
ECONOMIC ANALYSIS FOR URBANIZATION IMPACT ON FOOD AND PROCESSING COMPANIES USE CASE OF UKRAINE



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Abstract. *The paper is devoted to studying the economic and social connections between the urbanization process and agricultural land use in Ukraine. It is worth noting that both urbanization and agriculture require new lands for their future development. The important part of this connection is ecology and effective use of the available resources, as well as land use in the context of urbanization. After all, the process of urbanization can have a significant negative impact on the state of land resources. The research work determines which economic factors of urbanization are the most relevant to the land use in city suburbs and agricultural regions. The article introduces the notion of economic feasibility of land use by purpose and studies cases of food and processing companies. Food and processing industries were chosen as the main research subjects since they are the most promising fields for the future economic development of each individual region and country as a whole. These industries are centered around both import and export, besides producing added value products. Cities without a doubt are the main consumers of food products and at the same time, they drain labor resources from the countryside.*

In this research work, we studied the global situation in Ukraine, how 21-century urbanization has affected the agricultural sector in the country. This sector has experienced rapid growth in past decades, as opposed to industrial and manufacturing sectors, and increased the national wide level of land use. While the national wide level of urbanization might not be the highest in modern history (20th to 21st century), it continues to have a wide impact on the national economy. The scope of this impact falls outside of this research work as it consists of multidimensional data and a wide range of interdependencies, including policies and regulations. Research models require a large amount of data and cases, that's why we focused on the food and processing sector in this paper. They proved to be a good test ground to study the urbanization impact patterns as well as make economical modeling more convenient. In this context, the peculiarities of land use models were studied, as food and processing industries use land resources, can be located both inside the city, suburban area, or in remote farmland region. It is evident that cities and businesses form large supply and demand of natural resources, labor, and financial investments.

Keywords: *urbanization, economics, economic modeling, modern city problems, land management, zoning, spatial planning, strategic planning.*

Introduction.

Without a doubt agriculture sector is a vital part of the modern Ukrainian economy. Agriculture is ranked 3rd largest contributor to the national gross domestic product (GDP) with approximately 17 % in 2018 (compared to 14.4 % in 2016) of total GDP, followed by industrial sector (26.3 %) and service sector (59.3 %) [1]. It should be noted that it is a very promising field in terms of potential economic growth and both regional and international investment opportunities. Food products being a necessity in the everyday life of every person. Food and processing industries are the large industries that are associated with agricultural cultivation. These industries have great potential to increase the value of agricultural products due to the added value, as no raw materials are sold but finished products that can be consumed in the domestic market and exported. Meanwhile, the global process of urbanization and changes in national politics, have had an impact on the Ukrainian economy. The number of urban populations continues to increase, while a great number of the workforce is migrating to neighboring countries. Several studies state that number of Ukrainian workers living abroad is around 2.5 million people. In this context, we plan to investigate and build a general forecast model on how urbanization is impacting agricultural land use and certain factors of its impact on the economic development of the region. On the other hand, we have examples of modern issues, such as climate change caused by rapid urbanization and the irrational use of natural resources. The study showed that urban development requires substantial land rescue for its expansion. By examining closely spatial data of urban and suburban areas, for example, that of Kyiv city, agricultural land in suburban areas is used for new construction sites and infrastructural development. An-

other indirect effect of urban development is ecological changes to the surrounding areas. The affected areas become much less suitable for agricultural uses, require large financial investment and high technologies to renew the soil fertility.

Analysis of recent researches and publications.

Research work that has been conducted in this area focused mostly on financial resources, international politics, and large agricultural holdings of agricultural land use. A lot of work has been done to highlight the importance of advocating an open land market in Ukraine. While other researchers in their research analyzed specific crops or certain agricultural industry markets. In general, the focus of previous publications was either on the current agricultural export or land use data in Ukraine. The goal of this research paper is to find, establish connections between urbanization and agricultural land use while focusing attention on possibilities for economic growth and development of effective land use policies. This paper will consider the open land market as a future possibility; however, its relations and impact with urbanization fall outside of the current research work scope.

The purpose of the research is to describe the connection between the rapid urbanization process and changes in agricultural land use from an economic perspective. We focus our research work and economic modeling on the case of Ukraine. We plan to showcase changes in agricultural enterprise income, in case of population migration to large urban centers. Additionally, we will study the cases of effective land resource management, where we will study whether it is more profitable for companies to establish the new enterprise closer or inside urban areas as opposed to

farmland regions. In this research, we plan to highlight the major economical differences of the company's startup and operation costs based on the available transportation networks, land resources, and the local agricultural specialization. The research work should introduce possible outcomes for small and medium companies, also separating those that are a part of international corporate structure and local business. The research will cover whether the local company can benefit from urbanization and what is its effects on individual farmers' earnings. One of the expected research outcomes is to describe how to increase added value of agricultural products with a focus on city markets.

