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RESEARCH OF THE URBAN DEVELOPMENT IN CONNECTION TO FOOD PROCESSING AND AGRICULTURAL COMPANIES IN UKRAINE¹

NAZARENKO Volodymyr PhD student faculty of land management
National University of Life and Environmental Sciences of Ukraine

UKRAINE

Abstract: *This article introduces a comprehensive study of the food processing and agricultural companies in three large cities and their regions. The research is focused on data from Kyiv, Lviv, and Kharkiv, incl their suburban areas. General demographic information, as well as major economic and social parameters, were analyzed for specific years: from 1995 to 2020 (2019 in some cases). In the context of the research work, three major industry areas were picked, grain and bread, milk and dairy products, meat, and poultry production. The author constructed company profile data for the given industry areas for each of the research cities. On the given research author noted current challenges that large cities face about food supply and production.*

INTRODUCTION.

Cities require land, human labor, and financial resources to be established in the first place and grow later on. Employment, social welfare, and housing are needed for people to move into cities and stay there. City governance on local and regional or national levels is needed for the city to operate and for its infrastructure to function. Water processing, waste disposal, and road cover are needed in any large city for it to properly function. Green areas, parks, and entertainment establishments are the places that people visit daily in each large city. Plenty of research works, papers, and articles have been written on the above-mentioned aspects of proper urban centers worldwide. Legislation, land use regulations, and special plans are being constructed, planned daily, or at least per quarter. However, there is an important citywide industry,

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everyday life aspect that eludes from being widely noticed and discussed in research and city planning work. This aspect is an activity that people are engaged in daily, it is food and meal. Agricultural and food processing companies are an essential part of any city. They can be directly connected to the city and be part of its large industries or they can be remotely established and transported to the city via various routes, sea, land, or air.

In this research work we aim to study the current state of the food processing and agricultural companies in Ukraine, with a focus on three large cities in three distinct geographical locations. The cities that we picked for our study are Kyiv - a large urban center in Ukraine, Kharkiv - a large urban center in the east of Ukraine, and Lviv - a large city in western Ukraine. To receive comprehensive results, we studied how the states of the industries and cities' economics, social systems changed through history. For convenience and to receive more accurate data we picked 6 years: 1995, 2000, 2005, 2010, 2015, and 2020. What is particularly interesting that 1995, 2005, 2015, and 2020 were also periods of political, social, and economic changes, both in Ukraine and worldwide. In 1995 and 2005 major economic and financial changes occurred; 2015 is the year after war and conflict broke out in Ukraine, and 2020 is the year when the global pandemic happened. It should be noted that some sections of the data may be missing for a certain city, from the study group. Unfortunately, this is the result of a lack of information in official statistical services and we cannot use any other information source to serve as relevant and accurate source material reference.

THE MAIN PART.

Figures 1 and 2 present map images for each of the three study group cities. Central business district (CBD) has been placed and denoted for Kyiv, Lviv, and Kharkiv. As this research paper is focused exclusively on food processing and agricultural companies' study, we picked three business types for each of the categories and placed related business locating on the map (Figure 1, 2). In the food processing category we picked, milk processing companies (M on the map), bakery companies (B), poultry and subproducts production companies (P pr.). Milk farms (M. farm), poultry farms (P), and grain farms (Gr.) were picked as part of the agricultural companies' category. The distance of the company placement in relationship to city CBD is 100 kilometers. The similarities between the three cities' data are in the placement of food processing companies, most of them were built

and operate either within city limits or near the city area. While more modern companies and farms are in one or more hour drive from the city central business district area. Both above-mentioned facts have to do with the historical heritage of Ukraine and the modern market economy situation, where transportation costs are reduced while operating costs are lower in the countryside, which is the specific case of the agricultural and food processing companies. In terms of the specific number of companies that are used in this research, we have the following, thirty-eight companies are located in the Kyiv area, forty-three are in the Kharkiv area, and thirty in the Lviv area. All the companies that are used for the research area privately owned or public for-profit businesses, of the medium to large company size. Each of the business types has a common type of spatial placement, mostly due to economical and historical reasons.

