

RESILIENCE OF SUPPLY CHAINS IN FOOD INDUSTRY ENTERPRISES AMID MILITARY CONFLICTS: STRATEGIES FOR OPERATIONAL CONTINUITY AND RISK MITIGATION

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ABSTRACT

The development of the military conflict associated with the full-scale invasion of Ukraine by the Russian Federation is a common factor influencing the emergence of threats and corresponding risks of deterioration in the supply chain and production processes of food industry enterprises. This impact has consequences that can be classified by type of hazard according to the main areas of management related to the supply chain and production processes of enterprises. Such an impact has specific characteristics for enterprises in different industries, and its identification in relation to food industry entities will ensure the development of scientific and practical research in this area. The identification of such characteristics is associated with the use of appropriate methodological support, which can be universal in nature and applied to the analysis of both the conditions in Ukraine and countries with a similar environment in conditions of military conflict. The aim of the study is to systematise and substantiate scientific approaches to assessing the impact of military conflicts on the supply chain and production processes of food industry enterprises. To achieve this goal, the following tasks have been set: to formulate methodological support for assessing the impact of military conflicts on the supply chain and production processes of food industry enterprises; to identify the characteristics of this impact using the example of leading food industry enterprises in Ukraine during the Russian Federation's war against Ukraine. Research methods: systematisation method; factor method; scoring; statistical method. The use of the author's methodological support made it possible to establish the characteristics of the impact of the military conflict on the supply chain and production processes of food industry enterprises in Ukraine. It was determined that the leading companies in the food industry market of Ukraine demonstrated a high level of security in key areas during the military conflict. At the same time, the need to update the technologies and equipment used in the supply chain (including within production processes) was noted. The practical value of this study lies in the development of characteristics of the impact of military conflicts on the supply chain and production processes of food industry enterprises.



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1. INTRODUCTION

The military conflict associated with the full-scale invasion of Ukraine by the Russian Federation is a

common factor influencing the emergence of threats and corresponding risks of deterioration in the supply chain and production processes of food industry enterprises. This impact has consequences that can be classified by

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type of hazard according to the main areas of management related to the supply chain and production processes of enterprises. Such an impact has specific characteristics for enterprises in different industries, and its identification in relation to food industry entities will ensure the development of scientific and practical research in this area. The identification of such characteristics is associated with the use of appropriate methodological support, which can be universal in nature and applied to the analysis of both the conditions in Ukraine and countries with a similar environment in conditions of military conflict.

The issue of the dependence of supply chains and production processes (including in the food industry) on the effects of military conflicts has been studied in the works of Ukrainian and foreign scientists. The characteristics and structure of the supply chain of enterprises (including the food industry) are considered in the works (Bocharova, 2019; Kolodzieva, 2015; Toygar & Yildirim, 2023).

The specifics of building an operational strategy for managing enterprise supply chains in the event of crises (for short periods of up to one year) are presented in the works of Durugbo and Al-Balushi (2023), Fasan et al. (2021), and Woldt and Prasad (2022). It should be noted that the authors consider both the Covid-19 pandemic and economic crises as crises.

We can highlight such a research direction as the development of sustainable supply chains in crisis conditions. In particular, the works (Gu et al., 2021; Feiz Abadi et al., 2021; Vega et al., 2023) present the rationale for using sustainable development goals as a benchmark in the formation and management of supply chains under the influence of crises. It should be noted that the authors' approach to building this process is quite typical, as it assesses the impact of recurring economic crises of a global and international nature.

The issue of overcoming disruptions in the functioning of supply chains during crises (the Covid-19 pandemic) is presented in a number of thematic scientific works (Baghersad & Zobel, 2021; Baz & Ruel, 2021; Qi et al., 2025). The problems and directions of response to incentives to support supply chains in the manufacturing industry and its actors during crises are considered in the study (Díaz Pacheco & Benedito, 2023).

