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MODERN OPERATING CONDITIONS OF THE SUPPLY CHAIN SYSTEM AT LIGHT INDUSTRY ENTERPRISES OF UKRAINE AND OPPORTUNITIES FOR THEIR DEVELOPMENT

The article examines the current conditions of the supply chain system functioning using the example of light industry enterprises in Ukraine. The current socio-economic conditions of the management of Ukrainian light industry enterprises are studied. The essence and elements of the light industry system in Ukraine are revealed. The features of the formation and functioning of supply chains in light industry are considered. The impact of full-scale hostilities on the light industry of Ukraine is studied. The impact of such factors as occupation, mobilization and changes in logistics routes on supply chains in the light industry of Ukraine is considered. The dynamics of the number of light industry enterprises is analysed, the volume of cargo transportation in Ukraine is studied. Potential ways for the development of light industry are considered, and opportunities for the development of supply chains at Ukrainian enterprises are presented.

Keywords: supply chains, light industry, logistics, management, cargo transportation.

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СУЧАСНІ УМОВИ ФУНКЦІОНУВАННЯ СИСТЕМИ ПОСТАЧАННЯ НА ПІДПРИЄМСТВАХ ЛЕГКОЇ ПРОМИСЛОВОСТІ УКРАЇНИ ТА МОЖЛИВОСТІ ДЛЯ ЇХ РОЗВИТКУ

У статті розглянуто сучасні умови функціонування системи ланцюгів поставок на прикладі підприємств легкої промисловості України, з акцентом на проблеми та виклики, з якими стикаються ці підприємства в умовах змінюваної соціально-економічної ситуації та зовнішніх чинників. Оцінено поточні соціально-економічні умови господарювання українських підприємств, а також з'ясовано основні фактори, які впливають на ефективність функціонування ланцюгів поставок у легкій промисловості. Зокрема, розкрито сутність та ключові елементи системи легкої промисловості в Україні, враховуючи її структурні особливості та роль у економіці держави.

Одним із важливих аспектів дослідження є особливості формування та функціонування ланцюгів поставок в умовах нестабільності та кризових явищ. Окрему увагу приділено впливу повномасштабних бойових дій на легку промисловість України. Розглянуто такі фактори, як окупація частини територій, мобілізація та зміни в логістичних маршрутах, що призвели до серйозних змін у діяльності підприємств, зокрема в плануванні поставок і забезпеченні виробничих потужностей.

Вивчено динаміку кількості підприємств легкої промисловості, а також обсяги вантажоперевезень в Україні, що дозволяє оцінити масштаби та напрямки розвитку галузі. Зроблено аналіз впливу цих факторів на ефективність ланцюгів поставок та виявлено найбільші проблеми, з якими стикаються підприємства. Також розглянуто потенційні шляхи для розвитку галузі, включаючи вдосконалення логістичних процесів, модернізацію виробничих ліній та інтеграцію інноваційних технологій.

У статті наведено пропозиції щодо розвитку ланцюгів поставок на підприємствах легкої промисловості України, зокрема через впровадження цифрових технологій, оптимізацію постачальницьких мереж та розширення міжнародної співпраці. Висвітлено важливість адаптації до нових реалій ринку, зокрема через розвиток гнучких логістичних стратегій і зміцнення партнерських відносин між підприємствами та постачальниками.

Ключові слова: ланцюги поставок, легка промисловість, логістика, управління, перевезення вантажу.

FORMULATION OF THE SCIENTIFIC AND PRACTICAL PROBLEM

In today's conditions of globalization and growing competition, effective supply chain management is a key factor in the successful functioning of light industry enterprises. This sector of the economy plays an important role in providing the population with essential goods, as well as in the development of related industries. However, the instability of the economic environment, changes in consumer preferences, the impact of digitalization and the need

to implement the principles of sustainable development require the improvement of the supply chain system to increase the competitiveness of enterprises.

The formation of an effective supply chain system in the light industry of Ukraine depends on many factors, in particular, on the integration of production, logistics and distribution processes. Important aspects are the optimization of transport and logistics routes, the introduction of modern information technologies and risk management in an unstable market. Given the significant dependence of the industry on imported materials and components, the issue of diversifying suppliers and localizing production processes is relevant.

