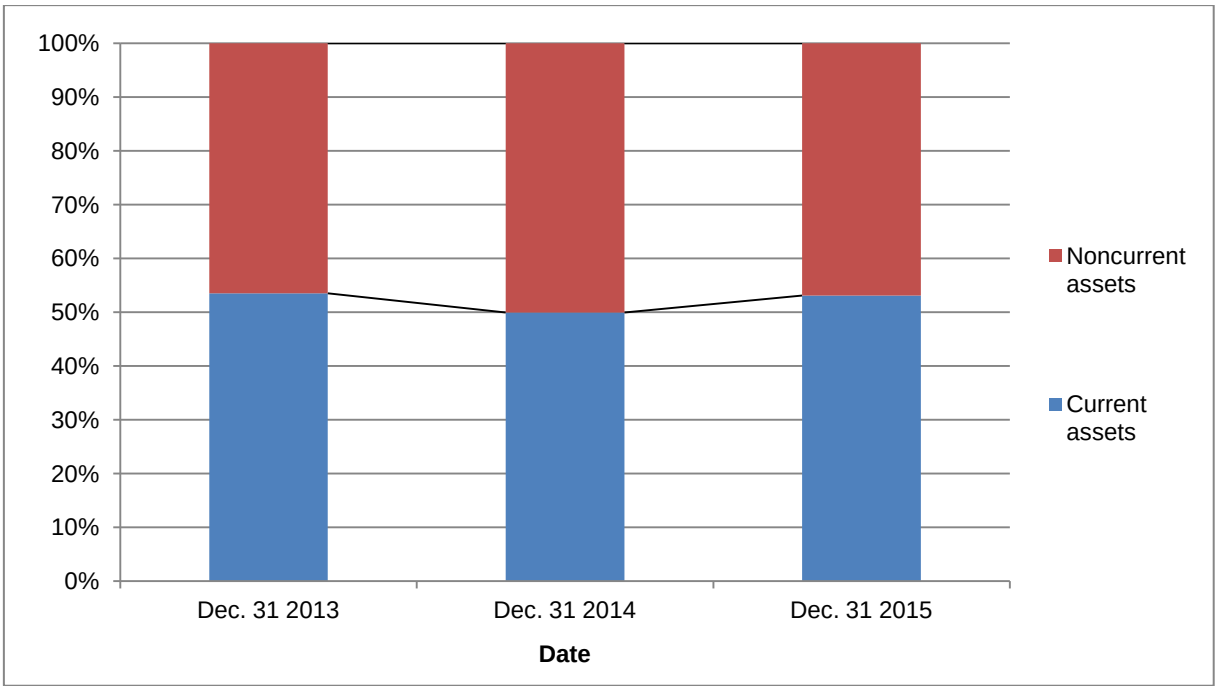

Figure 8. Structure of Assets side of a Balance.

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

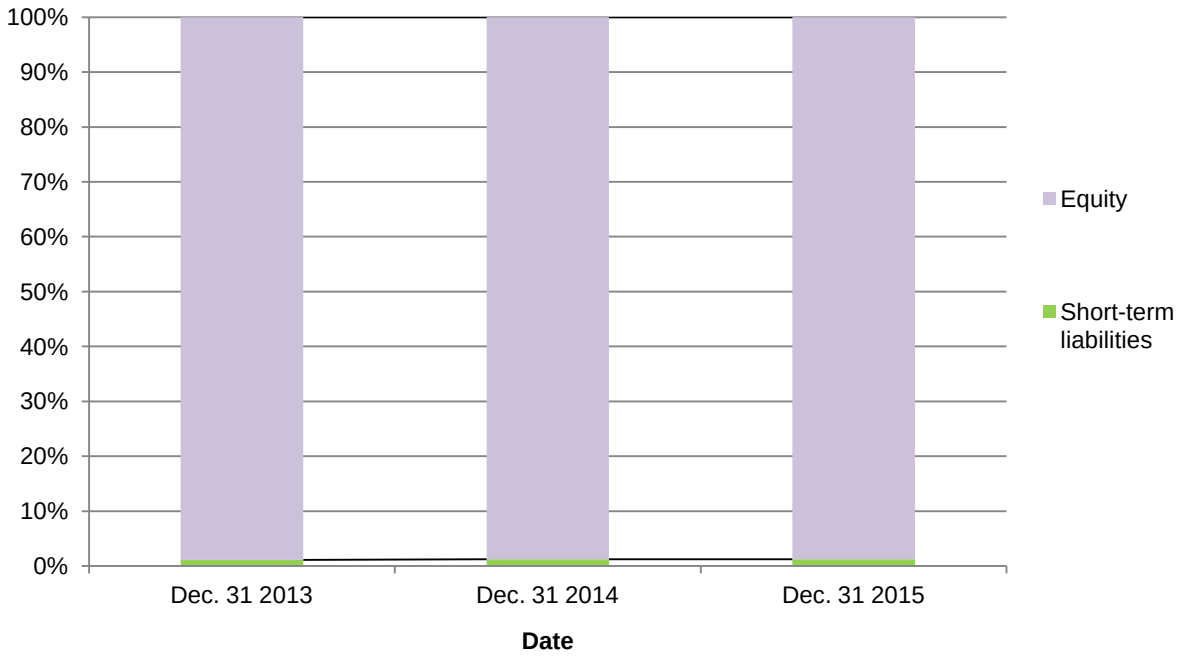

Figure 9. Structure of Liabilities side of a Balance.

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

For the further analysis of business activity of an enterprise it's necessary to analyze the Income statement of APC "Bolshevik" for 2013-2015. Need to make the vertical analysis and horizontal analysis to get more information about the trends of enterprise development. The analysis of income statement's structure made for 3 accounting years. Data obtained from accounting

statements (Form 2), and presented in the table 3 (vertical analysis) and 4 (year-to-year horizontal analysis). (Horngren, Harrison, & Oliver, 2012)

Table 3. Income statement of APC "Bolshevik" for 2013-2015, vertical analysis.

Name of item	2013		2014		2015	
Revenues	**amount**	**%**	**amount**	**%**	**amount**	**%**
Plant growing	350 590	17,0%	304 616	11,9%	472 948	15,6%
Animal breeding	1 660 008	80,7%	2 225 147	87,1%	2 519 116	83,3%
Other goods	36 081	1,8%	9 813	0,4%	17 933	0,6%
Other services	11 238	0,5%	14 317	0,6%	13 954	0,5%
Total revenues	**2 057 917**	**100,0%**	**2 553 893**	**100,0%**	**3 023 950**	**100,0%**
Cost of revenues						
Plant growing	185 525	9,0%	192 475	7,5%	304 844	10,1%
Animal breeding	1 544 386	75,0%	1 784 691	69,9%	2 023 530	66,9%
Other goods	35 892	1,7%	9 813	0,4%	17 933	0,6%
Other services	5 646	0,3%	14 559	0,6%	9 208	0,3%
Total cost of revenues	**1 771 449**	**86,1%**	**2 001 538**	**78,4%**	**2 355 516**	**77,9%**
Gross profit						
Plant growing	165 065	8 342	112 141	8,0%	168 103	5,6%
Animal breeding	115 622	32 765	440 456	5,6%	495 585	16,4%
Other goods	188	0	0	0,0%	0	0,0%
Other services	5 592	-18	-242	0,3%	4 745	0,2%
Total gross profit	**286 468**	**13,9%**	**552 355**	**21,6%**	**668 434**	**22,1%**
Other items						
Other incomes	174 932	-	152 227	-	139 940	-
Other expenses	86 236	-	99 410	-	93 388	-
Profit before income taxes	**375 164**	**18,2%**	**605 172**	**23,7%**	**714 987**	**23,6%**
Interest income	0	-	0	-	0	-
Interest expense	0	-	0	-	0	-
Other income (expense)	1 304	0,1%	0	-	0	-
Net profit	**373 860**	**18,2%**	**605 172**	**23,7%**	**714 987**	**23,6%**
Additionally						
Provision for Single Agricultural Tax	22 432	1,1%	36 310	1,4%	42 899	1,4%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

All the items in Income statement were compared with "Total revenues", because in this case we can see the structure of revenues and expenditures, and their influence on total income. As we can see from the Table 3, the biggest part of "Total Revenues" in revenues' and cost's part takes the item "Animal breeding" – more than 80% in revenues and more than 66% in costs each year. Then goes "Plant growing" – more than 11% in revenues and 7% in costs each year. In last 2 years, the item "Net profit" takes more than 23% of "Total revenues". In the section "Additionally" shows the Provision for a Single Agricultural Tax, that is used in Russian Federation for agricultural companies, and equal to 6% of "Net profit".

Table 4. Year-to-year horizontal analysis of APC "Bolshevik" Balance sheets.

Name of item	Year			2014 to 2013		2015 to 2014	
	2013	2014	2015	In amount	% of previous	In amount	% of previous
Revenues							
Plant growing	350 590	304 616	472 948	-45 975	86,9%	168 332	155,3%
Animal breeding	1 660 008	2 225 147	2 519 116	565 139	134,0%	293 969	113,2%
Other goods	36 081	9 813	17 933	-26 267	27,2%	8 120	182,7%
Other services	11 238	14 317	13 954	3 078	127,4%	-363	97,5%
Total revenues	**2 057 917**	**2 553 893**	**3 023 950**	**495 975**	**124,1%**	**470 057**	**118,4%**
Cost of revenues							
Plant growing	185 525	192 475	304 844	6 950	103,7%	112 369	158,4%
Animal breeding	1 544 386	1 784 691	2 023 530	240 305	115,6%	238 840	113,4%
Other goods	35 892	9 813	17 933	-26 079	27,3%	8 120	182,7%
Other services	5 646	14 559	9 208	8 913	257,9%	-5 350	63,3%
Total cost of revenues	**1 771 449**	**2 001 538**	**2 355 516**	**230 088**	**113,0%**	**353 978**	**117,7%**
Gross profit							
Plant growing	165 065	112 141	168 103	-52 925	67,9%	55 963	149,9%
Animal breeding	115 622	440 456	495 585	324 834	380,9%	55 129	112,5%
Other goods	188	0	0	-188	0,0%	0	0,0%
Other services	5 592	-242	4 745	-5 834	-4,3%	4 987	-1961,1%
Total gross profit	**286 468**	**552 355**	**668 434**	**265 887**	**192,8%**	**116 079**	**121,0%**
Other items							
Other incomes	174 932	152 227	139 940	-22 705	87,0%	-12 287	91,9%
Other expenses	86 236	99 410	93 388	13 174	115,3%	-6 022	93,9%
Profit before income taxes	**375 164**	**605 172**	**714 987**	**230 008**	**161,3%**	**109 815**	**118,1%**
Interest income	0	0	0	0	0,0%	0	0,0%
Interest expense	0	0	0	0	0,0%	0	0,0%
Other income (expense), net	1 304	0	0	-1 304	0,0%	0	0,0%
Net profit	**373 860**	**605 172**	**714 987**	**231 312**	**161,9%**	**109 815**	**118,1%**
Additionally							
Provision for Single Agricultural Tax	22 432	36 310	42 899	13 879	161,9%	6 589	118,1%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

As we can see from the table 4 Total Revenues increased on more than 966 thousand euros from 2013 to 2015. The biggest part of it – is a growth in income from Animal breeding – over 850 thousand euros. In "Total gross profit" section we also can see, that Animal breeding brought over 375 thousand euros of gross profit.

Provision for a Single Agricultural Tax was also increased on more than 20 thousand euros. More graphically it's on the figure 10.

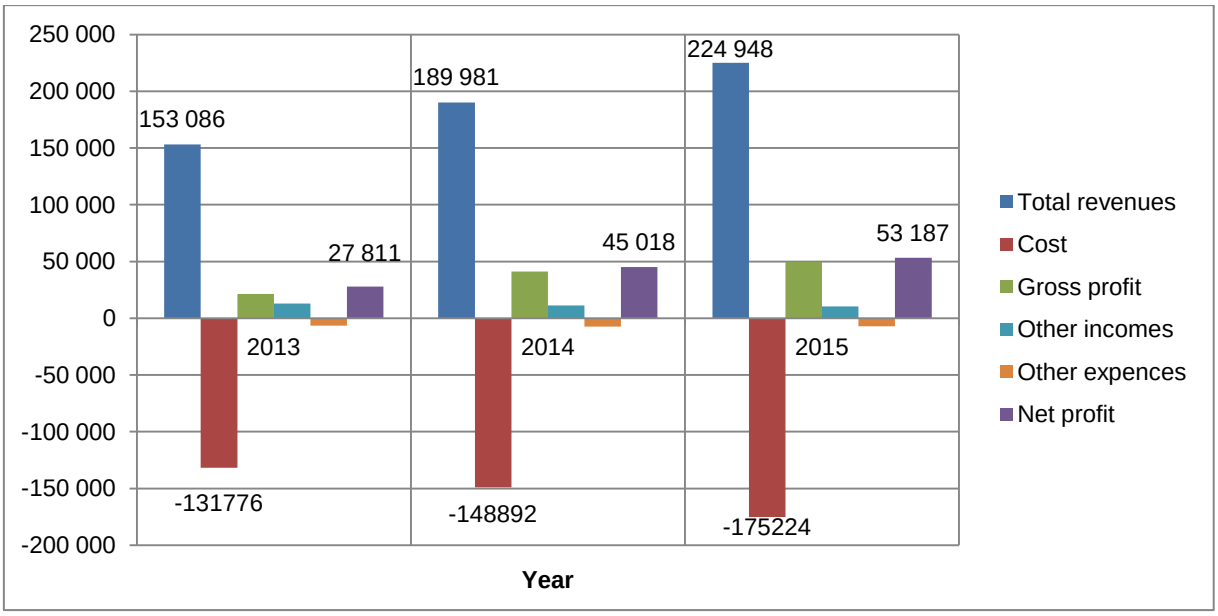

Figure 10. Dynamic in changes of Income statement results, in Euros.

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

Next step of analysis of business activity and state of an enterprise is the analysis of its current assets. Firstly, we will start with analyzing of lands' composition and structure. For inspection of square and quality of lands, it's necessary to make the analysis of its structure and composition for last 3 years. Data obtained from accounting statements, and presented in the table 5 with both analysis – horizontal year-to-year, year-to-base and vertical ones.

Table 5. Composition and structure of lands of APC "Bolshevik" for 2013-2015.

Kind of land	Years											
	2013		2014		2015		2014 to 2013		2015 to 2014		2015 to 2013	
	Sq, ha	To total, %	Sq, ha	To total, %	Sq, ha	To total, %	In ha	In %	In ha	In %	In ha	In %
Total square of lands:	6303	100	7562	100	8214	100	1259	120	652	109	1911	130
Agricultural lands:	6303	100	7562	100	8214	100	1259	120	652	109	1911	130
Arable	6303	100	7562	100	8214	100	1259	120	652	109	1911	130
Type of ownership:												
In ownership	0	0,0	42	0,6	178	2,2	42	-	136	424	178	-
Renting	6303	100,0	7520	99,4	8036	97,8	1217	119	516	107	1733	127
By usage in production:												
Used	6303	100,0	7398	97,8	7022	85,5	1095	117	719	111	-376	95
Not used	0	0,0	164	2,2	1192	14,5	164	-	1192	-	1028	727

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

Results of both analyses and vertical analysis are graphically presented on the figure 11.

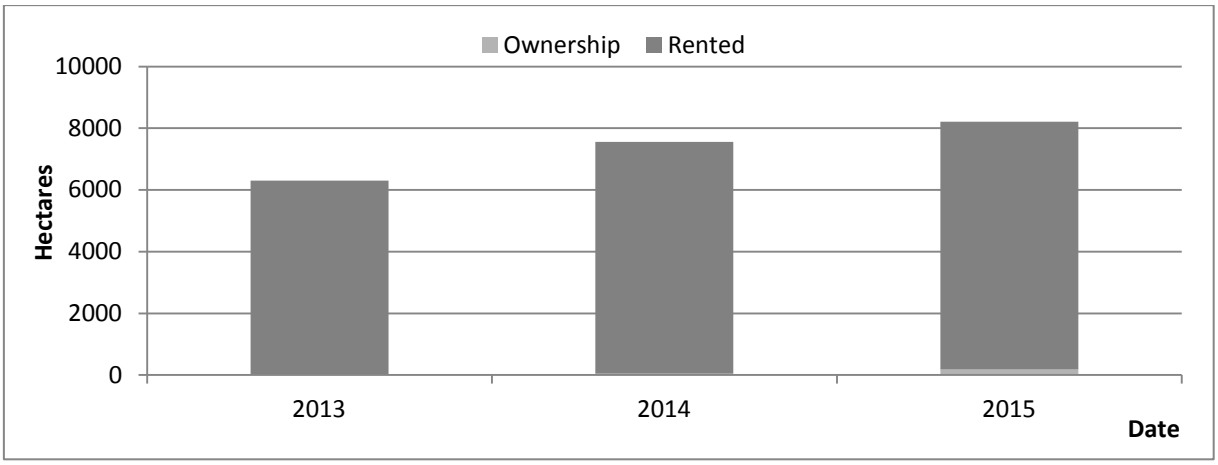

Figure 11. Result of vertical and horizontal analyses.

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

Horizontal analysis shows, that there is a positive trend of square of lands change. Total square was increased from 6303 ha in 2013 to 8214 ha in 2015 – on 1911 hectares (30,3%). Vertical analysis (structural analysis) shows us, that there are no changes in the structure of agricultural lands – 100% of arable for 3 years. But there is a small change in the type of ownership of lands: increase on 178 hectares from 0 in 2013 to 178 in 2015. Also, there is a big change in square of rented lands: increase on 1733 hectares (27%) from 6303 in 2013 to 8036 in 2015.

Secondly, need to determine the presence of means of production (combines, tractors, etc.) and its dynamic of changing for 3 last years.

Table 6. Composition and structure of means of production in APC "Bolshevik" in 2013-2015.

Kind of mean of production	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	In units	In %	In units	In %	In units	In %
Machineries	125	133	131	8	106	-2	98	6	105
Tractors of all marks	50	54	51	4	108	-3	94	1	102
Tractors trailers	16	16	15	0	100	-1	94	-1	94
Seeders and sowing machines	11	11	13	0	100	2	118	2	118
Tractor-drawn haymowers	7	7	7	0	100	0	100	0	100
Combines	12	14	14	2	117	0	100	2	117
Mlking parlors and agregates	11	11	11	0	100	0	100	0	100
Feed dispensers and mixers	13	14	14	1	108	0	100	1	108
Transporters for dung disposal	2	3	3	1	150	0	100	1	150
Tractor rake	3	3	3	0	100	0	100	0	100
Transport vehicles	28	29	30	1	104	1	103	2	107
Total number of means of production	153	162	161	9	106	-1	99	8	105
Cost of (in thousands rubles):				**In EUR**	**In %**	**In EUR**	**In %**	**In EUR**	**In %**
Machineries	891 707	1 218 369	1 272 813	326 662	137	54 444	104	381 106	143
Transport vehicles	116 805	177 809	227 212	61 004	152	49 403	128	110 406	195
Total cost	1 008 512	1 396 178	1 500 024	387 666	138	103 846	107	491 512	149

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

As we can see in the table 6, total number of Machineries and Transport vehicles increased from 2013 to 2015 on 6 and 2 units, accordingly. Total cost of all machineries and transport vehicles also increased on more than 491 512 euros (149%) from 2013 to 2015.

Because APC “Bolshevik” produces milk, further need to inspect the number of animals employed.

Table 7. Number of animals employed and their cost in APC “Bolshevik” for 2013-2015

Parameter	2013	2014	2015	2014 to 2013		2015 to 2014		2015 to 2013	
Number of animals									
Name of animals	**Units**	**Units**	**Units**	**In units**	**In %**	**In units**	**In %**	**In units**	**In %**
Cattle	3 883	3 865	4 012	-18	99,5	147	103,8	129	103,3
cows	1 350	1 350	1 350	0	100,0	0	100,0	0	100,0
milking cows	1 350	1 350	1 350	0	100,0	0	100,0	0	100,0
bulls	16	13	19	-3	81,3	6	146,2	3	118,8
heifer unbred	250	258	127	8	103,2	-131	49,2	-123	50,8
heifer 2-year and more	597	640	579	43	107,2	-61	90,5	-18	97,0
Horses	107	122	151	15	114,0	29	123,8	44	141,1
stud-horse	6	5	5	-1	83,3	0	100,0	-1	83,3
breeding mare 3-year and more	38	38	51	0	100,0	13	134,2	13	134,2
Cost of animals (Euros)									
Name of animals	**Cost**	**Cost**	**Cost**	**In RUB**	**In %**	**In RUB**	**In %**	**In RUB**	**In %**
Cattle	1 118 730	1 232 148	1 338 642	113 418	110,1	106 495	108,6	219 912	119,7
cows	439 085	519 783	547 569	80 698	118,4	27 786	105,3	108 484	124,7
milking cows	439 085	519 783	547 569	80 698	118,4	27 786	105,3	108 484	124,7
bulls	8 187	3 791	7 501	-4 396	46,3	3 710	197,9	-686	91,6
heifer unbred	97 098	106 064	41 216	8 966	109,2	-64 848	38,9	-55 882	42,4
heifer 2-year and more	210 516	203 794	220 786	-6 721	96,8	16 992	108,3	10 270	104,9
Horses	75 966	89 583	188 671	13 618	117,9	99 087	210,6	112 705	248,4
stud-horse	12 462	12 072	10 082	-390	96,9	-1 990	83,5	-2 379	80,9
breeding mare 3-year and more	27 934	23 323	101 427	-4 611	83,5	78 103	434,9	73 492	363,1
Total cost	1 194 696	1 321 731	1 527 313	281 279	110,6	293 122	115,6	574 401	127,8

Source: Author’s own elaboration based on bookkeeping data of APC “Bolshevik” for 2013-2015

As we can see in the table 7, the number of milking cows (the most important asset of milk production) stays same for last 3 years. The reason for that is to keep the number of milking cows on the same level – 33% of amount of cattle – because of maximum production of agricultural lands which can ensure the feeding of animals. Total growth of number of cattle is 129 units (103%) and 219 912 euros (120%).

