Kyiv National University of Trade and Economics

The Department of World Economy

FINAL QUALIFYING PAPER (PROJECT)

on the topic:

«UKRAINE'S FOOD SECURITY IN THE FACE OF GLOBAL CHALLENGES»

(based on the Ministry for Development of Economy, Trade and Agriculture, Kyiv)

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«___» _____2020

Task
for a final qualifying paper
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1. Topic of a final qualifying paper:

«Ukraine's food security in the face of global challenges».

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2. Term of submitting by a student his/her terminated paper: _____.

3. Initial data of the final qualifying paper:

Purpose of the paper - to define the essence of FS and its components in order to make a comprehensive review of different approaches to such term; analyze internal and external factors which affect food security, form a number of suggestions, how to eliminate possible risks and barriers and ensure food security provision on a high level.

The object of the paper - process of analyzing and forecasting indicators of food security, drivers and barriers that influence a process of food regulation and provision in Ukraine.

The subject of the paper - combination of theoretical, methodological and practical aspects towards forecasting of food security level in Ukraine.

4. Consultants of the research and titles of subsections which were consulted:

Section	Consultant (last name and initials)	Date and signature	
		The task given	The task received
1			
2			

5. Contents of a final qualifying paper (list of all the sections and subsections):

INTRODUCTION

PART 1. THE ESSENCE OF FOOD SECURITY AND ITS MAIN FACTORS

1.1. Theoretical approaches for food security measurement.

1.2. Major trends and barriers for food security.

Conclusions to Part 1

PART 2. ANALYSIS OF UKRAINIAN FOOD SECURITY COMPARED WITH WORLD LEADERS

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PART 3. WAYS OF IMPROVEMENT FOR UKRAINE'S FOOD SECURITY

3.1. Prior tasks for strengthening food security level in Ukraine.

3.2. Forecasted analysis of effectiveness for suggested improvements.

Conclusions to Part 3

CONCLUSIONS

REFERENCES

APPENDICES

6. Time schedule of the paper:

No.	Stages of the final qualifying paper	Terms of the final qualifying paper	
		de jure	de facto
1.	Choosing and approval of the final qualifying paper topic	01.09.2019 –04.11.2019	
2.	Preparation and approval of task for the final qualifying paper	05.11.2019 –05.12.2019	
3.	Writing and pre defense of the 1st part of the final qualifying paper	06.12.2019 –22.05.2020	
4.	Writing and preparation of scientific article	till 22.05.2020	
5.	Writing and pre defense of the 2nd part of the final qualifying paper	23.05.2020 –15.09.2020	
6.	Writing and pre defense of the 3rd part of the final qualifying paper	16.09.2020 –01.11.2020	
7.	Preparation of the final qualifying paper (title, content, introduction, references, appendences), presentation of master diploma paper on the department and pre defense in the committee	02.11.2020 –08.11.2020	
8.	Additional processing, printing, preparation of material to final qualifying paper defense	09.11.2020 –19.11.2020	
9.	Presentation of the final qualifying paper on the department and on the deanery, receiving of referrals for external peer review	till 20.11.2020	
10.	Defensing of the final qualifying paper in the Examination Board	According to the schedule	

7. Date of receiving the task: _____

8. Scientific adviser of a final qualifying paper (project) _____ G.V. Duginets

9. Manager of the educational program _____ K.P. Kravets

10. The task received by the student _____ Daria Liu Bai Shun

11. Resume of a scientific adviser of a final qualifying paper (project)

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Scientific adviser of a final qualifying paper (project) _____
(last name, initials, signature)

Note about preliminary paper (project) defence _____
(last name, initials, signature)

12. Resume about a final qualifying paper (project)

A final qualifying paper (project) of the student _____
(last name, initials)

can be admitted to defence in the Examination Board.

Manager of the educational program _____
(last name, initials, signature)

Head of the Department _____
(last name, initials, signature)

_____, _____, 20__ .

АНОТАЦІЯ

Лю Бай Шун Дар'я Олександрівна. Продовольча безпека України в умовах глобальних викликів (на матеріалах Міністерства розвитку економіки, торгівлі та сільського господарства).

Випускна кваліфікаційна робота присвячена актуальній проблемі забезпечення та зміцнення продовольчої безпеки України в нестабільних умовах розвитку світових ринків. Дослідження виконано на матеріалах Міністерства розвитку економіки, торгівлі та сільського господарства.

У роботі проведено комплексний аналіз факторів, що впливають на стан агропромислового комплексу України, відтак на продовольчу безпеку на різних економічних рівнях. На макрорівні було проаналізовано структуру зовнішньої торгівлі продовольством, визначено основні тенденції та проблеми забезпечення сталого розвитку агропромислового ринку України. На індивідуальному рівні було виділено основні засади забезпечення достатнього рівня споживання для громадян як індикатора продовольчої безпеки. На основі проведеного аналізу розроблено пропозиції для стратегії щодо зміцнення потенціалу агропромислової галузі України, яка є запорукою для ефективного механізму забезпечення продовольчої безпеки.

Ключові слова: продовольча безпека, агропромисловий комплекс, прогнозування, індикатори продовольчої безпеки, продовольчий потенціал, внутрішнє споживання, експорт, імпорт.

ANNOTATION

Daria Liu Bai Shun. Ukraine's food security in the face of global challenges (based on the materials of the Ministry of Economic Development, Trade and Agriculture).

The final qualifying work is devoted to the relevant problem of ensuring and strengthening food security of Ukraine in unstable conditions of development of world markets. The study was performed on materials of the Ministry for Economic Development, Trade and Agriculture.

The paper includes a comprehensive analysis of factors that affect the state of the agro-industrial complex of Ukraine, therefore food security and food availability at different economic levels. At the macro level, the structure of Ukrainian foreign trade of food products along with the main trends and problems of ensuring sustainable development of the agro-industrial market were identified. At the individual level, the basic principles for sufficient level of consumption were defined as an important indicator of food security. The analysis suggested recommendations for the strategy of strengthening the agro-industrial potential of Ukraine, which is the guaranty for an effective mechanism of food security.

Key words: food security, agro-industrial complex, forecasting, food security indicators, food potential, domestic consumption, export, import.

CONTENT

LIST OF ABBREVIATIONS

B – billion

EU - European Union

EUR - Currency of the European Union, Euro

FAO - Food and Agriculture Organization of the United Nations

FS – food security

GDP - Gross domestic product

ha – hectare (-s)

m - million

MEDT - Ministry for Development of Economy, Trade and Agriculture of Ukraine

OECD Organization for Economic Co-operation and Development

R&D – research and development

SSSU - State Statistics Service of Ukraine

t - tonne (-s)

thou – thousand

UAH – Ukrainian Hryvnia

INTRODUCTION

The actuality of chosen topic is stipulated by increasing impoverishment and hunger of the masses in the world. Worldwide countries consider food security as an integral part of political and social-economic stability and state independence. The way food security is theorized, measured, and finally analyzed affects the typology of further policies that will be adopted. That is why it is significant to identify the meaning, components and drivers of such term and subsequently suggest a framework for analysis and recommendations.

Great contribution to the theory and practice of food security provision was made by next experts: A. Mostova, V.Boiko, V.Andriychuk, P.Sabluk, V.Balabanov, O.Varchenko and M.Bilokur. Among foreign authors it is important to mention T. Malthus, E.Reinert, R.Haug and M.Treacy, who formed a methodological basement for further studying of such topic. However, currently certain aspects of food security are still controversial and require further research and development. In particular, adopted strategies and reforms do not cover all trends and vulnerable points of agricultural complex in the country, thus the efficiency of current economic mechanism is rather low. Thus there is a need for new approach towards the development of food industry, aimed to strengthen food security level in Ukraine.

An objective of the paper is to define theoretical and practical aspects of food security in order to form valid suggestions towards increasing FS level in Ukraine. Such aim can be implemented by a number of tasks:

- to make a comprehensive review of different approaches to food security definition and measurement;
- to determine internal and external factors that affect food security;
- to define the evaluation methodology of food security level in Ukraine and consider its effectiveness in current conditions;
- to form a new strategy for food industry, which will eliminate possible risks and barriers and ensure food security provision at high level;
- to develop forecasts towards agricultural indicators of Ukraine, which will define food provision of the country in future.

The object of the paper is the process of analyzing and forecasting indicators of food security, drivers and barriers that influence a process of food regulation and provision in Ukraine.

The subject of the paper is a combination of theoretical, methodological and practical aspects towards forecasting of food security level in Ukraine.

The research was implemented by a number of methods, such as theoretical analysis (to form a complex overview over food security problem and its implementation), classification (to define main factors, drivers and indicators of food security), statistical, mathematic and graphic analysis (to evaluate influence of different factors on level of food security). Information scope of sources contain papers of Ukrainian and foreign scientists, laws and state acts of governmental bodies of Ukraine, statistical materials of the Ministry for Development of Economy, Trade and Agriculture of Ukraine and State Statistic Service of Ukraine, scientific publications and articles, international reports, Internet sources.

Scientific novelty of final results implies theoretical and practical justifications towards strategic decisions and efficient mechanism for providing and strengthening food security, focusing on industrial, economic and social development of Ukraine. Particularly, a new strategy for agricultural development emphasized on qualitative reforms in food industry, rather than quantitative figures. It included a new structure of agro complex and support for vulnerable industries along with the increase of balanced consumption and economic development.

Approbation and utilization of research results: article “The essence of food security and its main factors” in collection of scientific articles “International economics”, KNUTE, Kyiv, 2020.

Thesis consists of list of abbreviations, introduction, three parts, conclusions and recommendations, references, appendices. The volume of thesis is 61 pages. List of references includes 72 sources.

PART 1
THE ESSENCE OF FOOD SECURITY AND ITS MAIN FACTORS

1.1. Theoretical approaches for food security measurement

Scientific literature reflects a number of approaches for definition 'food security'. Even though there are some discrepancies in them, but one key feature encompasses both methods – namely a stable provision of population with food products. Simply put, food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Kostyrko, 2019). From this definition, four main dimensions of food security can be identified. For such objectives to be realized, all four dimensions must be fulfilled simultaneously (Table 1.1).

Table 1.1

Four dimensions of food security

Physical availability of food	Food availability addresses the "supply side" of FS and is determined by the level of food production, stock levels and net trade.
Economic and physical access to food	An adequate supply of food at the national or international level does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a policy focus on incomes, expenditure, markets and prices in achieving food security objectives.
Food utilization	Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet and intra-household distribution of food. Combined with good biological utilization of consumed food, this determines the nutritional status of individuals.
Stability of other 3 dimensions over time	Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on food security status of the masses.

Source: Pylypenko, 2018, 5-8

Generally there are 3 approaches to define the term of food security. The first points out on consumption as a final aim of food supplement (a constant access to goods in proper quantity). Thus, in order to reach food security, alternatives can be used such as import substitution or self-reliance. Supporters of second approach include production factor as well, or a country capability to provide population with

the food independently. Hence next tasks are raised: 1) to support food supplement at a proper level; 2) to provide appropriate level of purchasing power of people; 3) to decrease import-reliance and protect domestic producers. The third approach is based on two criteria: the essence of enough food in the country's food market which maintains a healthy lifestyle; the availability of these products for all segments of population. Thus, the aforementioned approach emphasizes the ability to ensure both physical and economic availability of food (Pylypenko, 2018, 6).

Food security is affected by a system of various factors, namely the quantitative and qualitative indicators of the availability of own and alternative resources, the level of their consumption, etc. All this combined into 5 essential aspects: political, economic, social, agricultural and the aspect of foreign trade.

Political factor characterizes the capability of the state to maintain its positive international image in the agrarian foreign markets and to provide its citizens with food consumption in accordance with accepted international standards and norms. In conditions of trade wars, when economic measures are used as an instrument of international policy, the basis for FS growth should be in form of improved agro-industrial strategy.

Economic factor reflects how the state mobilizes internal resources and enhances the potential to produce agricultural goods on its own and thus guarantee economic independence towards foreign markets. It plays a role of quantitative indicator for an assessment of food security in the country.

Social aspect defines employment of the population in agro-sector, its productivity and income. Besides, it includes measures for social protection of low-income categories of people, strengthening of social policy, achievement of equal cash income and social services in rural areas, equal social security conditions for all population groups regardless of type of work, accommodation etc.

The agricultural aspect shows the use of the agrarian potential of the country in the production of agricultural raw materials and food. It is characterized by certain efficiency indicators: crop yields, animal and agricultural productivity, labor and capital productivity and profitability of production.

Finally, the aspect of foreign trade reflects the interconnection of the world and domestic agricultural markets and is evaluated by next indicators: the volume of imports and exports of each product; the level of prices for different types of agro-products and foodstuffs of both own and imported production, the ratio of their level in the domestic and world markets (Mostova, 2016, 38-42).

All in all, food security is determined by efficient level of the whole economy. However, food resources derive from exact agro-industrial production. Therefore, such subsystems as food sale and distribution, food reserves and consumption, agro-industrial complex etc. refer to functional divisions. The structure of food security, depending on the environment, is shown in Figure 1.1.