The study of the formation of supply chains at light industry enterprises allows us to identify effective approaches to their organization and development. Analysis of modern practices and implementation of innovative logistics models will contribute to increasing operational efficiency and reducing costs. Improving the supply chain system at light industry enterprises in Ukraine is a strategic task to ensure their competitiveness. Studying this issue will allow developing scientifically based approaches to optimizing logistics processes and increasing the efficiency of the industry in modern conditions.

ANALYSIS OF RECENT PUBLICATIONS ON THE RESEARCH TOPIC

The works of scientists like Prytula Kh.M., Maksymenko A.O., Dubovyk S.H., Syhyda N.O., Spesyvyi Yu.Iu., Reznik N.P., Kharchevnikova L.S., Vlasiuk V.V., Nakonechna T.V., Kholodenko A., Petrusyk N., Bondarenko S.M., Zaverbnyi A.S., Dvulit Z.P., Vuiek Kh.I. are devoted to studying the formation and functioning of supply chains, particularly in light industry.

AIM OF THE RESEARCH

The purpose of the article is to study and substantiate approaches to forming an effective supply chain system at light industry enterprises in Ukraine, taking into account modern economic conditions, logistical challenges, and technological trends.

PRESENTATION OF THE MAIN MATERIAL

Light industry of Ukraine plays an important role in the national economy, providing the domestic market with consumer goods and contributing to the development of the country's export potential. This industry includes several key areas, in particular, textile, garment, footwear production, as well as the manufacture of knitted and leather goods. The main task of light industry is to create high-quality products that meet modern consumer demands and international standards. The range of goods covers various categories: clothing, footwear, textile materials, haberdashery and accessories. One of the basic sub-industries is textile production, which includes the production of natural and synthetic fibres, yarn, fabrics and non-woven materials. The clothing industry specializes in sewing products for various categories of consumers, including everyday ones, work and specialized clothing. The footwear industry provides production of products for different seasons and operating conditions, while the leather goods sector is focused on the production of bags, belts, accessories and other goods. Due to the diversity of activities and adaptation to market changes, light industry remains an important component of the country's economic development [4]. The formation of a supply chain system at light industry enterprises in Ukraine is a complex and multifaceted process that depends on several internal and external factors. The features of this process are determined by the specifics of the industry, its structure, economic conditions of operation, the level of integration of enterprises into global and regional markets, as well as technological innovations. Important aspects of effective supply chain management are the optimization of logistics processes, diversification of suppliers, the introduction of digital technologies and ensuring flexibility in responding to market changes.

One of the key features of supply chains in light industry is a multi-stage structure that includes suppliers of raw materials, manufacturing enterprises, logistics companies, distributors and end consumers. In the context of globalization, Ukrainian manufacturers are largely dependent on imported raw materials, in particular textile fibres, dyes, fittings and other components. This complicates logistics processes, as it requires careful inventory management, the selection of reliable suppliers and the use of effective transportation schemes. At the same time, there is a growing need to localize production and develop domestic suppliers, which will help reduce dependence on external markets and ensure the sustainability of supply chains [5]. Another important aspect is the adaptability of supply chains to changes in consumer demand. Light industry is characterized by seasonal fluctuations in demand, which necessitates the need for operational planning of production capacities and resource allocation. The use of flexible logistics strategies, particularly the Just-in-Time concept, allows you to minimize product storage costs and ensure timely supply of necessary materials and goods. However, the effective implementation of this model requires high synchronization of all supply chain participants, which is achieved through the integration of management information systems.

Digitalization is an integral part of modern supply chains. The introduction of technologies such as artificial intelligence, blockchain and Big Data allows you to automate logistics processes, increase transparency of operations and improve the accuracy of demand forecasting. For example, the use of blockchain technologies in supply systems helps to increase trust between counterparties due to the ability to track all stages of the movement of goods. The use of modern technologies in warehouse logistics provides control over the storage conditions of materials and finished

products, which is critically important for ensuring the quality of light industry goods. It is also worth noting the importance of the environmental component in the formation of modern supply chains. Global trends in sustainable development require light industry enterprises to implement environmentally friendly technologies, use secondary raw materials and minimize waste. In particular, many companies are implementing the principles of "green logistics", which involves optimizing transportation routes to reduce CO₂ emissions, using environmentally friendly packaging materials and using renewable energy sources in production processes [6].