For further, analysis of an enterprise it is necessary to analyze the labor resources of APC “Bolshevik”. Initial data and horizontal analysis are in the table 8.

Table 8. Average number of employees in APC “Bolshevik” for 2013-2015.

Parameter	2013	2014	2015	2014 to 2013		2015 to 2014		2015 to 2013	
Number of employees									
Type of employees	**In units**	**In units**	**In units**	**In units**	**In %**	**In units**	**In %**	**In units**	**In %**
Employees – total	249	249	250	0	100,0%	1	100,4%	1	100,4%
Employees in major production	248	248	249	0	100,0%	1	100,4%	1	100,4%
Regular employees	214	205	210	-9	95,8%	5	102,4%	-4	98,1%
Tractor-drivers	30	32	34	2	106,7%	2	106,3%	4	113,3%
Milking parlors' operators	54	50	55	-4	92,6%	5	110,0%	1	101,9%
Cattleman	49	49	47	0	100,0%	-2	95,9%	-2	95,9%
Horses keepers	5	4	5	-1	80,0%	1	125,0%	0	100,0%
Officers	42	43	39	1	102,4%	-4	90,7%	-3	92,9%
Managers	7	6	6	-1	85,7%	0	100,0%	-1	85,7%
Specialists	35	37	33	2	105,7%	-4	89,2%	-2	94,3%
Employees in other productions	1	1	1	0	100,0%	0	100,0%	0	100,0%
Salary of employees (thousands of rubles – RUB)									
Type of employees	**Salary**	**Salary**	**Salary**	**In RUB**	**In %**	**In RUB**	**In %**	**In RUB**	**In %**
Employees - total	553 403	602 053	674 967	48 650	108,8%	72 914	112,1%	121 564	122,0%
Employees in major production	551 588	600 359	672 991	48 771	108,8%	72 632	112,1%	121 403	122,0%
Regular employees	427 672	472 020	546 453	44 348	110,4%	74 433	115,8%	118 781	127,8%
tractor-drivers	84 408	91 748	91 264	7 340	108,7%	-484	99,5%	6 856	108,1%
milking parlors' operators	102 031	95 767	124 858	-6 264	93,9%	29 090	130,4%	22 826	122,4%
cattleman	97 071	99 706	102 058	2 635	102,7%	2 353	102,4%	4 987	105,1%
horses keepers	8 993	8 335	11 561	-659	92,7%	3 226	138,7%	2 568	128,6%
Officers	123 917	128 339	126 538	4 423	103,6%	-1 801	98,6%	2 621	102,1%
managers	34 441	35 503	35 489	1 062	103,1%	-13	100,0%	1 049	103,0%
specialists	89 476	92 837	91 049	3 361	103,8%	-1 788	98,1%	1 573	101,8%
Employees in other productions	1 815	1 694	1 976	-121	93,3%	282	116,7%	161	108,9%

Source: Author’s own elaboration based on bookkeeping data of APC “Bolshevik” for 2013-2015

As we can see from the table 8, the total number of employees was increased on 1 unit (100,4%) for last three years. Total amount of salary increased on 121 564 euros (122%) from 2013 to 2015.

For analysis of composition and structure of revenues from sale of production need to make an inspection of statements with specified data – Form 9 and Form 13 of bookkeeping statement. Initial data of plant production and horizontal analysis are in the table 9.

Table 9. Composition and structure of plant production in APC "Bolshevik" for 2013-2015

Parameter	2013	2014	2015	2014 to 2013		2015 to 2014		2015 to 2013	
Weight of cereals, in centners (100kg)									
Type of cereal	**Weight**	**Weight**	**Weight**	**In units**	**In %**	**In units**	**In %**	**In units**	**In %**
Cereals - total	29 490	38 092	46 484	8 602	129,2%	8 392	122,0%	16 994	157,6%
Wheat	15 170	30 514	46 447	15 344	201,1%	15 933	152,2%	31 277	306,2%
Barley	12 000	6 578	0	-5 422	54,8%	-6 578	0,0%	-12 000	0,0%
Peas	475	0	0	-475	0,0%	0	0,0%	0	0,0%
Oat	1 845	1 000	37	-845	54,2%	-963	3,7%	-1 808	2,0%
Other plant production	X *	X	X	X	X	X	X	X	X
Revenues from cereals, euros									
Type of cereal	**Income**	**Income**	**Income**	**In EUR**	**In %**	**In EUR**	**In %**	**In EUR**	**In %**
Cereals - total	281 830	298 230	454 571	16 400	105,8%	156 341	152,4%	172 741	161,3%
Wheat	144 982	261 760	454 343	116 778	180,5%	192 583	173,6%	309 361	313,4%
Barley	114 681	31 658	0	-83 023	27,6%	-31 658	0,0%	-114 681	0,0%
Peas	4 530	0	0	-4 530	0,0%	0	0,0%	0	0,0%
Oat	17 637	4 813	229	-12 825	27,3%	-4 584	4,7%	-17 409	1,3%
Other plant production	68 760	6 385	18 376	-62 375	9,3%	11 991	287,8%	-50 384	26,7%
Plant production revenues	350 590	304 616	472 948	-45 975	86,9%	168 332	155,3%	122 357	134,9%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

As we can see from the table 9, total yield production of cereals increased on 16 994 centners (157,6%), and in cash equivalent the growth was 172 741 euros (161,3%) from 2013 to 2015, accordingly. Especially, the most impressive results showed production of wheat – 31 277 centners (306,2%) and 309 361 euros (313,4%) in cash equivalent from 2013 to 2015. Total plant production revenues increased on 122 357 euros (134,9%) from 2013 to 2015, and has a positive trend. But, also from the composition of plant production and sales, disappeared the barley and peas. It explains with the decision of managers of APC do not sale these types of cereals on the market. Initial data for animal breeding and horizontal analysis are in the table 10.

Table 10. Composition and structure of livestock production in APC "Bolshevik" for 2013-2015

Parameter	2013	2014	2015	2014 to 2013		2015 to 2014		2015 to 2013	
Weight of livestock, in centners (100kg)									
Type of livestock	**Weight**	**Weight**	**Weight**	**In 100kg**	**In %**	**In 100kg**	**In %**	**In 100kg**	**In %**
Livestock - total	3 967	4 255	4 105	288	107,3%	-150	96,5%	138	103,5%
cattle	3 853	4 235	4 074	382	109,9%	-161	96,2%	221	105,7%
horses	114	20	31	-94	17,5%	11	155,0%	-83	27,2%
Milk (physical weight)	57 870	62 952	65 593	5 082	108,8%	2 641	104,2%	7 723	113,3%
Other livestock production	X	X	X	-	-	-	-	-	-
Livestock proceed production	X	X	X	-	-	-	-	-	-
Revenues from livestock, euros									
Type of livestock	**Income**	**Income**	**Income**	**In RUB**	**In %**	**In RUB**	**In %**	**In RUB**	**In %**
Livestock - total	320 089	355 107	457 797	35 019	110,9%	102 690	128,9%	137 709	143,0%
cattle	291 173	350 429	448 051	59 256	120,4%	97 622	127,9%	156 878	153,9%
horses	28 916	4 678	9 746	-24 238	16,2%	5 068	208,3%	-19 170	33,7%
Milk (physical weight)	1 325 751	1 849 297	2 044 286	523 547	139,5%	194 989	110,5%	718 536	154,2%
Other livestock production	242	229	471	-13	94,4%	242	205,9%	229	194,4%
Livestock proceed production	13 927	20 514	16 562	6 587	147,3%	-3 952	80,7%	2 635	118,9%
Livestock revenues	1 660 008	2 225 147	2 519 116	565 139	134,0%	293 969	113,2%	859 108	151,8%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

* not applicable for calculation in one measure

As we can see from the table 10, the total number of livestock sold in weight increased on 138 centners from 3 967 in 2013 to 4 105 in 2015. In monetary terms it is equal to 137 709 euros, namely: from 320 089 euros in 2013 to 457 797 euros in 2015. The volume of milk sold was also increased from 57 870 centners in 2013 to 65 593 centners in 2015. And in monetary term it is equal to the growth from 1 325 751 euros in 2013 to 2 044 286 euros in 2015. Total revenues received from livestock goods sold increased on 859 108 euros from 1 660 008 euros in 2013 to 2 519 116 euros in 2015.

For more detailed analysis of enterprise's efficiency necessary to consider such indicators as production yield per one hectare and average milk yield per one cow. In the table 11 is presented the calculation of an average milk yield, and yield of cereals and legumes from one hectare. Data obtained from the Forms 9 and 13 of bookkeeping statement.

Table 11. Production results of specified kind of productions in APC "Bolshevik" for 2013-2015

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2 013	2 014	2 015	In ha	In %	In ha	In %	In ha	In %
Total square of using lands, hectares									
Cereals total	6 303	7 562	8 214	1 186	143,9%	396	110,2%	1 582	158,6%
Spring grains	2 701	3 887	4 283	1 071	142,0%	490	113,5%	1 561	161,2%
Legumes grains	2 551	3 622	4 112	115	176,7%	-94	64,5%	21	114,0%
Perennial grasses	150	265	171	0	100,0%	-228	85,0%	-228	85,0%
Annual grasses	1 516	1 516	1 288	-311	80,0%	209	116,8%	-102	93,4%
Corn for silage and green fodder	1 553	1 242	1 451	-533	0,0%	0	-	-533	-
Total harvest of plant production, centner (100 kg)									
Cereals total	90 168	118 050	86 302	27 882	130,9%	-31 748	73,1%	-3 866	95,7%
Spring grains	87 346	112 650	84 542	25 304	129,0%	-28 108	75,0%	-2 804	96,8%
Legumes grains	2 822	5 400	1 760	2 578	191,4%	-3 640	32,6%	-1 062	62,4%
Perennial grasses as a hay	5 000	2 750	5 000	-2 250	55,0%	2 250	181,8%	0	100,0%
Perennial grasses as a green mass	217 220	124 292	80 040	-92 928	57,2%	-44 252	64,4%	-137 180	36,8%
Annual grasses	212 013	204 924	148 800	-7 089	96,7%	-56 124	72,6%	-63 213	70,2%
Corn for silage and green fodder	192 020	0	0	-192 020	0,0%	0	-	-192 020	-
Total yield of plant production, centner/ hectare									
Cereals total	33,4	30,37	21,3	-3	90,9%	-9	70,1%	-12	63,8%
Spring grains	34,2	31,1	21,8	-3	90,9%	-9	70,1%	-12	63,7%
Legumes grains	18,8	20,4	10,3	2	108,5%	-10	50,5%	-9	54,8%
Perennial grasses as a hay	25,9	22	24	-4	84,9	2	109,1%	-2	92,7%
Perennial grasses as a green mass (non applicable)	X	X	X	X	X	X	X	X	X
Annual grasses (non applicable)	X	X	X	X	X	X	X	X	X
Corn for silage and green fodder	360,3	0	0	-360	0,0	0	-	-360	-
Total yield of milk production									
Number of milking cows, units	1 350	1 350	1 350	0	100,0	0	100,0%	0	100,0%
Milk yield, centners	63 034	69 828	71 519	6 794	110,8	1 691	102,4%	8 485	113,5%
Average yeild of 1 cow per year, litres	4 669	5 172	5 298	503	110,8	125	102,4%	629	113,5%
Average yeild of 1 cow per day, litres	12,8	14,2	14,5	1,4	110,8	0,3	102,4%	1,7	113,5%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

Based on the data of table 11, we can say that the positive trend of yield of plant production sharply decreased in 2015 on more than 30%, because of strong drought and forest fires. These fires destroyed 234 hectares of cereals lands, what leads to the decline in total yield. But, in the same time was increased the total production of milk – on more than 8 thousand centners (113,5%) from 63 034 centners in 2013 to 71 519 centners in 2015. In the same time increased the average yield of 1 cow per day on 1,7 liters from 12,8 liters/day per one cow in 2013 to 14,5 liters/day per one cow in 2015.

3.3 Evaluation of financial-economic status of APC "Bolshevik".

Based on the analysis of balance sheets, income statements and other forms of statement, it is necessary to examine the financial ratios of an enterprise for last three years. The evaluation of financial-economic will be implemented according to the following ratios:

- General ratios;
- Liquidity ratios;
- Profitability indicator ratios;
- Operating performance ratios;
- Turnover ratios. (Horngren, Harrison, & Oliver, 2012)

Results of examination are presented in the table 12 – 16.

Table 12. General financial ratios for 2013-2015.

General financial ratios	2013	2014	2015
EBIT	231 542	197 394	159 085
EBT	49 724	41 089	21 310
Net (working) assets	201 476	163 426	151 829

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 12, we can see that EBIT and EBT have the positive values, which means that enterprise generates profit.

Table 13. Liquidity ratios for 2013-2015.

Liquidity Ratios	2013	2014	2015
Current ratio	44,22	41,48	47,50
Quick ratio	8,52	4,22	4,75
Capital flexibility ratio	43,22	40,48	46,50

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on table 13, results tell us that current liquidity ratio in 2015 is equal to 47,5 which means, that company can easily cover all debts.

Table 14. Profitability indicators ratios for 2013-2015.

Profitability Indicator Ratios	2013	2014	2015
Return (loss) on sales	0,24	0,24	0,18
Total return (loss) on sales	1,03	1,04	1,04
Return (loss) on cost of revenues	0,30	0,30	0,21
Gross profit margin	22%	22%	14%
Revenues to costs	1,28	1,28	1,16
Economic profitability (unprofitability)	15%	14%	19%
Return (loss) on equity	0,15	0,15	0,19
Return (loss) on capital employed	0,60	0,60	0,56
Return (loss) on liabilities	12,23	12,33	17,04
Net assets protitability (unprofitability)	0,14	0,14	0,10
Return (loss) on assets	0,15	0,14	0,19
Return (loss) on noncurrent assets	0,30	0,30	0,41
Revenue on noncurrent assets	1,28	1,26	2,27
Return (loss) on current assets	0,28	0,28	0,36
Revenue on current assets	1,20	1,18	1,97
EBIT on noncurrent assets	1,33	1,34	2,44

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 14, we can see that return on sales – the most important indicator – in 2015 is equal to 0,18, which is quite good value for agricultural company.

Table 15. Operating performance ratios for 2013-2015, euros.

Operating Performance Ratios	2013	2014	2015
Revenues per employee, euros	8 265	10 257	12 096
Permanent assets per employee, euros	7 050	8 905	9 818
Revenue on permanent assets	1,29	1,29	2,34
Fixed assets on revenue	0,77	0,78	0,43

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 15, we can see that revenue per employee is equal to 12 096 euros in 2015.

Table 16. Turnover ratios for 2013-2015.

Turnover ratios	2013	2014	2015
Total assets turnover ratio	0,62	0,61	1,06
Current assets turnover ratio	1,20	1,18	1,97
Days of current assets turnover	303	310	185
Noncurrent assets turnover ratio	1,28	1,26	2,27
Days of noncurrent assets turnover	284	291	161
Inventory turnover ratio	1,10	1,03	1,89
Days of inventory turnover	331	356	193
Accounts receiveable turnover	8,07	11,77	19,79
Days of accounts receivable	45	31	18
Accounts payable turnover	40,29	40,78	80,72
Days of accounts payable	9	9	5
Equity turnover ratio	0,63	0,61	1,07
Days of equity turnover	581	594	342

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 16, we can see that in 2015 the total assets turnover ratio was equal to 1,06 which means that company generate revenue equal to total cost of assets.

3.4. CVP-analysis of APC "Bolshevik".

Cost-volume profit (CVP) analysis is based upon determining the breakeven point of cost and volume of goods and can be useful for managers making short-term economic decisions. Cost-volume profit analysis makes several assumptions in order to be relevant including that the sales price, fixed costs and variable cost per unit are constant. Running this analysis involves using several equations using price, cost and other variables and plotting them out on an economic graph. (Horngren, Harrison, & Oliver, 2012). Breakeven point determines the volume of sales for covering of all expenditures and generates profit. For calculation of breakeven point used data from bookkeeping statements and Form 9 and 13 of APC "Bolshevik". Because of the inability of common calculation of the break-even points for the crop and livestock production, data for the calculations are presented in three tables separately for grain and milk. Results are presented in the following tables.

Table 17. Results of grain production in APC "Bolshevik" for 2013-2015.

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2 013	2 014	2 015	Amount	In %	Amount	In %	Amount	In %
Production sold, 100kg	29 490	38 092	46 484	8 602	129,2%	8 392	122,0%	16 994	157,6%
Revenues	281 830	298 230	454 571	16 400	105,8%	156 341	152,4%	172 741	161,3%
per centner of grain	9,56	7,83	9,78	-1,73	81,9%	1,95	124,9%	0,22	102,3%
Cost	149 875	189 249	295 757	39 374	126,3%	106 508	156,3%	145 882	197,3%
per centner of grain	5,08	4,97	6,36	-0,11	97,8%	1,39	128,1%	1,28	125,2%
Fixed cost, %	0,77	0,56	0,47	x	x	x	x	x	x
Variable cost, %	0,23	0,44	0,53	x	x	x	x	x	x
Fixed cost	115 404	105 979	139 006	-9 424	91,8%	33 026	131,2%	23 602	120,5%
per centner of grain	3,91	2,78	2,99	-1,13	71,1%	0,21	107,5%	-0,92	76,4%
Variable cost	34 471	83 270	156 751	48 798	241,6%	73 482	188,2%	122 280	454,7%
per centner of grain	1,17	2,19	3,37	1,02	187,0%	1,19	154,3%	2,20	288,5%
Profit	131 955	108 981	158 814	-22 974	82,6%	49 833	145,7%	26 859	120,4%
per centner of grain	4,47	2,86	3,42	-1,61	63,9%	0,56	119,4%	-1,06	76,4%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

As the results of implementation of new technologies in production, rational use of fixed assets, use of more productive machineries, as well as growth of purchasing prices, increase of volume of production and realization of it, enterprise generated the profit over 11 mln rubles.

Breakeven point in monetary terms is calculating according to the formula:

$$BP = R*FC/(R - VC), \quad (1)$$

where, R — revenues from sales; VC — variable cost; FC — fixed cost; BP — breakeven point in money.

By using of data from table 17 and formula (1) can be calculated minimal quantity of production and minimal amount of revenues. Results are in the table 18.

Table 18. Results of breakeven point in crop production in APC "Bolshevik" for 2013-2015.

	Year			2014 to 2013		2015 to 2014		2015 to 2013	
Type of breakeven point	**2013**	**2014**	**2015**	**Amount**	**In %**	**Amount**	**In %**	**Amount**	**In %**
Breakeven point, in Euros	131 486	147 033	212 168	15 547	111,8%	65 136	144,3%	80 683	161,4%
Breakeven point, in 100kg	13 758	18 780	21 696	5 022	136,5%	2 916	115,5%	7 938	157,7%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

More graphically it's presented on the pictures 12 and 13.