Despite the existence of scientific research on this issue, there is a need to create a comprehensive methodological approach to analysing this area and establishing the characteristics of the formation of this dependence.

The aim of the study is to systematise and substantiate scientific approaches to assessing the impact of military conflicts on the supply chain and production processes of food industry enterprises. To achieve this goal, the following tasks have been set: to formulate methodological support for assessing the impact of military conflicts on the supply chain and production processes of food industry enterprises; to determine the characteristics of this impact using the example of leading food industry enterprises in Ukraine during the war between the Russian Federation and Ukraine.

The scientific novelty of the presented research lies in the development of methodological support and the identification of the specifics of the impact of military conflicts on the supply chain and production processes of food industry enterprises.

2. LITERATURE REVIEW

Let us define theoretical approaches to methodological support for assessing the relationship between military conflict and the efficiency of the supply chain and production processes of food industry enterprises. For this purpose, it is necessary to identify assessment indicators that will identify the above-mentioned relationship.

It should be noted that researchers (Bocharova, 2019; Kolodzieva, 2015; Toygar & Yildirim, 2023) define the state of production processes as one of the basic processes of the supply chain. We can agree with the authors' approach and consider the efficiency of production processes in food industry enterprises as a component of supply chain efficiency.

In the study (Bocharova, 2019), the formula for the efficiency of an enterprise's product supply chain includes an integral coefficient of efficiency indicators in the area of supply chain planning, efficiency in the area of procurement of materials and inventories, efficiency of production processes, efficiency of sales processes, and efficiency of the return process organisation. The elements of each area are determined using quantitative and qualitative methods. It should be noted that most of the structural elements of each of the assessment areas are determined from the perspective of a focus on custom manufacturing, which is common among small and medium-sized enterprises in various industries. Overall, this approach is well-founded and takes into account the key areas of supply chain management.

The study (Tymchuk et al., 2024) lists the components of supply chain efficiency, which include: product quality efficiency component; sustainable supply efficiency component; sustainable production efficiency component; product manufacturability efficiency component; enterprise pricing strategy efficiency component; enterprise innovation solutions efficiency component. Their status is studied separately without creating a single indicator. In our opinion, this assessment is sufficiently comprehensive and takes into account a wide range of components that make up the main areas of supply chain management, which allows us to make judgements about the indicator under study.

There are studies aimed at determining the efficiency of the supply chain from the perspective of optimal resource use (resource approach) and in terms of meeting consumer expectations (subject-oriented approach). The study (Jenkins, 2022) identifies two approaches that involve assessing the effectiveness of the supply chain, namely:

1) a resource-based approach, based on the assessment of this indicator by establishing the efficiency of the

enterprise's use of resources to achieve the goal of implementing strategic results related to the production and sale of products within the established planned income and expenses, financial resources necessary to ensure working capital;

2) a subject-oriented approach, focused on assessing this indicator by establishing the efficiency of resource use in such a way as to ensure maximum customer satisfaction. In this case, the level of compliance of the supply chain components with consumer expectations, which are revealed through the dynamics of demand for the enterprise's products, is assessed.

3. METHODOLOGY

The presented study includes the following stages, in particular: systematization of scientific approaches to determining the procedure for assessing the impact of military conflict on the efficiency of the supply chain of food industry enterprises; determining the impact of military conflicts on the supply chain and production processes of food industry enterprises in Ukraine. To study the actual state of the issue, the author's methodological support was used, formulated in the context of the scientific approaches considered and the peculiarities of the supply chain of food industry enterprises under the influence of military conflict. The author's approach is presented for the first time and

allows determining the impact of military conflict on the efficiency of the supply chain of food industry enterprises. It can also be adapted to similar impacts associated with crisis phenomena of a similar nature.

The main research methods used include:

- the systematization method, which made it possible to establish the main scientific approaches to assessing the efficiency of the supply chain;
- the factor method, used to assess the impact of military conflict factors on the efficiency of the supply chain of food industry enterprises;
- a point system, used to determine the level of influence of the factors under study;
- the statistical method, necessary for establishing the reporting indicators used for evaluation.