Russia's full-scale military invasion of Ukraine, which began in February 2022, has had a significant negative impact on all sectors of the economy, including light industry. This sector, which before the war supplied the domestic market with consumer goods and had significant export opportunities, has suffered serious losses due to the destruction of production facilities, disruption of supply chains, loss of part of the workforce, and general economic instability. One of the most critical consequences has been the physical destruction or damage to light industry enterprises because of hostilities. A significant part of the production facilities located in regions that have been subjected to active shelling and occupation (in particular, in Donetsk, Luhansk, Kharkiv, Kherson, and Zaporizhzhia regions) have been completely or partially destroyed. In addition to the direct physical destruction of production facilities, enterprises faced damage to the logistics infrastructure, which made it impossible to supply raw materials, transport finished products and operate distribution networks. An equally significant challenge was the decrease in the purchasing power of the population, which directly affected the sales volumes of light industry products [13]. Martial law conditions, the forced displacement of a significant number of citizens, a decrease in population incomes and the reorientation of spending on primary needs led to a reduction in demand for light industry goods, especially in the middle and premium price segments. A separate aspect of the impact of the war is the loss of qualified labor. Some workers were mobilized into the ranks of the Armed Forces of Ukraine, others went abroad or were forced to change their place of residence within the country. The shortage of personnel complicated the resumption of work of enterprises and reduced the productivity of the industry.

Another important factor was the disruption of supply chains, which are critical for the functioning of the industry. Most Ukrainian light industry enterprises were largely dependent on imported raw materials and components. Blockade of seaports, destruction of logistics hubs and instability in the transport market led to an increase in transportation costs and a shortage of necessary materials. This, in turn, caused an increase in the cost of production and a decrease in the competitiveness of Ukrainian manufacturers both in the domestic and foreign markets. Russia's full-scale military invasion of Ukraine has caused a deep crisis in the supply chain system in light industry. This industry, which depends on a stable supply of raw materials, efficient logistics and uninterrupted operation of production facilities, has suffered large-scale disruptions due to hostilities, blocking of transport infrastructure, destruction of enterprises and loss of sales markets [7]. As a result of these factors, supply chains in light industry have been disrupted, which has led to disruptions in production, an increase in the cost of production and a significant decrease in the volume of goods produced.

One of the most critical problems has been the destruction of logistics infrastructure. The hostilities have led to the destruction and damage of roads and railways, bridges, warehouses and transport hubs, which has complicated the transportation of raw materials and finished products. In particular, the blockade and occupation of some seaports, which before the war provided a significant share of raw material imports (especially textile fibres, dyes, chemical components and fittings), forced enterprises to look for alternative supply routes. This, in turn, led to an increase in the cost of logistics and an increase in delivery times, which negatively affected the operational efficiency of enterprises. Another significant challenge was the disruption of the supply of critically important raw materials. Ukraine's light industry depended on the import of a significant part of components, in particular fabrics, threads, buttons, zippers and other materials. The war significantly complicated the transportation of products from traditional supply markets, in particular China, Turkey and EU countries. The forced reorientation to new suppliers was accompanied by additional costs and time delays. In addition, the shortage of raw materials forced some enterprises to reduce production or switch to manufacturing other products that did not require scarce materials [8]. Figure 1 shows a map of Ukraine, current as of February 3, 2025, indicating the occupied territory. Most of the occupied regions belong to deeply industrial, manufactured areas, and therefore their occupation and destruction because of hostilities have been a heavy blow to the economy of Ukraine and its industrial sector, including light industry.