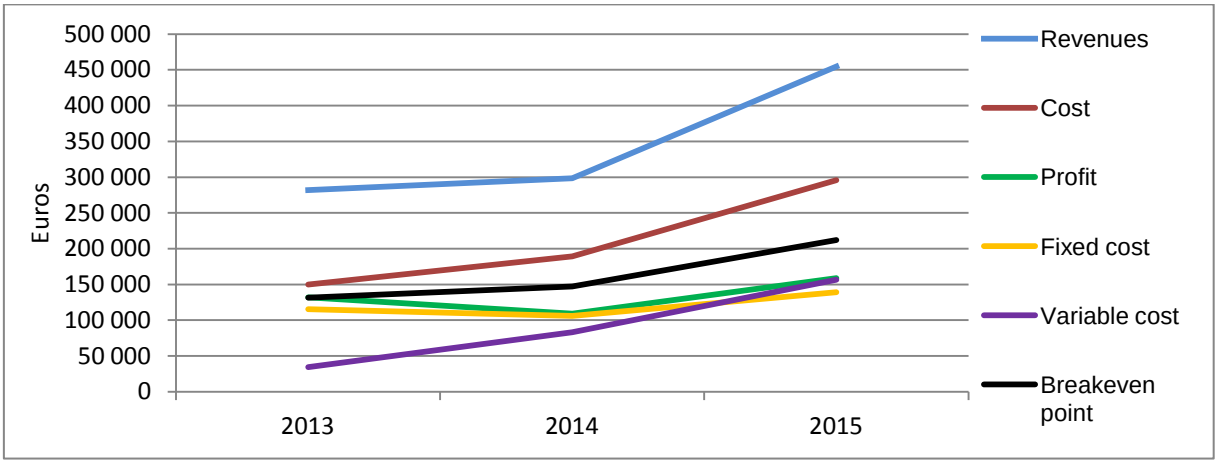

Figure 12. Financial results and breakeven point of crop production, in euros

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

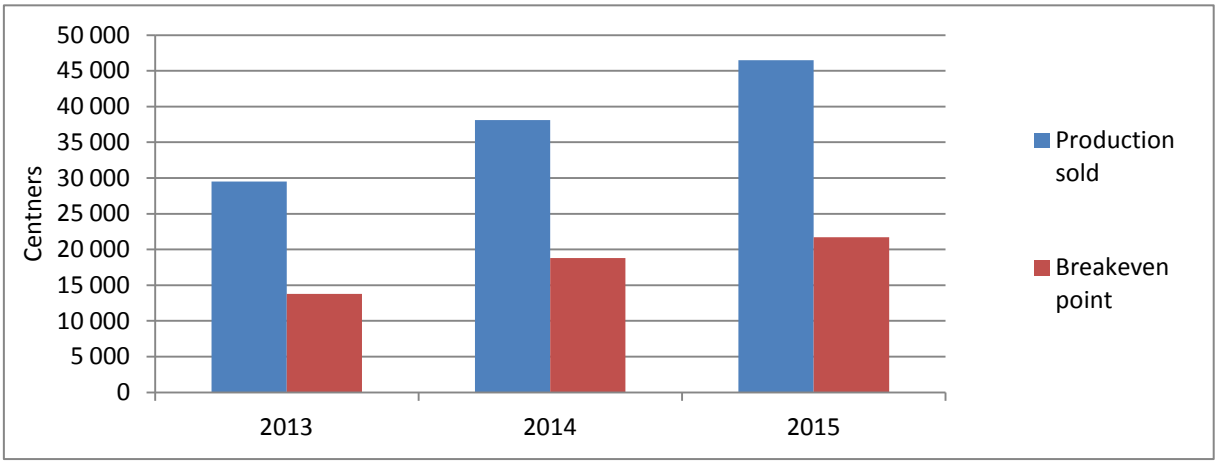

Figure 13. Production results and breakeven point of crop production, in centners

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

Thus, the breakeven point in monetary terms is much smaller, then current revenues and total costs, but bigger than profit, variable and fixed costs. As well as in production terms breakeven point is lower than current scope of production. Based on that, we can consider that in monetary and production terms, crop production is profitable for APC "Bolshevik".

In same way is proceeding the CVP and breakeven point analyses of milk production. Data are presented in the table 19.

Table 19. Results of milk production in APC "Bolshevik" for 2013-2015.

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	Amount	In %	Amount	In %	Amount	In %
Production sold, 100kg	57 870	62 952	65 593	5 082	108,8%	2 641	104,2%	7 723	113,3%
Revenues	1 325 751	1 849 297	2 044 286	523 547	139,5%	194 989	110,5%	718 536	154,2%
per centner of milk	22,91	29,38	31,17	6,47	128,2%	1,79	106,1%	8,26	136,0%
Cost	1 185 743	1 358 941	1 588 425	173 198	114,6%	229 483	116,9%	402 682	134,0%
per centner of milk	20,49	21,59	24,22	1,10	105,4%	2,63	112,2%	3,73	118,2%
Fixed cost, %	0,78	0,71	x	x	x	x	x	x	x
Variable cost, %	0,22	0,29	x	x	x	x	x	x	x
Fixed cost	924 880	964 848	1 191 318	39 969	104,3%	226 470	123,5%	266 439	128,8%
per centner of milk	15,98	15,33	18,16	-0,66	95,9%	2,84	118,5%	2,18	113,6%
Variable cost	260 863	394 093	397 106	133 229	151,1%	3 013	100,8%	136 243	152,2%
per centner of milk	4,51	6,26	6,05	1,75	138,9%	-0,21	96,7%	1,55	134,3%
Profit	140 008	490 356	455 862	350 348	350,2%	-34 494	93,0%	315 854	325,6%
per centner of milk	2,42	7,79	6,95	5,37	322,0%	-0,84	89,2%	4,53	287,3%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

By using of data from table 19 and formula (1) can be calculated minimal quantity of production and minimal amount of revenues. Results are in the table 20.

Table 20. Results of breakeven point in milk production in APC "Bolshevik" for 2013-2015.

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
Type of breakeven	2013	2014	2015	Amount	In %	Amount	In %	Amount	In %
Breakeven point, in 100kg	1 151 446	1 226 145	1 478 524	74 699	106,5%	252 380	120,6%	327 079	128,4%
Breakeven point, in euros	50 261	41 739	47 440	-8 522	83,0%	5 701	113,7%	-2 821	94,4%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

More graphically it's presented on the figures 14 and 15.

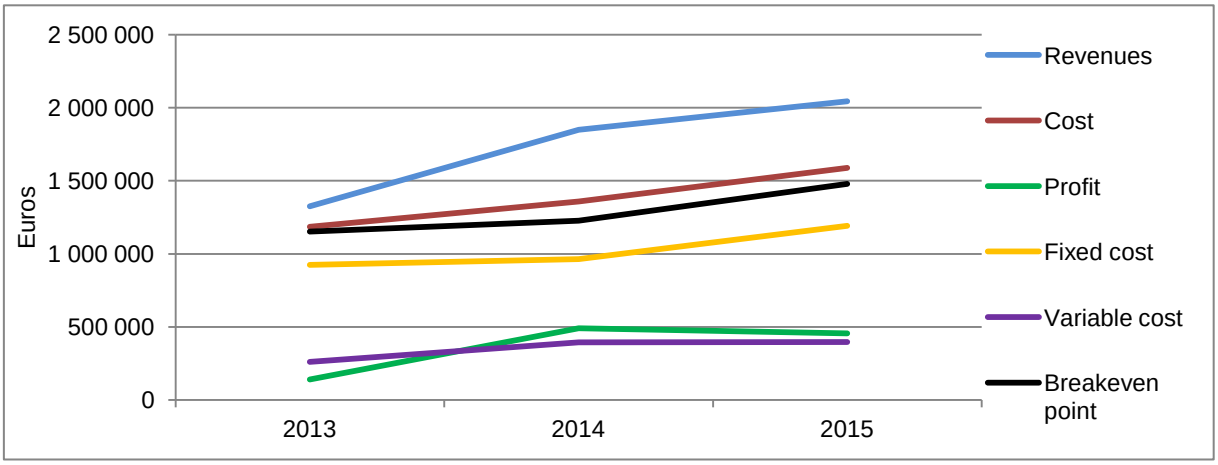

Figure 14. Financial results and breakeven point of milk production

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

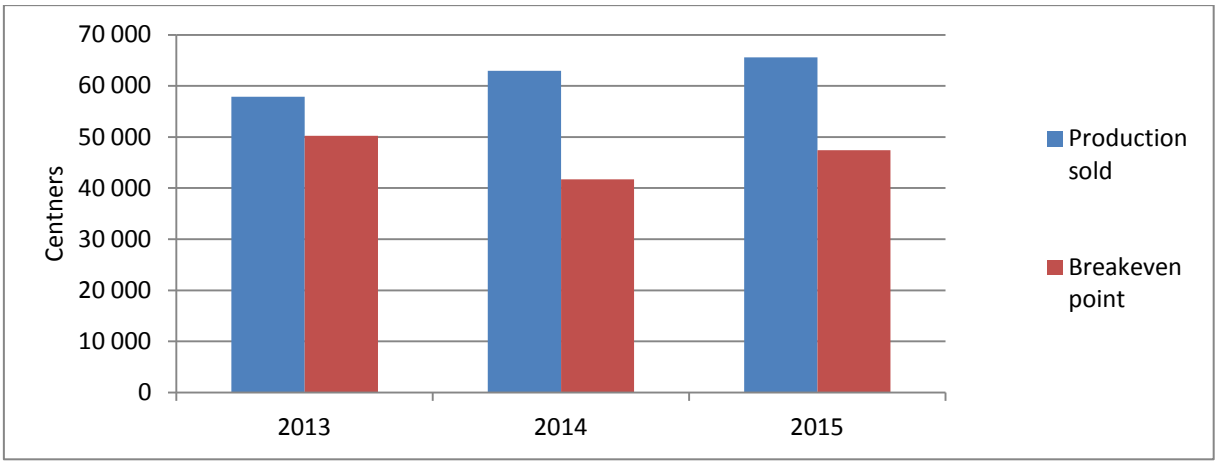

Figure 15. Production results and breakeven point of milk production, in centners

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

Thus, the breakeven point in monetary terms is much smaller, then current revenues and total costs, but bigger than profit, variable and fixed costs. As well as in production terms breakeven point is lower than current scope of production. Based on that, we can consider that in monetary and production terms milk production is profitable for APC "Bolshevik".

Financial strength indicator

For how far an enterprise from the breakeven point shows the financial strength indicator. This value shows for how much percent production can be decreased without loses.

Financial strength indicator is calculating according to the formula:

$$FSI = (R - BP)/R * 100\%, \quad (2)$$

where, R — Revenues; BP — Breakeven point in monetary terms.

This indicator needs to be calculated for each specified product. Data obtained from tables 17-20, and results are in the table 21.

Table 21. Financial strength indicator for crop and milk production in APC "Bolshevik" for 2013-2015

Kind of production	2 013	2 014	2 015
Crop production	53,35	50,70	53,33
Milk production	13,15	33,70	27,68

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

After calculation, we can see that, during all considering years, crop production was in the safety area at least on 50%, permanently. And milk production increased position in safety area from 13,15% to 27,68% from 2013 to 2015. That means that all of productions in APC "Bolshevik" is in safety area and bring profit.

3.5. SWOT-analysis of APC "Bolshevik".

In this section, need to evaluate qualitative characteristics of an enterprise, which helping to realize production and to be economically efficient. For that implement the SWOT-analysis.

SWOT-analysis (alternatively SWOT matrix) is an acronym for *strengths*, *weaknesses*, *opportunities*, and *threats* and is a structured planning method that evaluates those four elements of an organization, project or business venture. A SWOT-analysis can be carried out for a company, product, place, industry, or person. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and unfavorable to achieve that objective. (Osita, Onyebuchi, & Nzekwe, 2017) Results of implementation of this analysis are in the table 22.

Table 22. SWOT-analysis of APC “Bolshevik”

STRENGTHS	WEAKNESS
• high quality of management and employees; • presence of enough own financial resources; • presence of permanent markets; • reliable technology of goods production; • big opportunities for upgrading of production and use of intensive production; • timely replacement of obsolete equipment into new one; • use of advanced technologies and achievements of science; • reliable suppliers; • APC "Bolshevik" is the patron of primary school in village Ivanovka, as well as high school and home of culture in the village of Spartak.	• small level of foreign economic activity; • underdeveloped innovative activity; • low quality of harvesting feed (haylage, hay); • inability to increase production by extensive way.; • high electricity cost, and as the result – big part of it in the cost of milk production; • permanent increase of price for kilowatt.
OPPORTUNITIES	**THREATS**
• opportunities to enter of international markets according to WTO involvement of Russia; • capability to implement the experience and technology know-how to new production and businesses; • overcoming of trading barriers on attractive foreign markets; • fair competition with other producers; • decrease of income tax on agricultural companies; • use of scientific achievements; • possibility to install the renewable sources of energy. The most preferable sources are wind mills and solar panels.	• change of climate and weather conditions, crop failure, low milk yield, loss of cattle; • strengthening of positions of local competitors with equal costs; • emergence of new competitors with much lower costs and much higher quality of productions; • the lack of sufficient support and crop insurance from the state; • adverse demographic changes – lack of new employees; • decline of purchasing prices by dealers; • increase of energy prices, fertilizers, feeds; • accelerated rate of inflation.

Source: Author’s own elaboration, (Osita, Onyebuchi, & Nzekwe, 2017)

The main threats are associated with the production of the main product – milk. The weakness is relatively high cost of electricity, provided for agricultural companies, as well as permanent growth of the cost of electricity. This problem is not crucial, but makes the impact on forming of the cost of final product – milk. High cost of energy is the most common problem for all enterprises in the World, but at the same time quickly solvable. For implementation of measures for increasing of innovative activity in APC “Bolshevik” was selected the direction of price reduction of energy, especially – reduction of expenditures on electricity.

4. Organizational and economic evaluation of an enterprise activity.

4.1. Organizational characteristic of Portuguese enterprise.

Further consideration of practical aspects of organization of innovative activity in agricultural company will be implemented based on the data of Portuguese company. This company was selected from the others agricultural enterprises as the most typical representative of industry, according to the following features:

- the type of organizational structure – LDA – is common for companies, working in agricultural industry in Portugal;
- the company belongs to medium enterprise according to the amount of revenue, but at the same time belongs to micro-entity according to the number of employees, what is mostly common for agricultural companies Portugal;
- according to the bookkeeping statements and data of the company itself, it's an innovative company, because of application of modern agricultural technologies and machineries.

Because the management of Portuguese company has not given consent to the publication of legal data of the company, in coordination with the Supervisors of this Master thesis, the Portuguese company will be designated as "Company B" LDA.

For further research of this enterprise, it is necessary to make the analysis of organizational structure on the company. Organizational structure of "Company B" LDA is presented on the figure 16.

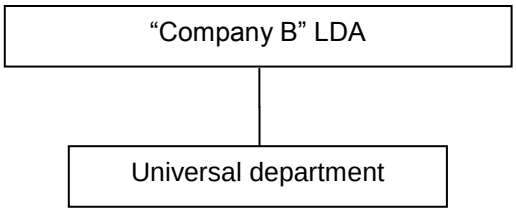

Figure 16. Organizational structure of “Company B” LDA.

Source: Author’s own elaboration based on managerial data of “Company B” LDA

“Company B” LDA is characterized by linear-functional type of organizational structure, because the company is the family enterprise where are involved only family members. That means the lack of any complicated organizational structure. First functional level of “Company B” LDA is presented on the figure 17.

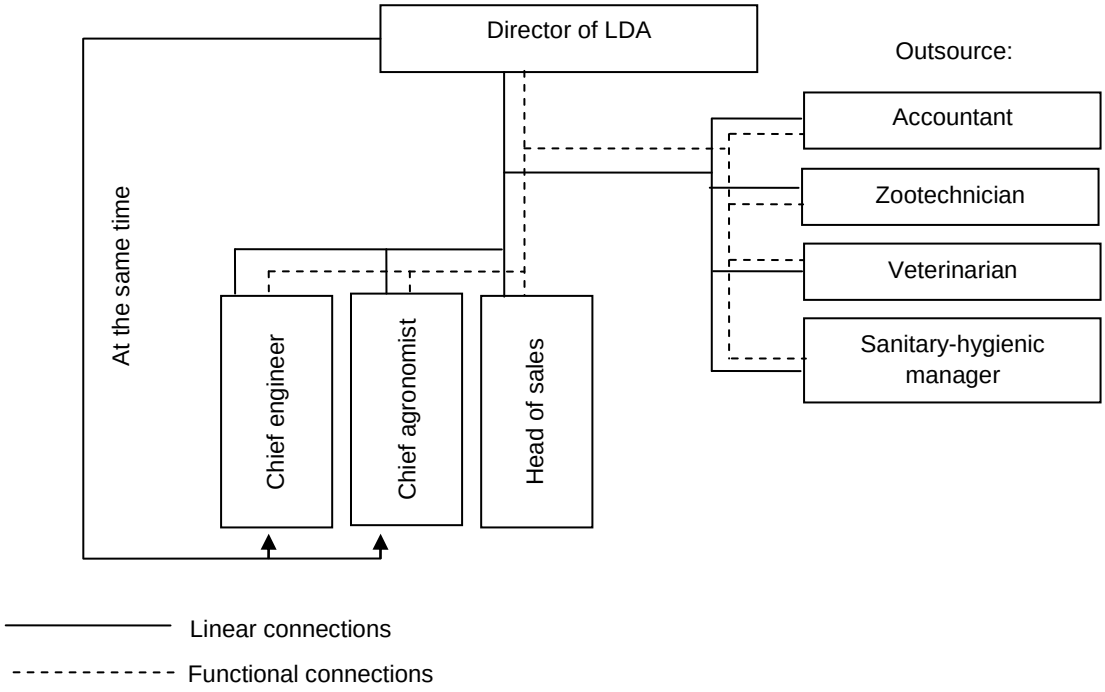

Figure 17. First functional level of “Company B” LDA.

Source: Author’s own elaboration based on managerial data of “Company B” LDA

As can be seen from the picture 17, the top-managerial level is presented by the head Director of LDA. In direct subordination of him are Chief engineer, Chief agronomist, and Head of Sales Department. Because the company is presented by only two employees, the Director of LDA at the same time is Chief engineer and Chief agronomist. Accountant, Zootechnician, Veterinarian, Sanitary-hygienic manager are on the outsource service. Because of absence of hired employees, the second managerial level of “Company B” LDA is not presented.

4.2. Financial and production characteristic of activities of “Company B” LDA.

“Company B” LDA of is located on the North of Portugal, in economic-statistical region North Region, in sub-region Alto-Trás-os-Montes in the district of Bragança. This district, in its turn, is located in a hard-leaved subtropical forest. The climate of the district is Mediterranean, which was formed under the influence of the distance from the coast and the elevation. As the most typical representative of mediterranean climate, in Bragança are relatively cold winters and short, but very hot summer. Snow in winter is rare, however, in case of snowing the snow cover can remain for several days. The average temperature in January is 8,8 °C, and in July is 29,2 °C. Annual precipitation in average is 758 mm. For the district of Bragança is mostly common the water shortages during hot season and devastating forest fires in the rural areas. (IPMA, 2017)

For making the estimation of economic and business efficiency of enterprise’s activity, necessary to make the analysis of the following indicators:

— Changing of balance sheet structure from year to year;

— Changing in financial results from year to year;

— Dynamics of changes in number and amount of current assets;

— Dynamics of changes in square and quality of lands;

— Dynamics of changes in average number of employees;

— Production of various kinds of agricultural products. (Horngren, Harrison, & Oliver, 2012)

Firstly, we need to inspect the Balance sheets and the Income statements of “Company B” LDA as the most important and reliable source of information. Also, need to make the vertical analysis and horizontal analysis to get more information about the trends of enterprise development. The analysis of balance’s structure made for 3 accounting years – 2013-2015. These years were chosen because of availability information in the year 2016.

Data obtained from accounting statements (IES – Informação empresarial simplificada), and presented in the table 23 (vertical analysis) and 24 (year-to-year horizontal analysis). “Year-to-year” analysis means, that all years will be compared in the sequence of ascending.

Table 23. Balance sheet of “Company B” LDA for 2013-2015, vertical analysis

Item	2013		2014		2015	
ASSETS						
Noncurrent assets						
Fixed tangible assets	311 466	66,20%	770 587	75,23%	942 927	90,68%
Intangible assets	6 867	1,46%	3 167	0,31%	917	0,09%
Financial investments	12 537	2,66%	12 537	1,22%	15 437	1,48%
Total noncurrent assets	**330 870**	**70,33%**	**786 290**	**76,77%**	**959 281**	**92,25%**
Current assets						
Inventory	14 865	3,16%	15 777	1,54%	18 022	1,73%
Accounts receivable	49 041	10,42%	65 201	6,37%	46 571	4,48%
Cash and cash equivalents	75 695	16,09%	41 352	4,04%	13 169	1,27%
Prepaid expenses and other current assets	0	0,00%	115 620	11,29%	2 788	0,27%
Total current assets	**139 602**	**29,67%**	**237 950**	**23,23%**	**80 551**	**7,75%**
Total assets	**470 472**	**100,00%**	**1 024 240**	**100,00%**	**1 039 832**	**100,00%**
LIABILITIES AND EQUITY						
Equity						
Common stock	5 000	1,06%	5 000	0,49%	5 000	0,48%
Revaluation of non-current assets	162 640	34,57%	162 640	15,88%	202 640	19,49%
Reserved capital	96 004	20,41%	96 004	9,37%	131 004	12,60%
Accumulated profit	131 325	27,91%	413 254	40,35%	384 832	37,01%
Total equity	**394 969**	**83,95%**	**676 897**	**66,09%**	**723 475**	**69,58%**
Long-term liabilities						
Long-term debt	0	0,00%	194 673	19,01%	177 572	17,08%
Other long-term liabilities	3 180	0,68%	0	0,00%	0	0,00%
Total long-term liabilities	**3 180**	**0,68%**	**194 673**	**19,01%**	**177 572**	**17,08%**
Current liabilities						
Accounts payable	72 323	15,37%	128 670	12,56%	120 784	11,62%
Short-term debt	0	0,00%	0	0,00%	0	0,00%
Deferred revenues	0	0,00%	24 000	2,34%	18 000	1,73%
Total short-term liabilities	**72 323**	**15,37%**	**152 670**	**14,91%**	**138 784**	**13,35%**
Total liabilities and equity	**470 472**	**100,00%**	**1 024 240**	**100,00%**	**1 039 832**	**100,00%**

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015

Table 24. Year-to-year horizontal analysis of “Company B” LDA Balance sheets.