The empirical materials used include actual data from financial statements and internal corporate materials of individual food industry enterprises in Ukraine that are leaders in their respective industries.

4. RESULTS AND DISCUSSION

Guided by the above approaches, we can propose an approach to assessing the efficiency of the supply chain (including components of production process efficiency) in terms of the management areas.

Table 1. Procedure for assessing the impact of military conflict on the efficiency of the food industry supply chain

No.	Stage / Indicator	Characteristics
1	2	3
1	Stage of supply chain performance assessment	
1.1	The stage of evaluating the effectiveness of supply chain planning (ESCP).	$E_{sc} = E_{imp} / E_{pl}$, If $E_{imp} \geq 0.75-1$ - high level of efficiency; $E_{imp} = 0.3-0.75$ - average level of efficiency; $E_{imp} \leq 0-0.3$ - average level of efficiency. The main components of E_{sc} are planned: where Pr_{pl} is the planned production volumes; S_{pl} is the planned sales volumes; $Stvol_{pl}$ is the planned stock volumes that ensure uninterrupted production. The indicator is set as a % of the planned production cost within the relevant period (C_{pl}); C_{pl} - planned production cost. For comparison, the main actual components of E_{imp} are determined: where Pr is production volumes; S is sales volumes; $Stvol$ is the volume of stocks that ensure production continuity. The indicator is set as a % of the cost of production within the relevant period (C); C - the cost of production
1.2	The stage of assessing the efficiency of production processes (Epr)	Where: T_{mdel} is the timeliness of the supply of materials for production (score from 1 to 10); T is the manufacturability of the enterprise determined through the indicators of the intangible assets depreciation ratio (C_{wria}) and the fixed assets depreciation ratio (C_{wrf}). If C_{wria} , $C_{wrf} > 0.5 \rightarrow$ production manufacturability is low, if at the level of 0.3-0.5 - medium, 0.1-0.3 - high; T_{pr} - timeliness of production in accordance with strategic targets (score from 1 (low compliance) to 10 points (high compliance))
1.3	The stage of assessing the effectiveness of product sales (Es)	$E_{sr} \rightarrow E_{ss}$ - compliance of the reported sales volumes (E_{sr}) with the strategic volumes (E_{ss}) (score from 1 (low compliance) to 10 (high compliance)). $\Delta E_{srt1,0}$ - change in sales in the reporting (1) year compared to the previous (0) year, %. If $\Delta E_{srt1,0} > 0$, it is a positive trend, if $\Delta E_{srt1,0} < 0$, it is a negative trend
1.4	The stage of organising communication between participants in the product supply chain (Ecom)	E_{com} is determined through a scoring system based on a survey of food industry representatives. Values: 1 point - low level of organisation of this process; 10 points - high level of this indicator
II	Stage of assessing the negative impact of military conflict on supply chain efficiency	
2.1	The stage of assessing the negative impact on the state of supply chain planning efficiency (E_{scw}).	Influencing factors: military risks (arithmetic mean of risks of this type), non-military risks (arithmetic mean of risks of this type), resource risks (arithmetic mean of risks). Their impact on the state of supply chain planning effectiveness (E_{sc}) is assessed. Values: 1 point - low level of impact; 10 points - high level of impact
2.2	The stage of assessing the negative impact on the efficiency of production processes (E_{prw})	Relevant impact factors identified in section 2.1. Their impact on the state of production process efficiency (E_{pr}) is assessed. Values: 1 point - low level of impact; 10 points - high level of impact

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2.3	The stage of assessing the negative impact on the state of product sales efficiency (Esw)	Relevant influence factors identified in section 2.1. Their impact on the state of product sales performance (Esw) is assessed. Values: 1 point - low level of influence; 10 points - high level of influence
2.4	The stage of assessing the negative impact on the organisation of communication between the participants of the product supply chain (Ecomw)	Ecomw is determined through a scoring exercise based on a survey of food industry representatives. Values: 1 point - low level of impact; 10 points - high level of impact