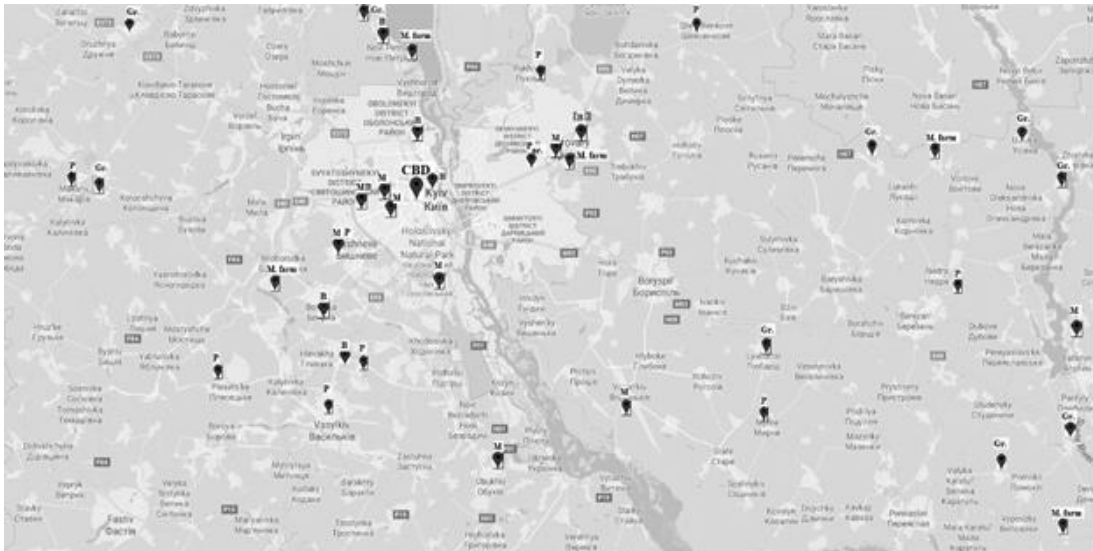


Fig. 1. Food processing and agricultural companies' placement near Kyiv city [1-3]



Fig. 2. Food processing and agricultural companies' placement near Kharkiv city (left) and Lviv city (right) [1, 4-8]

Kyiv city and its suburbs areas have a large number of food processing companies – 16 companies, while Kharkiv area has the biggest number of grain companies - 27-grain farms, while there are three poultry processing companies in Lviv area. Both Kyiv and Kharkiv suburbs are densely populated and consist of many small towns and villages, while there are few towns and villages that are close to the Lviv area, and most of the companies are located relatively far from Lviv CBD. During the research, we did not notice relations between the food resource site and its proximity to the production facility.

Tables 1, 2, and 3 represent general city data, as well as certain social, economic, and geographical data, grouped by relevant year. While population and total area of each of the selected city's dint change much, or as in some cases at all. The main changes are in economics and social data, especially the number of people employed, their average salary per industry type, and volume of sold products for each of the selected industry types. The biggest difference in the number of food processing and agricultural companies is in Kyiv city data, which shows the biggest growth among the three cities. At the same time number of operating companies did not change a lot in Kharkiv and Lviv cities. In the case of Lviv city data, we can notice that there we period of economic decline, as well as growth. In the future we plan to closely study specific cases of the selected companies from each of the cities and determine what are the economic growth and decline factors and are they related to a specific city or business facilities placement.