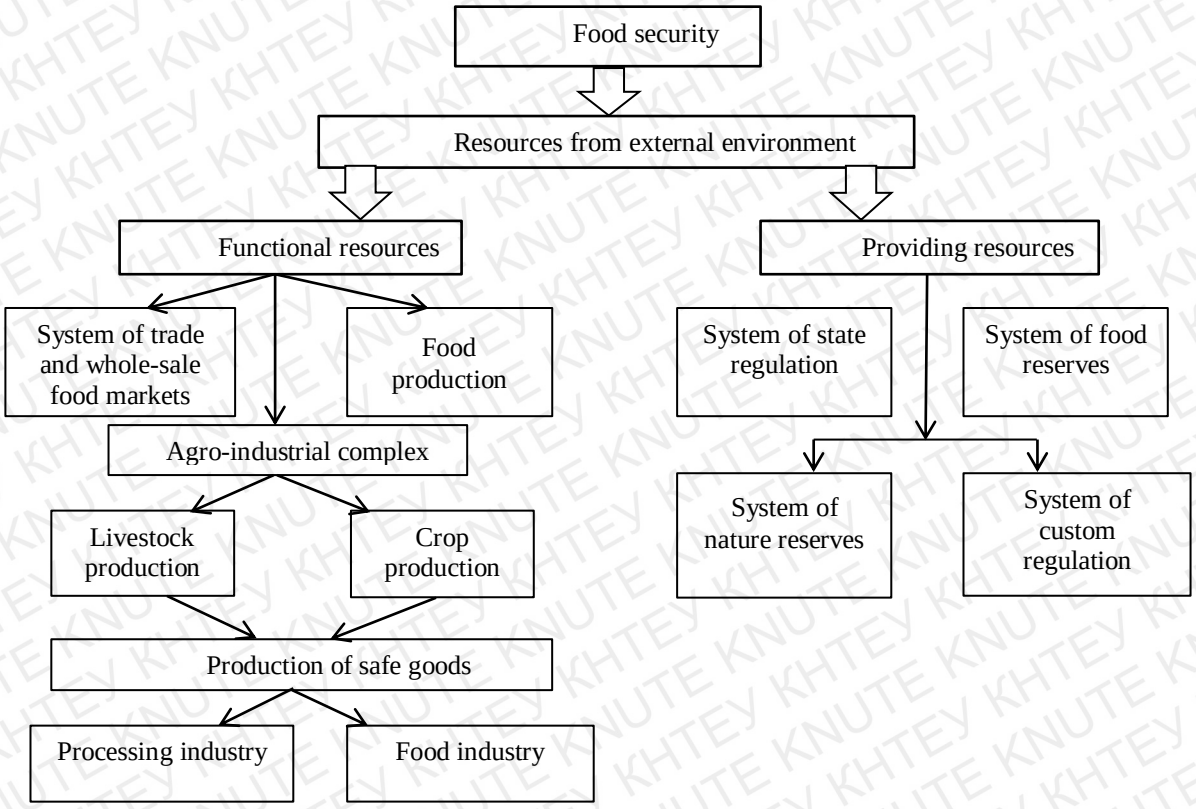

Figure 1.1. The structure of food security

Source: Kundieeva, 2019

The level of food security in each country can be measured by a complex methodology and a number of indexes. The first step of assessment shows the analysis of current state of food provision and includes calculations of economic indicators, risk quotients and their adjustment. As for the second part, major trends and tendencies on food market are considered, along with measuring the food

security indicators for each country. After that, the assessment of import-dependent regions is performed by finding common drivers, interconnections and correlation analysis of main factors. Finally, the risk analysis is carried out, which encompass all possible hazards of food security on certain market and classify regions by risk sources (Grynyshin, 2020, 142; Haug, 2018).

As for a sample of international organizations analysis, FAO Committee of World Food Security generally uses a number of indicators: food stocks in relation to forecasted volume of consumption on the market; dynamics of grain production in main countries – importers (China, India); share of grain stocks in total production volume; amount of supplement of 5 main agro-exporters (grain, corn, wheat) to a demand of import-dependent countries; export prices dynamics for the main grain products. In addition, FAO can use other indicators to measure a condition and perspective of FS provision in certain country. They are influenced by both external and internal factors and are also divided into 3 groups: presence of agro products, which gives physical availability to buy goods on a certain territory at any time; its economical availability, which implies a possibility for citizens to buy food despite their location and social position; health security and international economic integration (Table 1.2).

Table 1.2

Indicators for FS analysis on a country and global level due to the spheres of appliance

Spheres of appliance	Indicators
Presence of agro products; health care	- Amount of citizens, who are malnourished; - Share of population, who are malnourished; - Annual average consumption of energy from food per capita, % - Mortality among children before 5 years old per 100 born
Economic availability of products	- GDP per capita, $ - GDP increase per capita, % - Share of food expenditure in total costs of household, % - Share of merchandise trade to GDP, %
International economic integration	- Total amount of FDI to GDP, % - Dynamics of world trade increase and GDP,% - Share of word stocks of grain, corn, rice ,% - Index of import cost for the basic food products, $ m

Source: Pérez-Escamilla R. et al., 2017, 96-104

Thus, an assessment of efficiency of food security mechanism requires both quantitative and qualitative analysis through a system of special indicators and their dynamics, statics etc. Moreover, FS evaluation has to be implemented on 3 levels – global, national and local (individual). For the accurate evaluation of current FS condition and its needs, on the global level we should consider base, depended on the world grain stocks. Generally, save level implies stocks that are equal to 60 days of world grain consumption, or approximately 17% from the whole amount of its annual usage. Furthermore, on a country level we should measure the volume and structure of food import and the purchasing power of the population, interconnected with supply on food market and the level of self-maintenance of inhabitants (with their own households, farms etc.).

As for the food accessibility and calories per capita on individual level, in world practice there are 4 methods for measuring food security: 1) the Food and Agriculture Organization (FAO) method for estimating calories available per capita; 2) household income and expenditure surveys; 3) anthropometry; 4) experience-based food insecurity measurement scales. First three types are referred to direct methods of assessment, while the last one (FIES) is indirect.

The FAO method. It measures calories per capita using Food Balance Sheets and energy intake data derived from household income and expenditure surveys. Generally indicators of study include total calories available in certain year; number of people living in country; coefficient of variation of caloric intake. The advantages of this method are stipulated by fact, that the data in almost all countries is formed annually, and it is possible to estimate their daily per capita caloric availability. Besides, such method includes frequently updated information, thus allows observing national, regional, and global food insecurity trends across time. And lastly, such way of assessment is inexpensive.

From other side, the FAO method does not include dietary quality and hamper the understanding of intra-country caloric distribution of households. Furthermore, it supports the idea, that the caloric consumption above minimum caloric threshold indicates food security. However, it is far from the reality, as it is vital to research a

quality of consumed food and its influence on body condition. Finally, a poor standardization across countries along with high possibility of errors in numerator (balance sheets) and denominator (number of population) close the list of disadvantages for this method and make it questionable for a precise evaluation.

Household income and expenditure surveys. This method is based on interviewing respondents in their households by using certain information (for instance, the amount of money that they spend on food and other necessities), that is referred to different time periods like the week(s) or month(s) of the survey. Thus it estimates calories consumed on average per household member per day, and includes necessary information, such as quantity of food bought (or expenditures) and costs associated with different foods consumed within and outside the house; foods received by any household member as either a gift or as payment for work, goods or services; foods grown for consumption by household members (Clay M. et al., 2016).

The benefits of this method are that it identifies the households' risk of food insecurity, along with the determinants and consequence of food insecurity. Further, it collects dietary quality data that can be taken into account to understand the dimension of the food insecurity construct and to assess national food, nutrition, and anti-poverty programs. As for disadvantages, such method measures the amount of food available but not necessarily the amount of food consumed; accordingly, it is hard to consider amount of food consumed outside the household. Additionally, world countries use different methods for data collection and estimation of key parameters, making it difficult to compare the results across countries and regions. Finally, the method is quite expensive and requires major input from searching teams that can be the obstacle for an appliance nationally on an annual basis.

The Anthropometry method. Anthropometry is referred to an analysis of size, weight, body proportions and generally the composition of the human body. Anthropometric indicators measure the impact of both food insecurity and health status on the nutritional condition of people.

Considering positive effect of this method, weight and height measurements are highly standardized and are highly reproducible across individuals doing the

anthropometry. Also the cost of assessment is relatively low making it a very popular method in national surveys worldwide. Anthropometry also provides understanding of trends, determinants and consequences of malnutrition at the individual level. However, from the negative side, the interpretation of connection between food insecurity and obesity is complicated, as there is growing conviction that if a severe food insecurity cause body wasting, mild to moderate food insecurity may lead to obesity. The reason is that individuals in this category may rely heavily on cheap high-energy low nutrient foods.

The Food Insecurity Experience Scale. The only method that represents a fundamental or direct measure of food insecurity is the one focused on experience-based food insecurity experience scales (FIES). The FIES is a metric of severity of food insecurity at the household or individual level that relies on people direct yes/no responses to eight brief questions regarding their access to adequate food. It is a statistical measurement scale that evaluates a broad system of aptitude/intelligence factors, personality, and a broad range of social, psychological and health-related conditions.

Above all, it is the only fundamental method that measures directly not only the physical but also the psychosocial dimensions of food insecurity; the method can be used for mapping and understanding causes and consequences of food insecurity and hunger using the household as the unit of analysis; data collection, and analysis is straightforward and rather inexpensive, allowing for the decentralization of data collection efforts; the same scale is used, but with language adaptation, so that it can be compared across countries and provide relevant and predictable results.

To compare, if the FAO method concentrates on food insecurity risk for each person at the national level, other methods were focusing on assessing the risk at the individual or household level. Likewise, whereas some methods measured a number of determinants (like dietary intakes, food expenditures), others considered the consequences of food insecurity (anthropometry). All in all, provided methods complement each other and depend on the aim and level of the evaluation.

1.2. Major trends and barriers for food security

Nowadays, the world food security and overall sustainability of food and agricultural systems is influenced by key tendencies and trends, formed generally due to ecologic issues and sustainable development policies. Over the past decades, the process of agricultural intensification has caused changes in farm structures. The total amount of farms is declining while their average size is rising. Consequently, many farmers quit agriculture and find employment in other places. At the same time, agricultural production is becoming more specialized, changing from multiple crops to monoculture cultivation. It is becoming more capital-intensive, as farmers seek for higher value foods and cash crops, and such changes require higher levels of investment.

In nearest future global demand of food will expand rapidly due to several major trends, described below.

Rapid growth in global agricultural demand. The first is a rapid population growth, which is expected to reach over 9 billion by 2050, with most of the increase in emerging economies. Moreover, due to rapid pace of urbanization, the number of city inhabitants is expected to increase by 20% over the next decade (WHO, 2019). Consequently, the urban lifestyle will boost food consumption per capita. The second is an increase in income per capita. In emerging markets this indicator is expected to be 3 times bigger from now. Therefore, the consumption of food in developing nations will be driven up by the growth rate in income per capita. In fact, developing countries will consume more calories as well as go through a dietary shift to foods, such as meat, whose production requires a more intensive use of land, energy and water (Sheludko et al., 2018, 122).

Higher demand for biofuels. Increasing demand for biodiesel and bioethanol is a big factor behind the recent surge of global demand for corn, sugar cane and vegetable oil. More land will be diverted to non-food crops, leading to tighter supply and higher food prices (OECD/FAO, 2016).

Economic growth and population dynamics as the driver for structural changes of economies. The decline in the share of agriculture in total production and employment is taking place at different speeds and poses different challenges across regions. Although agricultural investments and technological innovations are boosting productivity, growth of yields has slowed to rates that are too low for comfort. Food losses and waste claim a significant proportion of agricultural output, and reducing them would lessen the need for production increases. However, the needed acceleration in productivity growth is hampered by the degradation of natural resources, the loss of biodiversity (Pérez-Escamilla R. et al., 2017).

Involvement of both rural and urban areas and supporting job creation and income diversification. Social protection combined with pro-poor growth will help meet the challenge of ending hunger and addressing the triple burden of malnutrition through healthier diets. Permanently eliminating hunger, malnutrition and extreme poverty also requires building resilience to protracted crises, disasters and conflicts, and preventing conflicts by promoting inclusive and equitable global development.

A rethinking of food systems and governance in order to meet current and future challenges. Vertically coordinated, more organized food systems will offer standardized food for urban areas and formal employment opportunities. But they need to be accompanied by responsible investments and concern for smallholder livelihoods, the environmental footprint of lengthening food supply chains, and impacts on biodiversity. These concerns need to be addressed by making food systems more efficient, inclusive and resilient (Birkenmaier J., Huang J., Kim Y, 2016, 194- 198).

A goal to sustainable development. One of the greatest challenges is achieving coherent, effective national and international governance, with clear development objectives and commitment to achieving them. Sustainable development is a universal challenge and the collective responsibility for all countries, requiring fundamental changes in the way all societies produce and consume (Pérez-Escamilla, 2017).

From other side, above trends pose a series of challenges to food and agriculture systems in total. Countries will possibly face various obstacles and unfavorable conditions which can lead to excessive increase of food insecurity.

First of all, the reasons of food dependence can be stipulated by products deficit on domestic level and low purchasing potential, which leads to disruptions in demand and supply on the national market. Such factor as reduced food availability along with imperfect social protection systems can push many people back into poverty and hunger. In the past three years, the number of people who suffer from hunger has slowly increased. This recent trend is confirmed by estimates of severe food insecurity in the world based on the Food Insecurity Experience Scale (FIES). Hunger is on the rise in almost all sub regions of Africa, the region with the highest prevalence of undernourishment, at almost 20 percent. It is also rising slowly in Asia, Latin America and the Caribbean (Global Hunger Index, 2019).

Furthermore, climate change will also affect disproportionately food-insecure regions, hazarding crop and livestock production, fish stocks and fisheries. An urgency to meet constantly increasing demands is likely to stimulate more intense competition for natural resources, with a growth of greenhouse gas emissions, and further deforestation and land degradation.

In addition, infectious diseases (COVID-19 and African Swine Fever) are hurting food production, disrupting supply chains and stressing people's ability to access nutritious and affordable food. A preliminary assessment suggests that the COVID-19 pandemic may add between 83 and 132 million people to the total number of undernourished in the world in 2020 depending on the economic growth scenario (WFP, 2020). There has already been challenges in terms of logistics bottlenecks, and similarly there is less food of high-value commodities (i.e. fruits and vegetables) being produced. Sectors in agriculture, fisheries and aquaculture are particularly affected by restrictions on tourism and restaurant industry. Vulnerable groups will include countries that depend on primary exports like oil, small-scale farmers, pastoralists and fishers.

Last, but not least, a role of geopolitical directions of world leaders can make a controversial difference into the dynamics of malnutrition volumes. As far as trade becomes more politicized, and armed conflicts are getting more tension, without a well-functioning and valid trade framework, geopolitical scenario can be harmful. That is why most experts are more and more concerned about success for the Zero Hunger target of the Sustainable Development Goals by 2030. A summarized view on primal and additional challenges, related to food security implementation, is presented in Appendix A.