Source: developed by the author

At the same time, the impact of the military conflict factor on the state of this indicator (and its components) is proposed to be assessed from the standpoint of the response sensitivity indicator. Table 1 presents the procedure for assessing the impact of military conflict on the efficiency of the supply chain of food industry enterprises. The scientific novelty of this methodological support lies in the development of a set of components of the efficiency of the supply chain of food industry enterprises, an approach to determining the impact of military conflict on the dynamics of the above indicator.

The difference between the author's proposal and other approaches is the formulation of methodological support for calculating indicators, determining the procedure for assessing the impact of military conflict. At the same time, the risks of military conflict are a factor influencing the efficiency of the supply chain of food industry enterprises. Using the above methodological support, we will assess the impact of military conflicts on the supply chain and production processes of food industry enterprises.

Table 2. Assessment of the impact of the military conflict on the supply chain and production processes of ALAN LLC

No.	Indicators	Meaning		
		2021	2022	2023
1	2	3	4	5
1	Stage of supply chain performance assessment			
1.1	The stage of evaluating the effectiveness of supply chain planning (ESCP).			
	The ratio of the actual value of the supply chain (Eimp) to the planned value (Epl) by component:	High level	High level	High level
	Ratio of actual output (Pr) to planned output (Prpl)	UAH 1,626.5 million / UAH 1,600 million = 1.01	2057,7 million UAH / 2000 million UAH = 1,03	2208,45 million UAH / 2200 million UAH = 1
	Ratio of actual sales (S) to planned sales (Spl)	UAH 1616,5 mln / UAH 1600 mln = 1,01	1953,5 mln UAH / 2000 mln UAH = 0,97	2299,1 million UAH / 2200 million UAH = 1,05
	The ratio of the actual volume of stocks that ensure uninterrupted production (Stvol) to the planned volume (Stvolpl)	UAH 66.3 mln / UAH 66 mln = 1	UAH 232.3 million / UAH 230 million = 1.01	138.2 million UAH / 130 million UAH = 1.06
	Ratio of actual production cost (C) to planned production cost (Cpl)	UAH 1,626.5 million / UAH 1,600 million = 1.01	2057,7 million UAH / 2000 million UAH = 1.03	2208,45 million UAH / 2200 million UAH = 1
1.2	The stage of assessing the efficiency of production processes (Epr) by indicators:			
	Timeliness of supply of materials for production (score from 1 to 10) (Tmdel).	10	9	9
	Technological efficiency of the enterprise (T)	Cwria = 0.07 (high manufacturability by technology). Cwrfa = 0.45 (average manufacturability by fixed assets)	Cwria = 0.35 (average manufacturability by technology). Cwrfa = 0.45 (average manufacturability by fixed assets)	Cwria = 0.81 (low manufacturability by technology). Cwrfa = 0.59 (low manufacturability of fixed assets)
	Timeliness of production in accordance with strategic targets (TPr)	10	9	9
1.3	The stage of assessing product sales efficiency (Es) by indicators:			
	Compliance of reported sales volumes (Esr) with strategic volumes (Ess) (Esr → Ess)	Esr = UAH 1616.5 million. Ess = UAH 1600 million. UAH 1616.5 million → UAH 1600 million (high correspondence = 10)	Esr = UAH 1953.5 million. Ess = 2000 million UAH. 1953.5 million UAH → 2000 million UAH (high correspondence = 9)	Esr = UAH 2299.1 million. Ess = 2200 million UAH. 2299.1 million UAH → 2200 million UAH (high correspondence = 10)
	Δ Esrt1,0 - change in sales volume in the reporting (1) year compared to the previous (0) year, %.	11,5	20,8	17,7
1.4	The stage of organising communication between participants in the product supply chain (Ecom)	10	9	9
II	Stage of assessing the negative impact of military conflict on supply chain efficiency			
2.1	The stage of assessing the negative impact on the state of supply chain planning efficiency (Erschw).	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.2	The stage of assessing the negative impact on the efficiency of production processes (Eprw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.3	The stage of assessing the negative impact on the state of product sales efficiency (Esw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.4	The stage of assessing the negative impact on the organisation of communication between the participants of the product supply chain (Ecomw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security