Table 1

Kyiv city general information, economics, and social data by year

	1995	2000	2005	2010	2015	2020
Total area, he	83.56					82.64 143.40**
Population, Kyiv, thousand people	2643.8	2615.3	2666.4	2785.1	2888	2967.4
Population, Kyiv region, thousand people	1911.6	1861.5	1778.9	1721.8	1729.2	1781
Total population, thousand people	4555.4	4476.8	4445.3	4506.9	4617.2	4748.4

Urban population, % of total	54 82.6 (incl. Kyiv)	1053.5 58	-	-	-	62 86 (incl. Kyiv)
Non-urban population, % of total	46	42	-	-	-	37.93
Average yearly salary, UAH	1200	4860	15768	41172	80784	204000
Average yearly salary in agricultural companies, Kyiv, UAH	828	3108	11208	27972	64884	156000
Average yearly salary in food companies, Kyiv, UAH	1056	4788	14352	38040	80772	204000
Average yearly salary in agricultural companies, Kyiv region, UAH	444	1740	6636	21840	47124	126000
Average yearly salary in food companies, Kyiv region, UAH	1368	4284	12024	34032	58356	156000
Number of agricultural companies, Kyiv	-	-	-	650	652	1486
Volume of sold products, thou. UAH	-	-	-	3266489.9	11397913.6	27162645.4
Number of food companies	-	-	-	3195	3038	6568
Volume of sold products, thou. UAH	-	-	-	875249010	1921645632.4	3568706184.8

Source: prepared based on personal research data and data from various sources [1-3,9-10]

Table 2

Kharkiv city general information, economics, and social data by year

	2010	2015	2020
Total area, he	30.6		
Population, Kharkiv, thousand people	1446	1450.3	1443.2
Population, Kharkiv region, thousand people	2769.1	2737.2	2640
Urban population, % of total	79 28 (Kharkiv city)	-	81,04 27 (Kharkiv city)
Non-urban population, % of total	21	-	18.96
Average yearly salary, Kharkiv, UAH	24000	46080	111876
Average yearly salary in agricultural companies, Kharkiv region*, UAH	18036	36000	102000
Average yearly salary in food companies, Kharkiv region*, UAH	24168	51600	120000
Number of agricultural companies*, Kharkiv region	1830	2029	2219
Volume of sold products, thou. UAH	8900000	23191300	28924259.1
Number of food companies*	1456	1480	1552
Volume of sold products, thou. UAH	15622323,4	577308000	664944307.2

Source: prepared based on personal research data and data from various sources [1, 7, 9-11]

Table 3

Lviv city general information, economics, and social data by year

	2000	2005	2010	2015	2020
Total area, he	18.2				
Population, Lviv, thousand people	750	761.7	760	758.4	756
Population, Lviv region,	2676.9	2588	2549.6	2537.8	2512.1

Table 3 continuation

	2000	2005	2010	2015	2020
thousand people					
Urban population, % of total	59 27.4 (Lviv city)	-	-	-	60.97 29.97 (Lviv city)
Non-urban population, % of total	41	-	-	-	39.03
Average yearly salary, Lviv, UAH	-	-	25800	49992	120000
Average yearly salary, Lviv region, UAH	3000	8720	21864	43752	107232
Average yearly salary in agricultural companies, Lviv, UAH	2640	6941	14983	-	119569
Average yearly salary in food companies, Lviv, UAH	4800	8998.2	24687	-	155188
Average yearly salary in agricultural companies, Lviv region, UAH	1400	4789	16602	43828	114589
Average yearly salary in food companies, Lviv region, UAH	4320	8659	24494	51452	124268
Number of agricultural companies, Lviv region	-	1600	1332	1405	1555
Volume of sold products, thou. UAH	-	608680.2	2197812.5	9166400	22973439
Number of food companies, Lviv region	-	-	1286	980	1005
Volume of sold products, thou. UAH	-	4975380.6	222713.6	11190217.4	567969332.4

Source: prepared based on personal research data and data from various sources [1, 4-6, 8-10]

In this paper we analyzed key data related to food and agricultural product production, which is consumption. For agricultural and food processing companies it is important to satisfy market demand as well as find ways to increase production and income. For the study, we picked three categories of food products - meat, milk, and bread. In Figure 3 we present food production and consumption in Ukraine for five time periods of years: 2000, 2005, 2010, 2015, and 2019. While Figure 4, 5, and 6 present charts from a specific city - Kyiv, Kharkiv, and Lviv, accordingly. All the data is in per capita format, bread and meat data is presented in kilograms per person per year, while milk is in liters per person per year format. In terms of Ukraine data, there is a noticeable decline in milk production after 2015 and there is a big gap between official bread consumption and production. The latter can be explained by the simple fact that a large portion of the market is illegal, bread is not a type of food product that is easy to transport over large distances and import from other countries. The above-mentioned facts provide a good foundation for future research to determine specific causes and real situation on the market.