Modern analysis of food security levels comprises not only trends and challenges, but includes a real situation on world trade market and agricultural industry itself. As for statistics, world merchandise export has been increasing on average by 1.8% per year for the last 12 years; food products saw the biggest increase, growing by 3.1% per year and rising by 36% compared to 2008 (WTO Statistical Review, 2019, 30). Thus, it additionally supports the trend of increasing demand for food products. Talking about trade leaders, top exporters that shipped the highest dollar value during 2019 include China, United States, Germany and others (see Table 1.4) The data also contains a change in the total value of exported products from 2018 to 2019 along with the share of each country in a world export.

Table 1.4

Top 10 countries by volume of export in 2019

Rank	Country	Export in 2019, $billion	2018-2019 change in export by country, %	Share in world export, %
1.	China	$2,498,6	+0.2	13.7
2.	USA	$1,645,2	-1.2	9.05
3.	Germany	$1,486,5	-4.5	8.22
4.	Netherlands	$721,3	-0.8	3.88
5.	Japan	$705,8	-4.4	3.18
6.	France	$555,1	-2.5	3.06
7.	South Korea	$542,3	-10.4	2.98
8.	Italy	$541,7	-1.5	2.93
9.	Hong Kong	$535,7	-5.9	2.95
10.	Mexico	$472,3	+4.7	2.6
World total = $18.1 trillion				

Source: Trendeconomy, 2019

Respectively, top leading countries-importers in 2019 are USA, China, Germany, Japan, UK and others (see Table 1.5)

Table 1.5

Top 10 countries by volume of import in 2019

Rank	Country	Import in 2019, $billion	2018-2019 change in import, %	Share in world import
1.	USA	2,068,9	+0.2	13.98
2.	China	2,567,5	-1.2	11.26
3.	Germany	1,240,5	-4.5	6.75
4.	Japan	720,9	-0.8	3.92
5.	UK	692,5	-4.4	3.77
6.	France	643,2	-2.5	3.5
7.	Netherlands	514,5	-10.4	2.8
8.	Hong Kong	578,6	-1.5	3.15
9.	Korea	503,3	-5.9	2.74
10.	India	478,9	+4.7	2.6
World total = $18.3 trillion				

Source: Trendeconomy, 2019

Considering world agricultural industry analysis, we can define top 10 leaders in export and import volume in 2019 respectively (see Table 1.6). Top ten exporters of agricultural products represented 72 % of world exports in 2019. The leaders were the European Union, the United States and Brazil. As for import leading countries, first place is given to China, which is now the world's largest agricultural importer, surpassing both the European Union (EU) and the United States in 2018 with imports totaling $133.1 billion. Next positions are taken by USA, Germany, Japan and others.

Table 1.6

Top 5 countries in agriculture trade 2018, $billion

Rank	Country-exporter	Exports, $B	Country - importer	Import, $B
1.	USA	172,2	China	133,1
2.	Brazil	93,8	USA	123,7
3.	China	83,1	Germany	94
4.	Canada	69,4	Japan	87,1
5.	Indonesia	46,4	Netherlands	54,1

Source: WTO, 2018

In sum, all main trends, fluctuations and trade restrictions on the world market can massively affect the food prices, disproportionately affecting poor consumers, and reducing overall production and food viability. Such changes can be interpreted through a system of food price indexes, which consist of the average of 5 commodity groups (meat, dairy, cereals, vegetable oil and sugar), weighted with the average export shares of each of the groups. Detailed characteristic of mentioned indexes is presented in Appendix B.

According to FAO statistics towards food prices in 2016-2020, each product category witnessed changes, depending on different economic and geopolitical measures, especially in 2020 (see Table 1.7).

Table 1.7

Food price indexes statistics 2016-2020

	Food Price Index	Meat	Dairy	Cereals	Vegetable Oils	Sugar
2016	91.9	91	82.6	88.3	99.4	111.6
2017	98	97.7	108	91	101.9	99.1
2018	95.9	94.9	107.3	100.6	87.8	77.4
2019	95	100	102.8	96.4	83.3	78.6
Oct 2020	100.9	90.7	104.4	111.6	106.4	85

Source: FAO, 2020

Meat prices have a tendency to increase due to population growth and higher demand. However, currently the index has dropped to 90.7, which is stipulated by the COVID-19 pandemic that is hitting both the demand and supply for meat. Due to restaurant closures and reduced household incomes, the level of consumption has become lower. Further, the FAO Dairy Price Index has recently increased due to the price quotations for all dairy products and robust import demand from Asian and Middle Eastern markets. The growth of Cereal Price Index was recorded due to increasing demand for wheat prices. At the same time, the production of wheat along with main exporters' volume has declined due to poor seasonal harvest in Brazil and Ukraine. As for corn market, U.S. government uses such culture for

biofuels production, thus lower supply on world market raise cereals prices as well. The Vegetable Oil Price Index is also strengthening, with growth of palm and soy oil market. The FAO Sugar Price Index has shown a decline for recent years, mostly because of lowered output in Brazil and India, the two largest sugar producing countries. The main reason is related to climate change issue and extreme dry conditions in regions. The high volatility of sugar prices can also be related to uncertainties in crude oil market and movements in the Brazilian Real against the US Dollar.

Overall, world experts consider current recession as the most massive for the last 80 years. Word Bank forecasts global trade decrease for 5.2%, and call further recovering as unstable and partial. The WTO supposed foreign trade to drop for 13-32 %, and the biggest impact will be exposed on export-dependent countries, such as Ukraine, with 72% share of raw materials in total exports (WTO Agriculture report, 2020).

Conclusion to Part 1

To sum up, several key conclusions can be drawn after the analysis of the essence, approaches, global trends and barriers towards food security. Scientific literature provides a number of approaches for the term ‘food security’. The first points out on consumption as a final aim of food supplement; the second approach includes production factor and stands for independent provision of foodstuffs for the country. As for the third one, it consists of two criteria: the essence of enough food in the country's food market and the availability of these products for all segments of the population.

Nowadays a big number of various factors are influencing world food security and agricultural potential. Therefore, 5 main aspects were formed: political, economic, social, agricultural and the aspect of foreign trade. As for methods of food security evaluating, they differ depending on goal of research and metric level (global, national or individual). Furthermore, the key tendencies and trends of food

security was defined, namely raising agricultural demand, increasing dynamics of hunger in certain regions, economic and population growth, reorganization of food systems and governance along with pursuing sustainable development goals. However, countries are expected to face certain obstacles concerning food security maintenance, which are closely related to climate challenges, logistic barriers due to quarantine regime, low efficiency and misbalance at domestic markets. That is why rapid changes and transitions in food systems will be urgently demanded and will call for effective governance systems and well-targeted policy responses.

Further, a statistical data of world trade history, with a specification for agricultural market were considered. As for global food export in 2019, the prevailing leaders include European Union, USA and Brazil; top global food importers were China, USA and Germany. It is supposed that the rising demand will be localized in Asian markets, so the situation and the leadership on the world area are likely to change in next few years. The impact of the COVID-19 outbreak on international trade is not yet visible in most trade data but some timely and leading indicators may already face the slowdown, like changes in Food Price Indexes. A 2021 recovery in trade is expected, but dependent on the duration of the outbreak and the effectiveness of the policy responses.

PART 2
ANALYSIS OF UKRAINIAN FOOD SECURITY COMPARED WITH WORLD LEADERS

2.1. Key role of Ukraine on global food market and its main comparative advantages

According to Global Competitiveness Index, Ukraine took 85th place among 141 countries (GCI Report, 2019). In addition, the export and import quota for goods and services is kept at a level of 45-50%, which indicates the openness of the national economy and sufficient capacity of the domestic market. This situation is perfect from the theoretical point of view: exactly the half of manufactured goods are consumed in the country, therefore, due to changes in market conditions, external or internal buyers have a sufficient supply of products. However, from other side, there is a discrepancy in the structural indicators: the import quota for trade in services does not exceed 6%, export quota –11%. That is, the production and trade of material products are much more intense than of the intangible (non-material) ones.

Furthermore, Global Index of Food Security was analyzed, where Ukraine took 76th place in 2019 among 113 countries (GFSI, 2020). As the index comprises economic development and resource provision of country along with its adaptation to natural and other risks, such result for Ukraine was based on balance between following positive and negative aspects in countries economy. First of all, Ukrainian strong features include expanded provision of resources, urban absorption capacity, low cost of food products and low import tariffs for agriculture. However, as for negative aspects, high level of corruption, mediocre food quality standards and low level of public expenditure on agricultural R&D were defined as main weak points (see Appendix C). Moreover, according to World Bank Data (2019), Ukrainian labor productivity is 5 times lower, comparing to EU countries. For instance, an indicator of added value for worker in agriculture in Ukraine is measured to be 6 times lower than in Europe, and it crucially affects an index of food security. Besides, other

factors that hinder Ukrainian development are a low GDP/capita, low productivity of soil usage and high level of political stability risk.

Considering its comparative advantages in relation to agricultural potential, Ukraine has unique opportunities, i.e. with its square of 60 million hectares crop territory takes about 70%. As for black soil square (28 million hectares, or 62% of total square), the country takes 4th place in the world after Russia, USA and China. Additionally, for a level of agricultural territory provision (0,9 ha per capita) Ukraine is at the 2nd place after Belarus(0,96 ha per capita) (Baliuk S. et al., 2017). Due to the current increase of food demand the world needs an enhancement of agricultural production, and Ukraine is considered to meet these needs with impressive results and a potential to feed about 600 million people.

Talking about current Ukrainian trade, in 2019 total product exports recorded $51.2 billion; total product imports reached $61.7 billion, resulting in a negative trade balance of -$10.5B (see Appendix F).

Considering the trade structure of export in 2016-2019 years, at first charts there were such goods as sunflower seed, vegetable oil, corn and wheat, defining them as top exporting goods for the last few years (see Appendix F). Hence, in 2019 top exports of Ukraine contained 52% of food products – Seed Oils ($4.12B), Corn ($3.51B), Wheat ($3.1B); metallurgical goods - Semi-Finished Iron($4.01B), Iron Ore ($2.89B), machinery and chemical products (see Figure 2.2). As for trade partners, Ukraine exports mostly to the EU ($20.75B), China ($3.59B), Russia ($3.24B), Turkey ($2,6B), Egypt ($2.25B) (MEDT, 2019).

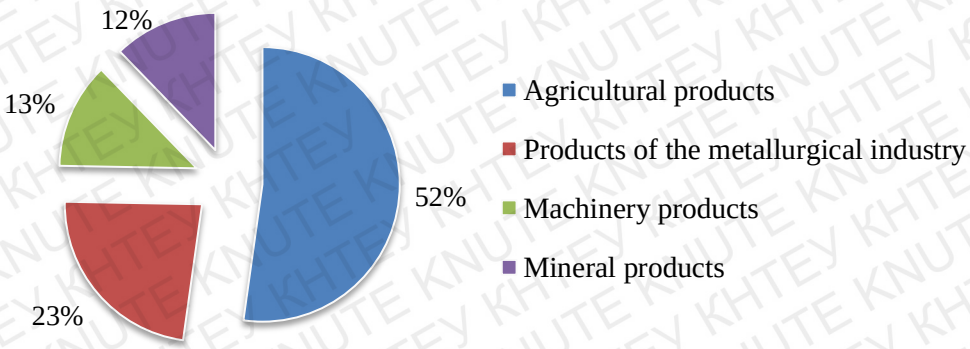

Figure 2.2. Ukraine's export structure in 2019, %

Source: SSSU

Further, the top imports of Ukraine in 2019 were Refined Petroleum ($5.47B), Petroleum Gas ($4.37B), Coal Briquettes ($2.63B), Cars ($1.98B), and Packaged Medicaments ($1.77B). Trade leading partners-importers included the EU (25.01B), China (9.2B), Russia ($6.98B), Belarus ($3,75B), and USA (3.28B) (National Bank of Ukraine, 2019).

Considering agricultural trade relations, the main markets for Ukrainian food export for the last few years were European Union, Asia and African countries, having a stake of 43%, 30% and 10% respectively. In total they recorded 90 % of agricultural exports value in 2019 (State Custom Service of Ukraine, 2019). As for trade relations with the EU, Figure 2.3 shows the dynamics of exports, imports and trade balance between the EU countries and the Ukraine from 2009 to 2019.

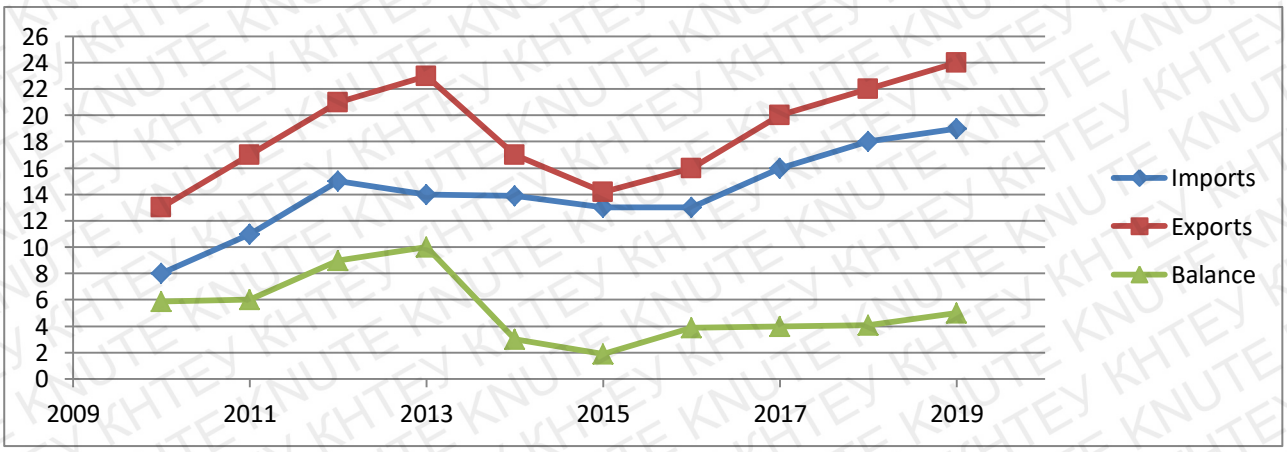

Figure 2.3. Ukraine food trade with EU in 2009-2019, EUR billion
Source: Eurostat

Due to the given data, in 2009, the EU had a trade surplus with the Ukraine of EUR 6 billion, and it remained stable throughout the whole period. Starting from 2014, Ukraine and EU cooperation was rather intense and had a result of implementing a free trade zone. Consequently, export and import volumes in 2019 were the highest throughout the history and equal to EUR 24 billion and EUR 19 billion respectively, with Ukraine positioning as the 19th largest partner for EU exports of goods (1 %) and the 20th largest partner for EU imports of goods (1 %).