Source: calculated by the author

The first enterprise in the food industry of Ukraine under study is ALAN LLC (Dnipro), which operates in the production and sale of meat products. Table 2.9 shows an assessment of the impact of the military conflict on the supply chain and production processes of ALAN LLC (Dnipro). The study is based on internal corporate data, financial statements (Alan, 2025), and expert assessment. The data for 2021, 2022, 2023 were used for the analysis; 2024 was not assessed because there is no data on the state of the estimated indicators.

The analysis of the results (Table 2) allows us to state the following:

1) the studied enterprise in 2021, during the period of military conflict in 2022, 2023 demonstrated a high level of supply chain planning efficiency. Namely, there was a high level of compliance with the restoration of the actual value of the supply chain to the planned value by components. This result, in our opinion, is due to the company's high ability to take into account and evaluate long-term forecasts for the economy, meso-level and its own development, and is also due to the high quality and demand for products, which did not decline during the war. Maintaining the production and sales volumes in line with the threats and risks caused by the military conflict is associated with maintaining a high security system in key areas;

2) assessment of the efficiency of production processes by indicators allows us to state the following. Timely delivery of materials for production and timely production of products in accordance with strategic targets were high in 2021 (10 points).

In 2022 and 2023, these indicators were also high, but lower than in 2021 (9 points). In 2021, the company's manufacturability in terms of intangible assets (technologies) was high (0.07) (less than 0.1-0.3), in 2022 it increased to 0.35 (average), and in 2023 it was 0.81 (low). It should be noted that the enterprise's manufacturability in terms of fixed assets (equipment) was average (0.45) in 2021 and 2022, and 0.59 (low (above 0.5) in 2023). The fact that the company demonstrates a deterioration in manufacturability is threatening and indicates further threats to the development of production and logistics processes;

3) the effectiveness of product sales in terms of indicators and organisation of communication between the participants of the product supply chain is high, which is due to the focus on a high level of organisation of the work of the relevant functional structural departments;

4) with a high negative impact of the military conflict on the macro environment, meso level and general micro level, the company demonstrates low sensitivity to the said external pressure due to the high level of security system organisation.

The second Ukrainian food industry enterprise selected for the study is Dubnomoloko PJSC (Dubno). It operates in the field of milk processing, cheese and butter production. Table 2.10 provides an assessment of the impact of the military conflict on the supply chain and production processes of Dubnomoloko PJSC (Dubno). This enterprise has a cheese factory that produces butter

and cheeses under the KOMO trademark. The financial statements of the enterprise (Dubnomoloko, 2025) and internal corporate data were used for the study.

The evaluation of the presented results (Table 3) allows us to identify the following points:

1) PJSC Dubnomoloko in 2021, during the period of military conflict in 2022, 2023, was determined by a high level of efficiency of supply chain planning. In particular, there was a high level of compliance with the restoration of the actual value of the supply chain to the planned value by component. This is due to the efficiency of planning caused by the use of such artificial intelligence tools as neural networks. The planning efficiency was also influenced by the geographical location of the company's production facilities (Rivne region, Dubno). During the war, this area received fewer air strikes from the Russian Federation compared to other regions closer to the frontline. Also, maintaining production and sales volumes in the face of threats and risks caused by the military conflict is linked to ensuring a high level of security in key areas;

