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Implementation of new technologies in agribusiness

(on the basis of «Agromonolit»)

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Abstract:

One of the greatest agricultural problems in the 21st century is to improve the agricultural business without damaging the ecosystem and land use. In areas whose crop production is limited, the restriction of abiotic factors due to the low supply of water and nutrients is a major problem. The food sufficiency or production level is expected to be achieved by a country only if it can close the yield gap between actual and attainable crop production for an area of land. In this context, the managed use of nutrients and water are essential for crop production. Hence, this paper is focused on the increasing of quality and demand for implementation on new technologies in agricultural sphere without having a harmful impact on the environment.

Key words: agricultural problems, ecosystem, abiotic factors, food sufficiency, crop production, quality and demand, new technologies.

Однією з найбільших проблем сільського господарства 21 століття є покращення сільськогосподарського бізнесу без шкоди для екосистеми та землекористування. У районах, де вирощування сільськогосподарських продуктів обмежене, недостатнє використання абіотичних факторів через низький запас води та поживних речовин є великою проблемою. Очікується, що країна досягне повного забезпечення продовольством та рівнем виробництва лише в тому випадку, якщо вона зможе забезпечити стабільний рівень розвитку врожайності між фактичним і ймовірним виробництвом сільськогосподарських культур. У цьому контексті кероване використання поживних речовин і води є важливими для рослинництва. Отже, дана робота зосереджена на підвищенні якості та попиту на впровадження нових технологій у сільськогосподарську сферу без шкідливого впливу на навколишнє середовище використовуючи інформацію для впровадження нових технологій в агросфері.

Ключові слова: проблеми сільського господарства, екосистема, абіотичні фактори, продовольча достатність, рослинництво, якість і попит, нові технології.

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**TASK
FOR BACHELOR’S QUALIFICATION WORK**

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(Name, Surname)

Topic of the work **Implementation of new technologies in agribusiness (on the basis of «Agromonolit»)**

Supervisor of the work *N. Chaplynska, Ph.D. in Economics, Associate Professor,*

Which approved by Order of University from “22” December 2022 №22-12/2022- 1c

2. Deadline for bachelor’s qualification work submission “19” May 2022

3. Data-out to the bachelor’s qualification work *materials received during the internship and consultations with the representatives of «Agromonolit».*

4. Contents of the explanatory note (list of issues to be developed) *There are 6 main tasks which are covered at the work. They include discovering the importance of new technologies in agribusiness; deciding what methods are the most suitable for implementing new technologies; discovering what innovations are already being used by the leading Ukrainian agricompanies; analyzing the company’s effectiveness and competitiveness before and after implementing technologies for agribusiness; analyzing what impact innovations have on the firm; providing recommendations for innovations improving.*

5. List of graphic material (with exact indication of any mandatory drawings)

Figures: “Trade year world wheat, corn and others exports”; “AgriTech start-ups”; “Ukraine’s export to the EU influenced by TBT”;

Tables: “Ranking of world production of major food crops (2020)”, “SWOT analysis”.

6. Consultants for parts of the work

Part of the project	Surname, name, position	Signature, date	
		Given	Accepted
1	Chaplynska N.M.	+	+
2	Chaplynska N.M.	+	+
3	Chaplynska N.M.	+	+

7. Date of issue of the assignment

Time Schedule

№	The title of the parts of the bachelor’s qualification work	Deadlines	Notes
1.	I chapter	14.02-13.03.2022	In time
2.	II chapter	14.03-10.04.2022	In time
3.	III chapter	11.04-24.04.2022	In time
4.	Introduction, conclusions, summary	25.04 – 01.05.2022	In time
5.	Pre-defense	08.06.2022	In time

Student

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Supervisor

Conclusions: *The bachelor's qualification work was designed according to the requirement of guidelines, commission, and high school for such type of scientific papers. It contains all necessary chapters and subchapters, describes information in details on the theoretical and practical side, and gives concrete recommendations for the development of new technologies in agribusiness. The theoretical part includes a deep analysis of scientific research and has a lot of figures and tables with explanations. Conclusion and proposals formulated correctly, all tasks were described. In total, the work can be recommended to the viva with the good grade.*

Supervisor

NATALIA Chaplynska

Table of contents

INTRODUCTION	3
CHAPTER I. THEORETICAL AND METHODOLOGICAL BASES OF IMPLEMENTING NEW TECHNOLOGIES IN AGRIBUSINESS	7
1.1. The essence and need of new technologies in different spheres of agribusiness	7
1.2. Methods of implementing new technologies	11
1.3. Modern examples of leading Ukrainian companies that use new technologies in order to conduct agribusiness	16
CHAPTER II. ECONOMIC ANALYSIS OF ACTIVITY OF THE «AGROMONOLIT» ENTERPRISE, EVALUATION OF COMPANY'S COMPETITIVENESS ON THE LOCAL MARKET	27
2.1. General characteristics and analysis of foreign economic activity of «Agromonolit» enterprise	27
2.2. Analysis of using modern technologies in agribusiness of «Agromonolit» enterprise	37
2.3. Analysis of the competitiveness of «Agromonolit» with other agricultural companies	42
CHAPTER III. RECOMMENDATIONS FOR IMPLEMENTATION OF NEW TECHNOLOGIES IN «AGROMONOLIT» AND WHOLE AGRICULTURAL SECTOR	52
3.1. Recommendation for implementation new technologies in agribusiness	52
3.2. Recommendations for implementing new technologies in «Agromonolit» enterprise	55
CONCLUSION	58
REFERENCES	62

INTRODUCTION

Agriculture faces several challenges that further impose adverse effects on the environment, economics and labor. In this context, smart agricultural technologies emerge to address the agricultural challenges and reinvent novel methods in agriculture and farming. The agricultural technologies for improved production are organized by typology, technology readiness and field operation. The modern methods of improved crop production are assessed by environmental, economic, labor impact, and ease of adoption by end-users. The scientific papers investigate mostly on techniques but the focus of the applied project is on the farm management procedures often using automation and robotic techniques. The commercial development of agricultural products focuses mainly on economic impact and is less concerned about environmental issues or labor.

In this context, the adoption readiness is an important criterion while discussing and analyzing smart agricultural technologies. The benefit of farmers and the environment is essential for the adoption of new technologies. The development of new technology in agriculture helps policymakers to align their strategies for digitized agriculture adoption for farmers in current situations. The intensification in agriculture in a sustainable manner seeks high yield from existing farming land by reducing the impact of the environment. The optimization plays an important role by scheduling irrigation and fertilizer on the farm concerning the yield of the crop and environmental effects. The trade-off between the conflicting objectives among environment used fertilizer, crop yield and labor efficiency are analyzed followed by providing a set of multi-objective solutions. This helps the policy and decision-makers to prioritize and select the best solution for highest crop production. By using multi-objective solutions, the water, nitrogen and nitrogen leaching are reduced considerably in the irrigation system.

Also, there is a term which is commonly used in today's agricultural world for implementing different new technologies as 'regenerative agriculture'. Regenerative agriculture stands out as an approach, which brings together various agricultural practices. Practices such as using diversified cover crops and avoiding using pesticides are focused on improving soil quality. Regenerative agriculture is renowned for its efficiency in

restoring soil fertility, especially in regions with exhausted soils. The entire practice is based on using natural and ancient farming traditions. It also utilizes modern research and innovations in pursuit of sustainable agriculture. Regenerative agriculture is highly effective in arid areas whose soil has been subjected to conventional farming. Today, the utilization of regenerative agriculture is being championed for its ability to fight global warming. This milestone is arrived at because it retains and sequesters carbon. The bottom line is that regenerative agriculture has brought forth numerous benefits. Regenerative agriculture has made it easy to increase productivity, facilitate economic growth, and also fight climate change.

The aim of the research is to study the influence of modern ways of farming practices on agricultural production and the environment in the «Agromonolit» enterprise. The research will determine the challenges of such modern technologies on agricultural productivity. It is seen that increasing the rate of population leads to an increase in food demand, which forced the agriculture sector in developing nations to adopt modern agriculture systems instead of traditional agriculture systems. Such practices lead to an increase in agriculture productivity, but to some extent, it creates an impact on environmental aspects.

Thus, the main **subject** of the study is analyzing the factors associated with modern agriculture practices, which affect the farmer's decision regarding the adoption of such technology. The study will evaluate the determinants of such technology by farmers, how it helps in increasing harvest quality along with crop cultivation, also, how to save costs using these technologies. Hence, technological advancement and agricultural research are significant for enhancing agricultural productivity by considering environmental aspects.

In this paper we will carefully review the implementation of new technologies by the «Agromonolit» company in the agricultural sphere and their use, also, the improvement of crop production based on implementing different technologies which is the main **object** of the research. We will determine what impact those technologies have on soil and harvest and whether it is efficient to use it in Ukraine. Furthermore, the research will focus on foreign companies that already implement new methods towards conducting the agribusiness and their performance on the international market.

The first chapter of the paper aims to review theoretical and methodical bases of implementing new technologies in agribusiness. There will be three subchapters and each subchapter will be responsible for a specific task. Firstly, the importance of new technologies and why every agricultural company needs to use them for their business will be determined. Secondly, will dive deeper into methods that are and can be used for implementing new machinery and what impact they have on sector in general. Finally, the comparison of different Ukrainian companies that have been already using modern smart technologies and how they operate in domestic and international market will be made.

In the second chapter the focus will be mainly on agricultural operations of «Agromonolit» enterprise. The first subchapter will analyze overall characteristics of the company, its performance and foreign economic activity compared to other companies. After that, the analysis of using and implementing technologies in «Agromonolit» specifically will be made and it will be determined what was already achieved and what is planning to be implemented. Last but not least, the competitiveness of the firm with other agricultural holdings will be analyzed based on its performance locally and internationally.

The third chapter will be about recommendations for effective using of technologies in «Agromonolit» and for the whole agrisphere in general. The recommendations will be made after detailed evaluation of the impact of new technologies on agribusiness and hopefully, it will be efficient for the company. From this we can conclude what are the main tasks of the research:

- understanding the importance of new technologies in agribusiness;
- deciding what methods are the most suitable for implementing new technologies;
- discovering what innovations are already being used by the leading Ukrainian agricompanies;
- analyzing the company's effectiveness and competitiveness before and after implementing technologies for agribusiness;
- analyzing what impact innovations have on the firm;
- analyze how innovations can be improved.

Methods and data collection. The important resource for agriculture is soil. The long-term agricultural productivity can be achieved with the management of the soil resource. The soil loss creates a loss in fertility and organic matter which is not only a problem for farmers but also raises environmental problems. The conservation of soil is a good practice for farmers that reduce the degradation of soil and improve organic matter. The methods of conservation include reduced tillage, crop rotation, cover cropping, mulching and cross slope farming. There are several methods of improved crop production. The methods may be implemented throughout the year with a target of preserving nutrients and water.

The major research strategy in the context of the study is the case study method that enables a targeted approach to studying the research subject of EV-specific urban planning. While it narrows down the focus of the study, the factors that determine the relevance of engaging in the complex process of planning that entails its costly implementation are studied through the prism of foreign influence, as is the case with geopolitics showing that overseas events can end up determining the feasibility of EV urban transformation in the US. In addition, the methods of analysis and literature review are employed, the latter allowing the study to compile and synthesize a large body of facts and data sets instrumental in addressing the research subject.

The data I use for this research consists of reports, articles and speeches of famous people on the issue of further development of implementation technologies in agribusiness. Speakers including major leaders in the industry have given vast speeches on this issue, which makes it possible to draw insights on the matter. Among the speakers' statements captured in this report include founders of biggest Ukrainian agriholdings and founders on UNIT city who are trying to popularize the implementation of innovations in agribusiness.

CHAPTER I. THEORETICAL AND METHODOLOGICAL BASES OF IMPLEMENTING NEW TECHNOLOGIES IN AGRIBUSINESS

1.1. The essence and need of new technologies in different spheres of agribusiness

Decades ago, technology enabled the deployment of business practices that are still used today. Innovation and technology allow businesses of all sizes to grow and thrive. As technology develops, it creates a range of services and products that companies can use to target potential businesses and increase productivity and efficiency. New technology has revolutionized the entire manufacturing and distribution industries. Ineffective business practices are being competed with by modern business practices through an array of technologies. In order to prepare for future technologies, businesses have developed numerous strategies aligned with technology. An entity is defined as immaterial or material, which is created by the application of physical and mental efforts to attain some value that we can reflect upon in business operations.

New innovations are not just crucial for organization or government, they are additionally critical for country. Organizations can't keep running with old advancements. Innovations expand human execution when human or representatives use innovation for the advantages of the association what's more, use with moral qualities. Unique individual can't embrace innovation effectively and on the other side gathering of individuals can embrace innovation effectively. New innovation can be utilized for both purposes for break or for make reason. Worker work load decrease through mechanical progression. Number of representatives to perform one undertaking is likewise diminished. Organizations require very little more workers to perform one occupation. Human exertion is moreover decreased through mechanical headway. Single representative can perform its occupation without any obstacle.

The implementation of modern agriculture maximizes fiber, food crop yields along with other necessary products for industries and made sure to reduce poverty and food security in most of the rural areas all over the world. The higher returns and productivity from modern agricultural systems are attained at the cost of sustainable agro-ecological

systems. Modern agriculture is categorized by high input usage and intensification, which may result in negative social costs and environmental impacts.