Among main exporting countries of agriculture to the EU Ukraine took third place in 2018-2019, reporting EUR7.3 billion for export operations (Eurostat). Moreover, with the recent news about possible free trade agreement between Great

Britain and Ukraine the situation may improve further. New cooperation is aimed to strengthen county's position on the European market and increase the competitiveness of national producers abroad.

Furthermore, it is important to mention an increasing role of China in Ukrainian trade, especially in a context of agricultural industry. For instance, in first half of 2020 Asian countries boosted agricultural import from Ukraine up to 11,6 % ($4.31B), and held a stake of 47,4 % in defined industry (MERT, 2020). Thus China has become a main trade partner as a separate country, and its role in Ukraine's trade will be surely increasing further. As for Africa, this region recorded a 16% of share, importing for $1.47 billion of agricultural products. With its world's fastest growing middle class, Africa has become the target for Ukraine's farmers amid shifting export markets. The main products in exports during 2019 include grain crops, fats and oils of animal or vegetable origin, milk and dairy products etc. (The Embassy of Ukraine to South Africa, 2020).

Generally, the increase of export volumes of Ukrainian agriculture in 2019 was shown within most trade directions, excluding Russia, India and Iran. Unfortunately, most experts clarify that Ukraine is one of few countries that strongly undervalue such perspective market as India, which GDP grows annually for 6,7 %. Recently situation has modestly improved, and the goods turnover in 2019 recorded $1,9 billion, but future results are expected to achieve higher figures.

Talking about product structure, as it was mentioned, the largest export revenues of Ukraine over the last 3-4 years were from 2 commodity groups - vegetable products (21.3% of the total exports in 2019) and non-precious metals and wares from them (23.4%), respectively). In sum it recorded 19.3 billion US dollars. Another 30% of export is practically formed by fats and oils of animal or vegetable origin, mineral products and machines, electrical equipment and mechanisms (SSSU, 2019).

Grain crops are one of the most important items of Ukrainian exports. Ukraine is considered to be one of the top 7 exporters of wheat on the world market, selling wheat to 66 countries in 2019. For example, the volumes of wheat sales abroad in

2019 amounted to about 2.8 billion US dollars, or 16, 37 million tons (SSSU, 2019). The most important markets for sales are Indonesia, Egypt, Bangladesh and Philippines, providing about 48.3% of total wheat exports (see Table 2.1). The next 30% goes to Tunisia, Thailand, Spain, South Korea, Morocco and Turkey, however, the share of other countries did not exceed 3%.

Table 2.1

Ukraine's wheat export by country in 2019, $ million

Country	Export, $ million
Indonesia	487
Egypt	370
Philippines	280
Bangladesh	253
Other	1532

Source: Latifundist, 2019

As for wheat import, in 2019 crops for 3 million US dollars were imported from Germany (45.6%), Czech Republic (17.7%), France (15.1%), Poland (7.1%) and Belarus (5.1%). Together these 5 economies accounted for 90.5% of purchases. Additionally, Ukraine is a net importer of wheat from Serbia, Slovakia, the Russian Federation, Belgium, the USA and Finland (the total volume of trade from these countries did not exceed 4.4%). But despite such small amount of sales, more varied crops are bought abroad for landing, not for processing and consumption.

Talking about future trends on the wheat market, Ukraine wheat production is expected to reach 25 million tons, down 3.3 million tons from 2020 as a result of a reduction in the planted area and dry conditions in some parts. The geographical structure will be similar to current one, although there might be activation on Bangladesh market, and higher demand from China and Africa. Overall, COVID-19 is not expected to have any significant impact on wheat production outcome, so global production of wheat is forecasted to reach 758.3 million tons in 2021 (OEC, 2020)

As for Ukrainian meat market, top food categories produced in Ukraine include poultry, pork, beef and veal (see Table 2.2). In 2018 total export volume of meat achieved 472 thousand tons, compared to 395 thousand tones in 2017. Such success

can be related to wide geographic diversification of trade and successful positioning on new markets after losing a Russian buyer. Nowadays top 5 buyers of Ukrainian meat include Netherlands (14,2%), Saudi Arabia (11,4%), Slovakia (7,7 %), Azerbaijan (7,3%), Belarus (7,1%) (State Custom Service of Ukraine, 2019).

Table 2.2

Production, export and import of meat in 2019, thou.t

Type of meat	Production, thou. t	Export, thou. t	Import, thou. t
Poultry	1259	329	131
Pork	604	28,6	1,8
Beef and veal	288	41,8	1,4

Source: Meat-inform, 2019

The situation on domestic market of meat is quite complicated. Generally, the amount of livestock for the last 5 years dropped for about 23%. At the same time, low volumes of meat sales were caused by a number of factors: reduction of saw numbers due to low profitability, the spread of the ASF (African swine fever), reduction in consumer demand in view of low consumer purchasing power, a reduction in government support and loss of foreign markets.

Talking about poultry meat, it is almost the only industry in livestock that presents stable dynamics. The chicken production in Ukraine is rising from year to year, along with export volumes (410 thousand tones in 2019) and trade geography on the foreign market (SSSU, 2019).

Situation on a domestic market is characterized by high demand for poultry meat. Although internal prices are high, but due to lower prices chicken meat is more preferred than, for example, pork or veil.

Country's chicken industry is mainly dominated by one large producer, Myronivsky HlebоProduct (MHP), which takes over 70 % of total industrial chicken production. The company implemented a major expansion program and brought a significant increase in production and exports in 2019. Its strategy included acquisition of a Slovenian poultry producer, expansion programs in the Netherlands, Croatia, Serbia and Saudi Arabia etc. As a result, Ukraine became the world's

seventh-largest chicken meat exporter (Meat-Inform, 2019). The main importing countries of Ukrainian poultry include Middle East and the EU. First became Ukraine's top export destination by volume and the second one by value. Contrary to that, The EU market recorded the biggest sales by value, but is at the second place by volume. Further, neighboring former Soviet Union states and Africa are next top trade partners in poultry export (National Bank of Ukraine, 2019). Potentially, Ukraine considers South-East Asia as a new trade partner in poultry industry. Although currently exports of Ukrainian chicken to that region remain insignificant, but country's authorities are planning to open new market possibilities in nearest years.

As for import, Ukraine is predicted to remain a large buyer of chicken, mainly from Poland, Germany and Hungary. However, since cheap chicken offal imports from the Europe were substituted for exported chicken meat in the domestic market, the growth of poultry production in Ukraine along with the increasing availability of domestically produced goods will eventually eliminate the need for EU import. One more factor that will restrain import is devaluation of national currency that will stimulate export due to exchange differences.

Further, analyzing pork meat industry, there is a strong negative dynamics of pigs' livestock in both private and enterprise sector. For the last 8 years the amount of pigs in Ukraine has dropped from 7,6 million in 2010 to 5,7 million in 2018 (Gladij, Sychevskyj, 2018). There are 2 main reasons for that - low business profitability for such sector and a spread of ASF. Due to first aspect, a cost of pork production in Ukraine is currently 37-41 UAH/kg. However, a proper level implies 25 UAH/kg. Secondly, during 2012-2020 there were about 518 sparks of swine fever in the country, and such tendency hinders export of Ukrainian pork significantly. Besides, there is one more trend about change in pork firms' structure in Ukraine. Due to recent data, in 2019 country had 1700 pig enterprises and households. However, in 2015 such figure exceeded 2700. Consequently, a number of players on a pork market are decreasing, and remained participants are big firms with livestock of 2000-5000 pigs (Meat-Inform, 2019).

As for trade balance, main export volume of pork in 2019 recorded only 2,3 thousand tons and included top destinations such as the UAE (30% of total imports); Saudi Arabia (12.8%); Hong Kong and Vietnam (11.9%). Further, pork import for 2013-2019 periods has decreased massively – from 150 thousand tons to 23,2 thousand tons respectively (see Figure 2.4). In 2019 the majority of imported pork Ukraine bought from Poland (42%), Germany (17%), and Canada (13.5%) (State Custom Service of Ukraine, 2019).

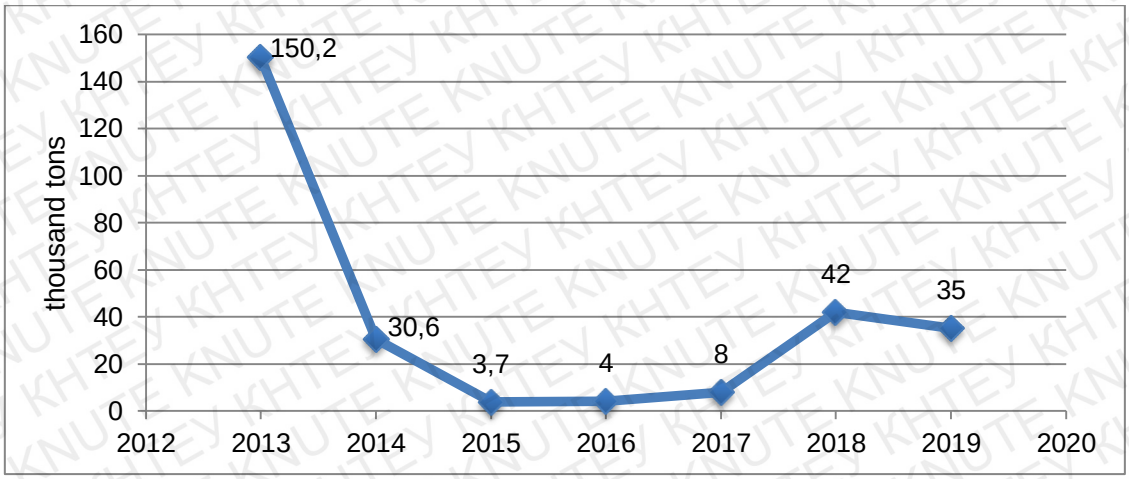

Figure 2.4. Import of pork meat to Ukraine in 2013-2019, thou t
Source: Latifundist, 2019

Considering the future of pork market, experts forecast that due to world population growth, pork consumption is likely to increase up to 131 million tons, and 60% of this amount will be given to South-East Asia (UNCTAD, 2020). Hence, Ukraine has a lot of perspectives for export growth; however, it is vital to solve such problems as epidemiological issues and governmental control over livestock standards. As for domestic market of pork, it is supposed that demand will decrease, and Ukrainian pork will be substituted by imported meat from Poland, Denmark and Brazil, or by cheaper poultry meat as an alternative. Thus, Ukrainian firms are about to reconsider the high cost of pork production and will start to get the profit not with high prices of realization, but with low manufacturing costs, as it is done by EU, US, Canada and Brazil. Surely, governmental support is necessarily required, because without financial, legal and social support successful future of Ukrainian meat market is rather questionable.

2.2. Analysis of effectiveness for Ukrainian food security potential

Globalization of world market and the increasing openness of national economies require an adequate response to the modern trends as well as anticipation of the impact of rapidly changing factors of food security in the countries. Thus a comprehensive methodology is required to assess such aspect on global, national and regional levels.

In Ukraine a set of methods and indicators in view of FS assessment is based on the resolution of Cabinet of Ministers of Ukraine from December 5th 2007 №1379 and comprises a scope of next indicators: daily energy value of the citizen's diet (kcal); sufficiency of consumption of a particular product (% to the rational level); the amount of stocks of grain in the country (and the volume of domestic consumption); economic affordability of agricultural products (% of food expenditures in the total expenditures of citizens); coefficient of differentiation of expenditures on subsistence by social groups of the population; the capacity of the domestic market for certain agricultural products; food independence in terms of agricultural trade (Cabinet of Ministers of Ukraine, 2007). Such systemized approach can provide a whole picture of the situation with food security, facilitate the identification of possible trends in the context of stable external conditions, as well as identify potential threats and give grounds for promising directions for strengthening food security. On this basis, it will be possible to determine the potential of industry by maximizing the use of available resources in a country and strengthening the competitive position of domestic producers in the European and world food markets.

Talking about current position of Ukraine on the global market, it has witnessed positive changes in forms of cooperation and new markets entrance. Signing the EU-Ukraine Association Agreement and the Free Trade Agreement with Canada has brought a significant advantage for the country and provided favorable conditions for agriculture trade. However, despite the governments' initiatives, Ukraine's brand image still needs more recognition and marketing efforts. Generally, export

activation is often hampered by the lack of information about new trading partners and the capacity of the consumer market, rather than by real tariff and non-tariff barriers. Therefore, the country tries to use a niche approach on EU and North American markets, as well as search for untraded markets.

In order to analyze the efficiency of export potential, Index of revealed comparative advantages (RCA) can be applied. Most developed countries have a low concentration of export items, as usually their trade portfolio contain various types of products, thus they are more flexible in aspect of world changes. Therefore we should analyze Ukraine's specialization on world markets and its potential to keep strong position as a foreign player.

The formula for RCA (Balassa) Index includes such calculations:

$$RCA = \frac{Xij/Xrj}{Xiw/Xr} \qquad (2,1)$$

where Xij - export volume of item i of country j; Xrj - total export volume of country j; Xiw - world export of item I; Xrw - world export in total (Balassa B.,1965).

As an example, top grain cultures of Ukraine's export in 2018 were used, such as wheat, corn and barley. For comparison, same items were taken for EU grain export. The data is presented in Table 2.3.