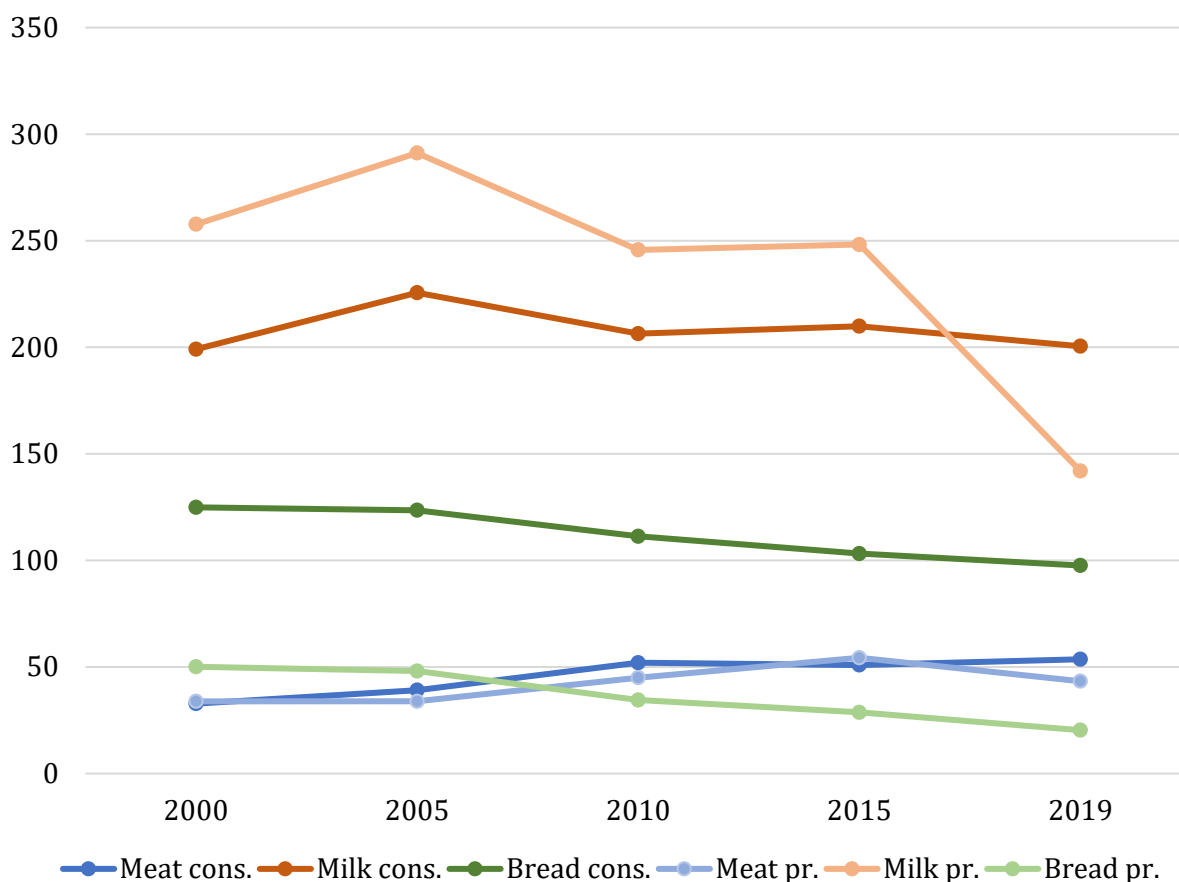


Fig. 3. Food products production and consumption per capita in Ukraine per year [1, 12, 13]