In the contemporary world, climate change is an important problem that is affecting agriculture and agribusiness internationally. Examples of key climate change issues include average temperature changes, climate extremes, invasive weeds, diseases, and increasing atmospheric carbon dioxide. Climate change influences agriculture in multiple ways, which tend to lower the overall value of agribusiness. Specifically, climate change affects agricultural productivity in the fields of crop, livestock, soil, and water. Climate change also impacts agricultural trade in terms of the commodities' price, quantity, and quality. That is one of the key factors why technologies should be implemented in conducting agricultural activity.

As per Kaab (Kaab et al., 2019), modern agriculture systems are efficient for the socio-cultural environment, which possess a massive proportion of the highly educated and literate farming population as well as the relevant establishment of broad services. In most of the developing nations, the farming sector is highly controlled by smallholder farmers, which creates complex situations for them to understand the science behind the adopted technology packages. Modern agriculture needs a considerable degree of calibration in the utilization of inputs to ensure accuracy (Begemann et al., 2018). Thus, formal education plays a significant role in helping farmers to attain the skills to process and access agricultural information and apply the information to improve on-farm productivity.

On the other hand, socio-economic factors, along with population growth, have led to food scarcity over the last 50 years. It has been estimated that by 2050 the global population would rise by 30%, which will require a 70% increase in food production (Waheed et al., 2018). Market fluctuations, government policies, socio-cultural development, climate change, water contamination, and land degradation. Such uncertainties create challenging situations for the agriculture sector to enhance productivity at the same time, minimizing the environmental impact that is estimated to be 20% of the emission of anthropogenic greenhouse gas (GHG).

Hence, to fulfill the increasing demand for food production, agriculture has started utilizing modern agriculture systems, which led to crop yield monitoring and growth modeling along with international navigation satellite systems. Usually, agriculture creates a direct impact on the environment, and the significant difference between modern and traditional farming systems is the factor input-output correlation. Modern agriculture systems focus on input escalation, which is not organic.

In the words of Kamilaris, Kartakoullis, and Prenafeta-Boldú (Kamilaris et al., 2017), the farmers with fewer or no education are needed to evaluate the negative impact of modern agriculture systems on the environment which leads to over-application or misuse of agrochemicals. The implementation of unsustainable and irrelevant modern ways of farming for food production could result in resurgences, pest resistance, and soil erosion of unknown pests as well as the loss of biodiversity. This may lead to severe consequences for environmental health and food security and affect the strategy of food production.

Innovations in agriculture practices rejuvenate the soil, thereby enabling it to support more crops. The conducive and fertile environment for crops, primarily due to nutrient availability, enables them to yield more. This positive outcome arises due to high soil health, which boosts crop performance. In the dairy sector, they create adequate feed for animals. The prolonged access to quality food without facing shortages enables the livestock to release lots of meat and milk products. The high productivity aspect enables farmers to achieve their large-scale and small-scale farming goals. The increased productivity aspect is helping farmers to pursue food security initiatives globally. Continuing to implement different new technologies in the long term will definitely solve the food uncertainties being experienced across the world.

Innovations have proven to be effective in triggering profitability. The profitability aspect is a positive outcome of the high productivity aspect. Individual farmers and companies engaging in agricultural activities experience between 40 % and 50 % improved profitability margins. This huge margin is experienced in the cultivation of crops such as wine grapes and livestock farming. Farmers are now able to produce high volumes of food products to meet the never-ending demand. On a global spectrum, the human population is increasing at a fast rate. As such, the demand for food products is also on the

rise. Technologies are the only approach that is enabling farmers to benefit from the sale of food products. Overreliance on modern farming methods has led to the loss of soil fertility, which has led to food shortages. Through profitability, farmers are now accessing finances that enable them to expand their agricultural operations. This development paves the way for the improvement of lifestyles and also the creation of job opportunities. With these issues in mind, it is imperative for agricultural sectors to uphold the regenerative agriculture concept.

Also, technologies have a great impact on climate change. Climate change results from global warming, which emanated from high carbon content in the atmosphere. As such, this concept is effective in reducing greenhouse gases and also acting as a sink for carbon dioxide. With reduced carbon levels in the atmosphere, it will be easy to combat climate change. The global community ought to capitalize on implementing new technologies in the agriculture because of its capability in curbing climate change. This move calls for the use of all the strategic initiatives that facilitate a safe and secure environment for everyone.

Moreover, innovations are pivotal because they help increasing the resilience of crops. This aspect makes crops reliable and productive in the long term. The problem with modern agricultural practices is the overreliance on elements such as fertilizers and pesticides. Without these elements, crops cannot perform well on their own. The situation is entirely different if implement innovations in agriculture. The use of traditional farming methods without any chemicals makes it easy for crops to adapt to the environments they are grown in. The crops can thrive independently, thereby enabling farmers to maximize their earnings from them. Organic crops are more reliable and profitable because they have no toxins in them. Achieving the crop resilience aspect means that future farming will be more reliable and less costly for farmers. Resilient crops can overcome many of the challenges that will arise. In this case, it is imperative for agricultural sectors to pursue this positive aspect.

Technologies in agriculture are a recent development in the farming sector that entails using new ways of leading the farming business. Modern research is also utilized for purposes of perfecting agricultural practices. The core techniques entail avoiding

fertilizers and pesticides, planting cover crops, and controlling erosion. The combination of these practices has made it easy for farmers to benefit from farming. The evident benefits entail high productivity, environmental protection, and the development of resilient crops. These positive outcomes arise because of the safe farming practices being used. Farmers are also experiencing high profitability from the sale of their products. Climate change is also being addressed as regenerative farming hinders the release of excess carbon gases into the atmosphere with the help of modern technologies.

1.2. Methods of implementing new technologies

In order to overcome such negative impacts of modern agriculture systems on food production and the environment, certain efficient practices are implemented. Currently, agricultural practices are highly supported by emerging technologies such as the Internet of Things, remote sensing, and cloud computing, along with biotechnology, which is known as smart farming. Smart farming helps farmers in overcoming the barriers of agricultural production in terms of sustainability, food security, environmental impact, and productivity.

Sustainable agriculture is directly and adequately linked to smart farming as it helps in improving the environmental resource base and quality in which agriculture relies upon to fulfill the fundamental food needs of human beings. According to the researchers, an ecosystem-based method to agriculture helps in incorporating social, economic, ecological, physical, chemical, and biological sciences is an efficient way to establish smart and safe farming practices that do not destroy the environment.

Moreover, the challenges of sustainable agriculture and smart farming can be addressed through unpredictable, multivariate, and complex agricultural environments which required being better understood and evaluated. As mentioned by Grunert et al. (2018), the adoption of efficient digital technologies helps in continuously measuring and monitoring different aspects associated with the physical environment. The use of big data in agriculture develops the basis for huge investments within infrastructure for data processing and storage, which helps in monitoring and forecasting crop pests.

Thus, the use of big data is considered to be a new generation of practices that creates a positive impact on agriculture production by helping farmers to gain huge profits. The wide range of data allows farmers to gain an understanding of farming processes without affecting the environment (Chen and Wong, 2016). Currently, big data is used within the agriculture sector as it provides several potential benefits to stakeholders for enhancing agriculture production. Most of the scholars have estimated that utilization of big data in agricultural practices could maximize annual global profit margins from crops of approximately \$20 billion.

Farmers spearheading regenerative agriculture have adopted a new approach called conservation tillage. This technique is characterized by low or no-tilling practices at all. Farmers usually minimize the physical disturbance of soil to leave it in its natural form. This approach has proven to be effective in increasing the levels of organic matter in the soil. The outcome is usually healthier and resilient environments where plants can grow and thrive (Morseletto, 2020). The practices of tillage and plowing are well-known for eroding the soil and releasing vast amounts of carbon dioxide. Thus, the idea of upholding conservation tillage is timely and beneficial for the soil.

The conservation of soil is a good practice for farmers that reduce the degradation of soil and improve organic matter. The methods of conservation include reduced tillage, crop rotation, cover cropping, mulching and cross slope farming. There are several methods of improved crop production. The methods may be implemented throughout the year with a target of preserving nutrients and water.

In this context, contour ploughing is an ancient method of soil conservation that originated in Phoenicia. In this method, the ploughing takes place in grooves in the region. The crop furrows are planted in the grooves and contours. This method is very effective in the region of slopes to prevent runoff of soil and improve the yield of crops. Another approach of carving flat, multiple levelled areas into hills is called terrace farming. In this method, mud walls are constructed to prevent soil runoff. This method is generally applied in less developed nations. This method is used for planting rice in Asia, however, scientists argue that it will be work in Europe too. Keyline design is the enhanced version of contour ploughing that retains maximum water by using watershed properties in the

contour lines. Perimeter runoff control is another soil conservation method where trees and shrubs are planted in the periphery of the farming area. This method reduces the surface flow and retains the nutrient in the soil for the crop. Crop rotation is another method where cover crops such as radish, turnips are planted in rotation with the main crop that replenishes the nitrogen of the soil. Another approach of planting the grass in highly eroded areas to reduce soil erosion is called an agrostological method of farming. No-till farming is another approach of growing crops all year without changing topography of soil by using contouring or tilling. This method penetrates more water in the soil to improve the organic matter in the soil.

To fertilize the farmland green manures are often grown other than crops which do not produce food supply. The soil structure is improved by this method; however, it suppresses the growth of the weeds. Salinity management is an important method for rejuvenation of soil when the soil loses nutrients during evaporation of water. In this method crops such as saltbush are planted or humic acids are used to replace lost nutrients. Streambank protection is a method of soil prevention during floods by constructing walls in the banks. Earthworms are helpful creatures for the improvement of farmland. They burrow the ground to rest more water in the soil. Moreover, the excretion of these creatures is good for the soil and absorbed as nutrients. By using mineralization methods with crushed rocks and chemical supplements in the farming area improve the mineral intake of the soils. This method is often used after flooding. In the regions of low rainfall areas, the crops that require very less water are grown often referred to as dry farming. The addition of magnesium and calcium-rich material in soils improve the acid neutralization of the soil also called liming that is essential for the improvement of the fertility of soil and pH. Moreover, crop production can be improved further by careful use of chemical fertilizers and the use of soil microorganisms.

Regenerative agriculture has adopted the concept of planting different plants. The plants release carbohydrates into the soil through their root. Soil microbes feed on the carbohydrates, thereby returning most of the nutrients to the plants and soil. The focus on plant diversity is helping farmers to keep their farms fertile with varied nutrients. This practice has created a scenario where farmers can attain high yields (Giller et al., 2021).

Plant diversity is fundamental in the agricultural sector. As farmers benefit from the high yields, the soil gets the much-needed nutrients for proper functionality.

Modern modes of farming usually leave the soil exposed, hence losing the valuable nutrients needed for plant growth. The nutrients are easily washed away during the rainy season. To combat this scenario, regenerative farmers have opted to embrace cover crops and also to practice crop rotation. The emphasis on rotation is that planting the same crops for a long time leads to a buildup of some nutrients. This aspect hinders the soil from accessing nutrients from other plants, which are significant (Sherwood & Uphoff, 2000). The combination of crop rotation and cover crops enables farms to infuse more and diversified soil organic matter. These approaches are also useful in hindering diseases and pest problems.

Regenerative agriculture farmers are focused on avoiding all practices that cause disturbance to the natural form of the soil. The use of chemical and biological interventions ends up damaging the soil's long-term health. The misuse of fertilizers and pesticides disrupts the relationship between plants and microorganisms. Modern agriculture relies on pesticides and fertilizers to achieve short-term results. The main challenge is that these practices decline the soil's fertility. This outcome arises because of the reduced organic matter and the increase of nitrogen content in the soil. The chemicals used in fertilizers and pesticides are also very harmful. They affect not only the plants but also the people who consume different foods after harvest. Regenerative agriculture is thus addressing both soil and human health issues (Elevitch et al., 2018). Precisely, prolonged use of foods bred using harmful chemicals leads to numerous health complications. Thus, regenerative agriculture has transitioned farming to accommodate traditional strategies which were not harmful at all. New technologies in agriculture rely on organic phytosanitary materials, which are exclusively biodegradable and natural. These materials are not harmful to the soil, hence enabling it to retain its fertility and well-being.

Soil erosion is a major problem affecting farmers globally. Due to climate change, droughts have led to heavy winds, which sweep away the top fertile soil. During floods, water washes away the fertile soil, hence making farms less productive. Regenerative farming capitalizes on numerous erosion control measures. For instance, farmers are

relying on filter dikes, hedgerows, and micro dams. The micro dams aid in managing both groundwater and rainwater. The focus on these initiatives has enabled farmers to reduce erosion by a bigger margin. As such, their farms are more productive and reliable because of the reduced disturbances (Giller et al., 2021). Reduced erosion means that soils end up retaining their nutrient value. As such, farmers are guaranteed high yields during the harvest period.

Implementing new technologies in the agriculture allowed everyone to adopt a culture of keeping roots in the soil for the longest time possible. Roots can stabilize soils as they continually cycle both nutrients and water. The presence of roots in the soil creates an environment where soils can retail water and nutrients without losing them. Keeping roots in the soil means that farmers do not go uprooting crops frequently. This concept calls for crops that are not seasonal because they expose the soil to long-term benefits. By ensuring that the fields are not bare, farmers end up developing healthy soils. Overseeding is usually utilized because it covers the soil, thus preventing the evaporation of the water held in the soil. The other technique aiding this agenda is the conversion of croplands into pastures. In this regard, such implementation should be emphasized in all farming regions.