Item	Year			2014 to 2013		2015 to 2014	
	2013	2014	2015	In amount	% of previous	In amount	% of previous
ASSETS							
Noncurrent assets							
Fixed tangible assets	311 466	770 587	942 927	459 120	247,4%	172 341	122,4%
Intangible assets	6 867	3 167	917	-3 701	46,1%	-2 250	28,9%
Financial investments	12 537	12 537	15 437	0	100,0%	2 900	123,1%
Total noncurrent assets	**330 870**	**786 290**	**959 281**	455 420	237,6%	172 990	122,0%
Current assets							
Inventory	14 865	15 777	18 022	912	106,1%	2 245	114,2%
Accounts receivable	49 041	65 201	46 571	16 160	133,0%	-18 629	71,4%
Cash and cash equivalents	75 695	41 352	13 169	-34 343	54,6%	-28 182	31,8%
Prepaid expenses and other current assets	0	115 620	2 788	115 620	-	-112 833	2,4%
Total current assets	**139 602**	**237 950**	**80 551**	98 349	170,4%	-157 399	33,9%
Total assets	**470 472**	**1 024 240**	**1 039 832**	553 768	217,7%	15 591	101,5%
LIABILITIES AND EQUITY							
Equity							
Common stock	5 000	5 000	5 000	0	100,0%	0	100,0%
Revaluation of non-current assets	162 640	162 640	202 640	0	100,0%	40 000	124,6%
Reserved capital	96 004	96 004	131 004	0	100,0%	35 000	136,5%
Accumulated profit	131 325	413 254	384 832	281 929	314,7%	-28 422	93,1%
Total equity	**394 969**	**676 897**	**723 475**	281 929	171,4%	46 578	106,9%
Long-term liabilities							
Long-term debt	0	194 673	177 572	194 673	-	-17 101	91,2%
Other long-term liabilities	3 180	0	0	-3 180	0,0%	0	-
Total long-term liabilities	**3 180**	**194 673**	**177 572**	191 493	6121,8%	-17 101	91,2%
Current liabilities							
Accounts payable	72 323	128 670	120 784	56 347	177,9%	-7 886	93,9%
Short-term debt	0	0	0				
Deferred revenues	0	24 000	18 000	24 000	-	-6 000	75,0%
Total short-term liabilities	**72 323**	**152 670**	**138 784**	80 347	211,1%	-13 886	90,9%
Total liabilities and stockholders' equity	**470 472**	**1 024 240**	**1 039 832**	553 768	217,7%	15 591	101,5%

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015

As we can see, the most impressive growth in year-to-year horizontal analysis in percentage showed by the item “Accumulated profit” – 314,7% (281 929 euros in money) from 2014 to 2013, and in cash – by the item “Fixed tangible assets” – 459 120 euros (247,4%) from 2014 to 2013. In general, mostly all of the items showed the positive trend, except the items “Intangible assets” – decline from year to year on 5 951 euros, and “Cash and cash equivalent” from year to year on 62 526 euros. More graphically it’s presented on the pictures 18-21.

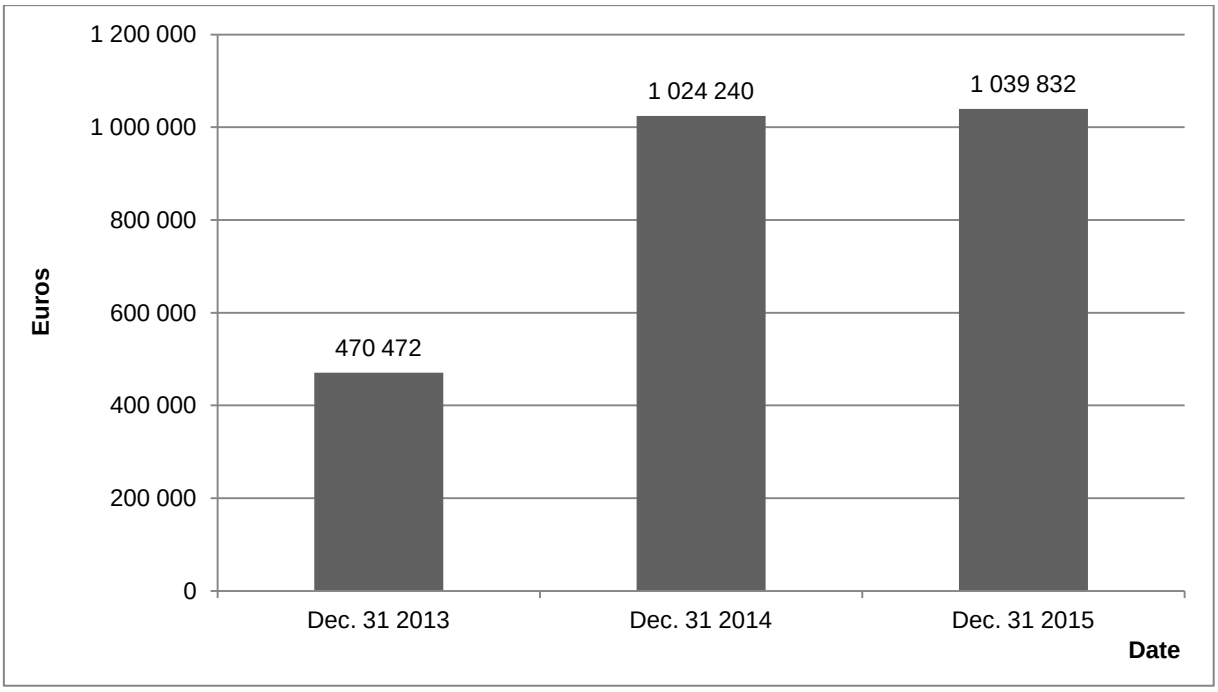

Figure 18. Dynamic of balance sheet's total results changing.

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

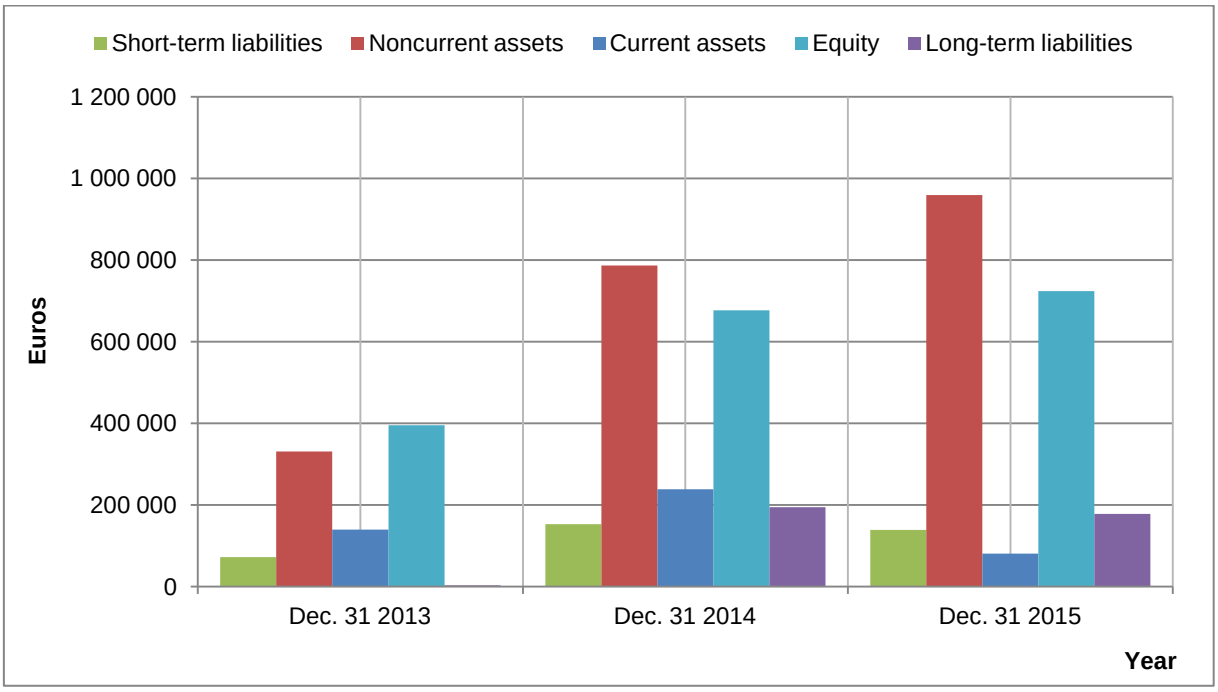

Figure 19. Comparison of the balance sheet's items for 3 years.

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

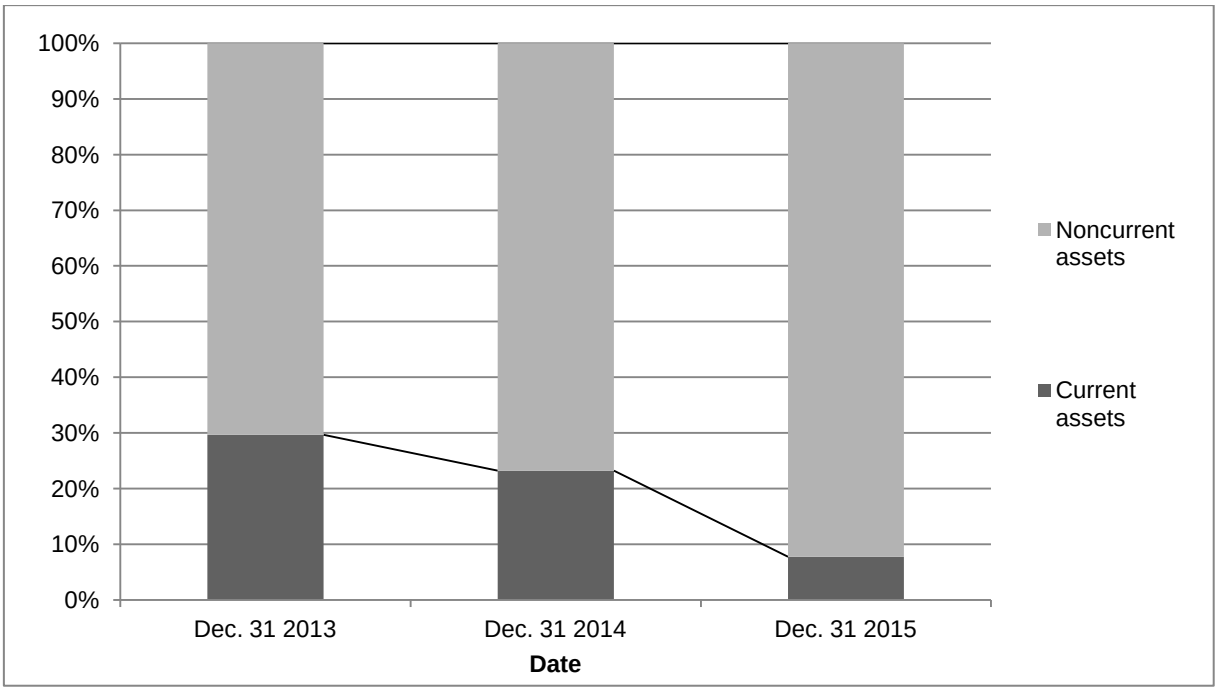

Figure 20. Structure of Assets side of a Balance of "Company B" LDA

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

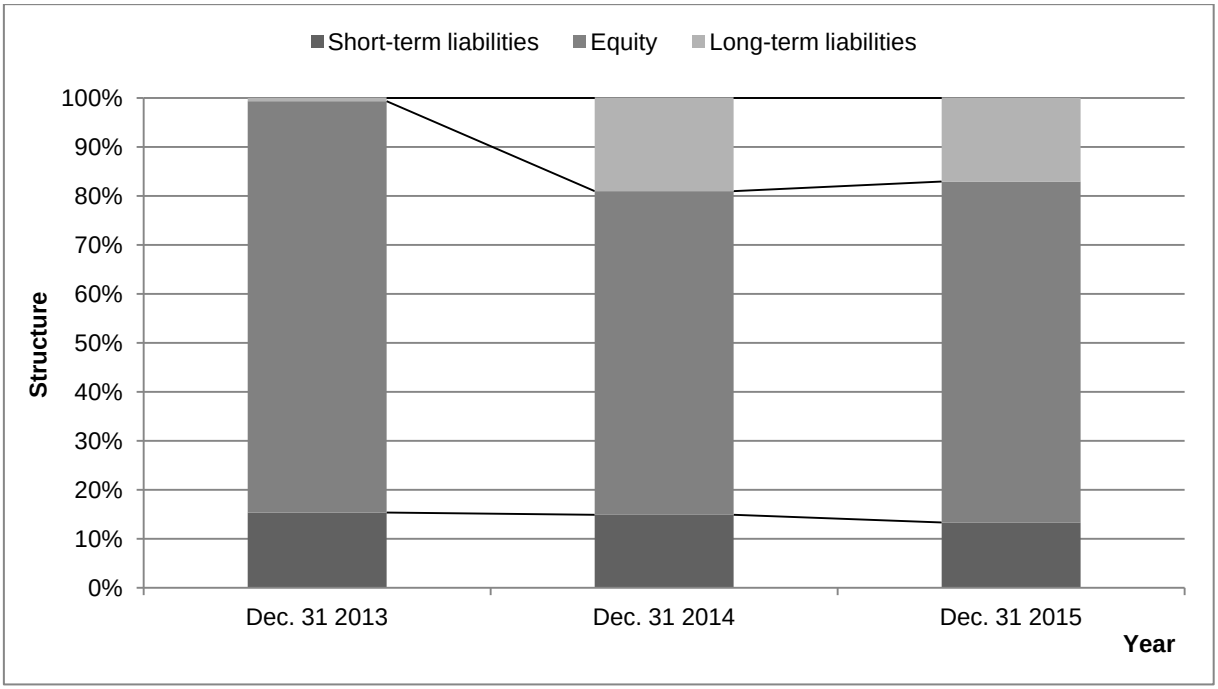

Figure 21. Structure of Liabilities side of a Balance of "Company B" LDA

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

For the further analysis of business activity of an enterprise it's necessary to analyze the Income statement of "Company B" LDA for 2013-2015. Need to make the vertical analysis and horizontal analysis to get more information about the trends of enterprise development. The analysis of income statement's structure made for 3 accounting years. Data obtained from accounting statements (Informação empresarial simplificada), and presented in the table 25 (vertical analysis)

and 26 (year-to-year horizontal analysis). All of the information will be presented in the tables according to the Portuguese legislation of bookkeppeing.

Table 25. Income statement of "Company B" LDA for 2013-2015, vertical analysis

Name of item	2013		2014		2015	
Revenues	**amount**	**%**	**amount**	**%**	**amount**	**%**
Plant growing	0	0,0%	0	0,0%	0	0,0%
Livestock production	437 148	86,2%	475 454	86,1%	429 207	83,8%
Subsidies	47 697	9,4%	55 702	10,1%	47 699	9,3%
Revaluation of inventory	373	0,1%	-954	-0,2%	562	0,1%
Works for own production	21 802	4,3%	22 043	4,0%	34 503	6,7%
Total revenues	**507 019**	**100,0%**	**552 245**	**100,0%**	**511 971**	**100,0%**
Cost of production						
Plant growing	155 010	30,6%	188 443	34,1%	158 589	31,0%
Livestock production	272 014	53,6%	223 005	40,4%	205 231	40,1%
Total cost of revenues	427 024	84,2%	411 448	74,5%	363 820	71,1%
Gross profit						
Plant growing	-155 010	-	-188 443	-	-158 589	-
Livestock production	165 133	32,6%	252 449	45,7%	223 976	43,7%
Subsidies	47 697	9,4%	55 702	10,1%	47 699	9,3%
Revaluation of inventory	373	0,1%	-954	-0,2%	562	0,1%
Works for own production	21 802	4,3%	22 043	4,0%	34 503	6,7%
Total gross profit	79 995	15,8%	140 797	25,5%	148 150	28,9%
Other items						
Other incomes	20 336	4,0%	42 762	7,7%	24 546	4,8%
Other expenses	9 236	1,8%	16 119	2,9%	17 205	3,4%
Profit before income taxes	**91 095**	**18,0%**	**167 440**	**30,3%**	**155 491**	**30,4%**
Interest income	0	0,0%	0	0,0%	0	0,0%
Interest expense	0	0,0%	2 594	0,5%	7 322	1,4%
Other income (expense)	57 508	11,3%	99 312	18,0%	113 137	22,1%
Operational profit	**33 587**	**6,6%**	**65 534**	**11,9%**	**35 033**	**6,8%**
Income tax	8 442	1,7%	10 763	1,9%	6 955	1,4%
Net profit	**25 145**	**5,0%**	**54 771**	**9,9%**	**28 078**	**5,5%**

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

All of the items in Income statement were compared with "Total revenues", because in this case we can see the structure of revenues and expenditures, and their influence on total income. As we can see from the Table 25, that there is no revenues from plant growing branches for 3 years. But the biggest part of revenues takes Livestock production: from 86,2% in 2013 to 83,8% in 2015. Net profit also increased the part in total revenues: from 5% in 2013 to 5,5% in 2015.

Table 26. Year-to-year horizontal analysis of "Company B" LDA of income statement.

Name of item	Year			2014 to 2013		2015 to 2014	
	2013	2014	2015	In amount	% of previous	In amount	% of previous
Revenues							
Plant growing	0	0	0	0,00	0,00	0,00	0,00
Livestock production	437 148	475 454	429 207	38 306	108,8%	-46 248	90,3%
Subsidies	47 697	55 702	47 699	8 006	116,8%	-8 004	85,6%
Revaluation of inventory	373	-954	562	-1 327	-255,9%	1 516	-58,9%
Works for own production	21 802	22 043	34 503	241	101,1%	12 461	156,5%
Total revenues	**507 019**	**552 245**	**511 971**	**45 227**	**108,9%**	**-40 275**	**92,7%**
Cost of production							
Plant growing	155 010	188 443	158 589	33 433	121,6%	-29 854	84,2%
Livestock production	272 014	223 005	205 231	-49 010	82,0%	-17 774	92,0%
Total cost of revenues	**427 024**	**411 448**	**363 820**	**-15 576**	**96,4%**	**-47 628**	**88,4%**
Gross profit							
Plant growing	-155 010	-188 443	-158 589	-33 433	121,6%	29 854	84,2%
Livestock production	165 133	252 449	223 976	87 316	152,9%	-28 474	88,7%
Subsidies	47 697	55 702	47 699	8 006	116,8%	-8 004	85,6%
Revaluation of inventory	373	-954	562	-1 327	-255,9%	1 516	-58,9%
Works for own production	21 802	22 043	34 503	241	101,1%	12 461	156,5%
Total gross profit	**79 995**	**140 797**	**148 150**	60 803	176,0%	7 353	105,2%
Other items							
Other incomes	20 336	42 762	24 546	22 426	210,3%	-18 216	57,4%
Other expenses	9 236	16 119	17 205	6 883	174,5%	1 086	106,7%
Profit before income taxes	**91 095**	**167 440**	**155 491**	**76 345**	**183,8%**	**-11 949**	**92,9%**
Interest income	0	0	0	0	-	0	-
Interest expense	0	2 594	7 322	2 594	-	4 728	282,2%
Other income (expense)	57 508	99 312	113 137	41 805	172,7%	13 824	113,9%
Operational profit	**33 587**	**65 534**	**35 033**	**31 947**	**195,1%**	**-30 501**	**53,5%**
Income tax	8 442	10 763	6 955	2 321	127,5%	-3 808	64,6%
Net profit	**25 145**	**54 771**	**28 078**	**29 626**	**217,8%**	**-26 693**	**51,3%**

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

As we can see from the table 26 Total Revenues increased on almost 50 thousand euros. But the main branch – livestock production – decreased on 8 thousand euros from 2013 to 2015. But at the same time increased the item "Works for own production" on 12 461 euros from 2013 to 2015. Net profit increased from 25 145 euros in 2013 to 28 078 euros in 2015.

More graphically it's on the figure 22.

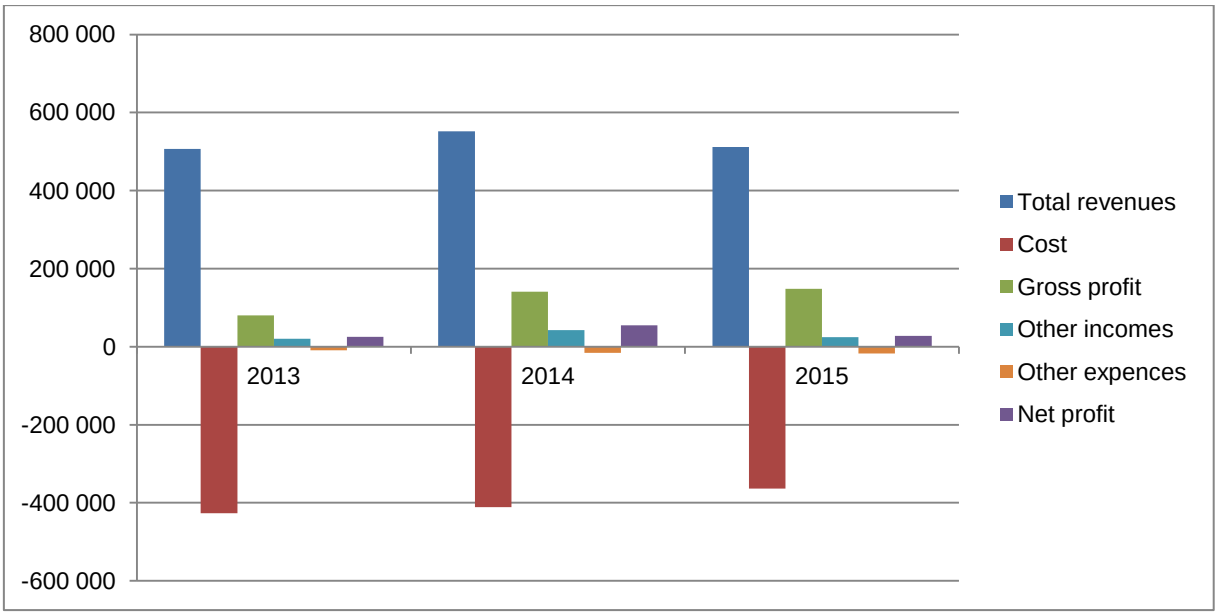

Figure 22. Dynamic in changes of Income statement results.