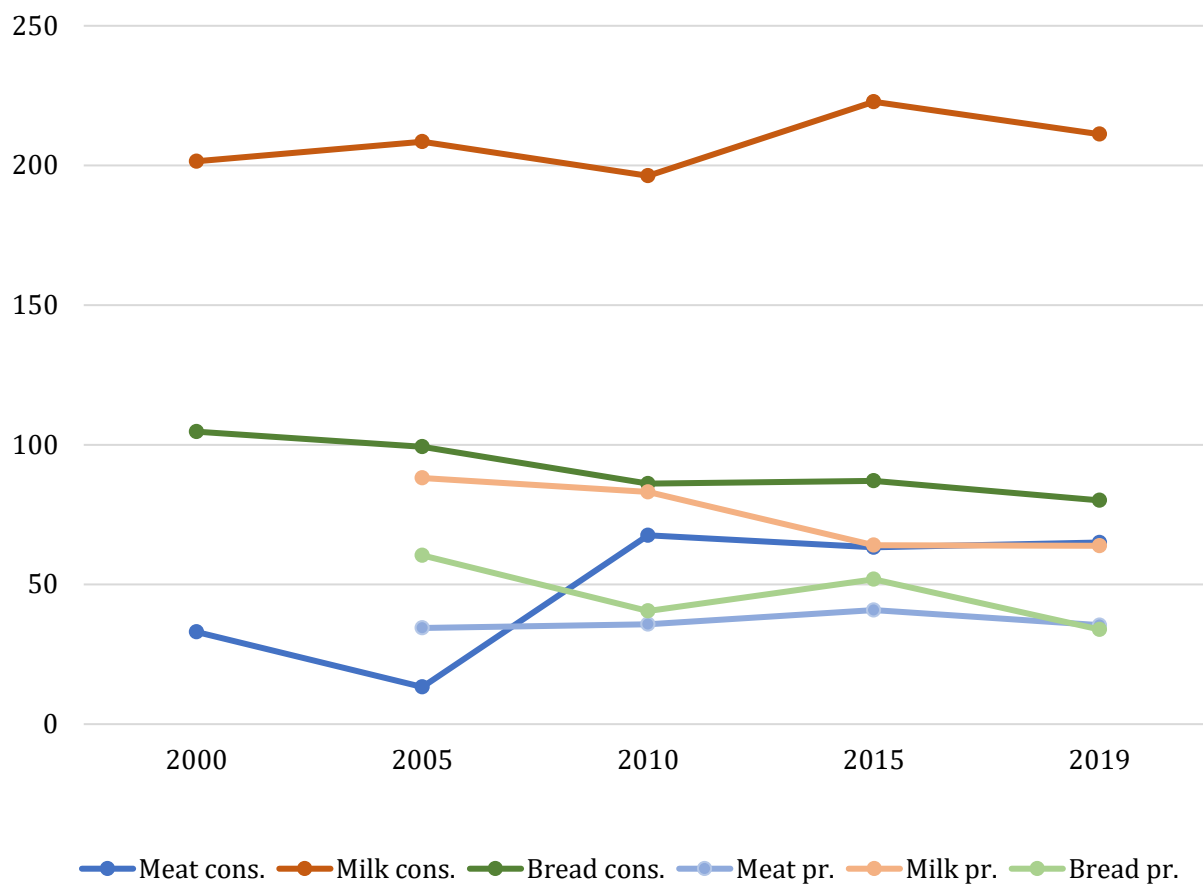


Fig. 4. Food products production and consumption per capita in Kyiv per year
[1, 2, 12, 13]