The reviews of the existing technologies of agriculture for improved crop production shows several farming practices that are effective for water and nutrient management. In this context, the more general approach is agroforestry, intercropping and cover crops. This approach helps in keeping water and nutrients in the soil. Moreover, this method protects crops from drought and the efficient use of water. The micro-irrigation approach is another efficient method of crop production. It is observed that 60% of irrigation water normally gets wasted. Hence, methods such as drip irrigation are more efficient in retaining water and fertilizers in the soil. However, implementation of this method is expensive. The harvesting of rainwater is essential for agriculture. There are approaches to improve rainwater resources. The rainwater can be captured by using planting with organic material. This approach helps in crop production in low rainfall regions. The water can be saved by using mobile technology. In the developing countries the use of mobile phones is a resource for farming. It is used as an automation and remote monitoring tool to control the irrigation remotely. The management of irrigation reduced the use of water and

electricity. Planting of perennial crops is helpful to protect soil better than the annual crops. This approach reduces water loss from runoff. The most important method of all is the use of soil conservation. The approach such as no-till farming and some other discussed for soil conservation makes a big difference while using water. The efficient use of water is achieved by the no-till farming method that holds water and improves crop ability of the soil.

1.3. Modern examples of leading Ukrainian companies that use new technologies in order to conduct agribusiness

Satellite technologies, electronic weather stations, automatic irrigation systems and soil moisture control - as well as mobile applications, special software. Previously, they were helped by the sowing calendar, folk signs and weather forecast. Now they are armed with smartphones, tablets, drones, mobile applications, all these technologies are being used by Ukrainian farmers. They are helped by technology. Despite difficulties, Ukrainian farmers already started to implement some modern agricultural business and successfully use them for conducting the business.

Every progressive country in the world (which has the status of agrarian - and even more so) introduces in agriculture the so-called principle of «precision farming», that is, the management of every square meter of land. Field tillage, sowing, fertilizing, weed and pest control all happen automatically, saving seed, fertilizer, plant protection products and more. And only online services provide civilized land use, increase its value and intellectual capacity of the market, and - and this is perhaps the most important nuance in modern Ukraine - reduce to zero corruption risks, for example, in the registration of land ownership. Experts estimate that the current global market for agricultural IT solutions is about \$ 400 billion annually.

The preconditions for computerization experienced by the agricultural sector are similar to other markets: optimization of financial and time costs, increasing the accuracy of calculations and planning. In addition, software packages and equipment for high-speed innovation have begun to appear. Agrarians started later, but are catching up with the financial, industrial and other sectors of the economy.

Today the majority of the businesses around the globe are expanding from local to the level of globalization. It has resulted in changing market trends that entertain the local customers. Global market segmentation has emerged as a significant aspect of positioning, developing, and selling the products beyond the national boundaries due to globalization. The global and local market segmentation requires specific segments, including a particular community or group in the country, consumer groups, and other communities across the countries. These groups across the country border contain potential customers with homogenous buying behavior attributes and tastes like the local consumers. Targeting a similar market or group helps in rapid and successful expansion. The internet and social media have expanded the local business globally because, in global market segmentation (GSM), the information is rapidly disseminated across various countries in unequal proportions, which helps companies to discover more information about export/import regulations. GSM differs in response to the marketing mix program of the firms.

Though a distant second for now to the humanitarian crisis brought on by the Russian invasion of Ukraine, the market volatility occurring along with it has many worried about how rising commodity prices will affect those outside of the region.

As is well known, Ukraine is a powerhouse producer and exporter of some key agricultural products. The country is a market mover in the crops and countries in which it trades, so disruptions in the Ukrainian market are having ripple effects across the world. The growing global concern is that the prolonged absence of Ukrainian products on the global market will lead to additional suffering in the form of food price crises in countries not directly involved in the conflict. We dig in here.

Ukrainian Agriculture

Ukraine is a significant producer and exporter of agricultural products. In 2021, Ukraine exported more than \$27 billion in agricultural products to the world. Ukraine's top export markets were the 27 nations that now comprise the European Union (EU-27) at \$7.6 billion, China at \$4.2 billion, India at \$2 billion, Egypt at \$1.5 billion and Turkey also at \$1.5 billion. These top five markets accounted for more than 60% of Ukraine's agricultural exports. Ukraine has six primary products with over a billion dollars in export sales (Fig 1.2): corn (\$5.8 billion), sunflower seed (\$5.7 billion), wheat (\$5.1 billion),

rapeseed (\$1.7 billion), barley (\$1.3 billion) and sunflower meal (\$1.2 billion). Combined these top six products accounted for more than 77% of Ukraine's agricultural exports.

Despite the tough situation that Ukraine is in right now, implementing new technologies a before the war allowed the country to become one of the biggest importers of agricultural products in the whole world.

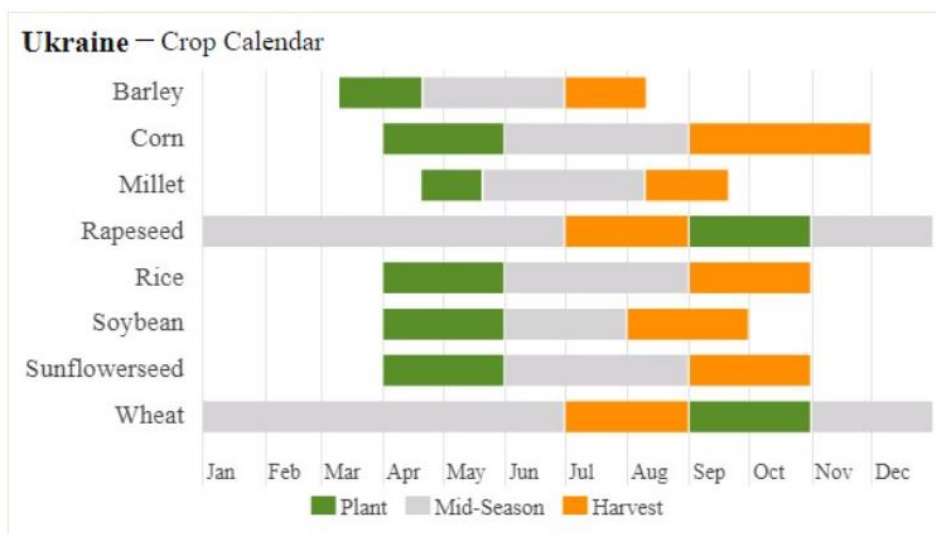


Fig 1.2. Ukraine's crop calendar

Source: <https://www.fb.org/market-intel/ukraine-russia-volatile-ag-markets>

Ukraine exported more than \$5.8 billion in corn to the world in 2021. China (\$1.9 billion) and the EU-27 (\$1.8 billion) were the top two destinations for Ukrainian corn, accounting for more than 60% of corn exports (Fig 1.3). Ukrainian corn growers are trade dependent; over the 17/18 – 20/21 trade years an incredible 80% of Ukraine's corn production was exported. Despite similar growing seasons, Ukrainian corn is exported primarily between November and May, while U.S. corn exports are strongest between March and June. For the global market that means that relatively large stocks of trade year 21/22 Ukrainian corn remain stuck in-country after the closure of Ukraine's Black Sea ports. The March WASDE estimated Ukraine corn exports at 27.5 million metric tons. According to S&P Global Ukraine had exported 18.98 million mt as of February 23. This

means that there are over 8.5 million mt still remaining to meet the USDA's export estimate for this marketing year. There has been discussion of utilizing Ukraine's state-run rail system to move the 8.5 million metric tons of Ukrainian corn to borders with Romania, Hungary, Slovakia and Poland, from where the grain can be delivered to ports and logistics hubs of European countries.



Fig 1.3. 2020/21 Trade year world corn exports

Source: <https://www.fb.org/market-intel/ukraine-russia-volatile-ag-markets>

Ukraine is the world's eighth-largest producer and sixth-largest exporter of wheat, responsible for 8.5% of global exports in the 2020/21 trade year. The crop is predominantly grown in the southern/southeastern portions of the country. Ukraine's wheat growing season is like the winter wheat growing season in the United States (Fig 1.4), with planting occurring in September and October, growth throughout the winter and spring and harvest occurring in July and August.

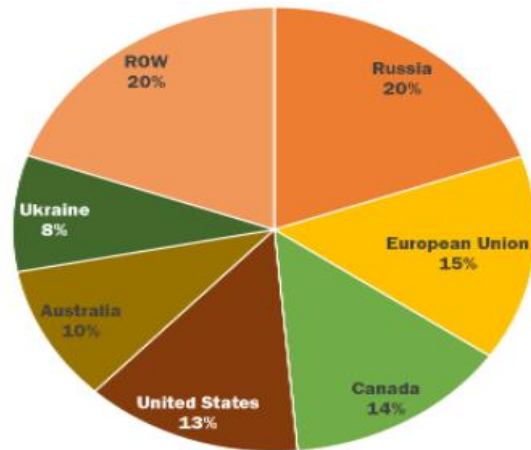


Fig 1.4. 2020/21 Trade year world wheat exports

Source: <https://www.fb.org/market-intel/ukraine-russia-volatile-ag-markets>

Ukraine is the world's largest producer and exporter of sunflower seed and its products, responsible for 47% of global exports in the 2020/21 trade year (Fig 1.5). The crop is predominantly grown in the eastern half of the country. Ukraine's sunflower crop is planted in April and May with a September and October harvest.

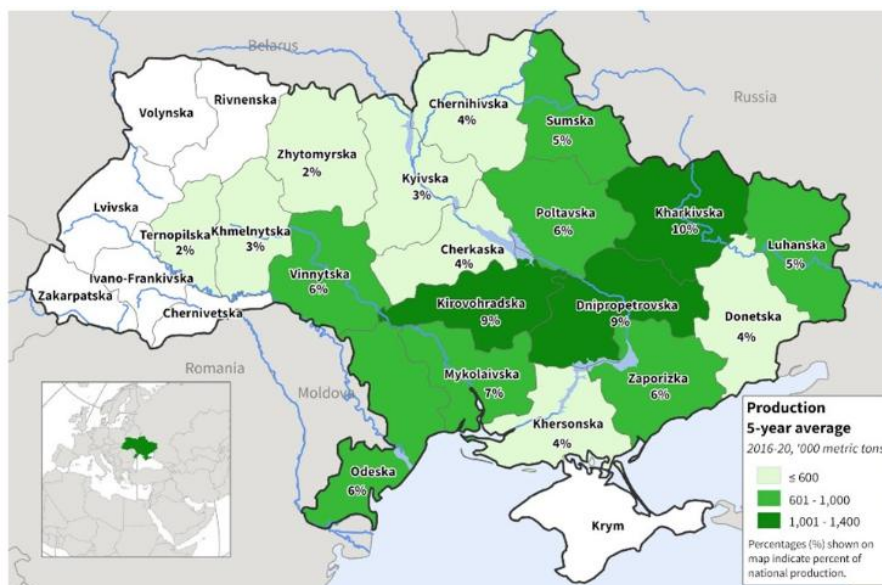


Fig 1.5. Ukraine: Sunflower seed production

Source: <https://www.fb.org/market-intel/ukraine-russia-volatile-ag-markets>

All in all, from all this graphs we can clearly see that Ukraine plays a very important role in the world's export of agricultural products. Different start-ups and their implementing in leading a business allowed agroholdings to invest more and gain more profit by increasing the amount of exported goods abroad. One of such technologies that was implemented as a new way of harvesting corn that made a Ukrainian company being one of the leaders on the market. The plant management technology SIDEDRESS made by the American company «360 Yield Center». It works on the principle of timing and placement - at the right time, in the right place. Putting nitrogen per row gives half a ton of corn more per hectare. The innovative development of the American company «360 Yield Center» for SIDEDRESS technology in Ukraine is offered by the company «Agrotterra». NB: 360 Y-DROP is an additional liquid fertilizer application that is installed on a trailed sprayer or cultivator, which allows fertilization with CAS in phase V5 – V8, or on a self-propelled sprayer - from phase V7 to ejection of the panicle.

Ukraine, for which agriculture is 18% of GDP, is not lagging behind the global trend. Large domestic agricultural companies are investing heavily in technological innovations to grow above the market and make additional profits. Today, almost all leading manufacturers in the industry - Kernel, MHP, Astarta, IMC, Mriya - have their own research and development centers. And their investment in new ideas is millions of dollars.

In terms of yield, we are significantly losing to countries that are actively implementing agro-technological innovations. For example, New Zealand harvests twice as much wheat and corn per hectare as Ukraine. And among those 10% of Ukrainian agricultural companies that implement innovations - all the largest agricultural holdings in the country, which determine the face of the market. They not only buy solutions from Ukrainian and foreign startups, but also engage in in-house development, creating IT solutions for their own needs.

According to AgTech Ukraine, there are about 70 agro-technological startups (Fig 1.6) in Ukraine. In addition to them, the Ukrainian agritech market employs integrators who implement «iron» and software from global developers in Ukrainian farms. Our

agritech market has a characteristic feature - a great demand for solutions against theft. Sensors on agricultural machinery allow you to monitor fuel consumption, land bank accounting systems - to control the cost of seeds, fertilizers, etc.