Light industry of Ukraine, as one of the important components of the national economy, has undergone significant transformations over the past decade. The dynamics of its development are formed under the influence of both external and internal factors, among which changes in consumer preferences, state economic policy, technological innovations and global market trends play a key role. The combination of these factors determines the structure of the industry, in particular the number and scale of activities of business entities, the level of their competitiveness and integration into international production chains. In recent years, light industry of Ukraine has witnessed significant structural changes, manifested in rethinking approaches to production, reformatting business models and adapting to new market conditions. One of the determining factors of these transformations is the change in consumer priorities, in particular the growth of demand for high-quality, environmentally friendly and local products. This trend has contributed to the emergence of new enterprises, especially in the small and medium-sized business sector, which are focused on the production of clothing, footwear, textiles and accessories using environmentally friendly materials.

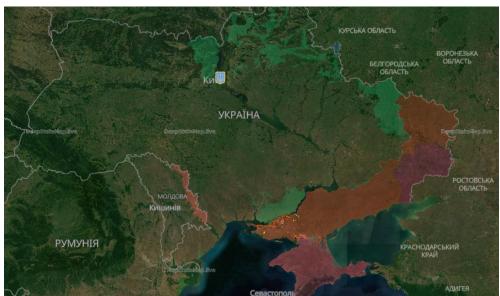


Fig. 1. Map of occupied regions of Ukraine as of 03.02.2025

Source: [1]

Modern manufacturers are increasingly implementing the principles of sustainable development, using organic cotton, recycled materials and waste minimization technologies, which not only meets global environmental standards, but also opens up prospects for expanding sales markets. Thanks to this, Ukrainian light industry is gradually integrating into international trade processes, expanding export opportunities and increasing its competitiveness in the world. In general, light industry in Ukraine remains a promising sector, which, despite significant challenges, has significant potential for development. The main task of enterprises in this sector is to achieve the optimal combination of traditional production technologies, innovative approaches and adaptation to modern market conditions. The dynamics of changes in the number of operating entities in light industry generally corresponds to national trends, but it is characterized by relative stability and less susceptibility to sharp fluctuations [9].

The first military invasion of russia into Ukraine in 2014 caused an overall decrease in the number of active enterprises in the country, but for light industry this outflow turned out to be less significant compared to heavy industry, in particular metallurgical production. Despite the difficult economic conditions, by 2019 the number of enterprises in the industry had almost reached the pre-war level, which indicated its ability to adapt and gradually recover. However, a new serious challenge was the global COVID-19 pandemic, which was accompanied by strict quarantine restrictions, which significantly affected all sectors of the economy. While the total number of operating enterprises in Ukraine remained relatively stable, light industry suffered significant losses. Restrictions on the movement of goods, disruptions in supply chains and a decrease in consumer demand led to another crisis in the industry [14]. As a result, over the next three years, the dynamics of the number of light industry enterprises was exclusively negative, which testified to its high sensitivity to global and domestic economic shocks.

For all of Ukraine, 2022 has become the biggest challenge for all sectors of the economy, including light industry, due to the full-scale invasion of russia. However, if we compare the dynamics of light industry enterprises with the all-Ukrainian one, we can testify to the rapid adaptation of the light industry business to the new crisis conditions and more positive forecasts for the future post-war recovery: if the total number of business entities in Ukraine in 2022 compared to 2021 decreased by 11,4%, then for light industry this figure is 10,5%. But Ukrainian entrepreneurship is recovering even during active hostilities, business continues to function, and already in 2023, the total number of operating business entities in Ukraine increased by 10,4%. This is also relevant for light industry, because in this sector the growth rate of the number of operating enterprises is even higher: the increase was 11,8% compared to the previous year. The dynamics of the number of enterprises in the light industry of Ukraine is shown in Figure 2:

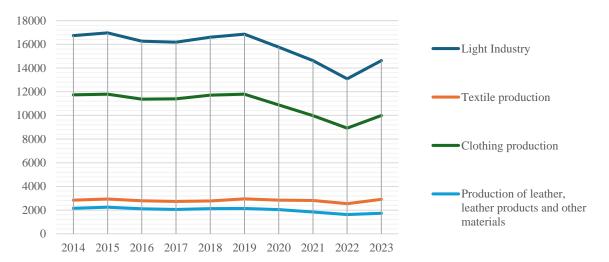


Fig. 2. Dynamics of the number of operating light industry entities in Ukraine for 2014-2023, units Source: developed by the author based on official statistics [2]