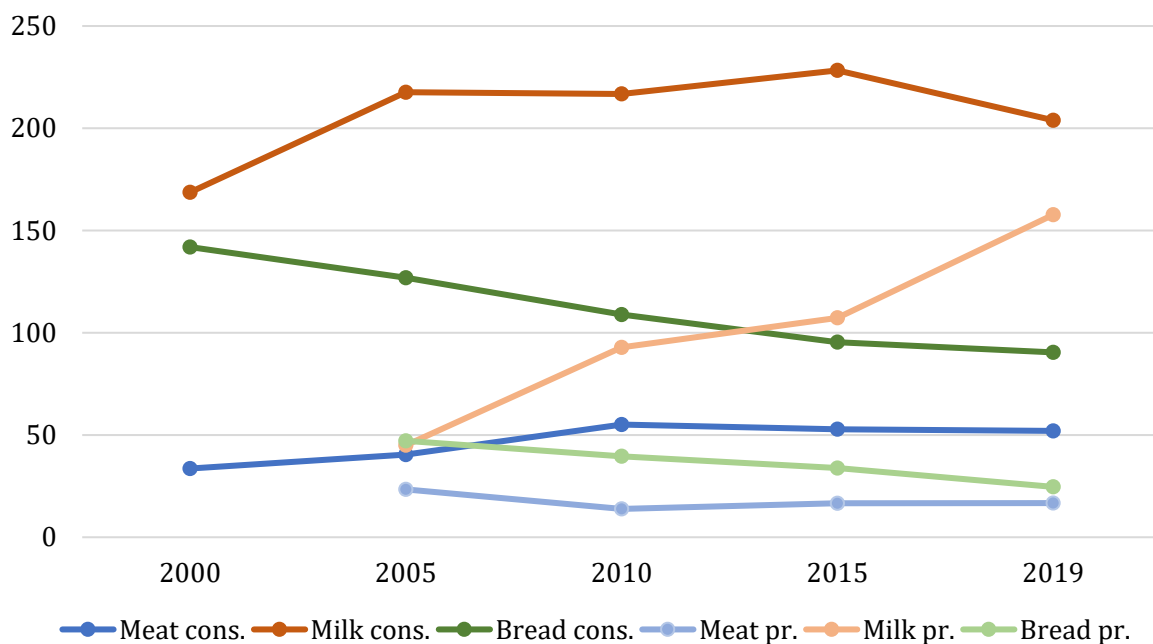


Fig. 5. Food products production and consumption per capita in Kharkiv per year
[1, 7, 12, 13]