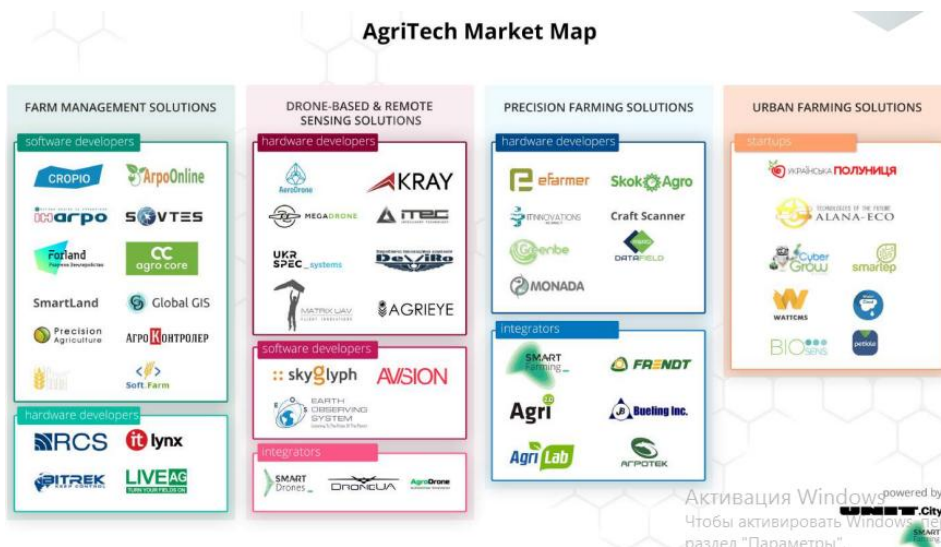


Fig 1.6 AgriTech start-ups

Source: http://agritech.unit.city/guide/f98ewf9fewfw/AgriTech_Industry_guide_en.pdf

Start-ups to watch

Agrieye - Unique multispectral camera for remote sensing and soil analysis for SMB land farmers. It's founder and CEO is Odessa resident Andrey Sevryukov. In May 2016, the startup raised \$ 150,000 of angel investments. In the summer of 2017 it received \$200,000 from the Norwegian Katapult Accelerator and joined a three-month program there. Agrieye became one of 12 residents selected among 1000 startups from around the world. Sevryukov's company already has experience of implementing pilot projects on four continents. Residents of Odessa have developed a drone and a multispectral camera for crop analysis. Now the company has refocused on the SaaS model (is a software distribution model in which a cloud provider hosts applications and makes them available to end users over the internet. In this model, an independent software vendor (ISV) may contract a third-party cloud provider to host the application. Or, with larger companies,

such as Microsoft, the cloud provider might also be the software vendor) and is already providing crop analysis to farmers on four continents.

Kray technologies - A hardware startup, founded by Kyiv resident Dmitry Surdu. The company started as a volunteer project to make a scout drone for the Ukrainian army. Since the end of 2015, Kray Technologies is developing unmanned aerial vehicles for spraying fields with plant protection products and growth regulators. In 2016, the startup received a grant from the US Civilian Research and Development Foundation. In two years, Kray Technologies attracted about \$600,000 of investments from four investors, including Ukraine-based Chernovetskyi Investment Group. Surdu said that even ordinary drone flights over the fields increase the yield of corn by 30-40% - at the sight of a drone, people are simply afraid to steal. Drones themselves are also a strong link in Ukrainian agritech. Paradoxically, one of the impetus for its development was military action in the east.

BIOsens - An IoT startup, which develops a mobile food quality testing laboratory. It's founder and CEO is Andrey Karpyuk. In April 2017, the project won the Intercontinental Startup Battle in San Francisco, proving itself the best among 9 startups from Eastern Europe (the event was organized by Startup. Network and Hack Temple). In August 2017, Swiss Kickstart Accelerator, the largest of its kind in Europe, selected this project together with other 30 lucky startups out of 1500 applicants.

The task of startups is to solve problems, and very soon humanity will face one of the most serious problems in its modern history. By 2050, the world's population will grow so much that we will need 70% more food. At the same time, the number of agricultural lands is decreasing every year. Agricultural technologies will have to solve this problem (Ukrainian agritech industry guide et al., (2021) .

To increase the profitability of the business, agricultural companies are investing in modern technologies: in particular, «Ukrlandfarming» invests in precision agriculture, «Agroprosperis» has purchased tablets for agronomists. For innovations in the agricultural sector to be visible and effective, companies need to spend the equivalent of \$ 50 per hectare, according to Taras Vysotsky, CEO of UCAB.

Such costs are still unaffordable for Ukrainian business, but some agricultural holdings report increasing the efficiency of their enterprises through the introduction of new technologies.

«Ukrlandfarming» - reports a 25% increase in yield due to the use of precision farming.

«Agroprosperis» - reports that the efficiency of work has increased several times after the purchase of tablets for agronomists with special programs and an interactive database that allows you to quickly make logistics decisions.

«Kernel» - implements a digital platform project for automatic planning of production processes, monitoring their implementation, as well as the development of mobile applications for work in the field of agronomists and engineers.

«Astarta» - saved \$ 15 million in 4 years thanks to the system of GPS-surveillance and monitoring of fuel use (more than the annual investment in innovation of the seven largest agricultural holdings in the country). It also plans to launch a mobile platform to monitor the condition of crops, their development and growth phase, the presence of insects and pests, which will allow you to select fertilizers, PPE and more.

80% of all investments in innovation in the agricultural sector are directed to accounting, document management and anti-theft solutions - says the director of «SmartFarming» Artem Belenkov.

Today, precision farming is implemented in 5% of the total arable land, and some of its elements cover only 20% - according to the founder of the consulting company «AgriLab» Yaroslav Boyko.

TOP-7 companies what invest the most in innovation:

«Kernel» - \$ 2.7 million on 540 hectares

«AP Group» - \$ 2.0 million on 400 hectares

«MHP» - \$ 2.5 million on 360 hectares

«Astarta» - \$ 1.0 million on 250 hectares

«IMC» - \$ 1.0 million on 124 hectares

«Harveast» - \$ 1.0 million on 123 hectares

«Epicenter» is \$ 420,000 on 112 hectares

The best example of a huge agricultural company that invests a lot in new technologies is «MHP» (Myronivskyi hliboproduct). The leading agricultural holding of Eastern Europe «Myronivsky Hliboproduct» cultivates one of the largest land banks in Ukraine - about 370 thousand hectares in 14 regions of Ukraine. During its 20 years of operation, the company is constantly improving production, open to innovation and actively implementing the latest advances in science and technology.

«Over the past 5 years, Farm management systems, precision farming systems, remote sensing systems (remote sensing), GPS-vehicle monitoring systems, geographic information systems (GIS), agricultural production management, automation of production processes of database accumulation, structuring and analysis of information have been actively developed. , satellite monitoring, use of unmanned aerial vehicles (UAVs), introduction of an agronomist's workstation, etc.,» the agroholding told Na chasi.

In 2016, the company launched a project to implement a geographic information system for automated land bank accounting in order to preserve land fertility, optimize production costs; auditing the land bank and developing common standards for all enterprises. The introduction of such an information system has made it possible to reduce the burden on employees of land departments and use information about the land bank in other programs or applications. Thus, MHP has created a single platform for collecting, storing and processing data on cultivated land with clear geopositioning. «It simply came to our notice then. Actual contours of fields and mapping of crops are used by the holding companies to increase the accuracy of technological work on growing plants. Now agronomists have the opportunity to much more effectively control the condition of crops, yields of a particular area, as well as dosed and effectively use fertilizers and plant protection products» - said in MHP. Precise farming systems are being actively developed - STRIP-TILL and NO-TILL, which, in turn, not only save 20% of resources (seeds, fertilizers, energy), but also preserve soil properties and moisture. The use of drones for visual monitoring and accumulation of a database on the state of crops has reduced the cost of energy, fertilizers, plant protection products, seeds. Currently MHP is actively testing technologies for variable seeding rates, leakage, application of mineral and organic fertilizers.

In addition, the holding's enterprises use solar energy. To do this, install solar panels. The pilot project has been operating at the Myronivka Poultry Farm for a year now. A solar panel with a capacity of 9 kW was installed at one of the production crews, which provides electricity for the checkpoint, provides lighting, heating and water heating. The payback of this project is about 5 years. The company plans to install such panels on all poultry houses. In addition, in order to make the most efficient use of all available resources and maintain the full production cycle, MHP enterprises, in particular the Myronivka Plant for Cereals and Compound Feed, have a boiler house that runs on biofuels - sunflower husk from oil press plants. a couple of technological processes and the company's own needs without the use of gas.

To sum everything up, in the first chapter we analyzed the importance and use of modern technologies in agribusiness. We have discovered how different new agricultural system influence the agriculture locally and internationally, while also taking into consideration climate changes, which has a sufficient impact on it. Moreover, we have discussed how innovations can influence profitability margins of the companies and why are they relevant towards food demand all over the globe. Also, a lot of interesting methods were discovered for implementing technologies in agribusiness. One of such methods is smart farming which basically allows farmers to increase the quality of crops greatly and is commonly used in Ukraine. After evaluating the essence and methods of implementing innovations in agribusiness we conducted a research on how leading Ukrainian companies are operating on the market and why are they so successful. The main reason for it is because all the companies are constantly looking for investments in the innovations and launching more modern methods for running a business rather than traditional ones. We have statistically analyzed the Ukrainian agriculture and its role in the global trading system. It is one of the leading countries in the world when talking about import of agricultural products and has a great amount of start-ups that will influence agribusiness in Ukraine only in a positive way.

CHAPTER II. ECONOMIC ANALYSIS OF ACTIVITY OF THE «AGROMONOLIT» ENTERPRISE, EVALUATION OF COMPANY'S COMPETITIVENESS ON THE LOCAL MARKET

2.1. General characteristics and analysis of foreign economic activity of «Agromonolit» enterprise

Economic analysis is the study of economics and economic activity of enterprises. The development of economics has led to the allocation of economic analysis in an independent field. The main purpose of economic analysis is to study the objectively valid economic laws in order to consciously use them in practice: in determining the most rational ways of development, optimal rates and proportions, maximizing production efficiency. Each science has its own subject of study, which it studies with its own methods. The subject of economic analysis of enterprises is the economic activity of enterprises, which is reflected in various sources of information.

Economic analysis of economic activity carried out directly by the enterprise, in addition to compliance with these principles, should cover all parts and factors of work, conducted regularly, systematically and, finally, be operational, and its data should be used in practical farm management. Thus, the main purpose of the analysis is to identify economic reserves and develop measures for their maximum use. Such reserves should be understood as opportunities to maximize the efficiency of enterprises based on the use of scientific and practical achievements. Economic reserves can be classified as domestic and economic. Intra-farm reserves include reserves that can be identified and can be used only in a given farm. National economic reserves include the use of which improves the efficiency of production not only of the enterprise but also of the industry and the economy as a whole (for example, improving specialization and better use of machinery and production facilities, basic and auxiliary materials, fuel, tools, electricity). Economic analysis is necessary as a basis for qualified management of the economy, improving the organization of production, scientific organization of labor and as a criterion for the

correct assessment of the results of enterprises. The analysis of economic activity puts forward certain requirements to the organization of the account and the maintenance of the reporting. Its content, tasks and methods are determined by the method of social production in which it is carried out.

The company started operating on the 16th of December 2004. The main purpose of the enterprise is the production of agricultural products, its processing and sale of other economic activities of the enterprise to make a profit and meet the needs of its founder on the basis of rational use of land, other natural resources and production and resource potential and to meet socio-economic needs.

«Agromonolit» keeps records of results of operations, operational accounting and statistical reporting and the responsibility for this and timely submission of accounting and other reporting is entrusted to the chief accountant of the company whose competence is determined by current legislation of Ukraine. Financial and economic activities of the enterprise are carried out in accordance with the plans approved by the director and his assistants.

Each financial year starts from the 1st of January and in the next week all the economic plans are made and approved. This all happens on a general meeting and the budget report is represented.

Agromonolit's economic activity is focused on the increasing profitability by saving costs on productions. For this reason, there is a special department that analyzes the market's performance and evaluates all the factors which can influence that focus.

Ukraine is a major exporter of wheat, corn and sunflower oil – and the Russian invasion is expected to lead to a further deepening of global food insecurity. Even before the war in February 2022, many countries around the world were struggling to get access to adequate food supplies following the economic downturn triggered by Covid-19. Between 720 and 811 million people went hungry in 2020, and this number is expected to go up in 2022 (United Nations, UN, 2021).

Russia and Ukraine – together sometimes called the 'breadbasket of Europe' – are top producers and exporters of several important grains (such as wheat and maize) and vegetable oils (Fig 2.1).

Commodity	Russia rank	Ukraine rank
Sunflower seed or cottonseed oil	2nd	1st
Wheat and meslin	4th	7th
Barley	2nd	6th
Maize	10th	6th
Fertilisers	4th	18th
Fuel	3rd	n/a

Fig 2.1. Ranking of world production of major food crops (2020)

Source: <https://wits.worldbank.org/countrystats.aspx?lang=en>

Ukraine is the world's largest producer of sunflower oil and, combined with Russia, it is responsible for more than half of global exports of sunflower oil. The region is also responsible for over a third (36%) of wheat exports (making it the world's largest exporter of wheat). Nearly every continent depends on them for either sunflower oil or wheat. In 2018, the European Union (EU) and other European countries were among the top importers of Russian and Ukrainian sunflower oil, with Southeast Asia and the Middle East the largest importers of the region's wheat.

Instability in the region is therefore likely to affect food supply in the importing countries, many of which are currently food-insufficient – a situation where there is not enough food to eat.

The Russian invasion has resulted in the suspension of commercial operations in Ukraine's ports, hampering the country's ability to export its products. A halt in agricultural exports is bad for Ukraine as agriculture is a major source of its export

revenue – 45% in 2020, amounting to \$22.2 billion (International Trade Administration, ITA, 2022).