An analysis of the dynamics of cargo transported in Ukraine over the past five years also shows trends similar to industrial trends: a decrease in cargo transportation in 2020, which is associated with the pandemic, and a significant collapse in 2022 due to the start of full-scale hostilities in the country, which is clearly shown in Figure 3. But, despite the significant logistics crisis, Ukrainian transportation enterprises also demonstrated the ability to adapt and flexibility in difficult conditions, and despite the all-round crisis, were able to recover after the start of a full-scale war and begin a gradual increase in cargo transportation volumes, increasing their volume by 3.4% in 2023. For comparison, the total volume of cargo transportation in Ukraine in 2022 compared to 2021 decreased by 48.9%:

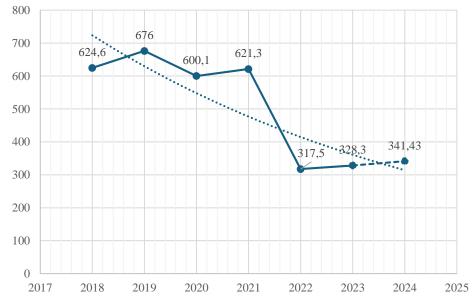


Fig. 3. Dynamics of transported cargo volumes for 2018-2024, million tons

Source: developed by the author based on official statistics [3]

* - Data for 2024 is forecast based on 9 months

The future of Ukraine's light industry in the conditions of modern military realities depends on several economic, technological and social factors. The war caused significant losses for the industry, but at the same time it became an impetus for adaptation, development of new directions and reorientation of production. One of the key factors of influence is changes in demand: in conditions of a long war, there is an increase in the need for military equipment, special clothing and ammunition, which stimulates the development of relevant industries. Ukrainian light industry enterprises, which quickly adapted to new realities, are actively working on the creation of high-quality tactical clothing, body armour and personal protective equipment, which contributes to their integration into the military-industrial complex. In addition, there is a tendency to change the structure of exports. Currently, enterprises are looking for new opportunities, expanding cooperation with international partners and adapting products to the requirements of wartime. A significant challenge remains the shortage of labor due to mobilization and migration of

the population. This encourages enterprises to automate production and implement innovative technologies, in particular the use of digital solutions in the field of design, 3D printing and robotic sewing systems.

Another important aspect of the future of the industry is state support and investment attraction. The Ukrainian government is actively working on programs to stimulate domestic production, providing benefits for enterprises that manufacture essential and military goods. In addition, international organizations and donors are financing initiatives aimed at restoring the economy and supporting small and medium-sized businesses, which allows the industry to gradually adapt to new conditions. In the future, we can expect that Ukraine's light industry will continue its development in two main directions: meeting the needs of the military sector and restoring civilian production after the end of the war. The post-war period can become a starting point for the modernization of the industry, increasing export potential and introducing sustainable technologies focused on European standards of quality and environmental friendliness [10].

The prospects for the development of supply chains in Ukraine's light industry are largely determined by the impact of military realities, geopolitical changes and the need to adapt to new economic conditions. The war led to significant disruptions in logistics processes, in particular due to the destruction of transport infrastructure, the blockade of ports and the reduction of access to traditional supply markets. This forces enterprises to look for new routes, expand cooperation with international partners and localize production facilities. One of the key trends is the transition to regionalization of supply chains, which involves reducing dependence on distant suppliers and increasing the role of domestic production. In conditions of limited access to imported raw materials and components, Ukrainian companies are actively developing the domestic market, stimulating the production of textiles, accessories and other materials. This not only reduces the risks associated with logistical disruptions but also contributes to the creation of new jobs and increasing the level of technological independence of the industry. An important factor is the development of alternative transport routes. The closure of seaports has forced businesses to adapt to the use of rail and road transport, which, in turn, has increased the importance of cooperation with EU countries. European logistics hubs have become key points for the export of Ukrainian products and the supply of imported materials. Despite higher transportation costs and the need to adapt to new customs procedures, this opens up opportunities for Ukrainian companies to integrate into international production chains and strengthen trade ties with partners from Europe. Digitalization and automation of logistics processes play a significant role in the transformation of supply chains. Ukrainian enterprises are increasingly implementing modern inventory management technologies, artificial intelligence for demand forecasting, and real-time cargo tracking systems [11]. This helps to minimize delays, optimize supply routes, and increase the efficiency of the industry.