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

Next step of analysis of business activity and state of an enterprise, need to analyze its current assets. Firstly, we will start with analyzing of lands' composition and structure for last 3 years. Data obtained from accounting statements, and presented in the table 27 with both analysis – horizontal year-to-year, year-to-base and vertical ones.

Table 27. Composition and structure of lands of "Company B" LDA for 2013-2015

Kind of land	Years											
	2013		2014		2015		2014 to 2013		2015 to 2014		2015 to 2013	
	Sq, ha	To total, %	Sq, ha	To total, %	Sq, ha	To total, %	In ha	In %	In ha	In %	In ha	In %
Total square of lands:	17,56	100	21,14	100	22,06	100	3,58	120%	0,92	104%	4,5	126%
Agricultural lands:	17,56	100	21,14	100	22,06	100	3,58	120%	0,92	104%	4,5	126%
Arable	17,56	100	21,14	100	20,64	100	3,58	120%	-0,5	98%	3,08	118%
Type of ownership:												
In ownership	0	0	0	0	0	0	0	-	0	-	0	-
Renting	17,56	100	21,14	100	22,06	100	3,58	120%	0,92	104%	4,5	126%
By usage in production:												
Used	17,56	100	21,14	100	20,64	93,6	3,58	120%	-0,5	98%	3,08	118%
Not used	0	0	0	0	1,42	6,4	0	-	1,42	-	1,42	-

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

Results of both analyses and also vertical analysis are more graphically presented on the figure 23.

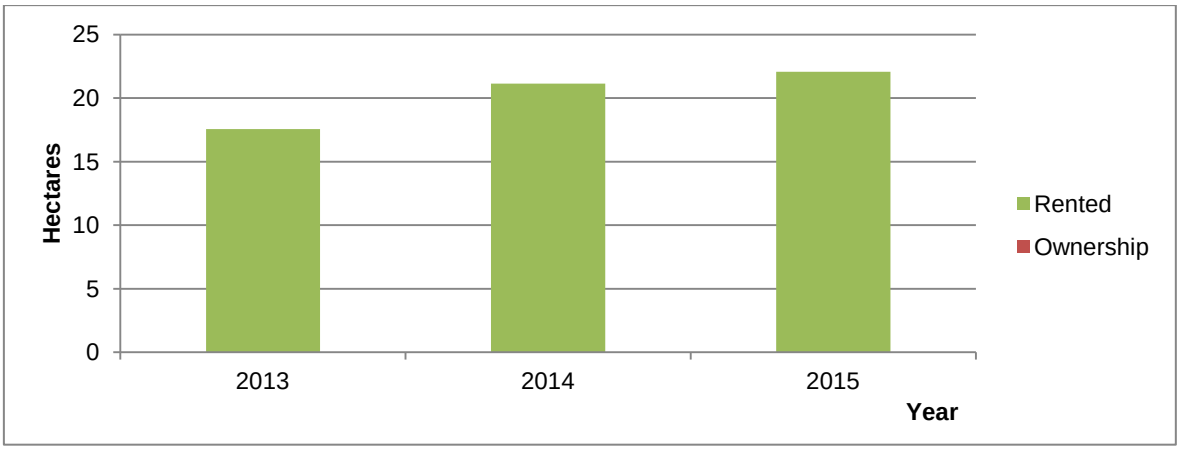

Figure 23. Result of vertical and horizontal analyses.

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

Horizontal analysis shows, that there is a positive trend of square of lands change. Total square was increased from 17,56 in 2013 to 22,06 in 2015 – on 4,5 hectares (126%). Vertical analysis (structural analysis) shows us, that there are no changes in the structure of agricultural lands – 100% of arable for 3 years. Also, there are no changes in the types of ownership: 100% of all lands are rented.

Secondly, need to determine the presence of means of production (combines, tractors, etc.) and its dynamic of changing for 3 last years. Results are in the table 28.

Table 28. Composition and structure of means of production in "Company B" LDA in 2013-2015

Kind of production means	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	In units	In %	In units	In %	In units	In %
Machineries	9	9	9	0	100%	0	100%	0	100%
Tractors of all marks	1	1	1	0	100%	0	100%	0	100%
Tractors trailers	1	1	1	0	100%	0	100%	0	100%
Seeders and sowing machines	1	1	1	0	100%	0	100%	0	100%
Tractor-drawn haymowers	1	1	1	0	100%	0	100%	0	100%
Combines	1	1	1	0	100%	0	100%	0	100%
Mlking parlors and agregates	1	1	1	0	100%	0	100%	0	100%
Feed dispensers and mixers	1	1	1	0	100%	0	100%	0	100%
Transporters for dung disposal	1	1	1	0	100%	0	100%	0	100%
Tractor rake	1	1	1	0	100%	0	100%	0	100%
Transport vehicles	1	1	1	0	100%	0	100%	0	100%
Total number of means of production	10	10	10	0	100%	0	100%	0	100%
Cost of:				**In Euro**	**In %**	**In Euro**	**In %**	**In Euro**	**In %**
Machineries	82 367	242 416	225 133	160 049	294%	-17 283	93%	142 766	273%
Transport vehicles	9 152	26 935	25 015	17 783	294%	-1 920	93%	15 863	273%
Total cost	91 518	269 351	250 148	177 833	294%	-19 203	93%	158 629	273%

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

As we can see in the table 28, total number of Machineries and Transport vehicles did not have any changes from 2013 to 2015. The reason for that is that company uses the Machineries and Transport vehicles with long-term warranty service and do not have any lack of work hours because of repairs. Also, there is no crucial changes in dimensions of an enterprise, namely in number of cows, in agricultural lands, in milk or meat production. So, for company it is enough to have only one unit of each required type of machinery. Total cost of all machineries and transport vehicles also increased on 158 629 euros (273%) from 91 518 euros in 2013 to 250 148 euros in 2015.

Because “Company B” LDA produces milk, further need to inspect the number of animals employed.

Table 29. Number of animals employed and their cost in “Company B” LDA for 2013-2015

Parameter	2013	2014	2015	2014 to 2013		2015 to 2014		2015 to 2013	
Number of animals, units									
Name of animals	**Units**	**Units**	**Units**	**In units**	**In %**	**In units**	**In %**	**In units**	**In %**
Cattle	251	241	273	-10	96,0%	32	113,3%	22	109%
cows	112	115	164	3	102,7%	49	142,6%	52	146%
milking cows	112	115	164	3	102,7%	49	142,6%	52	146%
bulls	28	27	4	-1	96,4%	-23	14,8%	-24	14%
heifer unbred	57	50	56	-7	87,7%	6	112,0%	-1	98%
heifer 2-year and more	54	49	49	-5	90,7%	0	100,0%	-5	91%
Cost of animals (thousands of rubles – RUB)									
Name of animals	**Cost**	**Cost**	**Cost**	**In Euro**	**In %**	**In Euro**	**In %**	**In Euro**	**In %**
Cattle	70 749	352 522	533 984	281 774	498,3%	181 461	151,5%	463 235	755%
cows	31 569	168 216	320 781	136 647	532,8%	152 565	190,7%	289 212	1016%
milking cows	31 569	168 216	320 781	136 647	532,8%	152 565	190,7%	289 212	1016%
bulls	7 892	39 494	7 824	31 602	500,4%	-31 670	19,8%	-68	99%
heifer unbred	16 066	73 137	109 535	57 071	455,2%	36 398	149,8%	93 469	682%
heifer 2-year and more	15 221	71 675	95 843	56 454	470,9%	24 169	133,7%	80 622	630%
Total cost	70 749	352 522	533 984	281 774	498,3%	181 461	151,5%	463 235	755%

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015

As we can see in the table 29, the number of milking cows (the most important part of milk production) increased on 52 units (146%): from 112 units in 2013 to 164 units in 2015. The reason for that is the increase of milk production, and, as the result, increase of revenues. Total growth of number of cattle is 22 units (109%) and in monetary term increased on 463 235 euros (755%) from 2013 to 2015 accordingly.

For further, analysis of an enterprise need to analyze the labor resources of “Company B” LDA. Initial data and horizontal analysis are in the table 30.

Table 30. Average number of employees in “Company B” LDA for 2013-2015

	2013	2014	2015	2014 to 2013		2015 to 2014		2015 to 2013	
Number of employees									
Type of employees	**In units**	**In units**	**In units**	**In units**	**In %**	**In units**	**In %**	**In units**	**In %**
Employees - total	2	2	2	0	100,0%	0	100,0%	0	100,0%
Employees in major production	2	2	2	0	100,0%	0	100,0%	0	100,0%
Regular employees	2	2	2	0	100,0%	0	100,0%	0	100,0%
Salary of employees (thousands of rubles – RUB)									
Type of employees	**Salary**	**Salary**	**Salary**	**In Euro**	**In %**	**In Euro**	**In %**	**In Euro**	**In %**
Employees - total	25 980	25 850	25 025	-130	99,5%	-825	96,8%	-955	96,3%
Employees in major production	25 980	25 850	25 025	-130	99,5%	-825	96,8%	-955	96,3%
Regular employees	25 980	25 850	25 025	-130	99,5%	-825	96,8%	-955	96,3%

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015,

As we can see from the table 30, the total number of employees was not changed for last 3 years. Total amount of salary decreased on 955 Euros (-3,7%) from 2013 to 2015.

For analysis of composition and structure of revenues from sale of production, need to make an inspection of statements with specified data from bookkeeping statement. Because the Total Revenues are presented only by Livestock branch, further will be make the analysis of livestock and milk production. Initial data for animal breeding and horizontal analysis are in the table 31.

Table 31. Composition and structure of livestock production in “Company B” LDA for 2013-2015

Item	**Year**								
	2013	**2014**	**2015**	**2014 to 2013**		**2015 to 2014**		**2015 to 2013**	
Weight of livestock, centners									
Type of livestock	**Weight**	**Weight**	**Weight**	**In 100kg**	**In %**	**In 100kg**	**In %**	**In 100kg**	**In %**
Livestock	570	591	635	21	103,7%	44	107,5%	66	111,5%
Milk	10 826	11 231	12 074	406	103,7%	843	107,5%	1 249	111,5%
Revenues from livestock, euros									
Type of livestock	**Income**	**Income**	**Income**	**In Euro**	**In %**	**In Euro**	**In %**	**In Euro**	**In %**
Livestock	43 715	47 545	42 921	3 831	108,8%	-4 625	90,3%	-794	98,2%
Milk	393 433	427 909	386 286	34 476	108,8%	-41 623	90,3%	-7 147	98,2%
Livestock revenues	437 148	475 454	429 207	38 306	108,8%	-46 248	90,3%	-7 941	98,2%

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015,

As we can see from the table 31, total revenues, received from the realization of livestock goods and milk decreased on 7 941 euros from 2013 to 2015. Decreased of revenues from milk happened because of decrease of purchasing price from 36 euros per centner in 2013 to 31 euros per centners in 2015.

For more detailed analysis of enterprise’s efficiency necessary to consider such an indicator as average milk yield per one cow. In the table 32 is presented the calculation of an average milk yield.

Table 32. Production results of specified kind of productions in “Company B” LDA for 2013-2015

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	In ha	In %	In ha	In %	In ha	In %
Total yield of milk production, liters									
Number of milking cows, units	112	115	164	3	102,7%	49	142,6%	52	146,4%
Milk yield, centners	11 395	11 822	12 710	427	103,7%	887	107,5%	1 314	111,5%
Average yeild of 1 cow per year, liters	10 174	10 280	7 750	106	101,0%	-2 530	75,4%	-2 425	76,2%
Average yeild of 1 cow per day, liters	27,9	28,2	21,2	0,3	101,0%	-6,9	75,4%	-6,6	76,2%

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015,

Based on the data of table 32, we can see, that the total volume of produced milk increased on 1 314 centners (111,5%), but in the same time the average yield of 1 cow per day decreased on 6,6 liters. The reason for such decline was because of milk yield of production per one cow due to the age of cows and changes in fodder base of animals. In average it is more than 5 years.

4.3. Evaluation of financial-economic status of “Company B” LDA

Based on the analysis of balance sheets, income statements and other forms of statement, need to examine the financial ratios of an enterprise for last 3 years.

Evaluation of financial-economic will be implemented according to the following ratios:

- General ratios;
- Liquidity ratios;
- Profitability indicator ratios;
- Operating performance ratios;
- Turnover ratios. (Horngren, Harrison, & Oliver, 2012)

Results of examination are presented in the table 33-37.

Table 33. General financial ratios for 2013-2015

General financial ratios	2013	2014	2015
EBIT	528 823	568 382	515 839
EBT	148 150	140 797	79 995
Net (working) assets	-58 233	85 280	67 279

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 33, we can see that EBIT and EBT have the positive values, which means that enterprise generates profit.

Table 34. Liquidity ratios for 2013-2015

Liquidity Ratios	2013	2014	2015
Current ratio	0,58	1,56	1,93
Quick ratio	0,43	0,70	1,72
Capital flexibility ratio	-0,42	0,56	0,93

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 34, we can see that current liquidity ratio in 2015 is equal to 1,93 which means, that company can easily cover all of the debt.

Table 35. Profitability indicators ratios for 2013-2015

Profitability Indicator Ratios	**2013**	**2014**	**2015**
Return (loss) on sales	0,07	0,12	0,07
Total return (loss) on sales	1,03	1,03	1,02
Return (loss) on cost of revenues	0,10	0,16	0,08
Gross profit margin	0%	0%	0%
Revenues to costs	1,41	1,34	1,19
Economic profitability (unprofitability)	15%	22%	39%
Return (loss) on equity	0,04	0,10	0,17
Return (loss) on capital employed	0,59	0,65	1,30
Return (loss) on liabilities	0,11	0,31	0,89
Net assets protitability (unprofitability)	0,04	0,08	0,08
Return (loss) on assets	0,03	0,09	0,14
Return (loss) on noncurrent assets	0,04	0,12	0,20
Revenue on noncurrent assets	0,59	0,99	3,06
Return (loss) on current assets	0,22	0,35	0,48
Revenue on current assets	3,21	2,93	7,26
EBIT on noncurrent assets	0,62	1,05	3,31

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 35, we can see that return on sales – the most important indicator – in 2015 is equal to 0,07 which is pretty good value for agricultural company.

Table 36. Operating performance ratios for 2013-2015, Euros

Operating Performance Ratios	**2013**	**2014**	**2015**
Revenues per employee	255 985	276 123	253 509
Permanent assets per employee	471 464	385 293	155 733
Revenue on permanent assets	0,60	1,02	3,26
Fixed assets on revenue	1,67	0,98	0,31

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 36, we can see that revenue per employee is equal to 253 509 Euros in 2015.

Table 37. Turnover ratios for 2013-2015

Turnover ratios	2013	2014	2015
Total assets turnover ratio	0,50	0,74	2,16
Current assets turnover ratio	3,21	2,93	7,26
Days of current assets turnover	114	125	50
Noncurrent assets turnover ratio	0,59	0,99	3,06
Days of noncurrent assets turnover	622	369	119
Inventory turnover ratio	4,78	5,63	57,45
Days of inventory turnover	76	65	6
Accounts receiveable turnover	9,16	9,67	20,68
Days of accounts receivable	40	38	18
Accounts payable turnover	2,92	4,09	11,81
Days of accounts payable	125	89	31
Equity turnover ratio	0,73	1,03	2,57
Days of equity turnover	499	354	142

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015, (Horngren, Harrison, & Oliver, 2012)

Based on results of table 37, we can see that in 2015 the total assets turnover ratio was equal to 2,16 which means that company generate revenue twice bigger than total cost of assets.

4.4. CVP-analysis of "Company B" LDA.

For calculation of breakeven point used data from bookkeeping and managerial statements of "Company B" LDA. Because company sells only one kind of good, namely – milk, so the data will be presented only for it.

Table 38. Results of milk production in "Company B" LDA for 2013-2015

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	Amount	In %	Amount	In %	Amount	In %
Production sold, 100kg	10 826	11 231	12 074	406	103,7%	843	107,5%	1 249	111,5%
Revenues	393 433	427 909	386 286	34 476	108,8%	-41 623	90,3%	-7 147	98,2%
per centner of milk	36,34	38,10	31,99	2	104,8%	-6	84,0%	-4	88,0%
Cost	244 813	200 704	184 708	-44 109	82,0%	-15 997	92,0%	-60 105	75,4%
per centner of milk	22,61	17,87	15,30	-5	79,0%	-3	85,6%	-7	67,6%
Fixed cost, %	0,60	0,57	0,54	x	x	x	x	x	x
Variable cost, %	0,40	0,43	0,46	x	x	x	x	x	x
Fixed cost	146 888	114 402	99 742	-32 486	77,9%	-14 659	87,2%	-47 146	67,9%
per centner of milk	13,57	10,19	8,26	-3	75,1%	-2	81,1%	-5	60,9%
Variable cost	97 925	86 303	84 966	-11 622	88,1%	-1 337	98,5%	-12 960	86,8%
per centner of milk	9,05	7,68	7,04	-1	84,9%	-1	91,6%	-2	77,8%
Profit	148 620	227 204	201 578	78 584	152,9%	-25 626	88,7%	52 958	135,6%
per centner of milk	13,73	20,23	16,70	7	147,4%	-4	82,5%	3	121,6%

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

By using of data from table 38 and formula (1) can be calculated minimal quantity of production and minimal amount of revenues. Results are in the table 39.

Table 39. Results of breakeven point in milk production in "Company B" LDA for 2013-2015

Type of breakeven	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	Amount	In %	Amount	In %	Amount	In %
Breakeven point, in 100kg	195 563	143 304	127 867	-52 260	73,3%	-15 436	89,2%	-67 696	65,4%
Breakeven point, in euros	5 381	3 761	3 997	-1 620	69,9%	236	106,3%	-1 384	74,3%

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

More graphically it's presented on the pictures 24 and 25.

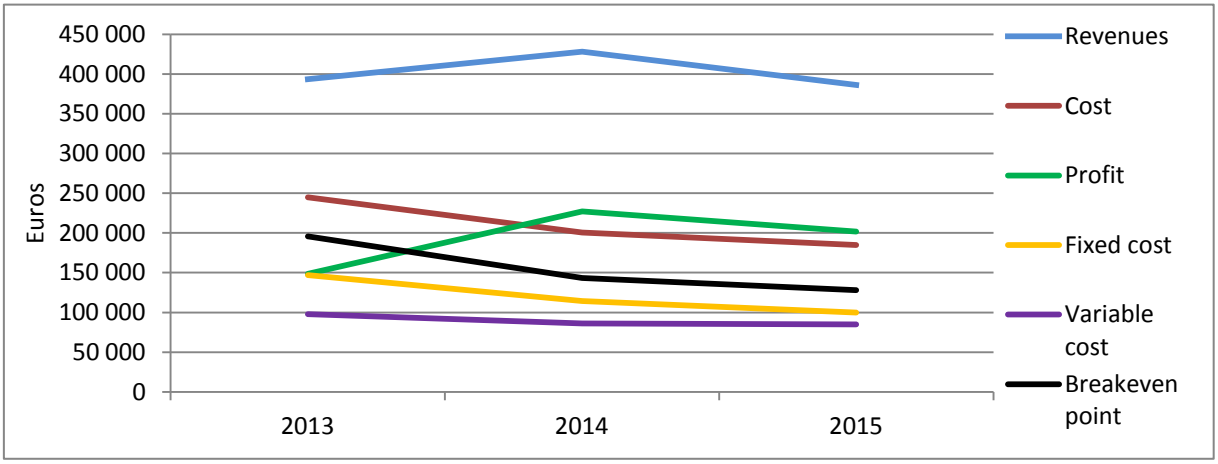

Figure 24. Financial results and breakeven point of milk production

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

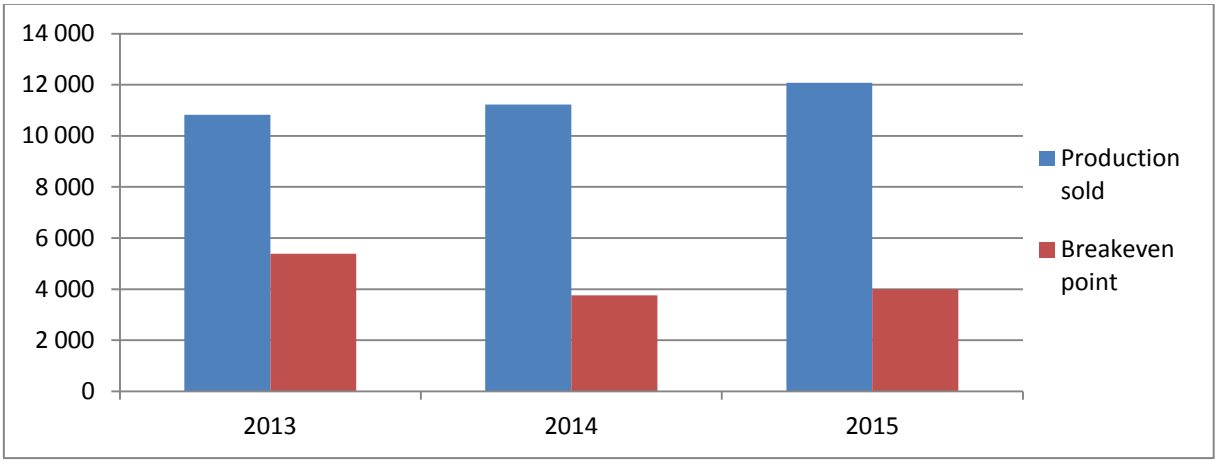

Figure 25. Production results and breakeven point of milk production, in centners

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

Thus, the breakeven point in monetary terms is much smaller, then current revenues and total costs, but bigger than profit, variable and fixed costs. As well as in production terms breakeven point is lower than current scope of production. Based on that, we can consider that in monetary and production terms milk production is profitable for "Company B" LDA.

