



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Progress by innovation



UKRAINE INDUSTRIAL COUNTRY DIAGNOSTICS 2023

EXECUTIVE SUMMARY

Disclaimer

© **UNIDO 2024**. All rights reserved.

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” or “developing” are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

UNIDO bears no responsibility for the change or interpretation of the primary and secondary data adopted in this work.

ACKNOWLEDGEMENTS

The Ukraine industrial country diagnostic study 2023 was produced as part of the UNIDO green industrial recovery programme for Ukraine and with funding from the Federal Ministry for Economic Cooperation and Development of Germany (BMZ). The substantial support and information from key stakeholders in Ukraine's industrial policy and structural transformation greatly enriched this diagnostic study. The authors extend their heartfelt appreciation to all individuals and institutions involved for their time, availability and valuable input, which significantly influenced the shaping of this report, in particular the Ministry for Communities, Territories and Infrastructure Development of Ukraine, the Ministry of Economy of Ukraine, the Ministry of Strategic Industries of Ukraine, the State Statistics Service of Ukraine, regional statistics service offices, the Ukrainian League of Industrialists and Entrepreneurs, the Regional Council of Entrepreneurs of Kharkiv Region, the all-Ukrainian network of experts and practitioners in regional and local development REGIONET, the State-Owned Enterprise M.P. Shulgin State Road Research Institute, the Confederation of Builders of Ukraine, the Construction Chamber, the Academy of Construction of Ukraine, the Donetsk Chamber of Commerce and Industry, the Kharkiv Regional State Administration (during the war – Kharkiv Regional Military Administration), the Verkhovna Rada (Parliament) of Ukraine, the Lviv Chamber of Commerce and Industry, the Kyiv Chamber of Commerce and Industry, the Chernigiv Chamber of Commerce and Industry, the Dnipro Chamber of Commerce and Industry, the Local Territorial Organization of Employers of the City of Lviv and the Entrepreneurship and Export Promotion Office.

Consultations were held with Anatoliy Khayetskyi, Anatoliy Kinakh, Andrii Remizov, Anton Slyusarev, Artem Bezuglyi, Dmytro Aftanas, Dmytro Aleksashov, Dmytro Gerashchenko, Dmytro Ivanov, Dmytro Shamin, Eduard Naboka, Grygoriy Shmatkov, Halyna Tretyakova, Halyna Vasylichenko, Hryhorii Tsapko, Iana Stanislavska, Igor Trutayev, Iryna Hubarieva, Kyrylo Dikhtyarenko, Larysa Kryvenko, Larysa Tsygan, Lesia Vasylenko, Lev Perzhaladze, Maxim Anufriev, Mykhailo Kyrylenko, Mykola Merkulov, Mykola Rudya, Myron Kuzemskyy, Nadiya Bihun, Natalia Gorshkova, Natalia Yudenko, Nataliia Karpenchuk-Konopatska, Nelia Kapusta, Oleksandr Dudka, Oleksandr Lebedev, Oleksandr Malin, Oleksandr Palazov, Oleksandr Tarapatov, Oleksii Tymoshyn, Oleksiy Budarin, Oleksiy Mykhaylov, Oleksiy Sologub, Olena Kryvenko, Olena Pastukhova, Olena Romanenko, Olga Boiko, Pavlo Bondar, Pavlo Myroshnichenko, Petro Kulikov, Roman Kropyvnytskyy, Roman Lyubin, Rostyslav Gapatyn, Sergei Kucheriavenko, Sergiy Moroz, Sergiy Kucheryavenko, Serhiy Chaika, Serhiy Zayika, Stanislav Zinchenko, Svitlana Filyppova, Valerii Pavlovskiy, Valeriy Bezus, Viktor Kushnir, Viktor Slobodyanyuk, Vitaliy Maistrenko, Volodymyr Korud, Volodymyr Kostyuk, Volodymyr Mishchenko, Volodymyr Tkachenko, Volodymyr Vlasyuk, Yana Lahunova, Yaroslav Rushchyshyn, Yaryna Skorohod, Yevhen Dubravskiy, and Yulia Levinska.