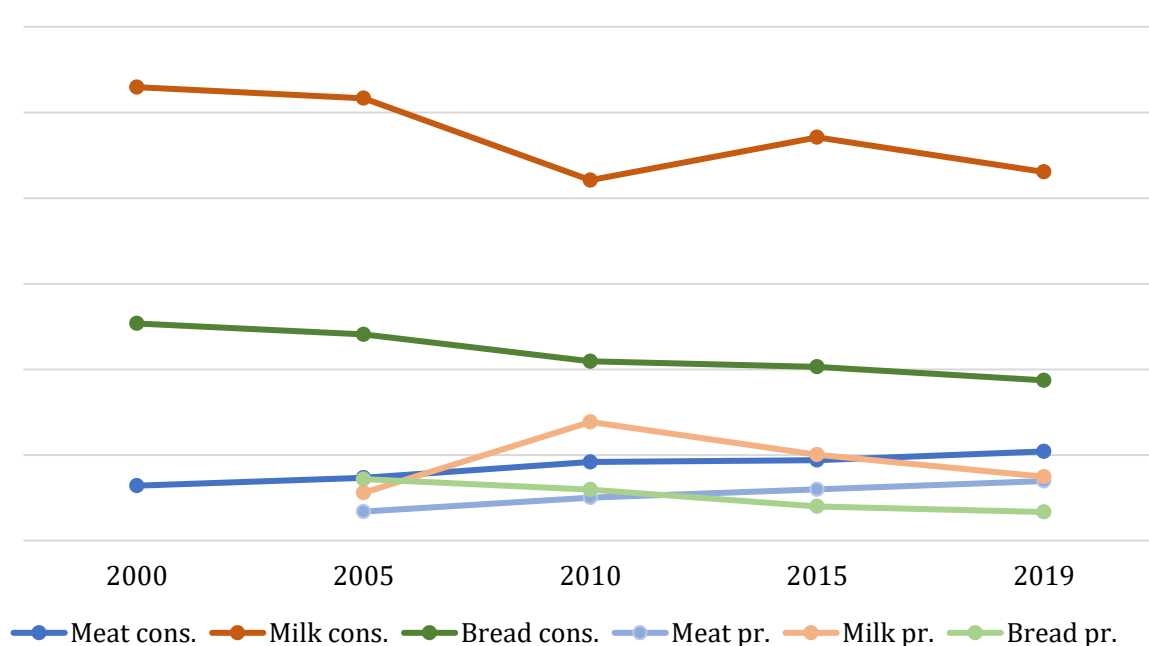


Fig. 6. Food products production and consumption per capita in Lviv per year
[1, 4, 5, 12, 13]

Bread and meat consumption show similar median values for each of the three cities. Milk consumption data show different results and values for each of them. Meat production falls a bit short for each of the cities, while the most dramatic difference is in milk and bread consumption versus its production. There are several possible explanations for this, there may be a largely hidden shadow market, those two categories are being imported from other regions or abroad. It is clear that meat production and distribution location are close to each other, due to the nature of the food. While milk is generally a short-term storage product, its sub-products can be stored for long periods when processed and refrigerated, while some do not require cold temperate to be stored. Grain which is the main ingredient used in bread production can also be stored for longer periods of time. While baked bread and sub-products usually have expires date within 2- or 3-days span after production. Within this context, it is appropriate to take customer preferences into account, whether they prefer fresh products or are ok with prepared products that can be stored for longer periods. Besides, it is evident that we must determine the important export profiles of both food production and producers' companies. Do production companies import local products, or the cheapest available (regardless of the distance), or import it in form of sub-products from abroad or other companies. In the future we plan to closely examine what is the main

source of food products that are sold in the city market, calculate and determine financially efficient production placement in relationship to the city CBD.

Food and agricultural products are required to be transported to production facilities or retail facilities. Tables 4, 5, and 6 showcase calculated data for Kyiv, Kharkiv, and Lviv. Each of the tables presents data for six company types, their accumulative number, the average distance from them to the CBD, transportation cost, prices of production. The consumption data is divided into two categories, price in the city and price in the city-suburban region. In the cases of poultry, milk farms and grain companies' consumer price per region column denotes their retail price to the food production companies. Transportation cost columns, reset data that is grouped by vehicle type, its storage capacity, while acronym "i" stands for transportation cost inside the city, and "o" – outside of the city limits. Poultry and bread information is measured in kilograms, while milk is in liters.

Table 4

Food processing and agricultural companies' data in Kyiv area

Company type	Number of companies closer to Kyiv CBD by type	Avg distance to CBD, km	Transportation cost to CBD		Price per 1 unit of production, UAH	Consumer price city per 1 unit, UAH	Consumer price region per 1 unit, UAH
			Per 1km	Total distance			
Poultry production companies	1	17.2	3 t: 25 5 t: 30 10 t: 40	3: 930 5: 1116 10: 1488	35	72	65
Milk production companies	9	43.3 24.55 (outside city)	3.5: 25i 10o 5: 30i 13o 20: 50i 27o	3.5: 1214.25 5: 1162.5 20: 2600.35	13.5	26	20
Bread production companies	6	22.96 4.21 (outside city)	1: 10 2.5: 11 10: 18o	1: 629.6 2.5: 792.56 10: 1133.28o	16	32	30
Poultry farms	9	47.1 28.35 (outside city)	10: 18o 40i 20: 27o 50i	10: 2060.3 20: 2702.95	14	-	35
Milk farms	5	53.96 35.21 (outside city)	1: 10 5: 15 10: 20	1: 939.6 5: 1509.4 10: 1879.2	7	-	10
Grain companies	9	81.1 62.35 (outside city)	25: 2.3o 21i 50: 2.8o	25: 1537 50: 1174.58o	2.77	-	8