Government support also remains critical for the development of supply chains. The Ukrainian government is working to create favourable conditions for the localization of production, the development of transport infrastructure and the attraction of investments in the modernization of logistics facilities. In addition, international partners provide financial and technical assistance to adapt Ukrainian business to new economic conditions. In the future, the development of supply chains in light industry will be focused on increasing resilience to external risks, integration with European markets and the introduction of innovative technologies in logistics. This will not only restore stability in the industry but also lay the foundation for its further growth in the post-war period, making Ukraine a competitive player in the global light industry market.

The potential for the development of Ukrainian light industry supply chains is largely determined by the need to adapt to modern challenges and integrate into global economic processes. The war caused significant imbalances in logistics systems, but it also opened new prospects for the reorientation and modernization of the industry. One of the main opportunities is the localization of raw material and component production, which will reduce dependence on imports and create sustainable domestic supply chains. Ukrainian enterprises can use this trend to expand their own production capacities, especially in the field of textiles, accessories and synthetic materials, which are critical for the stable functioning of light industry. Another promising opportunity is integration into European and international supply chains through the reorientation of exports and strengthening trade ties. Ukraine already has the status of a candidate for accession to the European Union, which involves the gradual harmonization of logistics processes with European standards. This opens prospects for creating new cross-border logistics routes, simplifying customs procedures, and attracting investments in the development of transport infrastructure. Cooperation with European logistics hubs and the adaptation of Ukrainian enterprises to the requirements of sustainable production are especially important, which will facilitate entry into new markets [12].

Also, increasing the capacity of railways to Europe, expanding border infrastructure and creating new logistics centres can significantly improve the efficiency of supply and contribute to the integration of Ukraine into the European logistics system. Equally important is the attraction of international investment and financial support for the development of supply chains. The war has attracted the attention of international financial institutions and donor organizations, which are ready to support the recovery of the Ukrainian economy. Small and medium-sized business financing programs, grants for the development of innovative solutions in logistics and support for the modernization of transport infrastructure can become key drivers of the development of the industry in the coming years [15].

In the long term, the development of supply chains of light industry in Ukraine will be focused on increasing their resilience, diversifying sources of raw materials, expanding cooperation with international partners and introducing digital technologies. These changes will create a foundation for the stable functioning of the industry in

the post-war period, will contribute to its integration into the world economy and strengthening its positions in the international market.

CONCLUSIONS

Thus, the future development of Ukraine's light industry and its supply chains will be determined by the industry's ability to adapt to new challenges, including military realities, changes in the global economy, and technological progress. Despite significant losses, Ukrainian light industry demonstrated adaptability to new realities. Some enterprises quickly reoriented production to the needs of the defence complex, establishing the production of military uniforms, tactical clothing, body armour, footwear and other necessary goods [16]. In addition, there was a process of partial relocation of enterprises to the western regions of the country, where conditions were created for the continuation of the industry. A significant factor in support was state aid, international financial support and initiatives from volunteer organizations. The introduction of small and medium-sized business financing programs and grant initiatives for enterprises engaged in the production of critical goods has partially compensated for losses and facilitated the restoration of production.

In addition, there has been a shift to digital supply chain management technologies. Ukrainian enterprises have begun to more actively implement inventory management systems, demand analytics, automated solutions for cargo tracking and resource allocation. The role of international partners in restoring supply chains has also increased, as many Ukrainian companies have been able to establish direct cooperation with European raw material suppliers and logistics companies, which has partially compensated for the losses from the destroyed routes through the Black Sea. In the long term, it can be expected that Ukraine's light industry will not only adapt to the challenges of wartime but will also gain new opportunities for growth. The creation of efficient, technologically advanced and sustainable supply chains will be the key to Ukraine's integration into global economic processes, contribute to the recovery of the economy after the war, and ensure a strong position in the international market.

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