Financial strength indicator

This indicator needs to be calculated for milk as the main product. Data obtained from tables 38-39, and results are in the table 40.

Table 40. Financial strength indicator for milk production in “Company B” LDA for 2013-2015

Kind of production	2013	2014	2015
Milk production	50,29	66,51	66,90

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015

After calculation, we can see that, during all considering years, milk production increased position in safety area from 50,29% to 66,90% from 2013 to 2015, accordingly. That means that all of productions in “Company B” LDA is in safety area and bring profit.

4.5. SWOT-analysis of “Company B” LDA.

In this section, need to evaluate qualitative characteristics of an enterprise, which helping to realize production and to be economically efficient. For that implement the SWOT-analysis. (Osita, Onyebuchi, & Nzekwe, 2017) Results of implementation of this analysis are in the table 41.

Table 41. SWOT-analysis of “Company B” LDA.

STRENGTHS	WEAKNESS
• high quality of management and employees; • presence of enough own financial resources; • presence of permanent markets; • reliable technology of goods production; • timely replacement of obsolete equipment into new one; • reliable suppliers.	• small level of foreign economic activity; • underdeveloped innovative activity; • low quality of harvesting feed (haylage, hay); • inability to increase production by extensive way.; • high electricity cost, and as the result – big part of it in the cost of milk production; • permanent increase of price for kilowatt.
OPPORTUNITIES	THREATS
• capability to implement the experience and technology know-how to new production and businesses; • overcoming of trading barriers on attractive foreign markets; • fair competition with other producers; • decrease of income tax on agricultural companies; • use of scientific achievements; • possibility to install the renewable sources of energy. The most preferable sources are wind mills and solar panels.	• change of climate and weather conditions, crop failure, low milk yield, loss of cattle; • strengthening of positions of local competitors with equal costs; • emergence of new competitors with much lower costs and much higher quality of productions; • the lack of sufficient support and crop insurance from the state; • adverse demographic changes – lack of new employees; • decline of purchasing prices by dealers; • increase of energy prices, fertilizers, feeds.

Source: Author’s own elaboration based on managerial data of “Company B” LDA

As we can see that “Company B” LDA has approximately the same problems as APC “Bolshevik”. The most problematic weakness is the high cost of electricity in Portugal. That fact leads to the opportunity to implement the system of renewable energy on the entereprise, as the fastest way to reduce these kinds of expenditures.

5. Improving of innovative activity in APC “Bolshevik” and “Company B” LDA.

5.1. Recommendations for development of innovative activity in APC “Bolshevik”

Based on the SWOT-analysis of APC “Bolshevik” of Moskalensky district Omsk Region, mentioned in chapter 3, among the “Weakness” of an enterprise can be selected such problems as high cost of electricity and its permanent grow. However, they can be solved operatively. In addition to that and based on the SWOT-analysis of “Company B” LDA, among the weakness of the company also was identified the high cost of electricity.

As the result of analysis of both enterprises, we can conclude that based on common kind of activity and specialization APC “Bolshevik” and “Company B” LDA have the point of contact in the question of conceptual directions of innovative activity development, namely:

1) implementation of technologies, helping to decrease the cost of electricity, received from power generating third-party companies;

2) implementation of technologies, helping completely abandon the receiving of electricity produced by power generating third-party companies, and switch to the production of electricity with the capacity received as the result of implementation of these technologies.

In our opinion the most rational way is the second option of innovative activity development in APC “Bolshevik” and in “Company B” LDA. Implementation of these technologies, helping to produce electricity independently, will bring a positive effect in the short term, in form of immediate decrease of electricity costs, and in the long term, in form of released funds that will allow to company to invest in other projects and directions of activity.

In this section will be considered the expediency of implementation of technologies, helping to produce electricity with own capacities, in APC “Bolshevik” of Moskalensky district Omsk Region.

Firstly it is necessary to track the dynamic of cost of electricity in Omsk region for companies in Omsk region from 2013 to 2015 years. Data were obtained from the reports of Regional Energetic Commission of Omsk region. Results are presented on the picture 16. (Enegro-consultant, 2017)

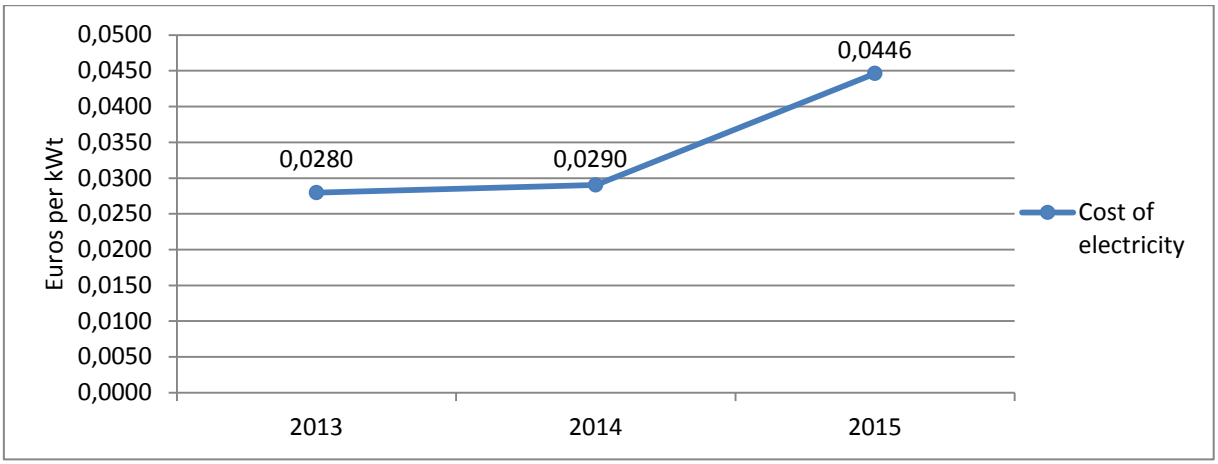

Figure 26. Dynamic of cost of electricity in Omsk region of Russian Federation

Source: (Enegro-consultant, 2017)

From the picture 16 we can see the permanent growth of cost of electricity from 0,0280 Euros per kWt in 2013 to 0,0446 Euros per kWt in 2015.

Further, for estimation of necessity of implementation of new system of production and consumption of electricity, as well as to estimate its economic expediency, it’s necessary to make the analysis of consumption of electricity on production in total and on specified kinds of production. For that it is necessary to obtaine data from accounting statements (Form 8, 9 and 13) of APC “Bolshevik”, and presented in the table 42 (vertical analysis) and 43 (horizontal analysis).

Table 42. Vertical analysis of electricity cost in APC “Bolshevik” in 2013-2015.

Parameter	2013		2014		2015	
Type of cost	**Amount**	**In %**	**Amount**	**In %**	**Amount**	**In %**
Total cost of main production	3 025 213	100,00%	3 057 194	100,00%	3 519 737	100,00%
Total cost of crop	1 164 275	38,49%	912 194	29,84%	1 022 641	29,05%
Total cost of livestock	1 860 939	61,51%	2 103 475	68,80%	2 413 387	68,57%
Total electricity cost in production	60 587	2,00%	55 317	1,81%	56 998	1,62%
Total electricity cost of crop	16 360	0,54%	14 653	0,48%	11 252	0,32%
Total electricity cost of livestock	44 227	1,46%	40 665	1,33%	45 746	1,30%
Type of use of electricity	**1000kWt**	**In %**	**1000kWt**	**In %**	**1000kWt**	**In %**
Total use of electricity in production	1 133	100,00%	1 187	100,00%	1 185	100,00%
Total electricity use in crop	306	27,00%	314	26,49%	234	19,74%
Total electricity use in livestock	827	73,00%	873	73,51%	951	80,26%
Total use of electricity in production	1 005	100,00%	1 103	100,00%	1 183	100,00%
Total use of produced electricity	0	0,00%	0	0,00%	0	0,00%
Total use of received electricity	1 005	100,00%	1 103	100,00%	1 183	100,00%

Source: Author’s own elaboration based on bookkeeping data of APC “Bolshevik” for 2013-2015

From the table 42 we can see that there is no big change in total material cost from 2013 to 2015. Dtcline of electricity cost for plant production from 38,49% in 2013 to 29,05% in 2015, increase in

livestock production from 61,51% in 2013 to 68,57% in 2015. In the same time the total cost of electricity has the permanent decline in percentage points from year to year: from 2,00% in 2013 to 1,62% in 2015. In the section about total expenditures of electricity in production we can see that 100% of electricity received from other companies.

Table 43. Horizontal analysis of electricity cost in APC "Bolshevik" in 2013-2015, Euros

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
Type of cost	**2013**	**2014**	**2015**	**Amount**	**In %**	**Amount**	**In %**	**Amount**	**In %**
Total cost of main production	3 025 213	3 057 194	3 519 737	31 981	101%	462 543	115%	494 523	116%
In crop production	1 164 275	912 194	1 022 641	-252 081	78%	110 447	112%	-141 634	88%
In livestock production	1 860 939	2 103 475	2 413 387	242 537	113%	309 912	115%	552 449	130%
Total electricity cost	60 587	55 317	56 998	-5 270	91%	1 680	103%	-3 589	94%
In crop production	16 360	14 653	11 252	-1 707	90%	-3 401	77%	-5 108	69%
In livestock production	44 227	40 665	45 746	-3 562	92%	5 081	112%	1 519	103%
Type of use of electricity	**2013**	**2014**	**2015**	**In 1000 kWt**	**In %**	**In 1000 kWt**	**In %**	**In 1000 kWt**	**In %**
Total electricity use in production:	1 133	1 187	1 185	54	105%	-2	100%	52	105%
Total electricity use in crop	306	314	234	8	103%	-80	74%	-72	76%
Total electricity use in livestock	827	873	951	46	106%	78	109%	124	115%
Total use of electricity in production:	1 005	1 103	1 183	98	110%	80	107%	178	118%
Total use of produced electricity	0	0	0	-	-	-	-	-	-
Total use of received electricity	1 005	1 103	1 183	98	110%	80	107%	178	118%

Source: Author's own elaboration based on bookkeeping data of APC "Bolshevik" for 2013-2015

From the table 43 we can see that there was the increase of total cost of main production on more than 494 523 euros (116%): from 3 025 213 euros in 2013 to 3 519 737 euros in 2015. Total material cost increased on more than 270 753 euros (114%): from 1 960 766 euros in 2013 to 2 231 519 euros in 2015.

Besides that at the same time the total electricity cost decreased on 0,267 mln rubles: from 4,507 mln rubles in 2013 to 4,240 mln rubles in 2015. But in the same time there was the growth in total expenditures of electricity on 178 kilowatts: from 1005 kW in 2013 to 1183 kW in 2015. But it isn't explained by the decrease of price of electricity. The explanation to that is the decline in cost of electricity in crop production, but growth in cost of electricity in livestock production.

Because the electricity is the only expense that the company currently can replace by the renewable sources, it is necessary to consider the possibility of reducing the cost of electricity. This will be done by installation of renewable energy sources.

Based on performed SWOT-analysis were discovered opportunities for company's development – installation of renewable sources of energy, helping to produce electricity by company's own capacities. The most popular sources of renewable energy are the wind mills and solar panels. Considering that the company cannot allocate the additional squares for installation of any source of energy, and based on analysis of technical and territorial capacities of an enterprise, was revealed the following:

— on production squares of APC “Bolshevik” in immediate vicinity to each other are 14 dairy farms (barns), where are in average 100 cows in each;
— technical characteristics of these dairy farms are allowed to implement the installation of solar panels on their roofs, and this installation doesn’t impact on its technical conditions.

Based on that initially it is necessary to calculate the possibility of installation of solar panel on the roofs of dairy farms of APC “Bolshevik”.

Need to start from the calculation of total square of the surface of the roofs on which will be installed the solar panels.

Standard dimensions of dairy farms build in USSR and used in APC “Bolshevik” are presented on the picture 27.

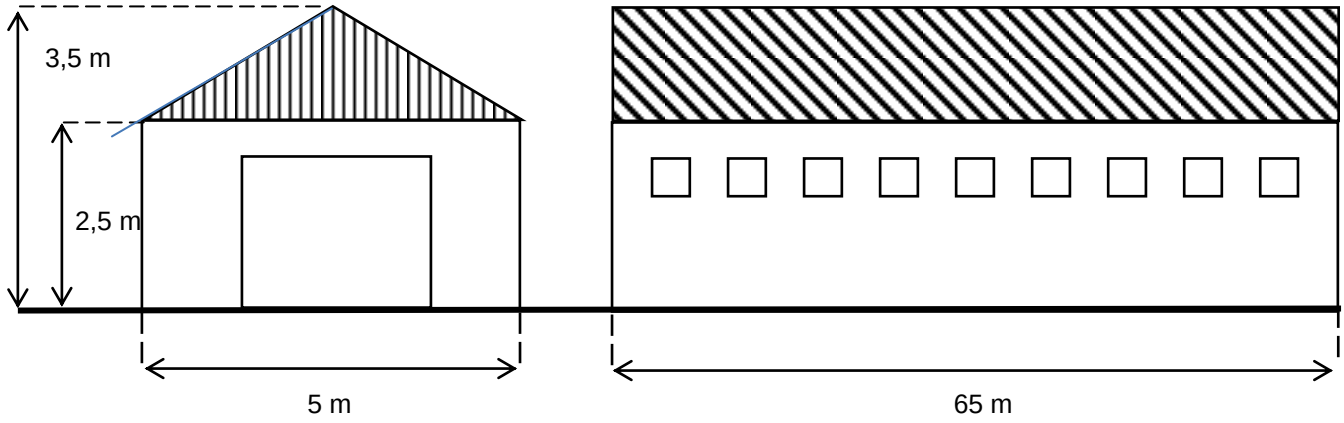

Figure 27. Dimensions of dairy farm of soviet types used in APC “Bolshevik”

Source: Author’s own elaboration based on managerial data of APC “Bolshevik”

As we can see from the picture the dimensions of the standard dairy farm are the following:

— height with the roof – 3,5 m;
— height without the roof – 2,5 m;
— width – 5 m;
— length – 65 m.

Based on that it’s necessary to calculate the slope of the roof to find the total square of the surface. As it showed on the picture 17, the length of roof’s side is:

$$\sqrt{(1^2 + 2{,}5^2)} = 2{,}7 \text{ m},$$

and total square of the roof of one dairy farm is:

$$2{,}7 \times 65 \times 2 = 351 \text{ m}^2.$$

Total square of surface of roofs of all dairy farms is:

$$351 \times 14 = 4\,914 \text{ m}^2.$$

On Russian market of solar panels are presented big amount of firm-producers of solar panels. Among them there are NPP “Kvant” (Russia), “RZMKP” (Russia), “Solar Swiss International” (Switzerland), “Krasnoe Znamya – Almaz-Antey” (Russia) and many others. When choosing a supplier of solar panels, were selected the Russian producers, since the products of domestic companies is not inferior to its foreign analogues in quality, yet relatively lower in cost. (Svobodnaya energia, 2017) (Invertor.ru, 2017) Based on the analysis of prices of solar panels in Russia and Omsk region, were selected “Kvant KSM” of NPP “Kvant” (Russia). Advantages of solar panels “Kvant KSM”:

- high resistance against mechanical and climatic influences;
- excellent water proof;
- efficiency of photovoltaic devices exceeds 19%;
- quick and easy installation;
- work life is 10 years;
- operating temperature range from -40º to +70º C.

In the table 44 are presented the electric parameters of solar panels “Kvant KSM” according with standard conditions: light intensity 1000 W/m², temperature - +25ºC, air mass is 1,5.

Table 44. Parameters of solar panels “Kvant KSM”.

Solar panels	KSM-180	KSM-190	KSM-200
Price in euro, including VAT	180	195	210
Capacity P_{max} , Wt	180	190	200
Voltage in Max Power point, V	36,0	35,7	36,3
Current in Max Power point, A	5,0	5,4	5,5
Open-circuit voltage, V	44,5	44,7	45,2
Short-circuit current, A	5,4	5,8	5,9
Switching voltage, V	24		
Dimensions, mm	1586 x 806 x 35		
Mass, kg	16		

Source: (Svobodnaya energia, 2017)

Because of exactly the same dimensions and weight it is cheaper (in the long run) to buy a solar battery “Kvant KSM-200” with a maximum capacity of 200 watts.

To determine the required number of solar panels it is necessary to determine their location on the roof of the barn. Because the walls of barn are made from the concrete, and the roof is made from wooden racks and beams, so it is possible to install the solar panels in immediate vicinity to each other. Barn construction will bear an additional load. A schematic arrangement of the panels on the roof is shown on the figure 28.

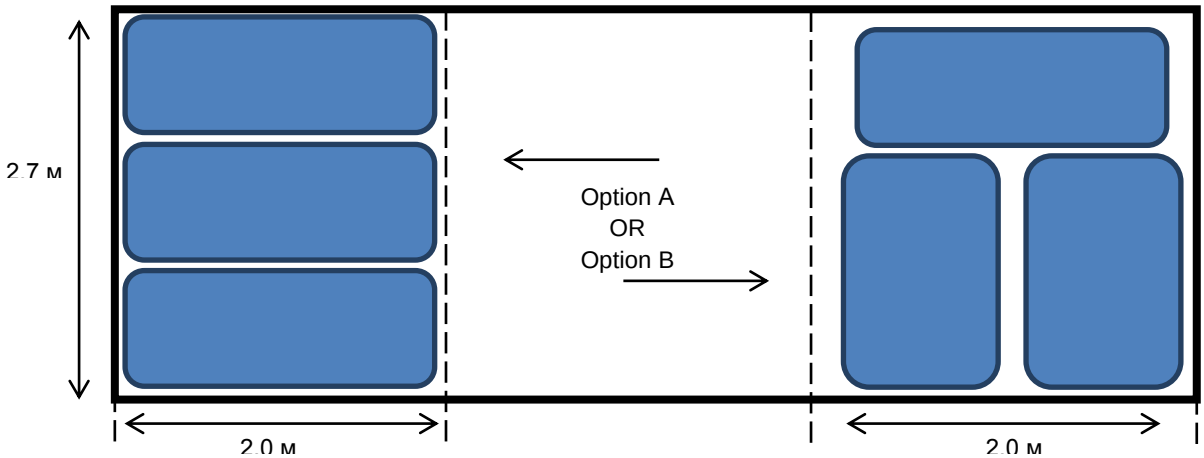

Figure 28. Schematic options of solar panels arrangement on the roof of dairy farms

Source: Author's own elaboration

Based on the picture 28, we can say that both of options are the same in case of arrangement on the roof, because total square of covered surface is:

$$2,7 \text{ m} \times 2,0 \text{ m} = 5,4\text{m}^2.$$

Based on that, for easier calculations it will be mentioned as the section, we can calculate the required number of solar panels sections:

$$4\ 914\ \text{m}^2 / 5,4\ \text{m}^2 = 910 \text{ sections}.$$

Further, we can find the number of solar panels:

$$910 \text{ sections} \times 3 \text{ units} = 2\ 730 \text{ units}$$

For that it is necessary to estimate the total cost of all panels:

$$2\ 730 \times 210 = 573\ 300 \text{ Euros}.$$

Also, in addition to solar panels, it is necessary to purchase batteries that will accumulate the energy from the solar panels. Based on the analysis of the market of batteries for solar panels, were chosen batteries Haze HZB.

Advantages of batteries made by AGM technologies:

- Completely maintenance-free and sealed construction eliminates the need to refill the water;
- High purity of sulfuric acid;
- Protected against the leakage and spill of acid;
- Ability to operate in different positions;
- Work life is 12 years;
- Central system of gas emission;
- Plumbum and plastic are recyclable;
- Accordance to requirements of GOST of RF, DIN 43534, BS6290 Pt4, IEC896-2, Eurobat.

Further are presented the models of rechargeable batteries Haze of mark HZB.

Table 45. Models of rechargeable batteries Haze of mark HZB.

Models	HZB12 - 70	HZB12 - 100	HZB12 - 150	HZB12 - 200	HZB12 - 230
Price in euro, including VAT	50	80	110	140	180
Voltage, V	12	12	12	12	12
Storage capacity, Ah	70	100	150	200	230
Maximum current of charge, A	18	25	38	50	57
Length, mm	259	305	482	520	521
Width, mm	168	168	170	240	269
Height, mm	208	208	242	220	203
Mass, kg	21,5	30,0	44,2	66,0	70,0

Source: (Svobodnaya energia, 2017)

Because of the biggest storage capacity the most expedient (in long-run term) to purchase the rechargeable batteries of type Haze of mark HZB with maximum capacity 230 Ah.

Required number of rechargeable batteries is determining by the ratio of total capacity of solar panels to total storage capacity of rechargeable batteries as 1 to 0,375. (Invertor.ru, 2017)

After determining of required number of solar panels, it is necessary to calculate the total amount of producing energy:

2 730 units x 200 Wt = 546 000 Wt – announced capacity of all solar panels.