Materials and methods of research.

In this study, we used data mining and analytics approaches. During research work we placed great emphasis on determining, locating, and analyzing statistical data from multiple sources. Important part of the research work is identifying the right data in the context of our research, the one that has a clear connection to the urbanization process. Spatial data visualization was used to determine key urban centers in Ukraine, as well as locations of agricultural, food and processing companies. Other types of material used are official national statistical data, European Union public reports, U.S. Department of Commerce datasheets, Kyiv city council, Municipal Enterprise "Kyivgenplan", private companies report, economists' publications, and Public cadastral map of Ukraine. A mathematical framework was used to build a robust forecast model. The methodology of the study employed various mathematical tools, such as statistical analytics, polynomial and linear approximations, mathematical correlation, ratio

analysis. Besides, profit and utility curves were used for growth modeling and global forecast. Spatial data have been outlined as highly effective for prediction modeling and establishing connections with the existing urbanization growth models.

Results of research and their discussion.

Urbanization processes serve as a catalyst for land use change and shift in economic activities [2]. As more population migrate to urban centers, remote villages and towns shrink in size, lose workforce and often local enterprises become bankrupt or shut down. There is a consequent indirect effect of urbanization on agricultural land use that is when local community become poor or bankrupt, the farmlands are rented by large agricultural holdings. Many researchers noted that agricultural holdings have no interest in the development of local communities or investment in a local business. Even though they employ local people, the average income of holdings farm employees is much lesser than those farmers whose lands are in private use or those working in the agricultural sector in neighboring European Union countries. The average salary is an important factor when looking at land use by large companies since agricultural holdings' business goals centered on exporting raw resources and they are registered as business entities in offshore countries [3].

The scope of current research works is limited to the analyses of medium to large size food and processing companies that operate in the local Ukrainian market, with a brief overview of the food product export business. To build an economic model, the existing transport infrastructure in Ukraine and its neighboring European countries was studied and used in system analyses. We analyzed available human resources,

amount of investments, industry type, and available transportation connections. As a part of research work, physical geographical placement (distance by road) of food and processing production companies in relation to closest and regional urban center positions have been outlined. A large array of economical and spatial data has been processed. It was determined that parts of this data have low correlation levels, which makes it difficult to include for modeling purposes. We decided to make the necessary edits, generalization to sim.

To build a research model we made the following assumptions and data sets. We used the city of Kyiv as the main market for food products, i.e. it is the largest city in Ukraine with a huge number of food product consumers and significant financial resources [4]. We have identified it as an urban center for this research work. Figure 1 shows the geographical location of selected enterprises of the food industry, as well as depicts the main transport arteries of national importance (note: automobile roads are main transportation arteries for transportation of food products). It is im-

portant to note that new companies and international corporations choose to establish their business in Kyiv or the 50-km zone from it. For modeling, we chose 12 enterprises, which are located both in the capital and in different regions of Ukraine – west, south, east, and center. We rank the selected enterprises by the number of employees, all indicators are shown in Table 1.

In the context of our economic modeling, the land market is considered, namely: the average lease value of 1 hectare per year, the location of the enterprise in an industrial region, or a separate settlement. It should be noted that the production capacity of the investigated enterprises is concentrated in one production site (complex). However, the exception is “Milk Alliance” corporation, which has 5 separate production facilities, we have focused on the largest of them located in the city of Yagotyn (others are located in Peratyn, Zolotonosha, Bashtanka).

It is reported that the total area of land plots in Ukraine is 60.4 million hectares, of which 42.4 million hectares are agricultural land (32 million hectares are