Farmers may be incentivised to ‘eat their seed’. Many other producers have fled the war to neighbouring countries for their own safety. Whether the displaced population will restore balance in global food supply by going into farming in their host nations is questionable, certainly in the short term. Others that remain in the country are presumably fighting or supporting the war effort.

Food prices have been rising since January. The Food and Agriculture Organization (FAO) of the United Nations reports that the food price index is 24.1% higher than it was a year ago, and similar trends have been experienced across the world (FAO, 2022). In the UK, for example, food price inflation hit 4.3% in February 2022, the highest in about a decade (Office for National Statistics, ONS, 2022).

In Ukraine, household income has fallen while poverty is rising. This is due to deaths of household heads (such as parents), job losses following destruction of infrastructure and businesses, and reduced economic activities. Forced migration to countries still grappling with post-pandemic recovery has also contributed to the crisis. Loss of income makes it more difficult for Ukrainians to access food, especially against the backdrop of rising prices.

Commodity prices are reaching record highs across the board. On the 8th of April 2022, the United Nations Food and Agriculture Organization (FAO) published its third consecutive record food price index. Food prices are 34% higher than this time last year and have never been this high since FAO started recording them (Fig 2.2).

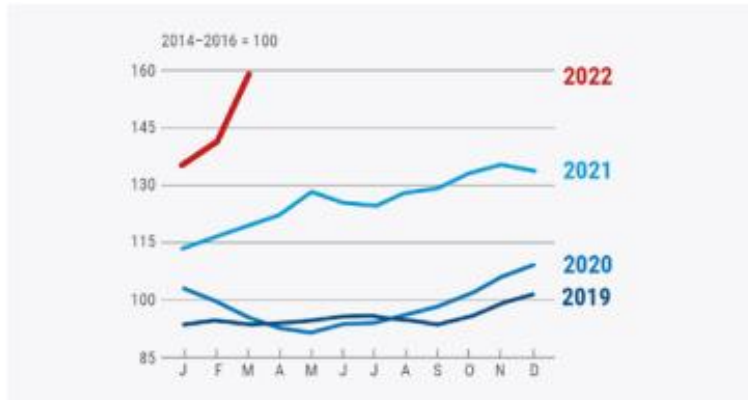


Fig 2.2. FAO Food Price Index

Source: <https://news.un.org/pages/wp-content/uploads/2022/04/UN-GCRG-Brief-1.pdf>

One of the biggest issues the company has faced in recent years was COVID-19. It was mainly due to the big drop of prices on the crops and lack of different pesticides and fertilizers, as the import of these products was very low and the company could not operate in its normal rate. That led to a huge profit loss and a quality reduction on the products made. However, due to the savings that «Agromonolit» made during all these years of conducting the business, the company managed to gain the maximum from the occurred situation and remained effective on the local market. Despite all the difficulties its managed to pay the salary to the employers and maintain their normal life.

Nowadays, another huge factor that influenced the company's being is war that started in February 2022. There is also a huge drop in the price of the crops and export of the products is almost impossible as all the seaports are being blocked by the Russian invaders which makes the agrisector of Ukraine not efficient. The company almost fully changed its vector of business and is now making donations and supporting the local community, so everyone could be safe and provided with everything they need. It is expected that «Agromonolit» will have profit losses and will not be able to operate at the same level in the next year, in case the situation remains the same.

Analyzing the performance of production, it is necessary to study the composition, qualifications and use of personnel, productivity, use of equipment, provision of material resources, relationships with other enterprises and organizations, financial condition, ie to study all the specific conditions on which depends produced.

Examining the cost of production, it is necessary to disclose and measure the specific factors that led to its formation (organization of labor, use of material, labor and financial resources, organization of production, etc.). Only a comprehensive and organically interconnected study of economic processes of enterprises will provide a correct, objective assessment of the results of their work, will reveal the factors influencing these results, find out the reasons for their occurrence, identify internal reserves and develop real proposals for them using.

Economic growth in a company is driven by factors of production such as land, labor, capital, and entrepreneurship among others. In this regard, company comes up with policies to aid in the realization of economic growth. For example, it may increase budget allocations towards research in the quest of promoting scholarly excellence through skills provisions. This implies that a well-skilled labor market is instrumental in promoting the social, economic and political growth of an enterprise. In the wake of industrialization across European countries, the mission to empower the society with the necessary skills remains a fundamental initiative. To achieve prosperity, companies come up with economic policies geared towards creating a favorable environment to do business.

Foreign economic activity of «Agromonolit» enterprise

Agricultural trade acts as an important role when discussing international trade. The reason for this is simply agricultural trade is held in such high importance to many countries in terms of how the state of their economy functions. It is conceded that the variance between the size of different countries is quite large, however relatively, a countries agricultural industry is so crucial for the sustained development of a given economy. Due to this reason, TBT (**technical barriers**) are formed to protect the interest of a given country. Many economists have studied TBT and before we dive into the crux of the analysis, it is important to understand all the intricate roles of TBT, as it is because

of these intricacies and nuances that dictate how much influence they have on agricultural trade.

Most literature out there in terms of the definition of Technical Barriers to Trade (TBT) is consistent throughout. They incur that TBT were initially set up at the beginning of 1995 and they operate essentially as a trade import control which acts as a mechanism to protect national security, the health and safety of both civilians and animals, to detect fraud to make sure that the quality of domestic products is ensured. Ukraine is an emerging or developing country as opposed to a developed country, this is important as developed countries feel more of a need to restrict imports via TBT because they have more to lose if mass exports flood their domestic markets and recede their economy in doing so.

TBT's main function is to act as a restrictor to sustainable healthy foreign trade development and adds a certain interruption to economic globalization, further to imply TBT are put in place to increase export cost which acts as a mechanism to reduce export competitiveness. Moreover, it is also suggested, and universally agreed, that TBT have a negative impact upon customers, especially regarding welfare, a decrease in choice whilst experiencing a simultaneous increase in cost.

It is important in this juncture to declare that TBT can act in the positive and not just the negative, although it is conceded most economists argue they operate mostly in the negative. Interestingly, it is also suggested the choice of interest by government is important and declares TBT are often set up primarily with the perspective of public choice. There is also a question over the effectiveness of TBT in relation to which time period you use to analyze their effect. For example, Xia, Y.-F, (2012) states that TBT are extremely negative to the overall competitiveness of exporting products short term however in the long-run the effect will change to a positive one.

Having understood the effect TBT have over agricultural exports, its's also just as important to measure specific correlation between the two. The main link is that TBT reduces exports of developing countries more than those developed ones. This is backed up by many economists therefore we can state from the outset that Ukrainian agricultural trade is hugely effected. There has been a few quantitative studies to attempt to quantify its

effect, which will be looked at in another chapter, however Li, J.-N. and Pan, Y. (Li, J.-N. and Pan, Y.,2012) concluded that the TBT effect upon equilibrium is estimated and suggested, via regression analysis, that Ukrainian agricultural exports were at the detriment significantly from TBT (Fig 2.3).

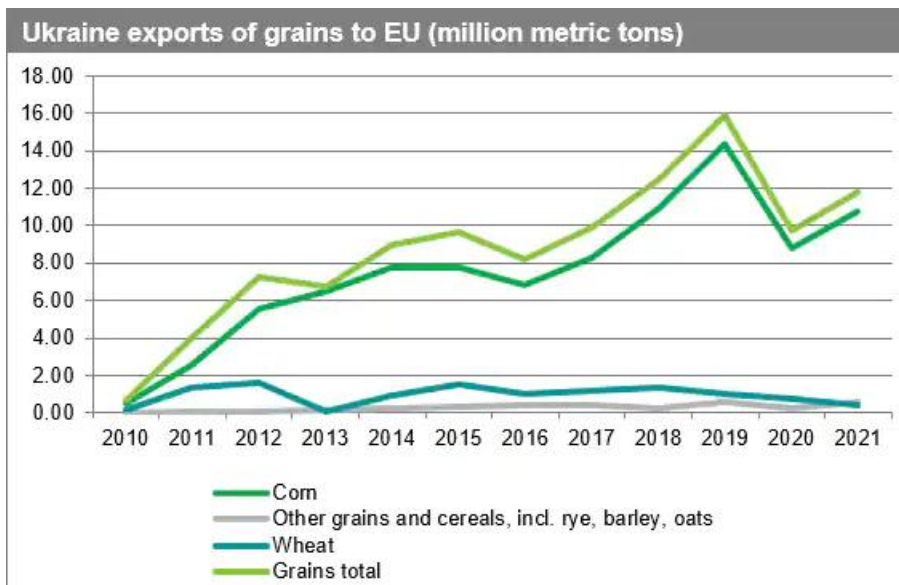


Fig 2.3. Ukraine's export to the EU influenced by TBT

Source: <https://www.bloomberg.com/> .

From this we can conclude that TBT impact the whole agricultural sector in the country and it is a significant factor for any company's foreign economic activity (in this case international trading).

Food security, levels of competition between branches, the direction of investment streams, and other economic processes in Ukraine are all influenced by the country's foreign economic vector of agribusiness activity, which is characterized by a number of peculiarities and tendencies that determine key aspects of the agrarian production structure and have a significant. Regional variables, which are linked to the market place, major transportation routes, and other components of international trade infrastructure, have a

unique role in shaping foreign economic activity. The concentration of agro-business firms, their production specializations, and their strategic and tactical planning are all influenced by regional factors. This demonstrates the necessity to clarify the flow of foreign economic activity for Ukrainian agribusinesses in the current environment, as well as to identify regularities in how export-import operations are conducted and the conditions required to extend their presence on international markets.

Foreign economic activity in the agricultural sector means is the company's performance on the global market, its trade and investing opportunities. In recent years, the company's cross-border activity has risen greatly. Due to implementing new technologies, «Agromonolit» managed to improve the quality of the products made and to increase the amount of imported goods. The company managed to implement the new technology of growing garlic from the company «Clean Product» works. The main feature of it is that you can sow it only one time and reap it three times.

Today, this technology allows planting only once and for the next three years harvest different types of garlic products - one-toothed, one-toothed with heads or only heads of garlic during the last, third year. The approach is constantly improving, however, it is already a great technology that allowed the company to triple the profit.

One of the key factors in foreign economic activities is communication. Company's representatives constantly contacts a lot of foreign agricultural holdings regarding new machinery (such as drones, tractors that do not need operators and new tillage equipment), fertilizers, pesticides, new types of seeds... .

Successful companies are important to ensure that a country's economy grows and when a country is able to satisfy a local market, the market develops which ultimately leads to the creation of good products that can be exported for greater foreign exchange. There are many countries that are known for specific exports which define their position in the international political economy. Germany is known for cars and technological products whilst South Korea is known for consumer electronics. These are things that did not happen overnight. It happened as a result of industrialization which went through several stages. It started with few industries that grew over time and supported themselves. This created a local market that encouraged the different industries in the country to support

each other and earn revenue for their products. As time went on, they had the benefits of the economies of scale and economies scope. That is what the company is trying to do and expand its foreign economic activity.

Also, a huge role in foreign economic activity plays government. Governments have a form of duty to protect its domestic markets, however often have certain trade deals with other countries. This area is extremely complex and complicated in its process, however in layman terms it generally means governments of one country will agree to be lenient with exports from another country in a certain market like electronics, however to return the favor it will receive leniency with that country in a different market, like the automobile industry for example. This happened all the time, especially within Europe and the EU, but also extremely common with the UK and the USA. So, it is extremely important for the company to be on good terms with the company's government not only of the local country, but also with others, so it will open doors to a lot of trade opportunities.

Government is not the only ones building measures in the fight against TBT. Large Ukrainian firms are more of the opinion now, than in any other time, that more technological investment is needed in the short term, that will offset the cost long term. There has been a significant jump in Ukrainian manufacturing investment in technology over the past five years. Although reasons for this investment are not just specifically down to combatting TBT, a large part of it is solely for this reason

As we touched upon earlier, agricultural exports, main destination is America, Japan, Africa and Europe. We also established that these are the very areas where TBT are extremely rigorous. To combat this situation, exporters of agriculture have outlined a strategy in which a change in their geographical export pattern will become apparent. Ukrainian exporters are deliberately targeting countries where TBT will be much more lax in a bid to counteract the business they will lose within the three main areas they export to. Short term this can be quite unproductive in a cost sense as large-scale exportation to countries is cost effective as it's done on mass. What we are beginning to see is investment in technology, such as packaging and transportation innovations, meaning that Ukraine can import to smaller countries at less of a cost and therefore in the long run make it possible to offset the loss of stringent TBT in the EU or America.

2.2. Analysis of using modern technologies in agribusiness of «Agromonolit» enterprise

The main activity of the enterprise is harvesting, so all the technologies that were and are in the process of implementing are for decreasing the human labor efforts and increasing profit. One of such technology is UAS (Unmanned aerial system) system.

Agricultural automation seeks to enhance agricultural production through safer working environments and improve worker safety outcomes. UAS and other technologies are incorporated in agriculture to improve the economic and environmental risks involved in the industry. Modern agriculture is based on precision systems that seek to enhance four practices by farmers. The four rights encouraged in precision agriculture are right application, right timing, right place, and right quantities. Remote sensing has been an essential part of precision agriculture since its inception. UASs enhance agricultural productivity and success by inventing better farming practices that increase efficiency and productivity in agriculture.