2) analysis of the efficiency of production processes by indicators shows the following. Timely delivery of materials for production and timely production of products in accordance with strategic targets were high in 2021 (10 points). In 2022 and 2023, these indicators were also high, but less so compared to 2021 (8 points). The company's technological efficiency in terms of intangible assets (technologies) in 2021, 2022, 2023 was high (less than 0.1-0.3). In 2021, 2022, and 2023, the company's technological efficiency in terms of fixed assets (equipment) was low (above 0.5). Accordingly, there is a need to increase the technological upgrading of equipment, as it is quite outdated and affects the state of competitiveness in the cheese and butter market. At the same time, the high level of technological sophistication of information systems based on artificial intelligence (machine learning, computer vision, neural networks) makes it possible to ensure high product quality, control processes, maintain production continuity and optimise resources in the face of external challenges;

3) the effectiveness of product sales in terms of indicators and communication between participants in the product supply chain is high, due to the focus on a high level of organisation of the relevant functional departments;

4) given the high negative impact of the military conflict on the macro environment, meso level and overall micro level, the company demonstrates low sensitivity to the said external pressure due to the high level of security system organisation.

The third enterprise in the food industry of Ukraine selected for the study is Shchedro LLC (Dnipro). The main type of economic activity of the enterprise is the production and sale of animal fats, oil, and other types of food products. It operates in the field of milk processing, cheese and butter production. Table 4 presents an assessment of the impact of the military conflict on the supply chain and production processes of Shchedro LLC (Dnipro).

Table 3. Assessment of the impact of the military conflict on the supply chain and production processes of PJSC Dubnomoloko

No.	Indicators	Meaning		
		2021	2022	2023
1	2	3	4	5
1	Stage of supply chain performance assessment			
1.1	The stage of evaluating the effectiveness of supply chain planning (ESCP).			
	The ratio of the actual value of the supply chain (Eimp) to the planned value (Epl) by component:	High level	High level	High level
	Ratio of actual output (Pr) to planned output (Prpl)	UAH 1888.6 million / UAH 1800 million = 1.05	2125.6 million UAH / 2100 million UAH = 1,01	2206,3 million UAH / 2150 million UAH = 1,03
	Ratio of actual sales (S) to planned sales (Spl)	2429,9 million UAH / 2400 million UAH = 1,01	2551,1 million UAH / 2500 million UAH = 1,02	2678,6 million UAH / 2600 million UAH = 1,03
	The ratio of the actual volume of stocks that ensure uninterrupted production (Stvol) to the planned volume (Stvolpl)	316.4 million UAH / 316 million UAH = 1	UAH 370.6 mln / UAH 330 mln = 1.12	UAH 403.6 million / UAH 350 million = 1.15
	Ratio of actual production cost (C) to planned production cost (Cpl)	2353,7 million UAH / 2300 million UAH = 1,02	2467.5 million UAH / 2400 million UAH = 1.03	UAH 2621,3 mln / UAH 2600 mln = 1
1.2	The stage of assessing the efficiency of production processes (Epr) by indicators:			
	Timeliness of supply of materials for production (score from 1 to 10) (Tmdel).	10	8	8
	Technological efficiency of the enterprise (T)	Cwria = 0.001 (high manufacturability by technology). Cwrfa = 0.68 (low manufacturability by fixed assets)	Cwria = 0.001 (high manufacturability by technology). Cwrfa = 0.73 (low manufacturability by fixed assets)	Cwria = 0.001 (high manufacturability by technology). Cwrfa = 0.766 (low manufacturability by fixed assets)
	Timeliness of production in accordance with strategic targets (TPr)	10	8	8
1.3	The stage of assessing product sales efficiency (Es) by indicators:			
	Compliance of reported sales volumes (Esr) with strategic volumes (Ess) (Esr → Ess)	Esr = UAH 2,429 million. Ess = 2400 million UAH. 2429 million UAH → 2400 million UAH (high correspondence = 10)	Esr = 2551.1 million UAH. Ess = 2500 million UAH. 2551.1 million UAH → 2500 million UAH (high correspondence = 10)	Esr = UAH 2678.6 million. Ess = 2600 million UAH. UAH 2678.6 million → UAH 2600 million (high correspondence = 10)
	Δ Esr1,0 - change in sales volume in the reporting (1) year compared to the previous (0) year, %.	8	5	5
1.4	The stage of organising communication between participants in the product supply chain (Ecom)			
		10	8	8
II	Stage of assessing the negative impact of military conflict on supply chain efficiency			
2.1	The stage of assessing the negative impact on the state of supply chain planning efficiency (Erscw).	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.2	The stage of assessing the negative impact on the efficiency of production processes (Eprw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.3	The stage of assessing the negative impact on the state of product sales efficiency (Esw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.4	The stage of assessing the negative impact on the organisation of communication between the participants of the product supply chain (Ecomw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security