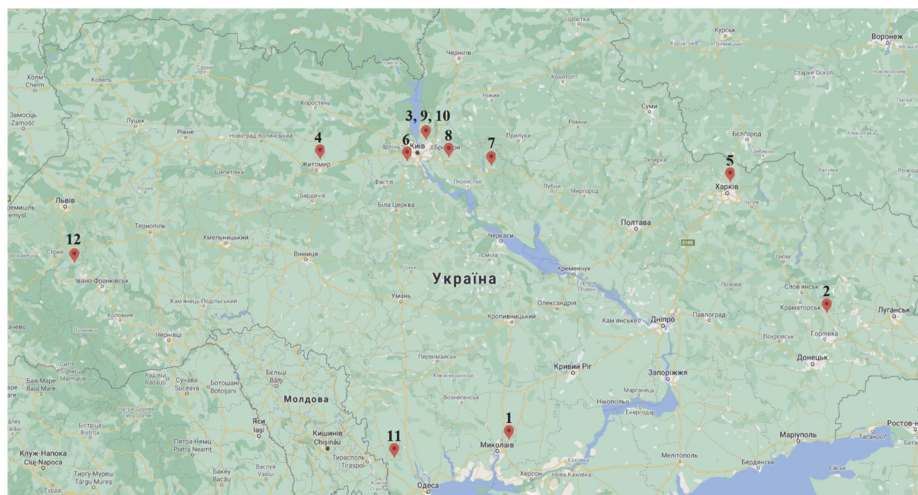


Fig. 1. Largest city in Ukraine and region (like master plan hot spots and data on population, if available movement of resources)

1. Company classification by distance to Kyiv, profit data and employees

№	Company name	Region	Distance to Kyiv, km	Number of employees	Net profit, thou. UAH	Gross profit, thou. UAH	Investments, thou. UAH
1	Sandora	Mykolaivske, Mykolaiv Oblast	501	3230	10404098	3164165	200936
2	Artyomslat	Soledar, Donetsk Oblast	714	2840	1748539	771559	16396
3	Kyivhlib	Kyiv	0	1911	1767501	301833	33592
4	Zhytomyr MeatFactory	Zhytomyr	139	1722	130451	38779	6234
5	Corporation "Biscuit-Chocolate"	Kharkiv	481	1227	14171	6447	233824
6	Wimm-Bill-Dann Ukraine	Vyshneve, Kyiv Oblast	18	554	441134	64020	49316
7	Milk Alliance	Yahotyn, Kyiv Oblast	112	496	5684501	1411977	120857
8	Lantmannen Axa	Boryspil, Kyiv Oblast	38	221	546133	324721	0
9	Hipp Ukraine	Kyiv	0	146	380160	187237	169
10	Herbalife Ukraine	Kyiv	0	29	738581	332176	1080
11	Odessa cannery of baby food	Stepanivka, Odessa Oblast	473	29	21444	3378	12053
12	Potyzništ	Zarichne, Lvivska Oblast	647	4	216	196	154

Source: compiled by the author on personal research data based on [5; 8; 9]

cultivated per year), the area of built-up land plots is 2550.4 thousand hectares [5]. Land for industrial purposes, which includes the food industry, is 224.1 thousand hectares. The annual lease value of land in Ukraine for the 2019 population is 3518 UAH/hectare per year [6].

At the same time, the statistics by region are as follows: Kyiv – 2694 UAH per year; Kyiv Oblast – 3474 UAH per year; Zhytomyr and Oblast – 4000 UAH per year; Mykolaiv Oblast – 4103 UAH per year; Kharkiv and Oblast – 3152 UAH per year; Odesa Oblast – 4065 UAH per year; Lviv Oblast – 4172 UAH per year; Donetsk Oblast – 1832 UAH per year. It is planned that in 2020 the total revenues to local budgets from land rent will amount to 185,714,285 UAH per year [7].

To understand the general picture of the relationship and economic performance of enterprises located in Kyiv and different re-

gions of Ukraine, we have considered Kyiv as a self-sufficient object, both in terms of products sales and production. The largest food retailers have opened more than 575 stores in Kyiv as of 2018, and more than 60 new stores are opened each year. The production of food, beverages, and tobacco by Kyiv enterprises is 46.6 % of the total industrial production, which employs 1,730,000 people (7.4 % of the total in Kyiv), and the average wage in the industry is from 16,511 UAH/month in 2019. In total, there are 9069 industrial enterprises in the capital, which employ 278,863 people, the volume of products sold by industrial enterprises of Kyiv in 2019 amounted to 892,1765,46.2 thousand UAH. At the same time, there are 7351 natural persons-entrepreneurs operating in the capital (11,877 people are employed, the volume of sold products is 5,622,011.9 thousand UAH) in industry, including the volume of products sold by

food industry enterprises – 125,140,998.9 thousand UAH according to 2019 data [5].

It should be noted that in Kyiv the main industrial capacities of food and processing enterprises are concentrated in the following areas: industrial zone “Degtyarivska Street” covers an area of 17.7 hectares; Podilsko-Kurenivskyi industrial district – 539.5 hectares, Pirogovo industrial zone – 121.9 hectares; Voskresensky industrial district – 107.2 hectares [5].