UASs are used in agriculture to perform various functions aimed at enhancing food productivity. The first area where they are highly applied is in remote sensing to determine the state of the agricultural fields. Remote sensing involves dealing with issues like ascertaining weather conditions like humidity and temperature that directly affect the state of the crops. Precision monitoring looks after the essential aspects of farming to determine what can be done to alter the outcome of agriculture. The remote sensing is conducted through cameras and sensors attached to the UAS. The sensors are designed uniquely depending on the function which each component is expected to play. Sensor payloads comprise imaging sensors, laser scanners, or thermal cameras, which provide extensive details depending on the analyzed information. The sensors collect reflected light from leaves based on three spectral regions and are applied in the crops' analysis to determine their health. Multispectral sensors extend the spectral sampling to ranges past the visible spectrum, while hyperspectral sensors extend visibility beyond the multiple contiguous wavelengths. These aspects in sensing provide images that can be used in plantation analysis to determine the needs of the plants.

UASs are classified depending on the wing type, and rotary and fixed wings are the most prominent designs used. In rotary wings, the UAS has several rotors that interact to enable the motion of the drone. Multiple rotor wings (Fig 2.3) UASs are commonly referred to as drones, and the rotors generate sufficient airflow for uplift. Drones are advantageous in their ability to perform several hovering flights, unlike fixed-wing UASs. The multiple rotor UASs are further classified depending on the number of rotors on the platform. Multiple rotors are common because of the ease of manufacturing them and have minimal challenges, unlike fixed-wing rotors.



Fig 2.3. A multi-rotor UAV (Yinka-Banjo & Ajayi, 2020).

UASs are used in nutrient evaluation and health assessment by integrating multispectral aerial soil data and geophysical data. Monitoring soil nutrients and assessment is essential in determining the required nutrients needed to supplement the maximum productivity of food. The nutrient assessment ensures that farmers provide adequate nutrients to eliminate the unnecessary fertilization that might hinder food productivity. UAVs provide high-resolution images that apply various algorithms to determine soil health and nutrients. Modern agriculture applies UAVs in various roles that ensure crop sufficient crop production. Water stress, soil nutrients, and health are the key areas where UAVs analyze and determine the necessary remedies needed to improve productivity.

Also, one of the most effective technologies was discovered recently. A new autonomous laser robot kills 100,000 weeds per hour, called Laserweeder. It is a device that travels through agricultural fields and kills weeds with a laser. For identifying pests it uses cameras based on artificial intelligence (AI).

The device works with 12 high cameras resolution connected to artificial intelligence systems. They can separate useful plants against weeds. Laserweeder controls itself with computer vision, finding furrows in the fields, locating with GPS and detecting obstacles with LIDAR. It moves at a speed of 8 km / h and can clear 60 thousand km in a day. You will need the device to move between fields or perform complex actions human intervention. Farmers can set up a geozone with GPS coordinates outside of which the machine will not leave. The robot also works all night - for this it uses powerful lamps that allow you to identify weeds even at night. It is extremely effective for Ukrainian land which is full of weeds and farmers are struggling with it almost every day as it has a very negative impact on the harvest. So, this technology will be implemented by «Agromonolit» once it enters the Ukrainian market.

The conventional agriculture methods are not efficient and the use of input is overused, where labor and energy demands are not sufficient. The development of proximal, remote and contact sensors provides communication and networking capability in the farming regions where the real-time information about the environment is captured for the farming area. This information once collected, processed and analyzed gives detail of the state of the agro environment such as soil, climate and crop status. The information combined with the economic model provides an automated or robotized solution. This approach of farming is often called smart farming, which is commonly used in the «Agromonolit» enterprise. The management of nutrients and water is possible with the concept of smart farming by using modern technologies. In the context of farmer's point of view, these technologies provide support for timely decision making for effective operation and management of water and nutrients. The smart farming technologies are divided into three major categories: precision agriculture, farm management information system and agricultural automation. The precision agriculture aims at the optimization of the use of input in agricultural land. The farm management system is a software system for

data collection, processing and analyzing data to suggest various functions and operations related to a farm. Agricultural automation deals with automatic control, robotic platform and artificial intelligence in all levels of crop production. In this context, several applications related to specific tasks have been developed such as weed control, harvesting. It is seen that modern agricultural technologies evolve at a fast pace in industries and research. However, end-users do not follow modern agricultural technologies. Hence, to achieve adoption readiness for the modern agricultural technologies labor, economic and environmental aspects need further evaluation and assessment.

Implementing of modern techniques is utilized for purposes of perfecting agricultural practices. The core techniques entail avoiding fertilizers and pesticides, planting cover crops, and controlling erosion. The combination of these practices has made it easy for farmers to benefit from farming. The evident benefits entail high productivity, environmental protection, and the development of resilient crops. These positive outcomes arise because of the safe farming practices being used.

Table 2.4

SWOT analysis

<p><u>Strengths</u></p> <ul style="list-style-type: none"> - supplier relationships - positive reputation - strong and influences the decision-making systems adopted. - ability to exports - large domestic demand - reputation as a responsibility and punctuality. 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> - Old aging of infrastructure facilities - dependence on climatic conditions - high price for mineral fertilizers
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> - increased demand for services is achieved to ensure that the organization can increase domestic demand - chance to expand its market span by continue the performance of a high level. - Proper utilization of natural resources. 	<p><u>Threats</u></p> <ul style="list-style-type: none"> - high competitive area with the low profile. - to maintain the pricing strategy - cost of modern technology is always high

Source: created by the author

Strengths

The organization has excellent supplier relationships since it attracts a lot of local partners. The company is known for its positive reputation in the marketplace which is strong and influences the decision-making systems adopted.

“Agromonolit” has the ability to exports which enables to build a connection with foreign companies. Also, large domestic demand is a great advantage. Although there are a lot of such firms like Agromonolit, a lot of brokers want to cooperate with us, due to our reputation as a responsibility and punctuality.

Weaknesses

Old aging of infrastructure facilities does not always allow any agricultural company operate fast and effective. Those facilities needs quite a lot of time in order to do the activity for which they were built, due to their bad conditions. Also, dependence on climatic conditions is the major factor that can influence the profit and the company’s performance in general. In case of bad weather (fog, rain) it is impossible to harvest and process fields.

One of the most disturbing factors is a high price for mineral fertilizers that are needed for effective cultivation. It started at the end of the summer and keeps growing till this day, so a lot of agricultural firms started to use «traditional» fertilizers such as manure.

Opportunities

The company has a chance of ensuring that increased demand for services is achieved to ensure that the organization can increase domestic demand and that it employs highly skilled employees in the organization. Agromonolit has a chance to expand its market span by continue the performance of a high level. Proper utilization of natural resources is a great opportunity for leading an agricultural business, especially in such country as Ukraine which is very rich with the land.

Threats

It is very difficult to agribusiness entrepreneurship to run a business in the high competitive area with the low profile. Due to the price fluctuations it is very difficult to maintain the pricing strategy some time company may have loss, this losses agro based

industry could not bare, hence this factor creating the threat for agribusiness entrepreneurship. Also, the cost of modern technology is always high it is very difficult to purchase this machinery for small organization in Ukraine.

2.3. Analysis of the competitiveness of «Agromonolit» with other agricultural companies

Competitiveness can be attained in the economy by successfully developing a value-creating strategy. The strategy entails integrating and coordinating a set of actions and commitments to exploit the core competencies and gain a competitive advantage. A firm is considered to have attained a competitive advantage when it implements a unique strategy that is hard or too costly for the competitors to imitate.

The competitive index plays a significant role in the determination and classification of countries depending on their productivity levels using numerous indicators in the analysis process. In light of this, countries such as Ukraine inject a considerable amount of revenue in the different economic sectors such as agriculture, infrastructure, information technology and environmental sustainability as well as labor productivity to ensure that they remain competitive among its peers in the European region. Ukraine's agricultural sector is one of the strongest in Europe that is why keeping the position on the market and being the competitor is difficult.

Climate plays a fundamental role in the determination of food security in a country. Introduction of modern agricultural practices across the world has not dampened Ukraine's resolve to upscale environmental sustainability thus influencing its global competitiveness. To this end, Ukraine is ranked 69th in the wastewater treatment segment of environmental sustainability. This is meant to scale down wastage of water; a critical ingredient for human survival. In this regard, this European country has to strive to ensure that its citizens access clean and affordable water. Additionally, it is well positioned to address forest cover change because if climatic conditions that negatively affect a

country's food security. With this in mind, Ukraine will lead in environmental sustainability as well as setting a good example to its peers.

Climate change is an important challenge in agribusiness around the world. Major direct climate change effects include climate extremes, increasing atmospheric carbon dioxide, average temperature changing and disappearance of glaciers. On the other hand, the indirect climate change effects are diseases, an invasive plant, and invasive weed species. These climate change elements affect crop production, livestock production, water, and soil. They are mainly associated with decreased agricultural productivity. Environmental protection approaches that target carbon dioxide emission and conversion of land can address the issue of climate change. Sustainable farming practices such as the use of biofuels and other organic farming practices can help in environmental protection. Sequestration of Carbon can also help to improve carbon levels. Conversion of farming land into pasture land and mixed farming practices can control climate change.

Due to the fact that the international economy operates on the free market principle which is based on self-interest, competition and the forces of demand and supply, countries are forced to organise their affairs in the best way that maximises their returns from international trade and minimises their losses and outflows. This gives impetus to a rationalist approach to participation in international trade. Rationalism in national choices tends to be powered by national competitiveness because it aims at developing the most important sectors that a country has the greatest comparative advantage.

National competitiveness comes up when a country develops the areas it has the best advantage and this creates the foundation for the economic power of a nation. Thus, a developing country might want to develop some type of industry, when it comes to Ukraine, it is agricultural industry. A developed country might want to develop its industries and produce things that they can export. Hence, the international political economy is powered by none other than the main sectors that are productive and produce results.

A good competitiveness is when the country makes suitable conditions on the market and all the local companies can operate and make profit for themselves and for the country. Competitiveness depends on a number of factors such as: the volume of products

made and sold, the force labor, innovations, the company's expenditure and profit. In our time, to be competitive on the market a company must offer some unique products or services that other companies do not have. In this way, the company can attract more customers and partners that will allow them to develop and expand.

«Agromonolit» offers such uniqueness and is a successful competitor despite the size of the company. So, let's determine what services and products have been launched by the company and analyse its effectiveness.

- Drones and machinery: The company was one of the first who implemented such technologies. It showed to the customers that the company does not stick to the traditional ways of agricultural products and is not afraid of innovations and created a little bit new image. It also showed that with implementing innovations, the company offers a lot of work places with a good salary for young people. Nowadays, it is quite hard for medium agricultural companies to find a good specialist who wants to work with the old machinery, so a lot of workers are elderly people. That image of the company has boosted the number of companies which wanted to cooperate and doubled «Agromonolit's» profit. All in all, it was very beneficial for the company to implement new technologies and they are constantly looking to improve it.

- Environmental aspects: It has been analyzed that the utilization of modern agriculture technology creates a positive as well as a negative impact on agricultural production and the environment. However, the current practices associated with modern technology in agriculture have become successful in overcoming such negative environmental impacts. Therefore, the prospective open access of such data to the public may provide enormous opportunities for research and development towards more sustainable and smarter farming without affecting environmental aspects.

- Bioenergy: There are a lot of perks for the companies that implement green energy in the business, such as solar panels. It is good both for the country and for the company, so country pays more attention to those companies which offers any type of bioenergy. Bioenergy derived from sustainable agriculture practices provides an opportunity for the country to utilize its resources and attract the necessary stakeholders to accelerate its sustainable development process. Some of the benefits that come with the development of

bioenergy include environmental benefits from the reduction of greenhouse gases and the recuperation of soil productivity and degraded lands. The economic benefits could result from increased activity that will be a result of improved access to quality energy services. So, when the country pays more attention to some companies than to others, everyone wants to work with such company. It improves the company's reputation which is very important on the competitive market.

- Human factor: This factor plays one of the most important roles, as agricultural sector is very close to people and companies have to have a nice reputation, so people can relate to them. «Agromonolit» built some effective ways for communication. So, when people are worried about something, or they have any issues, or they can have some really good ideas, the company can be easily reached and all the problems or recommendations will be noted. Due to this reason, the company is highly appreciated among the community where it conduct its business.

Competitiveness is a function of industries that help companies to gain optimal access to factors of production, regulations, business partners and skilled labour in order to thrive and grow. This is a result of historical factors, government policies and the company's performance. However, in most cases, it is actualised through the creation of industrial clusters that create demand conditions, supporting industries, regulations, leadership and management conditions as well as other factors that promote successful industries and sectors. As the industries trade amongst themselves, clusters are formed and this gives impetus to the creation of strong and viable industries that make a country viable for business and raises it up in the rankings of the «doing business» scale. Therefore, it is conclusive that industrial clusters have a strong relationship with the market competitiveness.

Industrialization of agriculture and seed industry monopolies has continued to manifest themselves in the monopolization of agribusiness, especially in agricultural raw materials. This extends to the beverage and food industry. Currently, the international trade on agricultural goods is almost a phenomenon of millions of small-scale farmers producing raw materials and raw food that are collected by various big farmers' cooperatives, but only very few commercial firms are left with the processing of such

materials for trade and even feed the industry. In this chain, very few retail firms distribute the food that is usually highly processed to many consumers. For instance, today, there is a tremendous global concentration and expansion of supermarket chains and retailing companies, including Wal-Mart, Tesco, Metro, and Carrefour, which are popular in developing countries. Consequently, economic opportunities in the retail food business have been increasingly diminishing. This has created the risk of dislocating the small and retail processing labour, particularly in the poor communities.