Table 2.3

Balassa Index calculation for Ukraine and EU, 2018

Export item	Export volumes, $ m		RCA		Export price, $/t	
	Ukraine	EU	Ukraine	EU	Ukraine	EU
Wheat	3004	7025	28.15	1.991	166.4	223.1
Corn	3032	3994	42.84	1.085	166	204.4
Barley	681.9	1292	43.28	2.911	157.6	283.9

Source: author; UNCTAD; COMTRADE

Thus, even though EU countries sold bigger volumes of defined products, Ukraine's RCA recorded bigger indicators. Difference can be explained by high stake of grain resources in Ukrainian exports, and differentiated export of high-technological goods by the EU. In addition, the main advantage of Ukraine's export

was low prices for grain products, caused mainly by low demand on the domestic market. Due to the index categorization (Balassa B., 1965), index over diapason 4 implies a strong competitive advantage in such industry. It means that Ukraine RCA approves country's strong position and future possibilities on the grain market.

Further, to analyze the effectiveness and intensity of Ukrainian intra-trade, the Grubel-Lloyd index was used to identify exact areas that require the most attention from the government. The methodology for estimating intra-industry trade can also be used in geographical dimension, to calculate the ratio between export and import in all positions for each country separately. The index equals 1, when exports and imports volume is at the same level, meaning that intra-trade of a country is improving. Index equals 0, when only imports or exports are prevailing (Grubel H. G., 1995).

Firstly, the intra-trade index of Ukraine in 2018 was analyzed separately for each country (see Figure 2.5). As a result, in most cases Ukraine had a high index (tending to 1), which means that it had the most balanced foreign trade with the following countries: Austria; Azerbaijan; Belgium; Denmark; Indonesia; Kazakhstan; Colombia; South Korea; Mexico; Poland; Uganda; Hungary; Czech Republic.

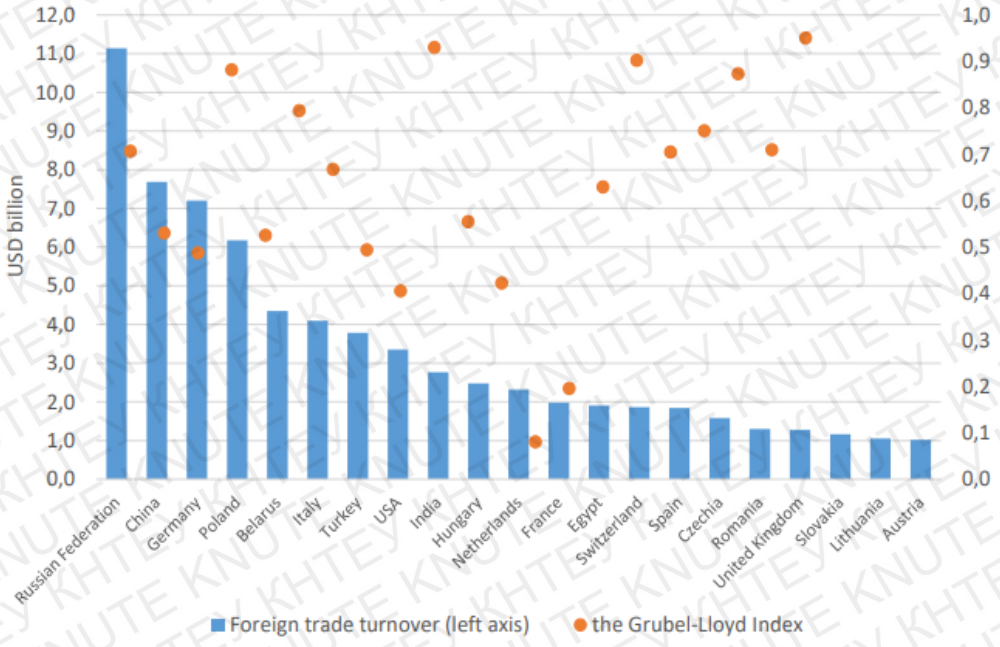

Figure 2.5. The Grubel-Lloyd index for largest foreign trade of Ukraine 2018
Source: Innovative Marketing, 2018

Furthermore, G-L Index was considered in relation to the summary export volumes in 2018 (see Table 2.4). Total number of trade partners included 158 countries with trade surplus trend in 98 countries. Due to the dynamics of index, the figures were decreasing every year, and the trade with Europe remained stable.

Table 2.4

G-L index for Ukraine exports, 2016 – 2018

	2016	2017	2018
Total trade	0,491	0,474	0,466
EU-28 trade	0,518	0,498	0,510

Source: author; SSSU

In addition, in 2018 seven leading product items took 84, 6 % of total export (see Table 2.5). Thus, for the comparison, G-L indexes of main product groups in export and import were taken in order to evaluate the dynamics of intra-trade for the 2016-2018 periods.

Table 2.5

Grubel-Lloyd index of Ukraine by exported/imported product group, 2016-2018

Product group	2016	2017	2018
Exports			
Products of plants origin (corn,wheat, barley etc)	0.135	0.158	0.162
Oils of animal or vegetable origins	0.105	0.117	0.109
Finished food products	0.610	0.559	0.572
Imports			
Mineral products	0.175	0.194	0.194
Products of chemical industry	0.406	0.343	0.416
Cars, equipment and mechanisms, electric equipment	0.772	0.631	0.603

Source: author on base of SSSU

As a result, the largest commodity export and import positions differ, which indicates a low degree of intra-industry trade at the level of diversification by small groups. In imports, chemical industry (medicines and mainly crop products), cars, equipment and machinery prevail, while in exports – agricultural products

(sunflower, safflower or cotton oil, corn, wheat, barley, soya beans etc.). Hence, there are two aspects of such results: first, high figures of intra-trade in chemical and car manufacturing can claim about increase of competitiveness of such products; second, too high export concentration in few categories can lead to strong dependence on world market and vulnerability to prices fluctuations. From this point it is important to solve the issues of exceeding export concentration and low level of intra-trade by restructuration in Ukraine's export.

Considering food securement on domestic level, due to the report of Ministry for Development of Economy, Trade and Agriculture of Ukraine (2019) country can provide itself with main food product groups and simultaneously remain an agricultural exporter, keeping leading positions in seed oil, grain and poultry export in the world. In such way country directly implies a full extent of physical availability of food, which equal to 2706 kcal per capita. At the same time, there is a questionable situation, why an increase of food production and trade of agriculture do not significantly solve the problem of insecurity and undernourishment of most social groups. For example, due to the statistics, for the last 8 years grain production has increased in 2,9 times, however, a level of calories consumptions per day grown only for 2 % (see Appendix G).

The main reason is not a physical, but economic availability of food in the country. There is a low level of purchasing power for the majority of social groups. Due to statistics, in 2019 Ukraine took the last place among 42 European countries, recording income of 14 739 euro per capita (GfK Purchasing Power Europe, 2019). Moreover, due to low income level, a share of food costs in middle-class household expenses equals 52.6 % in 2018 that is 3-5 times higher than in Europe (20-25%). Thus a decrease of income starting from 2014 crucially limits purchasing power and ability of proper nutrition. One more negative factor in terms of food security is referred to poor balance in consumption among Ukrainian population. In 2015-2019 there is a visible decrease of consumption volumes for a number of categories. For instance, products of animal origin are realized only for 30% compared to required 50%; dairy products hardly reach a half of accepted norms; the same situation is for

fish products and fruits (see Appendix G). As for bread, potato, sugar and oil categories, Ukrainians consumption exceeds rational norms and cause a rise of nutritional degradation and lack of vitamins and minerals. Obviously, it is justified by higher price availability of such goods. Totally, energetic value of consumption in 2018 recorded 2700 kcal per day, with accepted norm of 2500 kcal, however such nutrition is provided by products of animal origin only for 29%.

As for the effectiveness of agriculture distribution on domestic and foreign markets, we can take an example of oil production. The positive effect from its massive export is seen in foreign exchange earnings and increase of working places. However, in aspect of social and economic sphere the overall influence of oil production growth is not significant. Domestic market consume 600 thousand tons of oil, meanwhile produced volumes equals 4 million tons (Pylypenko, 2018). Consequently, we can supply other countries with huge amount of resources, but cannot provide enough meat, milk, fruits and other vital products for most of the population. Such case leads to the inadequate and irrational distribution of production facilities and lack of development for the strategic food categories. That is why Ukrainian agricultural complex should not be considered only as a source of foreign currency, but also be aimed to improve proper nutrition and higher consumption volumes of citizens. As for the food import, domestic level is generally supplied for not more than 30 % of imported goods. However, 3 most vulnerable positions that exceed this limit in aspect of import dependence include fish and its products (74%, import share of total consumption), oil (palm and coconut oil, 44.1%), berries and fruits (36%) (see Appendix H). Such exceptions are connected with a natural features of mentioned goods, e.g. with fish cultivation processes in different climate zones and exotic origins of most imported fruits, but, nevertheless, they are not consumed at proper nutritional norms.

Considering these aspects, it is reasonable to claim that it is quite difficult to increase the domestic production to the required level and to limit food imports at the same time. This is step-by-step process, which include lots of components, such as increase of the population solvency, higher level of food consumption; improvement

of food structure by increasing animal products, vegetables and fruits stake, balanced volumes of imports and exports of agricultural products, raw materials and food etc.

Governmental support plays a significant role in economic mechanism of food security. In Ukraine such instrument as Memorandum between the Ministry and the exporters guarantee safe dynamics of export operations and can provide needed 5-6 million tons of grain at country's reserves (Ministry for Development of Economy, Trade and Agriculture). However, due to current crisis effects of Covid-19 and rather active export of grain stocks government seeks for new instruments and institutes for ensuring food availability. For instance, a providing function of food security can be implemented by few institutions, such as "Derzhreserv', "State Food and Grain Corporation of Ukraine" (SFGCU) and "Agrarian Fund". The last one can be chosen as a holder of country's grain stocks; however the government interventions should foster this process and provide Fund with at least 5 bread-making plants. Therefore facilities will be used more effectively, and the Fund will save money by using its own processing and storage capacity.

For current period government policy has a number of negative aspects due to inefficient measures and reforms towards food industry, i.e.:

- lack of state supporting and stimulating programs towards processing industries;
- low development of rural areas;
- slow adoption of international standards for food quality and safety;
- lack of qualified labor in agriculture industry;
- low involvement of modern and technologies and innovation into manufacturing;
- poor system of subsidies and affordable loans for farmers.

According to Decree of the President of Ukraine №392/2020, new strategy of national security of Ukraine was recently approved, including part on food security strategy. Particularly, main tasks are aimed to reform land relations, provide clear mechanism of soil use and ensure environmentally oriented development of the agro-industrial complex and food security. In addition, in August 2020 government presented a supporting strategy for agricultural complex in 2021-2023, aimed to increase effectiveness of strategic food industries, e.g. livestock production, farming,

gardening etc. (see Appendix J). New possibilities will be also available for niche cultures (buckwheat, rye), organic production and crop insurance, resonating to world and national market trends. Thus such state programs and strategic decisions are expected to increase the effectiveness of food security mechanism in Ukraine and enhance the activity and capital investments in vulnerable food industries. The successful implementation of such measures depends not only on its settlement, but on proper mechanism of control and realization, especially in current economic conditions.

Conclusions to Part 2

To sum up, the analysis of Ukraine's comparative advantages and drawbacks of economy has shown that the country has a lot of benefits in context of agricultural trade and clearly realizes its potential in grain exports, which was proved by RCA Index calculations. However, negative aspects such as resource-based export concentration become a barrier to achieve food stability. Hence in 2019 Global Food Security Index Ukraine took only 76th place among 113 countries.

As for trade structure, food products take a major part of country's exports (about 40%). Ukraine has a strong position on world grain market, but as for meat industry, the country has a lot of problems and risks, caused by livestock decrease and low business involvement. In aspect of geographical structure, main partners – the EU, China and Africa – encompass 90% of food export. In addition, the analysis of effectiveness for food security mechanism was implemented, depending on agricultural structure and international activity on global food market. Considered national methodology provides a comprehensive measurement of FS at both national and local levels. Further, in order to evaluate the effectiveness of Ukraine's intra-trade, Grubel-Lloyd index was used. As a result, it has shown that high export concentration in few categories implies a strong dependence of Ukraine on world market and vulnerability to prices fluctuations. As for domestic level, it was stated that the main problem of food provision is not physical, but economic availability.

Analysis of statistics has shown that a lot of nutrition norms are not met. It is a top priority issue because the efficient consumption of food products is related to stable economic growth and driver for food security strengthening.

Finally, a system of governmental measures was considered in process of agriculture regulation and food provision, determining that there are certain problems in state policies, which hinder effective food security process. However, a new program of agricultural support for 2021-2023 is expected to improve its agricultural complex structure and production capacity. In summary, considering the analysis of effectiveness of FS mechanism in Ukraine, a proper level of food provision is not achieved yet. Modern level of agricultural market and foreign trade in context of its inefficiency caused disruptions in people's food consumption and balanced nutrition, as well as degradation of strategic food industries and farming activity. A new strategy is required that will cover existing issues on food market and will achieve a long-term goals for strengthening agricultural potential.

PART 3
WAYS OF IMPROVEMENT FOR UKRAINE'S FOOD SECURITY

3.1. Prior tasks for strengthening food security level in Ukraine

The development of the food industry is considered in terms of both food and economic security of the country and its regions. The analysis of existing tendencies in the development of the food industry and factors influencing makes it possible to determine the necessary tasks and policies in aspect of food provision.

The initial step in strengthening foods security of Ukraine should be made with assessing ongoing problems and challenges in food industry. Talking about threats towards food provision, they may be united in 5 groups:

1) economic (small-scale production, inconsistency with international standards of quality and safety; increased dependence on public funding; difficulty product sales by small farmers and individual farms; adaptation of the Ukrainian normative legal acts to the EU requirements; low economic efficiency of agricultural production in comparison with other countries; low investment, limited geography of foreign trade);

2) industrial (the use of outdated technologies; failure of agricultural production technologies; low level of organic and ecological production; control of the amount and terms of import depending on market necessities; creation of high quality standards and control over food safety indicators);

3) environmental (soil degradation; changes in temperature, change in water regime, environmental pollution; changes in the natural biological cycle; lack of control over the use of veterinary preparations);

4) social and demographic (rising unemployment; low purchasing power; reduced life expectancy; the aging of the working population; low level of qualification of personnel);

5) infrastructure (insufficient volume of fruit and vegetable warehouses; inadequate technical support for producers of agricultural machinery and poor service).