For economic analysis, we focused on a comparison of three large Ukrainian enterprises typical for the agricultural sector and food industry – “Astarta”, “Sandora”, and “Kyivhlib”, one of which is located in Kyiv (Fig. 2). We used the following data to calculate the transportation costs: 20 to 22 tons van will pay 27 UAH per km outside Kyiv, while 10 tons – 20 UAH per km outside Kyiv and 250 UAH per km within Kyiv.

The large agricultural enterprise “Astarta” holding has 5,470 employees, 230,000 hectares of land (approximately 1514090000 UAH per year for land rent), net profit – UAH 12,631,155,000, gross profit – UAH 2,432,488,000, and total salary expenditure – UAH 427,597,000 (on average, UAH 6,514 per employee per month). For our research, we used one of the sugar processing factories in Hlobyne

(Poltava Oblast) that is a part of “Astarta” holding. The distance from Hlobyne to Kyiv center is 287 km, so it will cost 7749 UAH per large van to transport products to Kyiv.

One of the largest food producers in Ukraine is “Sandora”. It has 3,230 employees, total salary expenses – 630,128 thousand UAH (average per employee 16,257 UAH per month), has a land area of 1.3646 hectares (approximately 5,600 UAH per year for land lease), and a unit cost of production – 22.66 UAH per liter of apple. A single 10-ton van will charge 10020 UAH to transport products to Kyiv (501 km distance to the city center).

For the Kyiv study, we chose “Kyivhlib”, which has 1911 employees, total salary expenses – 168,227 thousand UAH (average per employee 14,019 UAH per month), have a land area of 8 hectares (approximately 21,552 UAH per year for land rent) and the unit cost of production – 14.9 UAH per kg of rye-wheat bread. It will cost UAH 7500 to transport products within 30 km of Kyiv center by 10-ton van.

For future research, it is worth considering the current level of urbanization expansion in the Kyiv Oblast and European countries, study the increase of land use near the city areas and forecast its effects on the regional climate situation. We believe that is advisable to pursue a balanced policy in

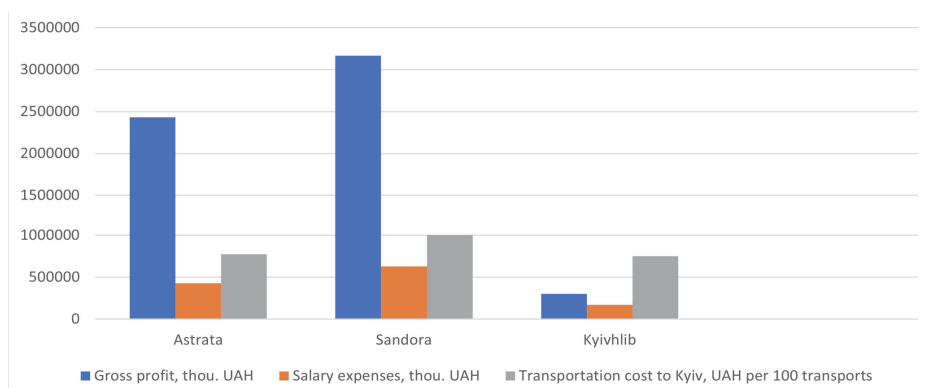


Fig. 2. Comparative economic analysis of the activities of three enterprises [5; 8; 9].

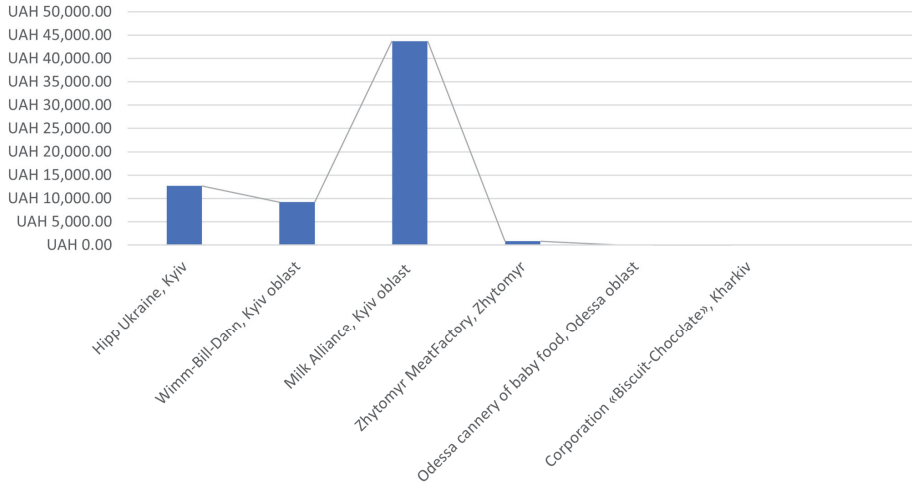


Fig. 3. The impact of distance to the market (Kyiv) on profits [5; 8; 9]

the context of sustainable urban development. We emphasize on rational use of land resources that should be outlined with the global forecast of possible outcomes and effects in short term (5–10 years) and long term (25 years).