The other big companies, the French firm Louis Dreyfus, as well as US-American companies, such as ADM (Archer Daniels Midlands), Cargill, and Bunge control, have led to agribusiness monopolizations. The four firms above control 43% of Brazil's oil mill capacity with only the three US-American firms above controlling 75% of America's oilseed capacities. Unfortunately, small-scale farmers in poor countries have to depend on the few big companies in exporting their commodities if they do not only supply the local or home market. For instance, in Brazil, the remaining TNC (transnational corporations)-controlled oil firms depend on the agribusiness monopolies to export their oil. The problem does not end at the export stage since the TNCs take charge of the soy meal, soy oil, or soybeans upon reaching Europe, where they also control the market. Besides, TNCs are influential, and any regulations that contradict their operations, such as a GMO-free feed production can never be implemented or else implemented only at higher costs. This renders small-scale farmers helpless and thus forced to comply with the terms of the TNCs.

The increasing global expansion has never targeted food security, but global profit maximization using agricultural raw materials and raw food produced by peasants from the poor communities. TNCs use global-monopoly-like power to predominantly push down prices of commodities of small-scale farmers and extract from the consumers as much as possible by employing market access control. Intuitively, higher prices are expected in market structures with less competition. With the increasing concentration of mergers in agribusiness, farmers are forced to sell their goods to a small market due to the decreasing number of companies that they can sell to. As a result, companies enjoy enormous bargaining power over the small-scale farmers who are the producers, driving

down the farmgate prices. TNCs, such as Bayer-Monsanto, BASF, and DowDuPont, among others employ aggressive price negotiations, playing producers or small-scale farmers off against their each other, and bulk buying to exercise their market power. This compels peasants to sell their products at prices, which are lower compared to the prices in more competitive market structures.

Overall, the out-of-control consolidation results in fewer options for the farmers. In most cases, private companies or investors focussed on establishing varieties of plants that can be easily identified in the courtroom or in the field are not likely to help farmers handle climate change and other challenges in agriculture. The situation above happens at every process of farming for the small farmers. For instance, farmers have to purchase seed from DowDuPont or Bayer-Monsanto, and the same applies for fertilizers and chemicals. When the farmers' produce is ready, there are a limited number of companies to sell to. For instance, in the pork industry, most farmers have entered into contracts with JBS and Tyson. Framers are generally smaller players in this market since they have constrained choices; due to lack of market power, small farmers cannot negotiate equal and fair terms with the TNCs.

The new agrarian techniques and genetic engineering are some of the measures adopted by TNCs to increase their profits. This has been witnessed in the seed industry and the beverage, as well as the food industry, which are characterized by monopoly-like structures. Farmers are forced to use commercial seeds, as well as the chemicals and fertilizers that are very expensive and have environmental and health effects on peasants. However, the war on agribusiness monopolizations staged by various leaders and organizations is likely to curb the increasing impacts of TNCs concentration in the international market, especially on small farmers and developing nations. For instance, the proposed checkoff reform legislation by Cory Booker and Mike Lee will ensure the corporations are accountable and allow farmers to pull resources together for promotion and research. Otherwise, the «out-of-control consolidation» is likely to cause more harm to farmers and economies of developing nations.

Although «Agromonolit» is a relatively small company compared to other agroholdings that keep 10 or more thousands of hectares, it is hardly trying to remain

competitive on the market by launching and adapting new technologies and representing a more people-oriented type of business. The main thing that makes the company a lot different from other companies is that it can be easily reached and people can be heard. That helps «Agromonolit» avoiding any issues with community where they conduct its business and therefore, meet peoples' needs.

Increasing the competitiveness of domestic producers should be based primarily on the production of environmentally friendly products, full funding from various sources of domestic breeding work and research institutions, the creation of agricultural parks, agribusiness incubators, venture capital firms and banks to lend to develop new ideas and implement ideas. Today there is an urgent need to review traditional technologies for growing crops in the direction of radically reducing its energy intensity, which will reduce labor costs and production costs, increase the profitability of the industry.

In the wake of technological advancement, the agricultural sector has immensely recorded substantial growth as a result of the adoption of modern agricultural practices that have not only increase agrarian yields but also amplified the employment rates in the country. Ukraine agricultural productivity continues to rank among the best export market share countries in Europe at a rate of 78 percent. This implies that the country has the ability to produce agricultural products for domestic and export purposes thus raking insubstantial amount of money in exports. In this regard, Ukraine's competitiveness is occasioned by its agricultural productivity that influences food security. Even with the economic crisis Ukraine's agricultural growth cemented its worth as a pacesetter (Fig 2.4).

	All agricultural holdings			Enterprises			Households		
	harvested area, thsd. ha	volume of production, thsd. centner	yield, centner per ha of the harvested area	harvested area, thsd. ha	volume of production, thsd. centner	yield, centner per ha of the harvested area	harvested area, thsd. ha	volume of production, thsd. centner	yield, centner per ha of the harvested area
Ukraine	15380,3	845703,6	55,0	11177,1	678736,0	60,7	4203,2	166967,6	39,7
Vinnitsya	865,3	65956,5	76,2	686,8	56327,7	82,0	178,5	9628,8	53,9
Volyn	316,8	15232,4	48,1	157,9	10675,6	67,6	158,9	4556,8	28,7
Dnipropetrovsk	1139,2	49130,4	43,1	701,8	33667,1	48,0	437,4	15463,3	35,3
Donetsk	599,7	22540,9	37,6	428,1	16446,7	38,4	171,6	6094,2	35,5
Zhytomyr	529,7	34862,2	65,8	426,9	31076,3	72,8	102,8	3785,9	36,9
Zakarpattia	74,2	3238,9	43,6	11,4	880,7	77,2	62,8	2358,2	37,5
Zaporizhzhya	1011,0	38469,1	38,0	723,4	28311,2	39,1	287,6	10157,9	35,3
Ivano-Frankivsk	150,7	9462,6	62,9	82,8	6412,9	77,5	67,9	3049,7	45,1
Kyiv	632,0	45431,9	71,9	532,4	41400,7	77,8	99,6	4031,2	40,5
Kirovohrad	866,9	48133,7	55,5	645,8	38098,0	59,0	221,1	10035,7	45,4
Luhansk	362,1	13098,6	36,2	278,1	10480,1	37,7	84,0	2618,5	31,1
Lviv	297,0	17139,2	57,7	178,4	12268,4	68,8	118,6	4870,8	41,1
Mikolayiv	940,4	38701,0	41,1	636,2	28335,1	44,5	304,2	10365,9	34,1
Odesa	1228,1	52452,0	42,7	848,5	38008,3	44,8	379,6	14443,7	38,0
Poltava	965,9	56837,0	58,8	749,4	46624,6	62,2	216,5	10212,4	47,2
Rivne	296,3	16396,0	55,3	167,1	11627,7	69,6	129,2	4768,3	36,9
Sumy	666,4	41064,7	61,6	587,1	37964,3	64,7	79,3	3100,4	39,0
Ternopil	456,0	31404,8	68,9	309,7	25203,4	81,4	146,3	6201,4	42,4
Kharkiv	1052,5	49768,4	47,3	763,7	38164,4	50,0	288,8	11604,0	40,2
Kherson	808,9	35995,4	44,5	511,1	24189,2	47,3	297,8	11806,2	39,6
Khmelnytskyi	592,2	47774,2	80,7	488,8	43071,3	88,2	103,4	4702,9	45,4
Cherkasy	660,7	48151,6	72,9	529,4	41601,9	78,6	131,3	6549,7	49,9
Chernivtsi	116,4	7128,0	61,2	42,1	2834,8	67,1	74,3	4293,2	57,8
Chernihiv	751,9	57334,1	76,2	690,2	55065,6	79,8	61,7	2268,5	36,6
as of 01 December 2021	14759,1	633445,4	42,9	10619,8	498761,6	47,0	4139,3	134683,8	32,5

Data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and a part of temporarily occupied territories in the Donetsk and Luhansk regions.

Fig 2.4. Harvesting of cereal and leguminous crops as of 01 December 2021 in Ukraine

Source: http://ukrstat.gov.ua/operativ/menu/menu_u/cg.htm

Earlier Ukrainian climatic conditions negatively influenced the country's agricultural growth such as the unequal distribution of land coupled with an agrarian innovation deficiency. The land available for agriculture was scarce compounded with the ineffectiveness of the farmers to inject a considerable amount of revenue in innovations. This was, however, a time-bound experience as the government's initiatives to spruce up agricultural practices as well as open up external markets influenced Ukraine's competitiveness in the agricultural sector. An increase in cultivated land in the nineteenth century opened up opportunities for growth.

Infrastructure development in Ukraine considerably helps in the actualization of the country's path of social and economic growth. According to the World Economic Forum statistics; Ukraine ground and port infrastructure are ranked among the best in the global standards. The rising quality of roads positions Ukraine in the global competitive index thereby influencing the transport industry. A country's ground and port infrastructure play a significant role in export and import trade as commodities are transported at ease thus

increasing productivity as well as the generation of revenue for the government. Investment on infrastructure is a key pillar in the European region notably in Ukraine as a result of motorways density. With an increased number of automobiles in the country; substantial investment in road infrastructure contributes to increased growth as goods are transported with the least time available thus improving business in the European country.

Additionally, the transport infrastructure assumes a symbiotic relationship with agriculture cognizant of the fact that agricultural practices are heavily accomplished in the rural areas. For this reason, Cresenzi and Rodriquez (2012) affirm that an efficient transport system aids in opening up connectivity and increment in agricultural yields as individuals can access urban areas for sale of agricultural products. Furthermore, Ukraine's transport infrastructure helps to open up rather dormant rural areas, therefore, influencing its growth as individuals' spillover to rural areas for housing solutions since housing in the urban areas is densely populated thus increasing the possibility of congestion and improper provision of sanitation programs. For example, a person working in an urban area may resolve to reside in the rural area and commute each day under proper road infrastructure that will significantly spare his/her considerable expenditure thus promoting savings and outwardly investment opportunities.

It is clear that the main feature of a market economy is the competition of entrepreneurs for maximum profits, but in agricultural production, competition has distinctive features. As a rule, competition through the system of market relations and the price mechanism coordinates the production of material goods, but in the agro-industrial production of Ukraine such competition is not carried out because the state does not regulate prices, lending and subsidies to farmers.

Thus, in summary, we note that the feature of competitive methods is the use of non-price methods, as price does not work. This situation causes a drop in incomes of farmers, does not allow the transfer of capital from one industry to another. That is why the main direction of increasing competitiveness for domestic producers should be the use of high (including energy-saving) technologies, innovation and production of environmentally friendly products. To achieve this, it is advisable to form appropriate organizational prerequisites aimed at creating the necessary market infrastructure (consulting firms,

agroparks, agribusiness incubators, venture capital firms and mortgage banks, information support, marketing research, commercialization of agricultural science, etc.). A special role in increasing the competitiveness of Ukrainian agro-industrial enterprises belongs to attracting foreign investment to the industry and creating free economic zones in the agricultural sector.

CHAPTER III. RECOMMENDATIONS FOR IMPLEMENTATION OF NEW TECHNOLOGIES IN «AGROMONOLIT» AND WHOLE AGRICULTURAL SECTOR

3.1. Recommendation for implementation new technologies in agribusiness

Technology is rapidly changing the world we live in, where technology, particularly information and communication, is transforming how businesses gain profit and how, where and when people work, communicate and relate with each other. Technology has intensified the output of ventures and employees, sped up financial activities, advanced dependence between current businesses, and permitted the exploitation of novel technologies. These technologies assist persons with refining and quickening work and allowing significant transformations in the way work is done in a corporation.

Sometimes, technology refers to the machines and tools used in the organization to resolve complex problems arising during production. A successful business is dependent on implementing a technological perspective for tracking, productivity, and communication that leads to overall sustainability. In the overall production process, new technologies have been applied, leading to increased productivity and, in turn, consideration of profit generation. Emerging technologies are mainly advances to the prevailing technologies. Most of these recent new and emerging technologies are advances to the prevailing technologies. These technologies tend to be based around and incorporate a set of new and relevant innovations.

The analysis indicates that there are different factors that prompt business organizations to embrace these new technologies. Arguably, most businesses incorporate these technologies since they believe they will achieve the best developments. However, the reality is that there are both positive and negative impacts of these technologies on business operations, decisions, and sales.

Positive Impacts

First, these new technologies have enhanced speedy operations in business. New technologies in agribusiness allowed the companies to speed up the seeding and harvesting processes. That benefited in fuel-efficiency, delivering and shipping the products and force

labor. Also, the company stands to benefit from the deployment of energy conversation systems, for instance, it could benefit from less GHG emissions, Carbon dioxide, and nitrous dioxide gases into the atmosphere, Although agro-residue handling requirements and volume vary across the country, this volume could be captured and combined across different farms in a single specific facility, where it can be processed and converted to energy. Besides, the unused agricultural residues conversion also ensures the production of useful heat that can then be used for both local and industrial sectors or electricity that can be absorbed into the national and local grid. There is also the aspect of byproduct that comes with the process, in this case, is fertilizer which could be used in other farming activity across the country and also increase soil fertility. The process also enables recirculation of the organic and green waste from farms. It also enables better waste management process at local and industrial levels.