Economic mechanism plays integral role in food insurance and is aimed to provide citizens and enterprise with proper amount of food products and resources despite foreign environment influence and other factors. It is a complicated system of economic measures and instruments, which are directed to solve food insecurity reasons by stable food supply, maintenance of food reserves and decent income abilities of the population (see Figure 3.1)

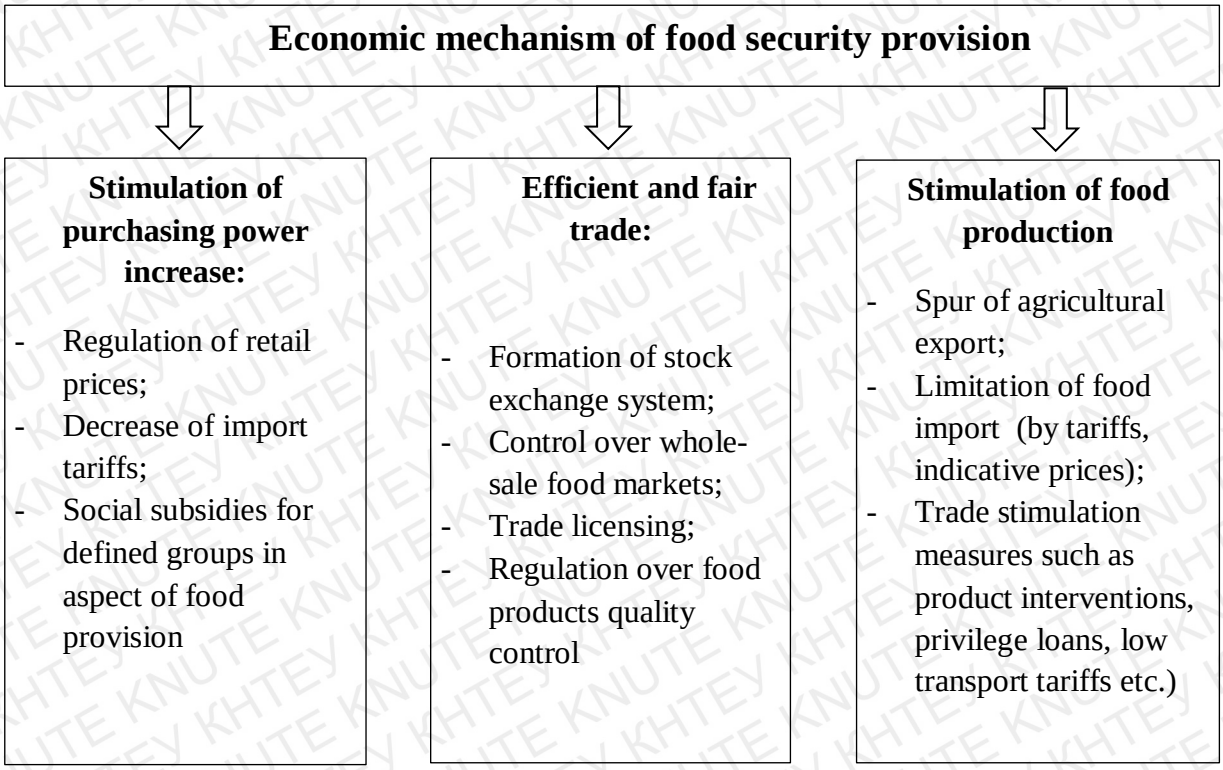

Figure 3.1. Economic mechanism of food security provision
Source: Kuts, 2019; Mostova, 2019

Reliable food security, which is implemented via domestic production, plays an important role in Ukraine's strategy and thus leads to the strengthening of not only food security, but to the national safety integrally. It is not necessarily to produce all kinds of agriculture to ensure food security; the perfect formula implies export of overproduction and import of such goods, which is not common on defined territory. Moreover, agriculture industry with biggest potential should be provided by strong

governmental support, as it is presented in foreign countries. For example, USA as a main exporter of food products and grain in the world has a level of state support about 40% towards produced value of products. EU countries level equals 35%, Japan and France – 72%. To compare, Ukraine has only 8.3% (WTO, 2019).

Additionally, food security should be considered as a vital stipulation of social and political stability of a country, along with reaching an international economic independence. The implementation of efficient food security system directly depends on next factors:

- structural changes in agricultural complex;
- investment policy of the state;
- technical provision;
- tax legislation improvements;
- operating system of crop insurance and agricultural assets of enterprises;
- scientific and informational supplements.

Considering such an extended amount of factors influencing food security mechanism, a system of steps and measures has to be complicated and fundamental as well, so that food safety will be achieved on all levels and in all forms. Thus the tasks for food security strategy in Ukraine should be based on 3 groups of determinants, which will cover global, national and regional levels of FS. In terms of Ukraine international integration on world market, economic mechanism of food security can be further improved by next steps:

- harmonization of legislation systems with EU laws;
- clear organization of agro market with competitive environment;
- boost of value-added food export;
- use of integration advantages and entrance to new trade markets;
- formation of agricultural financial and credit system;
- support of positive image of Ukrainian producers on world market.

To implement food security on the national level, a system of suggestions can be recommended, based on to modern trends and risen challenges on agricultural markets. First of all, a careful control process should be adopted over all processes in

agriculture industry. For instance, a price control over production resources and finished products; loans and antimonopoly regulation; ban for food import of categories, which can be produced domestically in order to protect national traders (Mostova, 2016). Therefore there is a need for proper state body that will be able to execute all required functions and will facilitate food production, distribution and trade in Ukraine. That is why a formation of Ministry for Agriculture remains a prior goal in country's institutional system.

Besides, a country's policy should not overlook such instrument as quoting. The main point lays in control over the production and price limits, so that there will be no over-producing, and domestic prices will remain at high level. Thus, it is advised to expand quotes within existing agreements and diversify exported product range. Besides, among 36 agricultural categories government should find ones with biggest limitations and try to change size of quotes, tariffs or other modules. Further, such instrument as an insurance system should also be added to FS policy, since it is vital to evaluate current and potential risks and threats on food market and be able to avoid insolvency as soon as possible. This statement can be supported by the fact, that most developed countries in the world have been already using such method of crop insurance, and it can be helpful for Ukraine to implement such experience in nearest future (Vasylieva, 2018, 215-220). In addition, it is urgent to form and adhere to a national strategy of economic and export development. Particularly, it is significant to create favorable conditions for the investors in such spheres, as transport manufacturing plants, tractors and combines etc. Ukraine is the third agricultural exporter in the world, but spends billions of dollars on import of technical equipment, and such situation hinders country's real potential. Besides, flow of investment into agriculture will increase quality of Ukrainian products, making them more competitive worldwide.

In aspect of strategic improvements for industries, a grain production requires serious reorganization. Particularly, most part of grain crops should not be just exported, but processed and finished in form of high added-value product. From annual 70 million tons of grain crop only 20 million tons is directed for domestic

consumption (AgroPolit, 2020). Thus, other 50 tons give a strong potential for processing industry. Another issue is related to irrigation systems, especially in southern regions. Effective water supply should be designed in order to prevent farmers from vast crop losses. From other side, a state support and debt refinancing opportunities should be available in case of extreme natural occasions or other factors. Furthermore, Ukraine's strategy should include development of organic production. Currently, country has 400 organic farmers and enterprises, being 20th country in the world in context of organic soil square (AgroPolit, 2019). Most of products are oriented for export, especially to the EU countries. Thus, a proper state program and legislation control will make Ukraine more competitive on world market and increase food safety on domestic level.

As for meat industry, main goals are to improve epidemiologic situation around the country and to create favorable conditions to activate a rise of meat farming. Precisely, a system of sanitary-veterinary services and standards should be presented, including identification and registration procedures for agricultural animals. Thus a risk of ASF sparks will be eliminated more effectively, and Ukraine will not be limited in export volumes of pork due to safety issues of produced meat. Besides, legal basement is important, as farmers are prone to violate or avoid registration procedures. The results of such measures will make meat affordable and available to the Ukrainians, and possibilities for export expansion will foster industry development.

On the regional level, main suggestions rely on regional decisions, efficient distribution of local budgets and adjustment to climate and economic conditions in each region of Ukraine. A number of goals for strengthening FS for households in regions in Ukraine include the following:

1. Public regulation of food industry development of the regions. In order to ensure positive changes in the development of the agriculture in regions, state regulation by economic methods is necessary. Primarily, it is urgent to spur an increase in livestock production. It will not only improve the structure of food consumption, but will also help to restore soil fertility. For instance, on the arable

territory of 1 ha there should be a defined number of animals: 2–3 cows, or 25 pigs, or 2500 chickens.

2. Implementation of financial benefits in growing crops, maintaining soil fertility. It is necessary to ensure balanced production of various crops taking into account their impact on soil fertility, along with experts' recommendations on rational crop rotation. Besides, a land plot for a period of at least 20 years can be formed as an agreement to reflect the obligation to maintain the soil until the end of the lease term.

3. Creation of regional funds for ecologically safe land use. It resonates with global experience of creating various non-governmental organizations, as well as legislative regulation at the local level of the business relationship. In addition, due to the decentralization of public power, it is suggested to give local Ukrainian authorities the right to regulate relations on environmental protection.

4. Improvement of social and economic situation in regions. Currently most social groups are exposed to food economic shortage due to low purchasing power and other economic factors. Such task for security strategy implies an effective economic mechanism to increase level of income, employment and provide valid legislation for food safety and quality standards. (Cherevko, Yakovenko, 2016). Main measures for internal state support include money subsidies and direct food supplements for certain social categories. It will help to achieve balanced consumption on individual level, stimulate agricultural complex for growth and import substitution, and finally ensure economic stability as a main driver of food provision.

All in all, defined tasks of strengthening food security in Ukraine are based on structural changes in both agricultural complex and economic mechanism. Previously most strategies for food industry had short-term plans and were inefficient for modern tendencies on national and world market. That is why a future strategic plan should contain long-term goals, forecasts and ways of its implementing in long-term aspect for at least 10 years.

3.2. Forecasted analysis of effectiveness for suggested improvements.

A new strategy of agricultural complex, based on defined tasks and risks, is expected to strengthen food security mechanism of Ukraine. Main positive changes will include improvement of country's positions on world market, the creation of attractive business and investment environment on national level and increase of social and economic prosperity along with balanced food consumption on local level. The most perspective fields of agriculture will be the meat industry and processing facilities of high added-value products. In addition, a growth of GDP and GRP is expected, which will be a resource for state budgeting and social funding. Simultaneously, due to technological improvements food prices will become lower, eliminating the gap between certain social groups.

Based on prior ways of improvements for Ukraine's agriculture and overall food security situation, an effect of new strategy will be reached by export limitations and new production of finished products with higher added value at higher prices. Besides, meat industry will be provided with extra financing and state support, thus, a whole structure. In total, share of agricultural trade will rise up on 15%, so Ukraine has to take a leading position in terms of new world order. In view of such conditions Ukraine will definitely appear in new markets, and activate bilateral trade with Asian and African regions. As for existing relations with Europe, its demand will likely be reoriented to organic food products, thus Ukraine will be on way of becoming a top producer of organic agriculture.

Further, future economic effect of new measures will provide next results:

- a level of investment flows will record $46B by 2030;
- added value in GDP will be up to $80 B;
- calculated GDP for 10 years will likely increase 5 times – up to 100 $ B;
- export of food products will record $175 B;
- effective agricultural complex will provide $15B to state budget;
- average salary will get 3-4% of increase because of economic growth;
- labor qualifications and wages will be higher;

- quality and safety of food products will be ensured by spur of organic production;
- domestically produced food prices will be lower than imported one.

Summarily, a structure of agricultural complex in Ukraine will face following changes (see Figure 3.2).

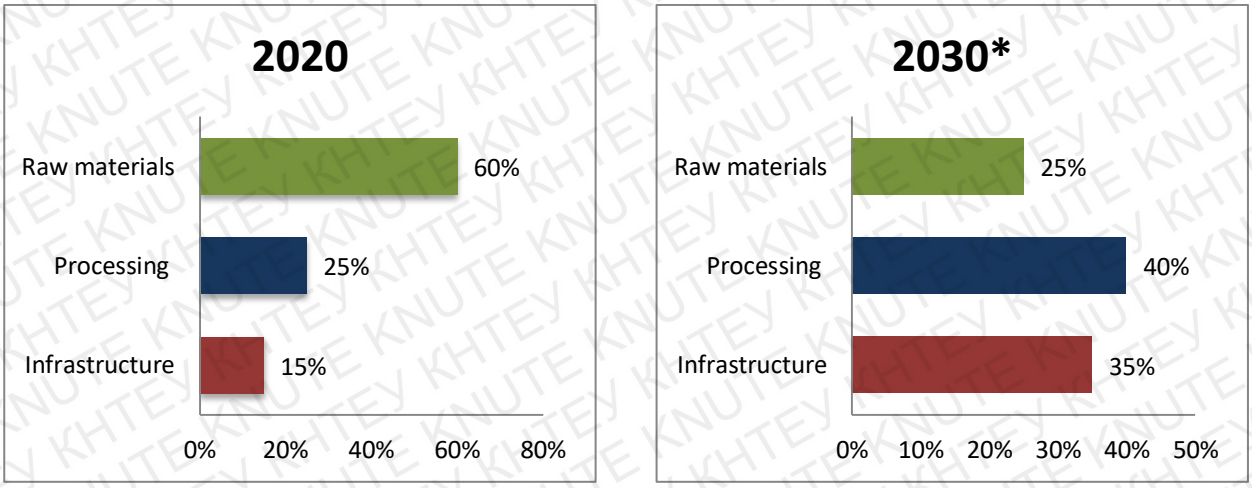

Figure 3.2. Structure of agricultural complex in 2020/2030
Source: made by author

Firstly, raw materials will be lowered to 30% of stake, while high-added value products and processing plants will be prevailing in given structure. Besides, a business model of domestic market will include 40% of medium sized businesses, thus big companies will take only 20% (contrary to current market division). Ukraine will be saturated with agro holdings and cooperatives which will spur innovative and economic development of regions. Moreover, a role of R&D centers will increase, which will become a concentration of startups, innovative decisions, new breeding trends and cultivation processes etc. In next 10 years, Ukraine will benefit from launching free land market. It is another diver for attracting investments and strengthening country's food potential. Approximately land market will led to $40 billion of investment and facilitate in launching IT technologies in agricultural business.