Conclusions and future perspectives.

Distance from the production location to the market is not always proportional to net profit, as shown in Figure 3. The research results have proved that it is worth examining the data from the same sub-industries companies in several regions, with a focus on large cities as the main market for those companies' products. Besides, we did not take into account the effects of urban development on land use, especially in sub-urban and close-distance farmlands, which is a promising field for future research. We plan to examine the free open land market, determine its relationship and impact on the urbanization process, profits of companies. The open land market is worth researching further upon as it has a great impact on the index of economic feasibility of land use by

purpose by food and processing industries enterprise. The index of economic feasibility of land use by purpose relies upon the following calculations, investments (internal, external), new enterprise start-up costs, financial resources, labor and land resources necessary and available to the enterprise.

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В. А. Назаренко (2020). ЕКОНОМІЧНИЙ АНАЛІЗ ВПЛИВУ УРБАНІЗАЦІЇ НА ПІДПРИЄМСТВА ХАРЧОВОЇ ТА ПЕРЕРОБНОЇ ГАЛУЗІ НА ПРИКЛАДІ УКРАЇНИ. БІОЕКОНОМІКА ТА АГРАРНИЙ БІЗНЕС, 11(4): 114-121.

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Анотація. Стаття присвячена дослідженню економічних та соціальних взаємозв'язків між процесом урбанізації та використанням земель сільськогосподарського призначення в Україні. Варто зазначити, що як урбанізація, так і сільське господарство потребують нових земель для свого майбутнього розвитку. Важливою частиною такого зв'язку є екологічна складова та ефективне використання наявних ресурсів, а також використання земель у контексті розвитку урбанізації. Адже процес урбанізації може задати значного негативного впливу на стан земельних ресурсів. Наукові дослідження, наведені в роботі, визначають які економічні фактори урбанізації є найбільш актуальними для землекористування в передмістях та аграрних регіонах України. Стаття вводить поняття економічної доцільності використання земель за цільовим призначенням та вивчає це на прикладі підприємств харчової та переробної промисловості. Основним об'єктом досліджень були обрані харчова та переробна галузі, оскільки вони є найбільш перспективними сферами для майбутнього економічного розвитку кожного конкретного регіону та країни загалом. Ці галузі, крім виробництва додаткової вартості, зосереджені як на імпорті, так і на експорті готової продукції. Міста, без сумніву, є основними споживачами харчових продуктів, і водночас вони виводять трудові ресурси із сільської місцевості.

У цьому дослідженні ми вивчали глобальну ситуацію в Україні, як вплинула урбанізація 21 століття на аграрний сектор країни. Упродовж останніх десятиліть цей сектор переживає швидке зростання, на відміну від промислового та виробничого секторів, і тому збільшив рівень використання земель на національному рівні. Хоча загальнонаціональний рівень урбанізації може бути не найвищим у сучасній історії (20–21 століття), він продовжує значно впливати на національну економіку. Масштаб цього впливу виходить за межі цієї дослідницької роботи, оскільки він складається з багатомірних даних та широкого кола взаємозалежностей, включно з законодавчими та регуляторними актами. Моделі досліджень вимагають вивчення великого обсягу даних та їхніх взаємозв'язків, тому в цій статті ми зосередилися на підприємствах харчової та переробної галузей. Вони виявилися хорошим полігоном для вивчення моделей впливу на урбанізацію, а також зробили доцільність моделювання більш важливою. У цьому контексті були вивчені особливості моделей землекористування, оскільки харчова та переробна промисловості використовують земельні ресурси та можуть бути розташовані як у місті, приміській зоні, так і у віддаленому аграрному регіоні. Очевидно, що міста та підприємства формують великий попит на природні ресурси, робочу силу та фінансові інвестиції.

Ключові слова: урбанізація, економіка, економічне моделювання, сучасні проблеми міст, управління земельними ресурсами, зонування, просторове планування, стратегічне планування.