Negative Impacts

An increase in prices is a notable adverse effect on business operations. The reality is that most businesses operate intending to minimize operation costs and achieve profit. However, the reality about most of these technologies is that they increase the chances of experiencing high operation costs in businesses. That will make an impact mostly on small agricultural companies that do not have big capital and can't afford to invest a lot in technologies. Moreover, new technologies can also affect a company's sales depending on the company's decisions. For instance, emerging technologies might result in losses through a decline in sales. Whereas the analysis indicates the benefits of these new technologies, some companies fail to keep up with the development. Consequently, this increases competition since other companies embrace new technology with ease. Technologically trendy companies have a competitive advantage over those that do not embrace new technology. This is a negative effect of new technology since the business would not have experienced this challenge if the new technology did not emerge. Finally, quality loss is also one of the key issues. Despite all good factors that new technologies offer, some new technologies such as pesticides or fertilizers, can affect the crop quality. Traditional methods include natural supplements (manure, etc.) while new chemical

additives can be good for soil or the business, but not for the product, as they simply do not have such strong impact as the traditional ones.

There are 2 main recommendations I would make in order to increase the agricultural efficiency:

- Carbon dioxide emission

Carbon dioxide emission is generated through agricultural practices and the use of energy for the production and application of agricultural inputs, including pesticides, fertilizers, lime, and fuel. Carbon dioxide can be mitigated by reducing the emission of CHGs due to agricultural causes, increasing sequestration of Carbon (C) in plant biomass and soil organic matter. The decision to increase soil carbon can be made by identifying the regions where soil carbon is low and where increased cultural production is needed. Based on recent research, between 0.7 and 1.6 Gt CO₂e annually can be sequestered in grazing lands, cropland, and Agroforestry systems by 2030 (Dickie et al., 2014). The effect of this practice is the net elimination of carbon dioxide from the atmosphere. Another strategy is the use of sustainable agricultural biofuels with the ability to mitigate carbon dioxide emission from fossil fuels.

- Conversion of land

Controlling the conversion of land can help in environmental protection. Conversion of land for agricultural activities accounts for about 80% of global deforestation, which reduces the size of the terrestrial carbon sink. Simulation models forecast that 10% and 24% less carbon is held in soil and vegetation respectively, due to high land conversion (Tanentzap, Lamb, Walker, & Farmer, 2015). Agricultural fields can be converted into pasture lands, and farmers can adopt mixed farming with using modern technologies to enhance environmental protection.

Also, it was mentioned in the research about difficulties for small agricultural companies to compete on the global market with agricultural monopolies. A possible solution to the problem of agribusiness monopolies is developing and implementing a systematic and effective protection policy for small-scale farmers, as well as supporting peasants with a systematic establishment of cooperatives. This was effective in addressing the agrarian crisis in Central Europe towards the end of the 19th century. Most

importantly, the new cooperatives should focus on strengthening the regional and local production, reinforcing the regional handicraft, modern services, and small-scale industry, as well as promoting the regional and local exchange of products. This also entails institutional reforms, organizational reforms, and land reforms. Since the above aims contradict the major tendencies and operations of the WTO and IMF, they should be restructured and reformed.

To sum everything up, technology is a crucial driver of business success in the modern world. From this perspective, the analysis has highlighted the critical impacts of new technologies on agricultural businesses. Whereas these technologies emerge intending to improve business and other operations, the analysis indicates that they have positive and negative effects on different parties. Some of the notable positive effects include speedy operations in business, fuel-efficiency and bioenergy and environmental impact. On the other side, there are also negative effects like price rising, sales and quality loss. Each of these factors plays an important role in agricultural business, so it is up to the farmers and companies to decide whether to implement new technologies. However, the world is emerging and developing, each day there is a new start-up or innovation, so everyone should follow it as we could not escape it in the 21st century.

3.2. Recommendations for implementing new technologies in «Agromonolit» enterprise

Agriculture faces several challenges that further impose adverse effects on the environment, economics and labour. In this context, smart agricultural technologies emergence to address the agricultural challenges and reinvent novel methods in agriculture and farming. The agricultural technologies for improved crop production are organized by typology, technology readiness and field operation. The modern methods of improved crop production are assessed by environmental, economic, labor impact, and ease of adoption by end-users. The scientific papers investigate mostly on techniques but the focus of the applied project is on the farm management procedures often using automation and

robotic techniques. The commercial development of agricultural products focusses mainly on economic impact and is less concerned about environmental issues or labor. In this context, the adoption readiness is an important criterion while discussing and analyzing smart agricultural technologies. The benefit of farmers and the environment is essential for the adoption of new technologies. The development of new technologies in agriculture will help «Agromonolit» owners to align their strategies for digitized agriculture adoption in current situations. The intensification in agriculture in a sustainable manner seeks high yield from existing farming land by reducing the impact of the environment. The optimization will also play an important role by scheduling irrigation and fertilizer on the farm concerning the yield of the crop and environmental effects. The trade-off between the conflicting objectives among environment used fertilizer, crop yield and labour efficiency are analyzed followed by providing a set of multi-objective solutions. This will help the company to prioritize and select the best solution for highest crop production. By using multi-objective solutions, the water, nitrogen and nitrogen leaching are reduced considerably in the irrigation system.

The development of agricultural management practice will also improve the crop yield considerably. In this context optimization of water and nutrients plays an important role in soil quality improvement that further improves the yield of the crop. The search for important constraints and optimizing them and decision making while building policy for agriculture will be very effective for «Agromonolit» in improved crop production. There are often conflicting objectives while managing resources for agricultural intake. For example, the total yield and total irrigation are conflicting towards each other. Modern optimization methods find the correct optima when there are conflicting objectives. The decision-makers in «Agromonolit» can use these optimum values while trading in their use case. The recent software-based crop modelling and optimization for objective function is quite novel and innovative for irrigation and nitrogen optimization in the high yield crop production. Hence, the analysis of various costs associated with the nutrient application, irrigation environmental impact and crop yield is essential for making decisions for efficient agriculture practices. In addition to this other socio-economic factor should be studied for the sustainable intensification of crop production for future agricultural

systems. Therefore, data analysis and follow-up are beneficial for the development of inventory for standards, practices, technologies, agreements that impact the agriculture in general and particularly for the «Agromonolit» enterprise.

All in all, we have discussed what challenges the implementation of technologies in agribusiness exist and how to cope with them. For the whole sector the main recommendations are:

- Carbon dioxide emission – by lowering carbon dioxide the quality of the soil and agricultural products will increase a lot. That will allow the producers to gain more profit, as the amount of good produced will be bigger and the environment for the harvest will be much better.
- Controlling the conversion of land – that will reduce the harmful impact on soil that is the result of deforestation and by controlling it, the companies can operate their business by not harming the environment and experimenting with different types of innovations for agribusiness.

“Agromonolit” can also increase its performance on the market a lot by considering some improvements which can result only in a positive way both for the company and the area where they conduct its business.

- Development and implementation of new technologies – the company should focus more on new technologies and try to improve this sector. In terms of crop output and environmental effects, optimization of innovations will also play an essential role by timing irrigation and fertilizers on the farm.
- Gathering and studying more data about development of technologies for standards, practices, agreements that impact the agriculture. That will allow the company to maintain their path towards being innovative company and help them to achieve much greater results in profit and crop maximization.

CONCLUSION

Finally, the study introduces a sustainable approach to the understanding of the modern agricultural business that is based on the implementing new technologies based on the example of «Agromonolit» enterprise. We have discussed that the development of agricultural management practice can improve the harvesting process considerably. In this context optimization of water and nutrients plays an important role in soil quality improvement that further improves the yield of the crop. The search for important constraints and optimizing them and decision making while building policy for agriculture can be effective in improved crop production. There are often conflicting objectives while managing resources for agricultural intake. For example, the total yield and total irrigation are conflicting towards each other. Modern optimization methods find the correct optima when there are conflicting objectives. The policymakers, farmers or other decision-makers can use these optimum values while trading in their use case. The recent software-based crop modelling and optimization for objective function is quite novel and innovative for irrigation and nitrogen optimization in the high yield crop production. Hence, the analysis of various costs associated with the nutrient application, irrigation environmental impact and crop yield is essential for making decisions for efficient agriculture practices. In addition to this other socio-economic factor should be studied for the sustainable intensification of crop production for future agricultural systems. Therefore, data analysis and follow-up are beneficial for the development of inventory for standards, practices, technologies, agreements that impact the agriculture system.

After conducting a research it was determined that the utilization of remote sensing, smart farming, and big data proves to be beneficial for farmers in enhancing agricultural production as well as enhancing as well as for addressing environmental impact. The results state that smart farming, when applied to agriculture, provides several advantages and is considered to be a non-destructive method to gather relevant data regarding broad geographical regions. Moreover, the use of remote sensing within agriculture, leads to the supply of operations goods like insurance from excess rain or drought, fire and flood risk assessment, and crop damage. The results also state that smart farming for large-scale crop

and land mapping is useful in examining the impact of modern agriculture technology in agricultural production in terms of evaluating and attaining environmental sustainability goals along with agricultural productivity.

It has been analyzed that the utilization of modern agriculture technology creates a positive as well as a negative impact on agricultural production and the environment. However, the current practices associated with modern technology in agriculture have become successful in overcoming such negative environmental impact. Also, it was mentioned that socio-economic factors and an increase in population resulted in food shortage. The growing population led to an increase in food demand, which affected agricultural production. However, to address these issues, the agriculture sector adopted modern agriculture technology, which helped in examining and evaluating crop yields and gain huge profits. It also proved to be helpful for potential stakeholders within the agriculture sector. However, the adoption of modern agriculture practices creates a negative impact on environmental aspects in various ways like reduction in soil fertility, climate change, water contamination, and land degradation. Thus, to overcome these issues, smart farming, big data, and remote sensing techniques are used, which enhances agricultural production without affecting the environment.

The paper determined the impact of modern agriculture technology on agriculture production and the environment. It has been observed that the paper used different research methods to gather relevant data. It also used a qualitative research method by observing in-depth interviews of farmers and business owners.

The first chapter of the research determined the overall essence of new technologies in agribusiness and why are they so efficient nowadays. Specifically, it was discussed in the first subchapter. Technologies are very important for agriculture as it increases fiber, food crop yields along with other necessary products for industries and made sure to reduce poverty and food security in a lot of parts all over the world. We also discussed that climate changes are crucial in agriculture, as it influence it mostly in a bad way. That is why implementing new technologies that will reduce the harmful impact of agriculture on climate and help the environment is very important. In the second subchapter we methods of such implementation were analyzed and it was clearly shown why such methods should

be more common on the market and how easy it is for the companies to implement those technologies in their business which will lead to the increasing of crop production, profit and company's performance without harming the environment. By analyzing all the gathered data and information we made a conclusion that methods for implementing such technologies are beneficial for the companies and will be cost- saving. The most common new methods are Smart Farming and Conservation tillage. These 2 methods were developed for increasing soil and crop quality by reducing the usage of soil in general which makes it less dry and more endured for harvesting. Also, in the third subchapter, the examples of local companies were provided in order to more carefully analyze what technologies are suitable and available for conducting business in Ukraine. There are quite a lot of new start-ups that are going to be launched and companies should pay more attention to them while they are only on start of the launch and it is easier to cooperate with them. We have analyzed the total situation of Ukrainian agriculture, its import and export policy which was statistically shown. Ukraine remains one of the leading agricultural countries in the world and blocking its export which was caused by the war will make the whole world suffer from seed and crop shortage. Moreover, we discussed all the major Ukrainian companies that invest most in the agricultural innovations and analyzed all the positive impacts which were caused.

Second chapter was focused on the general characteristics of «Agromonolit» enterprise and its performance in general on the Ukrainian soil. The first subchapter was about the economic activity and foreign economic policy of «Agromonolit». We have discussed its trading opportunities and cooperation with foreign partners on the global market. Also, we discussed the influence of COVID-19 and Russian invasion in Ukraine on the company's performance, its profit losses and how the firm helps its employers to maintain a stable level of life. TBTs have a great impact on the company as it is partially blocking exporting to some countries, so I conducted a research on how government protects its domestic producers and reduces the influence of TBTs. After gathering all the information from the company, in the second subchapter we described what technologies were already implemented and successfully used in operating the business while some others are only expected to be launched. Nowadays, the company's main focus is on drones and automatic

machinery which will reduce the labor force, will be cost-saving and will help the employers to complete a quality work. On the way of implementing the company is planning to launch a new system called “Laserweder” that will help to cope with the most common problems of Ukrainian field which is weeds. Hopefully, it will reduce the company’s usage of fertilizers which will improve the quality of soil and crops. Also, SWOT analysis was conducted in order to understand the company’s performance better. In the third subchapter there was an analysis of the company’s competitiveness with local companies and how «Agromonolit» cooperate with international firm. Trading also plays an important role in the economic activity of the enterprise. So, the higher amount of export of the company is the more competitive on the market it stays. That is why companies should invest more in innovation and be constantly in touch with their foreign partners. We have discussed the steps which company makes in order to differ from other companies and what uniqueness it offers to its clients. Also, it was discovered how globalization influences the global competitiveness and what steps are good to take in order to improve the position the local and international market.

As a result, after conducting all the researches and analyzing all the factors that can boost the agricultural sector, in the third chapter i have indicated a list of recommendations that I think would be properly integrated and be really helpful in some cases. The recommendations included more implementations of technologies in the sphere. How the technologies can be nicely inserted and what can be their impact.

Agromonolit’s performance is quite successful on the agricultural market. The company was one of the first which started using modern technologies and benefited a lot from that. It helped them to maximize their profit and improved the company’s image and reputation. The company remains competitive among other size related companies and is extremely popular among the local community.

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Примечание [A1]: Спробуйте знайти інформацію про сучасні бар'єри

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