Source: prepared based on personal calculations and data from various sources [14-21]

Table 5

Food processing and agricultural companies' data in Kharkiv area

Company type	Number of companies closer to Kharkiv CBD by type	Avg distance to CBD, km	Transportation cost to CBD		Price per 1 unit of production, UAH	Consumer price city, UAH	Consumer price region, UAH
			Per 1km	Total distance			
Poultry production companies	0	-	-	-	-	61.4	52.5
Milk production companies	6	41.1 23.9 (outside city)	3.5: 25i 10o 5: 30i 13o 20: 50i 27o	3.5: 1169 5: 1426.7 20: 2305.3	19	22	17
Bread production companies	6	35.2 18 (outside city)	1: 10 2.5: 12 10: 15o	1: 752 2.5: 962.4 10: 1070o	-	30	25
Poultry farms	4	36.5 9.3 (outside city)	10: 18o 40i 20: 27o 50i	10: 1835.4 20: 2381.1	17	-	48.5
Milk farms	0	-	-	-	5.7	-	7.2
Grain companies	27	66.8 49.6 (outside city)	25: 1.8i 1.6o 50: 1.6	25: 1010.32 50: 1079.36	3	-	7.8

Source: prepared based on personal calculations and data from various sources [14-21]

Table 6

Food processing and agricultural companies' data in Lviv area

Company type	Number of companies closer to Lviv CBD by type	Avg distance to CBD, km	Transportation cost to CBD		Price per 1 unit of production, UAH	Consumer price city, UAH	Consumer price region, UAH
			Per 1km	Total distance			
Poultry production companies	3	37.7 28.75 (outside city)	3 t: 25i 12o 5 t: 30i 15o 10 t: 40i 20o	3 t: 1068.75 5 t: 1299.75 10 t: 1733	33.5	65.7	54.5
Milk production companies	5	29.38 20.43 (outside city)	3.5: 25i 12o 5: 30i 15o 20: 50i 30o	3.5: 968.91 5: 1174.95 20: 2060.4		23	24
Bread production companies	6	36.5 27.55 (outside city)	1: 11 2.5: 12 10: 20o	1: 801.5 2.5: 938 10: 1271 o	18	30	26

Table 6 continuation

Company type	Number of companies closer to Lviv CBD by type	Avg distance to CBD, km	Transportation cost to CBD		Price per 1 unit of production, UAH	Consumer price city, UAH	Consumer price region, UAH
			Per 1km	Total distance			
Poultry farms	5	66.9 57.95 (outside city)	10: 180 40i 20: 270 50i	10: 2121.1 20: 2812.15	22.45	-	46.5
Milk farms	2	24.9 15.95 (outside city)	1: 10 5: 15 10: 20	1: 649 5: 853.5 10: 1218	6.9	-	10
Grain companies	9	54.32 45.37 (outside city)	25: 30 25i 50: 40	25: 1259.86 50: 1181.480	2.5	-	7.6

Source: prepared based on calculations and data from various sources [14-21]

CONCLUSIONS AND RECOMMENDATIONS.

We have conducted an extensive study of the food processing and agricultural companies in the Kyiv, Lviv, and Kharkiv areas. Connections between company placement, transportation expenses, gross profit, and product price with city CBD have been outlined. There are common denominators between company placement and its profits, as a well larger city generally have a richer population, that consumes more products and companies generate more profit if they are located inside such city or in its proximity. Transportation costs are much higher inside the city and some agricultural companies require special conditions, georgical location in order to operate. For cities to grow and expand they need to have stable food supply and its beneficial if agricultural companies are located in close proximity to the city. In future research we will try to establish a framework for food processing and agricultural companies within the context of the urban development and growth.

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Scientific adviser:

Andrii Martyn

Doctor of Economy, Professor,

head of the Land-Use Planning Department

National University of Life and Environmental Sciences of Ukraine, Ukraine