The 2023 Ukraine industrial diagnostic study is an outcome of rigorous research endeavours led by Nicola Cantore and supported by Upalat Korwatanasakul, who spearheaded the diagnostics team including the Global Policy Incubator (in particular, Thomas Bernhardt, María Elena Ayala, Robert Djidonou and Christian Timm), Gideon Ndubuisi, Oriol Gisbert Marti, Ahmed Osman, Overseas Development Institute (in particular, Dirk Willem te Velde and Yohannes Ayele), Giovanni Marin, Elena Paglialunga, Yevgeniya Shevtsova, Nicola Coniglio, Davide Vurchio, Olha Ilyash, Tetiana Salashenko, Volodymyr Buzhan and Viktoriia Khaustova. This collaborative effort involved coordination with UNIDO colleagues Solomiya Omelyan, Mariia Pavlova, Stephan Sicars, Eric Bishel, Steffen Kaeser, Noriko Takahashi, Nobuya Haraguchi, Andrii Vorfolomeiev, Mariia Reva and Florian Hespeel. Advanter and, in particular, Andrii Dilgach and Pavlo Sobolievskiy were the focal points of the UNIDO firm survey data collection. The executive summary has been edited by Niki Rodousakis and designed by Kateryna Molchanova.

INTRODUCTION

Ukraine's industrial production is facing profound challenges, preceded by a series of shocks that have had an impact on the growth rate of the country's gross domestic product (GDP) (Figure 1) and industrial production (Figure 2) over the last 15 years.

Comprehensive industrial country diagnostics have been conducted to chart a strategic path for Ukraine's future industrialization and green industrial recovery. This assessment builds on the existing policies of the Government of Ukraine and the Recovery and Reconstruction of Ukraine (the 'Ukraine Plan') of the European Union (EU). It addresses challenges and offers solutions aimed at promoting economic growth, rebuilding and modernizing the country's economic system and fostering deeper integration with the EU to facilitate recovery, reconstruction and reform at all levels (i.e. at the macro-, meso- and micro-level).

Drawing on UNIDO's extensive experience and research in contributing to global public policy debates, the industrial country diagnostics tool is structured around the following four blocks informed by quantitative data and consultations with stakeholders and experts in Ukraine:

Block 1 provides a macro-level analysis and examines the economic, social and environmental dimensions of recent industrial performance to capture the key thematic areas that require policy intervention.

Block 2 presents a meso-level analysis of Ukraine's industrial sectors to gauge their potential and highlight sectors that require increased attention due to the impact of the armed conflict.

Block 3 discusses the outcome of a micro-level analysis of Ukrainian firms, with a focus on identifying critical bottlenecks in their business operations. This information is useful for designing effective interventions as part of Ukraine's green industrial recovery programme.

Block 4 entails a product analysis to capture key strategies for Ukraine's economic diversification.

FIGURE 1: DYNAMICS OF UKRAINE'S GDP GROWTH, 2000–2022

Source: World Bank, *World Development Indicators* database (accessed September 2023).

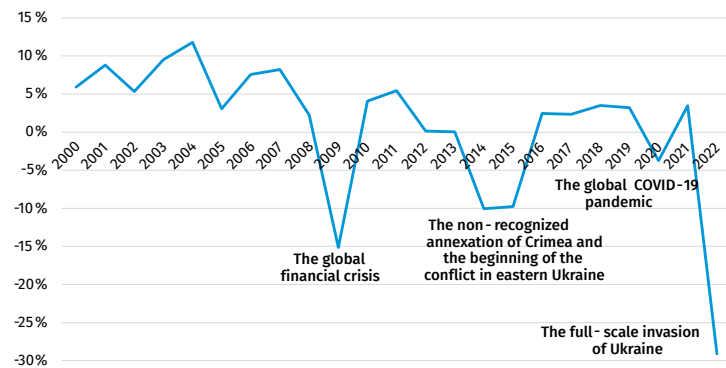
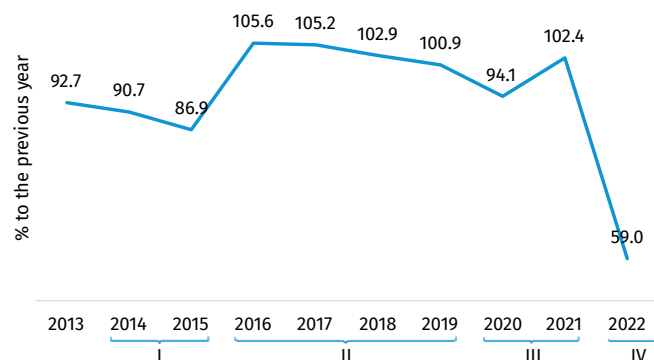