Source: calculated by the author

This company produces products under the Shchedro trademark (a wide range of mayonnaise, instant noodles, sauces, mustard, margarine, and various fats). The study uses the company's financial statements (Schedro, 2025a; Schedro, 2025b; Schedro, 2025c) and internal corporate data.

The study of the calculations (Table 4) showed the following, in particular:

1) 'Shchedro' LLC in 2021, during the period of military conflict in 2022, 2023, was characterised by a high level of efficiency of supply chain planning. Namely, a high level of compliance of the restoration of the actual value of the supply chain to the planned value by components

was found. This is due to the effectiveness of planning, which is ensured, among other things, by engaging experts in strategic and operational planning. As in the case of the other two enterprises, we note the high level of development of the security system, which allowed not only stabilisation but also growth in production and sales; 2) the assessment of the efficiency of production processes by indicators showed the following. The timeliness of the supply of materials for production and the timeliness of production in accordance with strategic targets were high in 2021 (10 points). In 2022 and 2023, these indicators were also high, but lower compared to 2021 (9 points).

Table 4. Assessment of the impact of the military conflict on the supply chain and production processes of Shchedro LLC

No.	Indicators.	Meaning.		
		2021	2022	2023
1	2	3	4	5
1	Stage of supply chain performance assessment			
1.1	The stage of evaluating the effectiveness of supply chain planning (ESCP).			
	The ratio of the actual value of the supply chain (Eimp) to the planned value (Epl) by component:	High level	High level	High level
	Ratio of actual output (Pr) to planned output (Prpl)	UAH 5181,3 mln / UAH 5000 mln = 1,04	UAH 5182,8 mln / UAH 5100 mln = 1,02	UAH 4892.5 million / UAH 4700 million = 1,04
	Ratio of actual sales (S) to planned sales (Spl)	4287,6 million UAH / 4000 million UAH = 1,07	4876,7 million UAH / 4700 million UAH = 1,04	UAH 5166,6 mln / UAH 4900 mln = 1,05
	The ratio of the actual volume of stocks that ensure uninterrupted production (Stvol) to the planned volume (Stvolpl)	UAH 435.5 mln / UAH 400 mln = 1.1	UAH 703.5 million / UAH 650 million = 1.08	UAH 471.8 mln / UAH 450 mln = 1.05
	Ratio of actual production cost (C) to planned production cost (Cpl)	3690.5 million UAH / 3500 million UAH = 1.05	3461,9 mln UAH / 3300 mln UAH = 1,05	3533,7 million UAH / 3400 million UAH = 1,04
1.2	The stage of assessing the efficiency of production processes (Epr) by indicators:			
	Timeliness of supply of materials for production (score from 1 to 10) (Ttmdel).	10	9	9
	Technological efficiency of the enterprise (T)	Cwria = 0.355 (average manufacturability by technology). Cwrfa = 0.63 (low manufacturability by fixed assets)	Cwria = lack of technology due to the use of outsourced information systems management services. Cwrfa = 0.73 (low technology in terms of fixed assets)	Cwria = lack of technology due to the use of outsourced information systems management services. Cwrfa = 0.701 (low technology by fixed assets)
	Timeliness of production in accordance with strategic targets (TPr)	10	9	9
1.3	The stage of assessing product sales efficiency (Es) by indicators:			
	Compliance of reported sales volumes (Esr) with strategic volumes (Ess) (Esr → Ess)	Esr = UAH 4287.6 million. Ess = 4000 million UAH. 4287.6 million UAH → 4000 million UAH (high correspondence = 10)	Esr = UAH 4,876.7 million. Ess = 4700 million UAH. UAH 4876.7 million → UAH 4700 million (high correspondence = 10)	Esr = UAH 5166.6 million. Ess = 4900 million UAH. 5166.6 million UAH → 4900 million UAH (high correspondence = 10)
	Δ Esrt1,0 - change in sales volume in the reporting (1) year compared to the previous (0) year, %.	8	5	5
1.4	The stage of organising communication between participants in the product supply chain (Ecom)	10	8	8
II	Stage of assessing the negative impact of military conflict on supply chain efficiency			
2.1	The stage of assessing the negative impact on the state of supply chain planning efficiency (Erschw).	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.2	The stage of assessing the negative impact on the efficiency of production processes (Eprw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.3	The stage of assessing the negative impact on the state of product sales efficiency (Esw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security
2.4	The stage of assessing the negative impact on the organisation of communication between the participants of the product supply chain (Ecomw)	0 points. No impact.	5.1 points with low sensitivity to the impact of military conflict due to the high level of security	5.7 points with low sensitivity to the impact of military conflict due to the high level of security