Considering previously mentioned tendencies, barriers, risks and opportunities for Ukrainian agriculture, it is important to make a data forecast of adopted changes and reforms in agricultural industry. Initially, we should assess a whole situation of

country's economy, using forecasts of world institutes and state bodies. The Ministry for Development of Economy, Trade and Agriculture forecasts level of impact of a stronger hryvnia on predicted macroeconomic indicators. Thus, in 2021, Ukraine's economy will expect growth, while inflation will remain moderate (4,5%). GDP growth is expected at 4.6% in 2021, 4.3% in 2022 and 4.7% in 2023, reaching $5,7 billion (Resolution of Cabinet of Ministers from 2020). In 2021 the consumer price index will likely achieve 107.3%, in 2022 - by 106.2% and 105.3% in 2023. Unemployment will see a tendency of decrease, in 2021 at the level of 9.2%, in 2022 - 8.5%, in 2023 - 8.0% (MEDT, 2020).

Hence, macroeconomic situation shows small changes in whole economy in 2021. Forecasted indicator of food security record more than 75% in 2022, which is acceptable. COVID-19 is likely to still have a depressive effect on investment activity and consumption, thus, the pace of economic recovery. However, export and import volumes are forecasted to grow in next 3 years (see Table 3.1).

Table 3.1

Trade volume forecast, $ millions

Trade volume	2021	2022	2023
Exports of goods and services, $ million	60 175	64 018	69 284
Imports of goods and services, $ million	70 591	77 661	86 280

Source: Resolution of Cabinet of Ministers, 2020

Furthermore, the prognosis of agricultural export and import tendencies depends initially on world prices fluctuations, especially due to coronavirus outbreak and future crisis consequences. Referring to Nomura's Food Vulnerability Index, Ukraine appeared in top 10 countries that are least exposed to food prices surge, along with Norway, Denmark and the Netherlands. Such index takes into account nominal GDP per capita, the share of food in household consumption, and net food imports of 110 world economies (Nomura, 2019).

According to the forecast of Ministry for Development of Economy, Trade and Agriculture of Ukraine grain crop is expected to reach 68 million tons in 2021

(comparing to 56.7 million tons in 2019/2020) and fully meet the needs of domestic consumption. Summary, the Ukraine GDP from agriculture is projected to around 90.51 UAH billion in 2021 and 92.87 UAH billion in 2022.

In terms of pandemic crisis and its controversial impact on different markets we can suppose what scenario should be expected, according on changes in Ukraine's export specializations, import dependence and agricultural complex structure. Calculations of forecasted export and import volumes of food products will be implemented through methods of moving averages and exponential smoothing. Firstly, a scenario for agro industry in short term is based on the assumption about the impact of virus on farm sector, harsh weather conditions and poor meat production. Ukrainian industry might be affected indirectly through the disruption of logistics, supply chains, high world prices and other economic impacts of the pandemic. In addition, a poor crop and massive losses due to difficult natural conditions caused a decrease in grain production and total export in 2020. Therefore, due to exponential smoothing method, export of agricultural trade in the end of 2020 will drop to $17.4 billion (see Figure 3.3). Such result can hinder further projections from growing trend and require more time for recovery from poor crop in first half of 2020. As for food import, in short terms volumes are not expected to change significantly, so there is a moderate tendency of decrease (to $5.8 billion in 2020/2021).

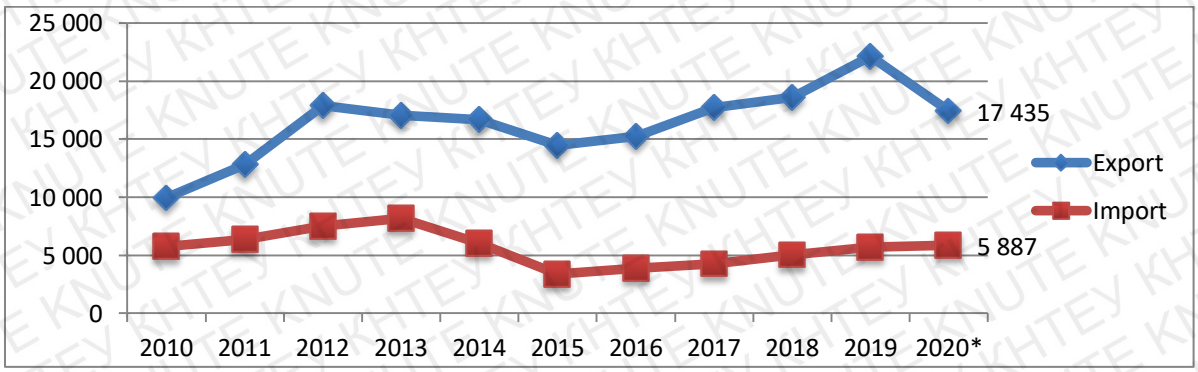

Figure 3.3. Forecasted trade dynamics of agriculture, $m

Source: made by author on base of Appendix D

Further, a long-term scenario will be based on further improvements in economic, social and legal mechanism. In case of quick appliance of new irrigation systems along with crop insurance programs negative consequences of 2020 dry season will be eliminated in future, thus trade prospects will include the following trend (see Figure 3.4).

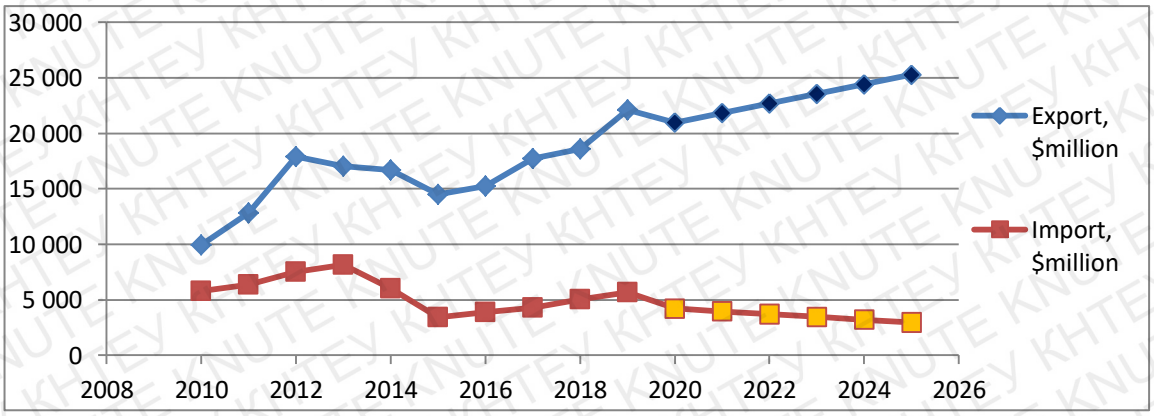

Figure 3.4. Forecasted trade dynamics of agriculture, $m
Source: made by author on base of Appendix D

Considering top export destinations, forecast showed a stable growth of food supply to the EU and Asian regions; particularly EU export is forecasted to grow by 35 %, or $2.7B in 2023 (see Figure 3.5).

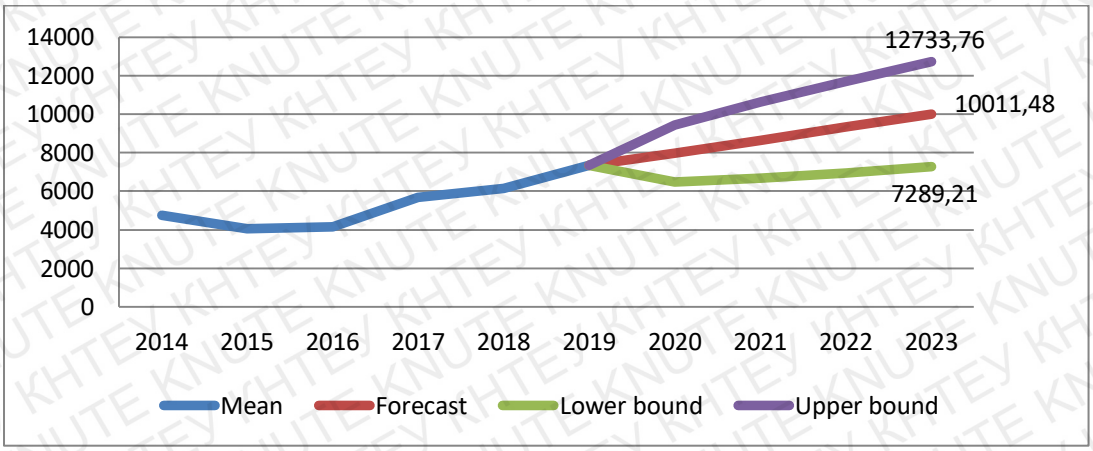

Figure 3.5. Forecasted food export to EU region, $m
Source: made by author on base of Appendix E

Further, food export to Asian countries is expected to increase by 16.7% or $1.6B in next 3 years (see Figure 3.6).

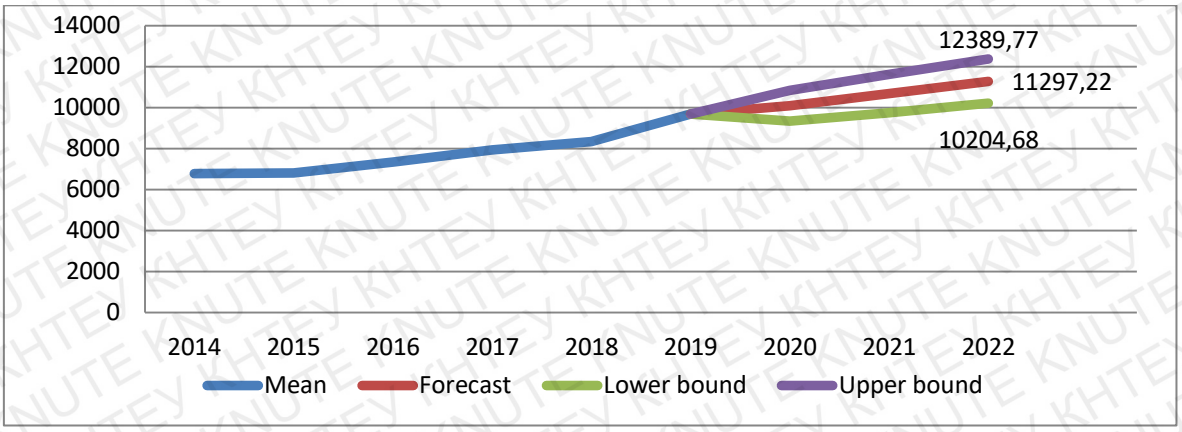

Figure 3.6. Forecasted food export to Asian region, $m

Source: made by author on base of Appendix E

As for domestic level, in next 10 years Ukrainian meat production is projected to increase by 26.3% (to 2.7 million t). Production of poultry meat in 2030 might increase by 35.2% (to 1.4 million t), pork - by 34% (to 891.3 thousand t). Consumption and trade of meat will also be changed; by 2030 Ukrainians are expected to consume more meat products, with average growth of 1.4 % annually (see Figure 3.5). In general, meat consumption per capita is projected to increase by 35% (69.5 kg per capita) in next 10 years.

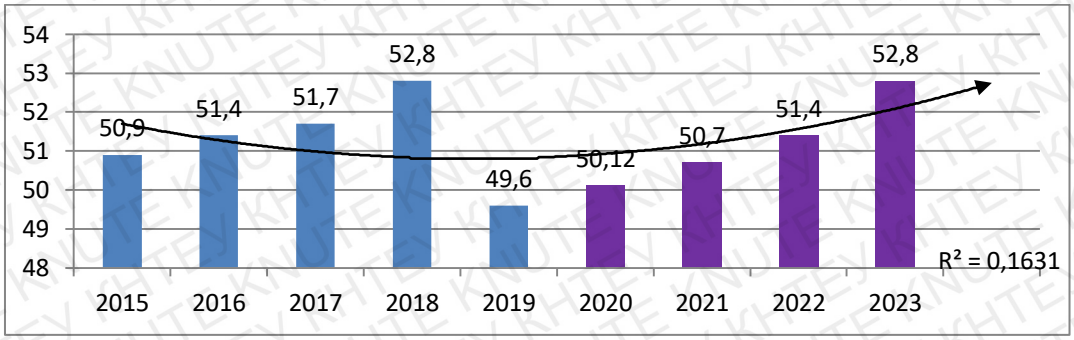

Figure 3.5. Forecasted meat consumption in Ukraine, kg/capita

Source: made by author on base of Appendix I

Milk production will also grow by 8.4%, eggs - by 87.8%. Main drivers will include growth of the world, higher domestic market prices for animal products and an increase of consumer income. In sum, such assumptions and forecasts towards future view on food industry are related to 2 aims that Ukraine must achieve in nearest years – to keep a strong position of grain, oil and poultry exporter; to increase domestic consumption of strategic products.

Conclusions to Part 3

To sum up, an integral part of Ukraine's food security provision includes an effective development of its agricultural complex. In order to form a set of suggestions for the industry, firstly it is important to make the analysis of possible risks and challenges of FS provision. They can be united in 5 groups, such as economic, industrial, environmental, social and demographic, infrastructure. Considering the variety of such factors, effective strategy should contain innovative decisions with complex approach to economic and trade development of Ukraine.

Therefore, new strategy of agricultural complex, formed in long-term dimension, is aimed to change total structure of agricultural complex and foreign trade of foodstuffs, summarily strengthening food security level in the country. Such model includes suggestions, based on aspects of agriculture, trade, investment, legislation and social policy. Future economic effect of improvements is expected to achieve higher export capacity, growth of GDP, active investment flows and social recovery of the population. As for agricultural industry, new structure will have a higher stake of value-added products, processing and infrastructure facilities, lowering a share of raw materials from 60% to 25%. Thus Ukraine will transform from resource-based country to a strong producer and seller of high-quality foodstuffs in the world.