Based on announced capacity can be calculated the required quantity of rechargeable batteries:

546 000 Wt / 0,375 / 230 Ah / 12 V = 527 units.

Further, it's necessary to determine the total cost of rechargeable batteries:

527 x 210 Euros = 94 860 Euros

In addition to the solar panels and rechargeable batteries, in the system of renewable energy are also included controllers of charge, uninterruptible power supply unit, invertors and other required elements. Usually, total amount of additional goods is 1% of total amount of solar panels and rechargeable batteries.

94 860 + 573 300 = 668 160 Euros

1%=668 160 / 100 = 6 682 Euros

668 160 + 6 682 = 674 842 Euros

Considering the fact, that APC "Bolshevik" in year 2015 earned 714 987 Euros of Net profit, and total accumulated profit for 3 years was 1 694 018 Euros, we can conclude that the enterprise has enough surplus funds for implementation of investments into renewable energy. It is necessary to notice that the management of an enterprise is trying to solve this problem.

To determine an annual amount of energy produced by these batteries, it's necessary to use the information about the average duration of daylight on the territory of Omsk region. Information will be grouped by the decades – 10 days – for simplifying of calculations (also will be 11 and 8 in according months). Also, will be calculated the total approximate efficiency of using. In

consideration will be taken the standard year – 365 days. Data are presented in the table 46. (Dateandtime, 2017)

Table 46. Approximate efficiency of solar panels during the year.

Month	Days in month	Days in decade	No. of decade	Average daylight duration	Number of hours in decade	Total yield in decade, kWt
January	31	10	1	7,2	72,0	39 312
		10	2	7,5	75,0	40 950
		11	3	8,2	90,2	49 249
February	28	10	1	9,0	90,0	49 140
		10	2	9,4	94,0	51 324
		8	3	10,2	81,6	44 554
March	31	10	1	11,0	110,0	60 060
		10	2	11,5	115,0	62 790
		11	3	12,3	135,3	73 874
April	30	10	1	13,2	132,0	72 072
		10	2	14,1	141,0	76 986
		10	3	14,5	145,0	79 170
May	31	10	1	15,4	154,0	84 084
		10	2	16,1	161,0	87 906
		11	3	16,4	180,4	98 498
June	30	10	1	17,1	171,0	93 366
		10	2	17,2	172,0	93 912
		10	3	17,2	172,0	93 912
July	31	10	1	17,1	171,0	93 366
		10	2	16,4	164,0	89 544
		11	3	16,1	177,1	96 697
August	31	10	1	15,4	154,0	84 084
		10	2	15,0	150,0	81 900
		11	3	14,2	156,2	85 285
September	30	10	1	13,3	133,0	72 618
		10	2	12,4	124,0	67 704
		10	3	12,0	120,0	65 520
October	31	10	1	11,1	111,0	60 606
		10	2	10,3	103,0	56 238
		11	3	9,4	103,4	56 456
November	30	10	1	8,5	85,0	46 410
		10	2	8,2	82,0	44 772
		10	3	7,5	75,0	40 950
December	31	10	1	7,3	73,0	39 858
		10	2	7,2	71,5	39 039
		11	3	7,2	78,7	42 943
				Total	**4 423,4**	**2 415 149**

Source: (Dateandtime, 2017)

Based on the results of the table 46 we see that annual result of solar panels work with the average duration of daylight is 2 415,149 thousand kilowatts / hour. These data need to compare with

information from the form 9, 13 and 17 of bookkeeping statement of APC “Bolshevik” in dynamic for 3 years. Results are in the table 47.

Table 47. Comparison of produced volume of electricity in dynamic of 3 years.

Indicator	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	In EUR	In %	In EUR	In %	In EUR	In %
Total electricity cost, Euros	60 587	55 317	56 998	-5 270	91%	1 680	103%	-3 589	94%
Total electricity use in production, 1000 kWt	1 133	1 187	1 185	54	105%	-2	100%	52	105%
Total electricity production by solar power, 1000 kWt	2415	2415	2415	0	100%	0	100%	0	100%
Total electricity produced by solar power, Euros	129 150	112 553	116 167	-16 597	87%	3 615	103%	-12 983	90%
Total cover of production needs, %	213%	203%	204%	-0,10	95%	0,00	100%	-0,09	96%

Source: Bookkeeping data of APC “Bolshevik” for 2013-2015, Author’s own elaboration

As we can see from the table that the production of electricity received from own sources (renewable energy) covers all production needs in APC “Bolshevik” on 213% in 2013 to 204% in 2015, in case if we don’t increase or decreased the number of solar panels.

Because of 10 years of work life of solar panels, we can calculate the approximate results of production in kilowatts and in thousand euro, as well as with covering of requirements of production.

The changes in cost of electricity were taken as average – 5% per year. The increase in 56% in 2015 was because of very big renovation of electric grids in Omsk region, and for covering of these expenditures, the electricity supplier company decided to increase price for electricity.

All of the calculations are presented in the table 48.

Table 48. Economic efficiency of renewable energy system implementation.

Electricity cost	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Cost of electricity, in euros	0,028	0,029	0,045	0,048	0,050	0,053	0,055	0,058	0,061	0,064	0,067	0,071	0,074	0,078
Annual change, in %	-	4%	54%	7%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Initial data, in Euros														
Total electricity cost	60 587	55 317	56 998	56 710	59 546	62 523	65 649	68 932	72 378	75 997	79 797	83 787	87 976	92 375
Total accumulated cost of electricity	-	-	-	-	59 546	122 069	187 718	256 649	329 027	405 024	484 821	568 608	656 584	748 959
Total electricity use in production, 1000 kWt	1 133	1 187	1 185	1 185	1 185	1 185	1 185	1 185	1 185	1 185	1 185	1 185	1 185	1 185
Implementation of the project, in Euros														
Cost of produced electricity	0	0	0	0	121 360	127 428	133 799	140 489	147 514	154 890	162 634	170 766	179 304	188 269
Accumulated cost of produced electricity	0	0	0	0	121 360	248 788	382 588	523 077	670 591	825 480	988 114	1 158 880	1 338 184	1 526 453
Production of electricity, 1000 kWt	0	0	0	0	2415	2415	2415	2415	2415	2415	2415	2415	2415	2415
After the project, in Euros														
Total electricity cost	60 587	55 317	56 998	56 710	-59 546	-62 523	-65 649	-68 932	-72 378	-75 997	-79 797	-83 787	-87 976	-92 375
Remained cost of electricity	0	0	0	0	61 814	64 905	68 150	71 558	75 136	78 893	82 837	86 979	91 328	95 894
Accumulated remained cost of electricity	0	0	0	0	61 814	126 719	194 870	266 428	341 563	420 456	503 293	590 272	681 600	777 495
Total non-covered electricity use in production, 1000 kWt	1133	1187	1185	1185	0	0	0	0	0	0	0	0	0	0
Remained electricity, 1000 kWt	0	0	0	0	1 230	1 230	1 230	1 230	1 230	1 230	1 230	1 230	1 230	1 230
Monetary terms, in Euros														
Saved funds	0	0	0	0	59 546	62 523	65 649	68 932	72 378	75 997	79 797	83 787	87 976	92 375
Accumulated saved funds	0	0	0	0	59 546	122 069	187 718	256 649	329 027	405 024	484 821	568 608	656 584	748 959
Initial expenditures and other expenses (1%)	x	x	x	-674842	-33742	-33742	-33742	-33742	-33742	-33742	-33742	-33742	-33742	-33742
Final result of the project	**x**	**x**	**x**	**x**	**25 804**	**28 781**	**31 907**	**35 189**	**38 636**	**42 255**	**46 055**	**50 045**	**54 234**	**58 633**
Accumulated final result of the project	**x**	**x**	**x**	**x**	**25 804**	**54 584**	**86 491**	**121 681**	**160 317**	**202 572**	**248 627**	**298 671**	**352 905**	**411 538**
With additional income, in Euros														
Income from electricity sold, euro (25% from suplus)	0	0	0	0	15 454	16 226	17 038	17 889	18 784	19 723	20 709	21 745	22 832	23 974
Final result with additional income, euro	0	0	0	0	41 257	45 007	48 945	53 079	57 420	61 978	66 764	71 789	77 066	82 606
Accumulated new result, euro	**0**	**0**	**0**	**0**	**41 257**	**86 264**	**135 209**	**188 288**	**245 708**	**307 686**	**374 450**	**446 239**	**523 305**	**605 912**

Source: Bookkeeping data of APC “Bolshevik” for 2013-2015, Author’s own elaboration

Based on the calculation from the table 48 we can say that the enterprise will generate more electricity, than it needs, what means that company will generate some income from saved funds. Also, because JSC will produce more electricity, than it is necessary, it can sell it to Omsk region Government for further sale. In the end of year 2026 APC “Bolshevik” will save as the accumulated funds 411 538 Euros, which company can invest in other activities of branches. In case if company will sold all of remained electricity, then total financial result will be 605 912 euros to the end of 2026.

5.2. Recommendations for development of innovative activity in “Company B” LDA

In this section will be considered the expediency of implementation of technologies, helping to produce electricity with own capacities, in “Company B” LDA of Bragança Municipality of Portuguese Republic.

Firstly it is necessary to track the dynamic of cost of electricity in Bragança Municipality for companies in Bragança Municipality from 2013 to 2015 years. Data were obtained from the reports of Eurostat. Results are presented on the figure 29 (Pordata, 2017).

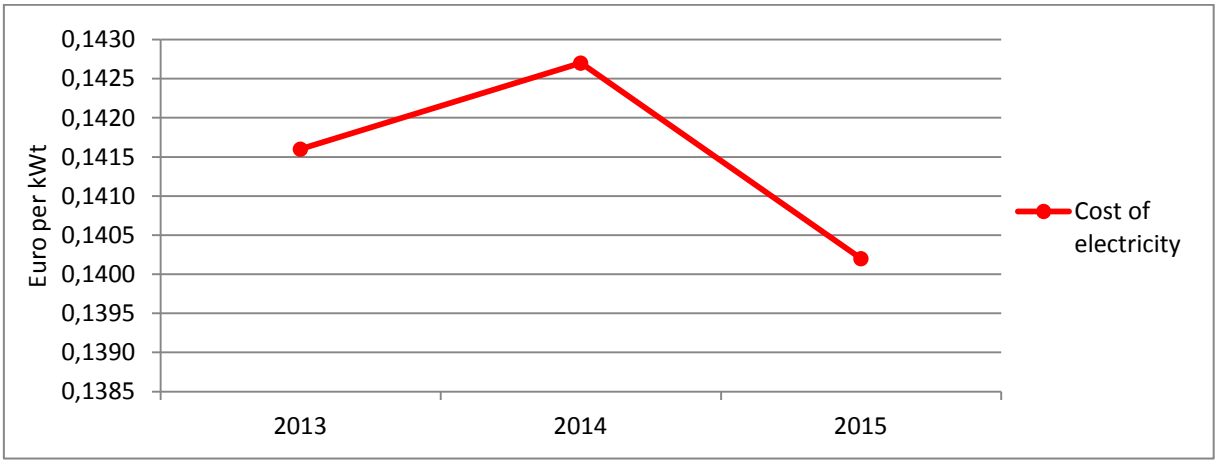

Figure 29. Dynamic of cost of electricity in Bragança Municipality of Portuguese Republic.

Source: (Pordata, 2017)

From the picture 29 we can see the decline of cost of electricity from 0,1416 euros per kWt in 2013 to 0,1402 euros per kWt in 2015.

Further, for estimation of necessity of implementation of new system of production and consumption of electricity, as well as to estimate its economic expediency, it’s necessary to make the analysis of consumption of electricity on production in total and on specified kinds of production. For that it is necessary to obtaine data from accounting statements of “Company B” LDA, and presented in the table 49 (vertical analysis) and 50 (horizontal analysis).

Table 49. Vertical analysis of electricity cost in "Company B" LDA in 2013-2015.

Parameter	2013		2014		2015	
Type of cost	**Amount**	**In %**	**Amount**	**In %**	**Amount**	**In %**
Total cost of main production	427 024	100,00%	411 448	100,00%	363 820	100,00%
Total cost of crop production	155 010	36,30%	188 443	45,80%	158 589	43,59%
Total cost of livestock production	272 014	63,70%	223 005	54,20%	205 231	56,41%
Total electricity cost	11 819	10,77%	12 232	11,31%	16 527	20,46%
Total electricity cost of crop production	4 290	3,91%	5 602	5,18%	7 204	8,92%
Total electricity cost of livestock production	7 528	6,86%	6 630	6,13%	9 323	11,54%
Type of use of electricity	1000kWt	In %	1000kWt	In %	1000kWt	In %
Total use of electricity	83	100,00%	86	100,00%	118	100,00%
Total electricity use in crop production	30	36,30%	39	45,80%	51	43,59%
Total electricity use in livestock production	53	63,70%	46	54,20%	66	56,41%
Total use in electricity in production	83	100,00%	86	100,00%	118	100,00%
Total use in produced electricity	0	0,00%	0	0,00%	0	0,00%
Total use in received electricity	83	100,00%	86	100,00%	118	100,00%

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

From the table 49 we can see that total cost of main production from 2013 to 2015 has small decline of percentage points: from 64,81% in 2013 to 63,40% in 2015. In the same time the total cost of electricity has the permanent decline in percentage points from year to year: from 2,00% in 2013 to 1,62% in 2015. In the section about total expenditures of electricity in production we can see that 100% of electricity received from other companies.

Table 50. Horizontal analysis of electricity cost in "Company B" LDA in 2013-2015

Parameter	Year			2014 to 2013		2015 to 2014		2015 to 2013	
Type of cost	**2013**	**2014**	**2015**	**Amount**	**In %**	**Amount**	**In %**	**Amount**	**In %**
Total cost of main production	427 024	411 448	363 820	-15 576	96%	-47 628	88%	-63 204	85%
In crop production	155 010	188 443	158 589	33 433	122%	-29 854	84%	3 579	102%
In livestock production	272 014	223 005	205 231	-49 010	82%	-17 774	92%	-66 783	75%
Total electricity cost	11 819	12 232	16 527	414	103%	4 294	135%	4 708	140%
In crop production	4 290	5 602	7 204	1 312	131%	1 602	129%	2 914	168%
In livestock production	7 528	6 630	9 323	-899	88%	2 693	141%	1 794	124%
Type of use of electricity	**2013**	**2014**	**2015**	**In 1000 kWt**	**In %**	**In 1000 kWt**	**In %**	**In 1000 kWt**	**In %**
Total electricity use in production, 1000 kWt:	83	86	118	2	103%	32	138%	34	141%
Total electricity use in crop	30	39	51	9	130%	12	131%	21	170%
Total electricity use in livestock	53	46	66	-7	87%	20	143%	13	125%
Total use of electricity in production, 1000 kWt:	83	86	118	2	103%	32	138%	34	141%
Total use of produced electricity	0	0	0	-	-	-	-	-	-
Total use of received electricity	83	86	118	2	103%	32	138%	34	141%

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA for 2013-2015

From the table 50 we can see that there was the decrease of total cost of main production on more than 63 204 Euros (-15%): from 427 024 Euros in 2013 to 363 820 Euros in 2015. Besides that at the same time the total electricity cost increased on 4 708 Euros: from 11 819 Euros in 2013 to 16 527 Euros in 2015. At the same time there was the growth in total expenditures of electricity on 34 thousand kilowatts: from 83 thousand kWt in 2013 to 118 thousand kW in 2015.

Because the electricity is the only expense that the company currently can replace by the renewable sources, it is necessary to consider the possibility of reducing the cost of electricity. This will be done by installation of renewable energy sources.

Based on performed SWOT-analysis were discovered opportunities for company's development – installation of renewable sources of energy, helping to produce electricity by company's own capacities. The most popular sources of renewable energy are the wind mills and solar panels. Considering that the company cannot allocate the additional squares for installation of any source of energy, and based on analysis of technical and territorial capacities of an enterprise, was revealed the following:

- on production squares of "Company B" LDA in is only 1 dairy farm (barn), maximum capacity of which is 300 cows;
- technical characteristics of these dairy farms are allowed to implement the installation of solar panels on their roofs, and this installation doesn't impact on its technical conditions.

Based on that initially it is necessary to calculate the possibility of installation of solar panel on the roof of dairy farm of "Company B" LDA. Need to start from the calculation of total square of the roof surface on which will be installed the solar panels. Dimensions of dairy farms used in "Company B" LDA are presented on the figure 30.

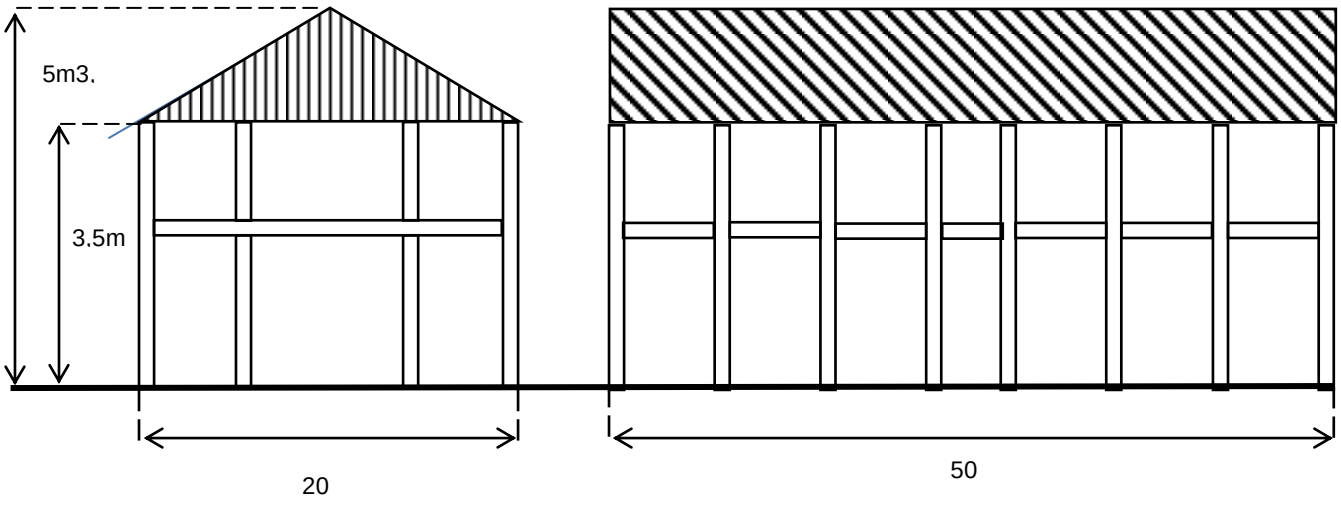

Figure 30. Dimensions of dairy farm used in "Company B" LDA

Source: Author's own elaboration based on managerial data of "Company B" LDA,

As we can see from the figure the dimensions of the dairy farm are the following:

- height with the roof – 5 m;
- height without the roof – 3,5 m;
- width – 20 m;
- length – 50 m.

Based on that it's necessary to calculate the slope of the roof to find the total square of the surface. As it showed on the picture 30, the length of roof's side is:

$$\sqrt{(1{,}5^2 + 10^2)} = 10{,}11 \text{ m},$$

and total square of the roof of one dairy farm is:

$$10{,}11 \text{ x } 50 \text{ x } 2 = 1011 \text{ m}^2.$$

On Portuguese market of solar panels are presented big amount of firm-producers of solar panels. Among them there are REC (Germany), "RZMKP" (Russia), "Solar Swiss International" (Switzerland), and many others. Due to making the decision about the solar panels, were taken into account the prices and technical characteristics. (Svobodnaya energia, 2017) (Invertor.ru, 2017)

Based on the analysis of prices of solar panels in Bragança Municipality was selected REC (Germany).

Advantages of solar panels REC:

- high resistance against mechanical and climatic influences;
- excellent water proof;
- efficiency of photovoltaic devices exceeds 17,7%;
- quick and easy installation;
- work life is 10 years;
- operating temperature range from -40º to +85º C.

In the table 51 are presented the electric parameters of solar panels "REC" according with standard conditions: light intensity 800 W/m², temperature - +2ºC, air mass is 1,5.

Table 51. Parameters of solar panels REC.

Solar panels	**REC183PE**	**REC187PE**	**REC190PE**	**REC193PE**	**REC196PE**
Price in Euros, including VAT	135	145	155	165	175
Capacity P_{max} , Wt	183	187	190	193	196
Voltage in Max Power point, V	27,8	28,0	28,2	28,4	28,6
Current in Max Power point, A	6,58	6,68	6,74	6,80	6,86
Open-circuit voltage, V	34,7	34,8	35,0	35,3	35,7
Short-circuit current, A	7,11	7,18	7,23	7,29	7,35
Switching voltage, V	24				
Dimensions, mm	1665 x 991 x 38				
Mass, kg	18				

Source: (REC, 2017)

Because of exactly the same dimensions and weight it is cheaper (in the long run) to buy a solar panel REC 196 PE with a maximum capacity of 196 watts.

To determine the required number of solar panels it is necessary to determine their location on the roof of the barn. Because the barn of "Company B" LDA is made not from the concrete blocks and the roof is not the wooden and doesn't have enough solidity, it's impossible to install the solar panel like it is on the roofs of APC "Bolshevik". Barn is made from the metal pillars with metal beams. The roof is covered by the thin metal tiles. Walls and roof will bear an additional weight only if it is in the

points of load, with required distance between them at least 1 meter to avoid deflection. Based on that, it is required to set the panels in the place of the joint of beams and pillars. A schematic arrangement of the panels on the 9 meters of roof is shown on the figure 31.