Source: calculated by the author

In 2021, the company's technological sophistication in terms of intangible assets (technologies) was average (within 0.3-0.5), in 2022 and 2023, there was a lack of technologies due to the use of outsourced information system management services. In 2021, 2022, and 2023, the enterprise's technological efficiency in terms of fixed assets (equipment) was low (above 0.5), although in 2023 there was a certain improvement in this indicator. In this case, we note the need to improve technological and technical support, which is especially relevant in the animal fats and oils market. This market is highly competitive, and there is a possibility of foreign competitors entering due to Ukraine's integration into foreign markets. Therefore, Shchedro LLC should consider upgrading its fixed assets;

3) the effectiveness of product sales in terms of indicators and organisation of communication between participants in the product supply chain is high, which is related to the focus on a high level of organisation of the work of the relevant functional structural departments;
4) in the conditions of a high negative impact of military conflict on the macro environment, meso level and general micro level, the enterprise demonstrates low sensitivity to the said external pressure due to the high level of organisation of the security system in the main areas of management.

The methodological support presented in this paper covers a list of factors of influence typical for the functioning of the supply chain of manufacturing enterprises in the context of military conflicts. This

qualitatively distinguishes it from existing scientific approaches, which are designed mainly for crisis phenomena not related to military impacts (Covid-19 pandemic, etc.).

5. CONCLUSIONS

The study showed that the leading companies in the Ukrainian food industry during the military conflict demonstrated a high level of security in key areas. This is due to the fact that they used high-quality strategic and operational planning, ensuring the highest possible level of protection against risks. Despite the impact of the main threats and risks, the three studied participants in the Ukrainian food industry managed to avoid negative consequences associated with the deterioration of supply

chain management and production processes. Despite the overall positive trends and indicators indicating growth, we note that a common problem for both these companies and the majority of Ukrainian food industry players is the deterioration of technological development. The need to upgrade technologies and equipment used within the supply chain (including within production processes) was noted.

It can be stated that although at the current stage there is a threat of worsening access to financing for the industry, the renewal of technologies and equipment is an urgent need for enterprises that are focused on continuing to support production and sales growth and seek to integrate into foreign markets.

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Resilience of Supply Chains in Food Industry Enterprises Amid Military Conflicts: Strategies for Operational Continuity and Risk Mitigation