In order to evaluate impact of changes on Ukraine's indicators and statistical data, a state forecast and own calculations were used. According to assumptions, Ukraine's economic stability is not expected to change, but foreign trade will be increasing. Calculated results determined negative tendencies of export short-term period (mostly because of lower grain production). In long-term forecast for 2021-2025 trade will record stable export growth and import decrease; geographic directions remained mostly for EU and Asia. Domestic consumption will also witness a positive dynamics, especially in meat industry. An activation of meat market will help to compound export volumes and decrease import dependence.

CONCLUSIONS AND RECOMMENDATIONS

To conclude, a thesis contains theoretical approaches and practical suggestions towards food security strengthening by both social, economic and trade improvements. Obtained results emphasized a role of industrial, social and economic component as an integral part of country's national safety. It was stated that an efficient mechanism of food security strengthening consists of market peculiarities, state support measures and social circumstances. The way food products produced, distributed and traded define a proper level of people's consumption, hence a stable economic and social development.

Initial stage of research included the analysis of methods and approaches for definition of food security and factors that affect food provision in a country. It was stated that two main components of such term comprise physical and economic availability of food products that require differentiated policies and reforms. According to the analysis of food security indicators, the main factor of food provision stipulates balanced and proper nutrition of the population, depended on both food production volumes and purchasing power of citizens. Furthermore, the methodology of food security includes 5 main methods, which can assess such term on different levels of economy. The Food Insecurity Experience Scale (FITS) was defined as the only method with fundamental approach of food safety, using experience scales with broad range of social, psychological and health-related conditions.

Additionally, main trends and barriers for achieving food security were analyzed, emphasizing a role of population growth, climate change and infection diseases in disruptions of food production and supply chains. Further, an overview on world trade statistics was made, defining leading countries in agricultural trade. Main assumptions towards future tendencies were made for Asian region, which will likely be a new leader on global market. Also it was stated that such factors as coronavirus impact and geopolitical uncertainties are currently not visible for total

trade, however, further scenario will depend on intensity of economic recession and countries' policies for recovery.

Ukrainian food security measurement was based on the development of agricultural complex and domestic consumption of food products. Analysis of country's foreign trade structure showed that foodstuffs have extremely high stake in exports (about 40%), and provide a strong position of Ukraine on world market, particularly in grain industry. According to RCA calculations, it was proved that Ukraine has high comparative advantages in such sphere. Meat and dairy production was defined as a vulnerable aspect of agro complex that hinder national food security. Domestic level was characterized by imbalanced consumption of food products, such as meat, fish and fruits with exceeding caloric indicator (2700 kcal), comparing to accepted norms. In addition, it was stated that average share of food expenditures in total household costs is much higher, than in EU countries, thus implies a lower income level and economic barriers for food provision.

Furthermore, the analysis of the effectiveness for Ukrainian food security mechanism was implemented, basing on agricultural trade structure, international activity on world food market and existing state support for the industry. According to the national methodology, country's food security includes indicators for both national and local levels. Besides, the analysis of Ukraine's intra-trade was conducted, using Grubel-Lloyd index. Results concluded that a high export concentration in few categories leads to higher dependence of Ukraine on world market and uncertainty in terms of price fluctuations. Overall, factors that hinder Ukraine's food potential were defined as limited range of exported products, poor quality and standard norms in the country and lack of geographical expansion in trade. In addition, governmental policies and models towards food security strengthening was analyzed, resuming in a need of new decisions, especially in regulation of agricultural complex.

According to defined problems and inefficient measures in current mechanism, main tasks and goals in long-term aspect for food security were formed. Complex strategy was developed on a basis of agriculture reorganization, social and economic

mechanism of a country. According to MEDT, it was stated that domestic production can fully meet the demand on internal market; hence a strategic direction was justified for food export compounding and increase of economic availability of products in long-term aspect. It was defined that forecasted economic effect of suggestions will provide higher export capacity, GDP growth, investment flows and social prosperity in the country. As for social position of citizens, it was suggested to adopt a state support in form of subsidies or direct food supplies for certain groups as a stimulating factor for growth of consumption dynamics and agricultural production.

Further, forecasted efficiency of suggested improvements was based on prognosis of credible institutes and state bodies and own calculations in short- and long-term dimension. In particular, by exponential smoothing and least squares method a forecast for agricultural trade and domestic consumption of strategic products was implemented. Due to results, export volumes will be increasing, contrary to import decrease. A level of domestic consumption, with an example of meat industry, is expected to grow with moderate pace, but indicators will be higher than in previous years.

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APPENDICES

Appendix A

World barriers for food security (FAO, FSIN, GHI, 2019)

MALNUTRITION	More than 800 million people are expected to suffer from hunger and malnutrition in the less developed countries in 2030. Particularly, malnutrition has three forms – undernourishment (lack of sufficient food), micronutrient deficiencies (poor intake of vitamins and minerals) and overweight / obesity (low nutritional value high-caloric food). Summarily it will cause high social and economic costs for individuals, families, communities and governments. It is vital that all strategies comply with the local conditions. For example, low food production caused by insufficient agricultural productivity is a primary reason for hunger in tropical Africa and parts of Asia and Latin America. In contrast, income poverty may be the primary reason for insecurity in South and East Asia, Latin America, Central Asia and the Middle East.
CLIMATE CHANGE	Climate change is expected to have severe consequences for food and water security, and create new risks and challenges on the global level. It will affect the availability of water with good quality, the timing and length of growing seasons, the distribution of agro-ecological zones. However, it will affect not only food production, but also food processing, distribution and consumption.
SCARCITY OF NATURAL RESOURCES	The sustainability of land is highly threatened by degradation due to over-exploitation, pollution, the impact of climate change and competition for land territory. In such way wastage limit and more efficient irrigation systems in agriculture need to be developed. Companies have to invest in innovative technologies for remanufacturing and recycling that are less dependent on rare elements.
AGRICULTURAL POLLUTION	The increasing use of energy and resources for agricultural production has a range of impacts on the environment. First, food production has negative effects on water, air and soil quality, mainly related to nutrient losses and emissions of pesticides. Second, these forms of pollution, combined which agriculture-related changes in land use and ecosystems, have a damaging effect on terrestrial and aquatic biodiversity. Finally, the GHG emissions related to agricultural production are responsible for their contribution to climate change.

Continuation of Appendix A

DEMOGRAPHIC CHANGE	The world's population is expected to rise from 7 to 8.5 billion by 2030, and to 9.7 billion by 2050. It will grow almost entirely in less developed countries, especially in Africa. In Europe and westernized countries, population figures will rise slowly or even fall, since age groups >60 years are projected to grow the fastest, and people > 80 years will account for around 10% of the world's population in 2050. Definitely, population growth is one of the major drivers for the future food and nutrition security. Global food systems will have to provide high-quality food to the additional 2 billion people in 2050, to prevent hunger and nutrition issues.
URBANISATION	In 2030, about 60% of the global population will live in cities. In less developed countries, about 3.9 billion people will then populate urban areas. Although cities cover only 2% of the Earth's surface, they produce 80% of global economic output, 70% of global greenhouse gas emissions, and consume 75% of the global energy. Thus, there is a need for rural urban planning, as the wealth gap between rural and urban areas is increasing. Moreover, the development of urban areas is highly dependent on the creation of food surplus in the rural areas. Although such trend as urban agriculture can become an additional decision for food security, especially in low-income communities.
LOW PRICES, HIGH CALORIES	Peoples' dietary styles depend on their living conditions and the socio-cultural environment. People with less money, lower educational level, insecure working conditions are more likely to choose low price food with high fat and sugar contents which are seen as major cause of the high prevalence of non-communicable diseases. Primarily, a number of policies and actions must tackle the systemic poor nutrition and include complex aspects from health to education. For instance, it can be strategies for promotion and education about healthy eating, especially addressed to lower income population segments; reduced prices for healthier options; food composition regulations (on salt/fat/sugar content) etc.

Appendix B

Food price indexes scope (FAO, 2020)

Name of index	Description
Meat Price Index	Computed from average prices of 4 types of meat, include two poultry products, three bovine meat products, three pig meat products and one ovine meat product.
Dairy Price Index	Consists of butter, skimmed milk powder, whole milk powder and cheese price quotations.
Cereal Price Index	Compiled using the International Grains Council (IGC) Wheat Price Index of 10 quotations, 1 US maize quotation and 16 rice quotations.
Vegetable Oil Price Index	Consists of an average of 10 different oils weighted with average export trade shares of each oil product
Sugar Price Index	Index form of the International Sugar Agreement prices

Appendix C

Ukraine's strengths and weaknesses in aspect of agricultural potential (author; Proshchalykina, Petrenko, 2018, 22-26)

Strong factors	Weak factors
Favorable geographical position	Prevalence of resource-based exports
Good climate and fertile soil	Current trend of soil degradation and uncontrolled use
Developed culture of farming	Low level of labor productivity ($4 thou per cap in agro sphere) and qualification
Leading positions on agricultural market	Lack of long-term strategies and planning; poor legislation
Inexpensive land rent (3431 UAH/ha)	Unfavorable agricultural environment, domination of big players
Cheap labor force (average salary is around 300$ in 2019)	High level of bureaucracy in the country

Appendix D

Dynamics of Ukraine's foreign trade, $ million

(National Bank of Ukraine, author)

	Agriculture exports, $m	Total exports, $m	Agriculture imports, $m	Total imports, $m
2010	9 936	51 405,2	5 761	60 742,2
2011	12 804	68 394,2	6 347	82 608,2
2012	17 906	68 830,4	7 513	84 717,6
2013	17 040	63 320,7	8 181	76 986,8
2014	16 670	53 901,7	6 025	54 428,7
2015	14 478	38 127,1	3 413	37 516,4
2016	15 250	36 361,7	3 863	39 249,8
2017	17 739	43 264,7	4 265	49 607,2
2018	18 594	47 335,0	5 020	57 187,6
2019	22 123	50 054,6	5 697	60 800,2
2020E	17 434	47023,92	5 305	55591,63
2021E	21 840	47460,81	3 967	58483,87
2022E	22 700	47897,71	3 714	61376,12
2023E	23 559	48334,6	3 461	64268,36
2024E	24 419	48771,49	3 209	67160,6
2025E	25 278	49208,38	2 957	70052,85

Appendix E

Trade dynamics of Ukrainian agricultural products in 2014-2019 by regions, $million (National Bank of Ukraine, 2019)

	2014	2015	2016	2017	2018	2019	2019 % to 2018
EXPORT							
World	16 670	14 478	15 253	17 739	18 594	22 125	119
EU	4 767	4058	4137	5684	6153	7326	119.1
Asia	6 790	6 826	7 359	7 936	8 342	9 676	116.0
Africa	2554	1961	2417	2543	2327	3332	143.2
IMPORT							
World	6 026	3 413	3 863	4 265	5 020	5 696	113.5
EU	2 799	1 674	1 943	2 293	2 765	3 209	116.1
Asia	1 270	767	948	966	1 108	1 172	105.7
Africa	296	183	199	220	256	254	99.4

Appendix F

Main trade commodities in 2016-2019, $billion (State Custom Service of Ukraine, 2019)

	2016	2017	2018	2019
Total exports	***36.5***	***44.3***	***47.3***	***50.1***
Agricultural products	8.8	10.4	11.1	22.1
Metals and its products	8.2	10.2	11.9	10.25
Machinery and equipment	3.5	4.4	4.5	5.5
Mineral products	2.5	3.7	4.2	4.9
Chemical products	1.8	2	2	2.6
Total imports	***39.2***	***49.6***	***57.1***	***60.8***
Machinery and equipment	7.9	9.9	17.4	20.6
Mineral products	8.5	12.5	14.1	12.9
Chemical products	5.6	6.1	10.6	11.04
Agricultural products	3.9	4.3	5.05	5.7

Appendix G

Annual consumption of main product groups per capita, kg
(State Statistics Service of Ukraine)

	2015	2016	2017	2018	Minimum	Rational norms
Meat and sub-products	50,9	51.4	51.7	52.8	52	83
Milk and dairy products	209,9	209.5	200	197.7	341	380
Eggs	280	267	273	275	231	290
Bread and flour products	103,2	101	100.8	99.5	94	101
Potato	137,5	139.8	143.4	139.4	96	124
Vegetables	160,8	163.7	159.7	163.9	105	161
Fruits, berries and grapes	50,9	49.7	52.8	57.8	68	90
Fish and fishery products	8,6	9.6	10.8	11.8	12	20
Sugar	35,7	33.3	30.4	29.8	32	38
Oil	12,3	11.7	11.7	11.9	8	13

Appendix H

Import dependence of food products in 2018, thou.t
(author on base of State Statistics Service of Ukraine)

Product	Import, thou t	Market capacity	Import dependence, %
Bread and its products	192	5745	3.3
Meat and sub-products	182	2195	8.3
Milk and dairy products	105	8942	1.2
Eggs (million pieces)	87	11409	0.8
Potato	27	5966	0.5
Vegetables	136	6984	1.9
Fruits, berries and grapes	732	2119	34.5
Fish and fishery products	306	410	74.6
Sugar	5	1420	0.4
Oil	219	497	44.1

Appendix I

Dynamics for meat industry in Ukraine, thousand tons (Meat-Inform, 2019)

	2016	2017	2018	2019
Meat (including meat by products, fat etc.)				
Production	2 367	2 362	2 409	2 469
Consumption	2 167	2 180	2 186	2 218
Export	298	343	393	462
Import	161	209	265	260
Poultry				
Production	1 167	1 185	1 256	1 317
Consumption	973	1 020	1 000	1 024
Export	242	273	331	400
Import	85	121	133	135
Pork				
Production	640	631	639	647
Consumption	623	615	651	678
Export	4	6	2	5
Import	4	8	42	35
Beef				
Production	301	291	264	255
Consumption	261	235	216	197
Export	45	54	54	50
Import	2	2	2	2

Appendix J

Ukraine's state spending for agricultural support, 2021-2023
(Resolution of Cabinet of Ministry of Ukraine, 2020)

Aspect of strategy	Planned governmental spending, million UAH		
	2021	2022	2023
Financial support for agriculture (loans and insurance)	2253	2138	2166
Support for niche products (in aspect of food security)	295	295	295
Farming support	727	772	943
Support for gardening and grape production	414	471	636
Support for livestock industry	3636	3427	3368
Partial compensation for purchased equipment	957	1127	1330
Total support spending	8442	8480	8988