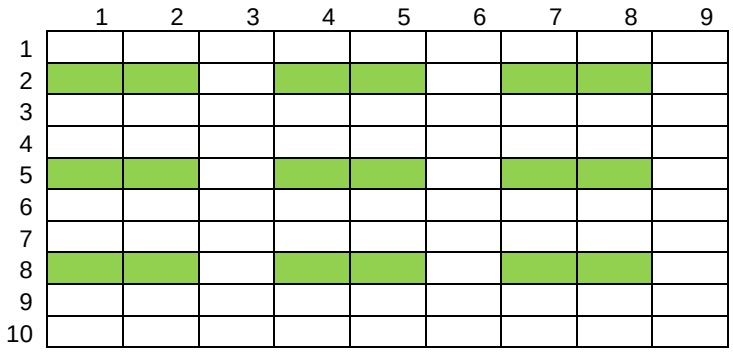

Figure 31. Schematic options of solar panels arrangement on the roof of dairy farms

Source: Author's own elaboration

In the figure 31 we've considered that one solar panel will take 2 meters at width and 1 meter at length, and named it as a section. Based on the figure 30, we can say that total square of covered surface is:

$$2{,}0 \text{ m} \times 1{,}0 \text{ m} \times 3 \text{ units} \times 17 \text{ sections} \times 2 \text{ sides} = 204 \text{ m}^2.$$

Also, based on the figure 31, we can calculate the required number of solar panels:

$$3 \text{ units} \times 17 \text{ sections} \times 2 \text{ sides} = 102 \text{ units}.$$

For that it is necessary to estimate the total cost of all panels:

$$102 \text{ units} \times 175 \text{ euro} = 17\,850 \text{ Euros}.$$

Also, in addition to solar panels, it is necessary to purchase batteries that will accumulate the energy from the solar panels. Based on the analysis of the market of batteries for solar panels, were chosen batteries CSB.

Advantages of batteries made by CSB technologies:

- Completely maintenance-free and sealed construction eliminates the need to refill the water;
- High purity of sulfuric acid;
- Protected against the leakage and spill of acid;
- Ability to operate in different positions;
- Work life is 10 years;
- Central system of gas emission;
- Plumbum and plastic are recyclable.

Further are presented the models of rechargeable batteries CSB.

Table 52. Models of rechargeable batteries CSB.

Models	GPL12260	GPL12520	GPL12750	GPL121000
Price in Euros, including VAT	40	80	90	110
Voltage, V	12	12	12	12
Storage capacity, Ah	26	52	75	100
Maximum current of charge, A	7,8	15,6	22,5	30,0
Length, mm	175	228	261	342
Width, mm	166	138	168	172
Height, mm	125	219	214	217
Mass, kg	9,2	17,9	26,0	35,0

Source: (CSB, 2017)

Because of the biggest storage capacity the most expedient (in long-run term) to purchase the rechargeable batteries GPL 121000 with maximum capacity 100 Ah. They were choosen because the grid of solar system do not increase 50 000 kWt, so it is not necessary to purchase the batteries with big storage capacity.

Required number of rechargeable batteries is determining by the ratio of total capacity of solar panels to total storage capacity of rechargeable batteries as 1 to 0,375. (Invertor.ru, 2017)

After determining of required number of solar panels, it is necessary to calculate the total amount of producing energy:

102 units x 196 Wt = 19 992 Wt – announced capacity of all solar panels.

Based on announced capacity can be calculated the required quantity of rechargeable batteries:

19 992 Wt / 0,375 / 100 Ah / 12 V = 45 units.

Further, it's necessary to determine the total cost of rechargeable batteries:

45 x 110 Euros = 4 950 Euros

In addition to the solar panels and rechargeable batteries, in the system of renewable energy are also included controllers of charge, uninterruptible power supply unit, invertors and other required elements. Usually, total amount of additional goods is 1% of total amount of solar panels and rechargeable batteries.

17 850 + 4 950 = 22 800 Euros

1%=22 800 / 100 = 228 Euros

22 800 + 228 = 23 082 Euros

Considering the fact, that "Company B" LDA in year 2015 earned as a Net profit 28 078 Euros, and total accumulated profit was 107 993 Euros for 3 years, we can conclude that the enterprise has enough surplus funds for implementation of investments into renewable energy. It is necessary to notice that the management of an enterprise is trying to solve this problem.

To determine an annual amount of energy produced by these batteries, it's necessary to use the information about the average duration of daylight on the territory of Bragança Municipality. Information will be grouped by the decades – 10 days – for simplifying of calculations (also will be

11 and 8 in according months). Also, will be calculated the total approximate efficiency of using. In consideration will be taken the standard year – 365 days. Data are presented in the table 53. (Dateandtime, 2017)

Table 53. Approximate efficiency of solar panels during the year.

Month	Days in month	Days in decade	No. of decade	Average daylight duration	Number of hours in decade	Total yield in decade, kWt
January	31	10	1	9,3	92,5	1 849
		10	2	9,5	95,0	1 899
		11	3	9,7	106,7	2 133
February	28	10	1	10,0	100,0	1 999
		10	2	10,5	105,0	2 099
		8	3	11,0	88,0	1 759
March	31	10	1	11,5	115,0	2 299
		10	2	12,0	120,0	2 399
		11	3	12,5	137,5	2 749
April	30	10	1	13,0	130,0	2 599
		10	2	13,5	135,0	2 699
		10	3	14,0	140,0	2 799
May	31	10	1	14,3	142,5	2 849
		10	2	14,5	145,0	2 899
		11	3	14,8	162,3	3 244
June	30	10	1	15,0	150,0	2 999
		10	2	15,3	152,5	3 049
		10	3	15,3	152,5	3 049
July	31	10	1	15,3	153,0	3 059
		10	2	15,0	150,0	2 999
		11	3	14,5	159,5	3 189
August	31	10	1	14,3	142,5	2 849
		10	2	13,8	137,5	2 749
		11	3	13,3	145,8	2 914
September	30	10	1	12,8	127,5	2 549
		10	2	12,5	125,0	2 499
		10	3	12,0	120,0	2 399
October	31	10	1	11,5	115,0	2 299
		10	2	11,0	110,0	2 199
		11	3	10,5	115,5	2 309
November	30	10	1	10,0	100,0	1 999
		10	2	9,8	97,5	1 949
		10	3	9,5	95,0	1 899
December	31	10	1	9,3	92,5	1 849
		10	2	9,3	92,5	1 849
		11	3	9,3	101,8	2 034
				Total	**4 450,0**	**88 963**

Source: (Dateandtime, 2017)

Based on the results of the table 53 we see that annual result of solar panels work with the average duration of daylight is 88,963 thousand kilowatts / hour. These data need to compare with information from the bookkeeping statement of “Company B” LDA in dynamic for 3 years. Results are in the table 54.

Table 54. Comparison of produced volume of electricity in dynamic of 3 years.

Indicator	Year			2014 to 2013		2015 to 2014		2015 to 2013	
	2013	2014	2015	Amount	In %	Amount	In %	Amount	In %
Total electricity cost, Euros	11 819	12 232	16 527	414	103%	4 294	135%	4 708	140%
Total electricity use in production, 1000 kWt	83	86	118	2	103%	32	138%	34	141%
Total electricity production by solar power, 1000 kWt	89	89	89	0	100%	0	100%	0	100%
Total electricity production by solar power, Euros	12 597	12 695	12 473	98	101%	-222	98%	-125	99%
Total cover of production needs, 1000 kWt	107%	104%	75%	-0,03	97%	-0,28	73%	-0,31	71%

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015,

As we can see from the table that the production of electricity received from own sources (renewable energy) covers all use of electricity in production in “Company B” LDA from 2013 to 2014 (from 107% to 104% accordingly), in case if we don’t increase the number of solar panels. But in the year 2015 it could not cover all needs because of big leap of electricity consumption due to increase of number of animals.

Because of 10 years of work life of solar panels, we can calculate the approximate results of production in kilowatts and in thousand euros, as well as with covering of requirements of production. The changes in cost of electricity were taken as average – 1% per year. All of the calculations are presented in the table 55.

Table 55. Economic efficiency of renewable energy system implementation in “Company B” LDA

Parameter	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Cost of electricity, in euros	0,142	0,143	0,140	0,140	0,142	0,143	0,144	0,146	0,147	0,149	0,150	0,152	0,153	0,155
Annual change, in %	-	1%	-2%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Initial data, in euros														
Total electricity cost	11 819	12 232	16 527	16 527	16 692	16 859	17 027	17 198	17 370	17 543	17 719	17 896	18 075	18 256
Accumulated total cost of electricity	-	-	-	-	16 692	33 551	50 578	67 776	85 146	102 689	120 408	138 304	156 379	174 634
Total electricity use in production, 1000 kWt	83	86	118	118	118	118	118	118	118	118	118	118	118	118
Data of project, in euros														
Cost of produced electricity	0	0	0	0	12 597	12 723	12 851	12 979	13 109	13 240	13 372	13 506	13 641	13 778
Accumulated cost of produced electricity	0	0	0	0	12 597	25 321	38 171	51 150	64 259	77 499	90 872	104 378	118 019	131 797
Production of electricity, 1000 kWt	0	0	0	0	89	89	89	89	89	89	89	89	89	89
After the project, in euros														
Total electricity cost to be paid,	11 819	12 232	16 527	16 527	4 095	4 135	4 177	4 219	4 261	4 303	4 346	4 390	4 434	4 478
Saved funds from electricity	0	0	0		12 597	12 723	12 851	12 979	13 109	13 240	13 372	13 506	13 641	13 778
Accumulated Saved funds from electricity	0	0	0	0	12 597	25 321	38 171	51 150	64 259	77 499	90 872	104 378	118 019	131 797
Total non-covered electricity use in production, 1000 kWt	83	86	118	118	29	29	29	29	29	29	29	29	29	29
Initial expenditures and other expenses (5%)	x	x	x	-23082	-1154	-1154	-1154	-1154	-1154	-1154	-1154	-1154	-1154	-1154
Final result of the project	**x**	**x**	**x**	**x**	**11 443**	**11 569**	**11 697**	**11 825**	**11 955**	**12 086**	**12 218**	**12 352**	**12 487**	**12 623**
Accumulated final result of the project	**x**	**x**	**x**	**x**	**11 443**	**23 013**	**34 709**	**46 534**	**58 489**	**70 575**	**82 793**	**95 145**	**107 632**	**120 256**

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA for 2013-2015,

Based on the calculation from the table 55 we can say that the enterprise will generate electricity to cover almost all need of it. Accumulated saved funds to the end of the year 2026 will be in amount of 120 256 euros, keep everything else constant. The only limitation, that bined 100% covering is the structure of a barn of “Company B” LDA. If company strengthens the barn, it is possible to install additional solar panels on the roof to produce more electricity.

5.3. Comparison of proposed ways of innovative activity increasing in APC “Bolshevik” and “Company B” LDA.

Comparison of efficiency of proposed ways of innovative activity increasing between APC “Bolshevik” and “Company B” LDA need to start from comparison of main bookkeeping items. All of the data will be compared for the year 2015, as the most recent year. Data are presented in the tables 56-61.

Table 56. Comparison of balance sheets of APC “Bolshevik” and “Company B” LDA

Item	APC “Bolshevik”	“Company B” LDA
Noncurrent assets	2 454 590	959 281
Current assets	2 781 104	80 551
Equity	5 173 023	723 475
Long-term liability	0	177 572
Short-term liability	62 671	138 784
Balance	5 235 694	1 039 832

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA and APC “Bolshevik” for 2015

Based on the table, we can see that APC “Bolshevik” has 5 times bigger Balance, than “Company B” LDA. This is the result of size of the company: square of agricultural lands, number of machineries, number of animals employed, employees and equity.

Table 57. Comparison of income statements of APC “Bolshevik” and “Company B” LDA

Item	APC “Bolshevik”	“Company B” LDA
Revenues	3 023 950	511 971
Cost of production	2 355 516	363 820
Gross profit	668 434	148 150
Net profit	714 987	28 078

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA and APC “Bolshevik” for 2015

Based on the table 57, we can make the conclusion, that APC “Bolshevik” has almost 6 times bigger Revenues, than “Company B” LDA. But the Net profit of Russian enterprise is 25 times bigger, than Portuguese one. This can be explained by the presence of high amount of other incomes in activity of APC “Bolshevik” in comparison to “Company B” LDA, what leads to increase of Net profit.

Table 58. General production indicators of APC “Bolshevik” and “Company B” LDA

Item	APC “Bolshevik”	“Company B” LDA
Agricultural land square, ha	8 214	22
Number of means of production, units	161	10
Cost of means of production, euros	1 500 024	250 148
Number of milking cows, units	1 350	164
Cost of milking cow, euros	547 569	320 781
Number of employees, units	250	2
Cost of employees, euros	2 479 204	25 025
Average milk yield /1 cow, liters/day	14,5	21,2

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA and APC “Bolshevik” for 2015

Based on the table 58, we can conclude that the main production indicator – Average milk yield per one cow is 1,5 times higher in Portuguese enterprise, than in Russian. This can be explained by the low productivity kind of employed animals in APC “Bolshevik”. Different kinds of animals, extreme weather conditions, and different quality and types of feed, leads to the difference in average milk yield.

Table 59. Production and financial results of APC “Bolshevik” and “Company B” LDA

Item	APC “Bolshevik”	“Company B” LDA
Milk sold, centners	65 593	12 074
Revenues from milk sold, euro	2 044 286	386 286
Average price per liter, euro	0,31	0,32

Source: Author’s own elaboration based on bookkeeping data of “Company B” LDA and APC “Bolshevik” for 2015

Based on the table 59, we can make the following conclusion: because the volume of milk sold and revenues from milk sold in APC “Bolshevik” is 5 times higher than in “Company B” LDA, the purchasing price for milk in Russian Federation and in Portuguese Republic is approximately the same – 0,31 euro per 1 liter.

Table 60. Electricity cost and consumption in APC “Bolshevik” and “Company B” LDA

Item	APC “Bolshevik”	“Company B” LDA
Price of 1 kWt, euro	0,0446	0,1402
Total electricity use in production, 1000 kWt	1 185	118
Total electricity cost, euro	56 998	16 527

Source: Bookkeeping data of “Company B” LDA and APC “Bolshevik” for 2015, (Enegro-consultant, 2017) (Pordata, 2017)

Based on the table 60, we see that in Russian enterprise the cost of electricity is 3 times smaller than in Portuguese one, what leads to bigger efficiency in case of implementing renewable solar energy system.

Table 61. Dimensions of barns in APC "Bolshevik" and "Company B" LDA

Item	APC "Bolshevik"	"Company B" LDA
Dimensions of a barn:		
height with the roof, m	3,5	5
height without the roof, m	2,5	3,5
Width, m	5	20
Length, m	65	50
Square of one roof, m^2	351	1 011
Number of barns, units	14	1
Square of all roofs, m^2	4 914	1 011

Source: Author's own elaboration based on managerial data of "Company B" LDA and APC "Bolshevik" for 2015

Based from the table 61, we see that the total square of roofs for installation in APC "Bolshevik" is 4 times higher than in "Company B" LDA. In the following table will be calculated the efficiency of implemented renewable energy system.

Table 62. Results after implementation of projects in APC "Bolshevik" and "Company B" LDA

Item	APC "Bolshevik"	"Company B" LDA
Initial expenditures, euro	674 842	23 082
Total number of solar panels installed, units	2 730	102
Capacity of all solar panels installed, kWt	546 000	19 992
Volume of electricity produced per year, 1000 kWt	2415,15	88,96
Cost of electricity produced at first year, euro	121 360	12 597
Total cover of production needs, %	204%	75%
Suplus (+) / Shortage (-) of electricity for total cover, 1000 kWt	1 230	-29
Saved funds per first year, euro	59 546	12 597
Saved funds in the end of project, euro	411 538	120 256
Efficiency of investments, %	61%	521%
Result in the end of the project with realisation of surplus of electricity, if applicable (only 25%), euro	605 912	-
Final efficiency of investments, %	90%	521%

Source: Author's own elaboration based on bookkeeping data of "Company B" LDA and APC "Bolshevik" for 2015, (Enegro-consultant, 2017) (Pordata, 2017)

Based on the calculation, presented in the table 62, we seem that after installation of all proposed solar panels on the roofs of all barns in APC "Bolshevik", they will produce the volume of electricity 2 times higher, that they need. So, the cover of all production needs will be 204%. That gives the opportunity to sell the surplus to the citizens of nearby villages, and generate additional income. Total efficiency of investments in the end of 10 years life of the project (based on worklife of solar panels) will be 90%.

At the same time, after implementation of the project in "Company B" LDA company will cover by own electricity sources only 75% of total consumption. But still, that leads to the generating of so called

saved funds. By the end of the proposed project company will saved 120 256 euros. Because of 3 times higher kWt cost in Portugal comparing to Russia, efficiency of implemented project will be almost 6 times higher – 521%.

All results mentioned above tell us, that both proposed projects are reasonable for implementation, because they lead to generating of additional and/or saved funds. That lets to companys' management make the decision to invest in development of a company, or in other activities.

Conclusions, Limitations and Future Research Lines

Based on implemented analysis of the definition of “Innovative activity” we can conclude, that it is the set of definitions, which includes a lot of components, related to the following branches of activity: production, storage, selling, finance, and many others. One of the main features of innovative activity is the opportunity to implement the most recent technologies, equipment and to use the most recent information.

By making the analysis of activity of APC “Bolshevik” was inspected the following information:

- company’s balance sheet increased from 3 896 756 euros in 2013 to 5 235 694 euros in 2015;
- company’s net profit increased from 373 860 euros in 2013 to 714 987 euros in 2015;
- company’s total square of agricultural lands increased on 1 911 hectares from 6 303 hectares in 2013 to 8 214 hectares in 2015, where 100% of it is arable;
- company’s total number of means of production increased from 153 units in 2013 to 161 units in 2015, and in monetary term increased from 1 008 512 euros in 2013 to 1 500 024 in 2015;
- number of cattle increased on 129 units from 3 833 units in 2013 to 4 012 units in 2015, and in monetary term increased from 83 221 euros in 2013 to 99 580 in 2015. Number of milking cows was the same for 2013-2015 and equal to 1 350, and in monetary term increased on 8 070 euros from 32 663 in 2013 to 40 733 in 2015.
- number of employees increased from 249 to 250 units from 2013 to 2015 accordingly, and in monetary term salary increased from 2 074 815 euros in 2013 to 2 479 204 euros in 2015;
- total volume of milk produced increased from 57 870 centners in 2013 to 65 593 centners in 2015, and in monetary terms from 1 660 008 in 2013 to 2 519 116 in 2015.

Based on the implemented SWOT-analysis was inspected that the weaknesses include: high electricity cost, and permanent growth of it.

By making the analysis of activity of “Company B” LDA was inspected the following information:

- company’s balance sheet increased from 470 472 euros in 2013 to 1 039 832 euros in 2015;
- company’s net profit increased from 25 145 euros in 2013 to 28 078 euros in 2015;
- company’s total square of agricultural lands increased on 4,5 hectares from 17,56 hectares in 2013 to 22,06 hectares in 2015, where 100% of it is arable;
- company’s total number of means of production stood same - 10, but in monetary term increased from 91 518 euros in 2013 to 250 148 in 2015;
- number of cattle increased on 22 units from 251 units in 2013 to 273 7units in 2015, and in monetary term increased from 70 749 euros in 2013 to 533 984 in 2015. Number of milking cows increased from 112 units in 2013 to 164 units in 2015, and in monetary term increased on 289 212 euros from 31 569 euros in 2013 to 320 781 euros in 2015;
- number of employees stood same from 2013 to 2015 and equal to 2 units, and in monetary term salary decreased from 25 980 euros in 2013 to 25 025 euros in 2015;

— total volume of milk produced and sold increased from 10 826 centners in 2013 to 12 074 centners in 2015, and in monetary terms from 393 433 euros in 2013 to 386 286 euros in 2015.

Based on the implemented SWOT-analysis was inspected that the weaknesses include: high electricity cost, and permanent growth of it.

For improving that problem we proposed the implementation of new electricity generating system, what includes changing the process of electricity production and purchasing of new required equipments. These equipments include: solar panels, invertors, batteries, and additional meterials. Total cost of purchasing agricultural machineries for APC “Bolshevik” 674 842 euros, and for “Company B” LDA is 23 082 euros. After implementation of new electricity generating system total electricity needs in production will be covered in APC “Bolshevik” on 204% and in “Company B” LDA on 75%. That leads to the realization of surplus ofelectricity produced by the APC “Bolshevik” to the citizens of nearby villages and to the Government. Total result of implemented projects by the end of year 2026 for APC “Bolshevik” is 1 526 453 euros of additional income and saved funds, and for “Company B” LDA is 120 256 euros of saved funds.

For the future researches can be chosen the following themes, related to the topic of this Master thesis:

— implementation of new kinds of agricultural machineries, which helping to decrease the fuel, fertilizers and other materials consumption and optimize costs structure;
— implementation of new harvesting and feeding technologies, which helping to increase the productivity of fields and animals;
— making of new branch of activity such as international sales what can lead to diversifying of business;
— implementation of recycling technologies, what can help to recycle remains of production into fertilizers, and sell it on the open market of Omsk region or Bragança municipality.

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