FIGURE 2: UKRAINE'S MANUFACTURING INDUSTRIAL PRODUCTION INDEX, 2013–2022

Source: State Statistics Service of Ukraine (accessed September 2023).



Note: I – non-recognized annexation of Crimea and the beginning of the conflict in eastern Ukraine; II – continuation of the conflict in eastern Ukraine; III – continuation of the conflict in eastern Ukraine and the spread of the COVID-19 pandemic; IV – full-scale invasion of Ukraine

BLOCK 1

A series of economic, environmental and social performance indicators are applied in this block (Figure 3) to analyse international and national data sets and benchmark Ukraine against comparators such as Argentina, Poland, Romania, Türkiye and the European Union.

FIGURE 3: STRUCTURE OF BLOCK 1

Source: UNIDO elaboration.

MACRO-LEVEL ANALYSIS: INCLUSIVE AND SUSTAINABLE INDUSTRIAL PERFORMANCE		
ECONOMIC	SOCIAL	ENVIRONMENTAL
<p>1. Economic Growth and Structural Transformation</p> <ul style="list-style-type: none"> Economic growth Economic structure Employment structure Exports <p>2. Productive Performance of the Manufacturing Sector</p> <ul style="list-style-type: none"> Manufacturing's contribution to total output Industrial production index for manufacturing Industrial capacity and growth Manufacturing labour productivity Subsector value added and growth <p>3. Manufactured Goods Trade Performance</p> <ul style="list-style-type: none"> Contribution of manufactured exports to total merchandise exports Manufactured export capacity and growth Composition of the manufactured exports basket Composition of the manufactured imports Manufactured trade balance <p>4. Manufactured Exports Diversification</p> <ul style="list-style-type: none"> Diversification in export products Diversification in export markets Degree of processing of resource-based exports <p>5. Industrial Innovation, Technology Upgrading and Digitalization</p> <ul style="list-style-type: none"> Industrial innovation and technology upgrading Digitalization <p>6. Investment and Finance</p> <ul style="list-style-type: none"> Capital investment Foreign direct investment Private-sector access to credit 	<p>1. Manufacturing Employment and Wages</p> <ul style="list-style-type: none"> Contribution of manufacturing to total employment Employment in manufacturing subsectors Wages in manufacturing subsectors <p>2. Youth and Female Employment</p> <ul style="list-style-type: none"> Female employment in total employment and in industry Share of youth not in employment, education or training <p>3. Education and Skills</p> <ul style="list-style-type: none"> Government expenditure on education Students in vocational training 	<p>1. Water Use and Supply</p> <ul style="list-style-type: none"> Sectoral water use Industrial water use intensity <p>2. Material Extraction and Consumption</p> <ul style="list-style-type: none"> Material extraction Material consumption in manufacturing Manufacturing material consumption intensity <p>3. Energy Generation and Energy-use Intensity use</p> <ul style="list-style-type: none"> Access to electricity Electricity production capacity Industrial energy use intensity Renewable energy <p>4. Cleaner Production – CO₂ Emissions</p> <ul style="list-style-type: none"> CO₂ emissions of the economy CO₂ emissions by sector using fuel combustion Manufacturing CO₂ emissions intensity <p>5. Waste Generation and Management</p> <ul style="list-style-type: none"> Municipal solid waste generation Municipal solid waste composition Municipal solid waste management <p>6. Forest Area</p> <ul style="list-style-type: none"> Forest area and net change rate

Despite Ukraine’s relatively strong performance in the ranking of Sustainable Development Goals (SDGs) (38th of 166 economies), a concerning trend in the country’s industrial development indicators is evident, namely a decreasing share of manufacturing value added (MVA) in total GDP (Figure 4) and a decline in industry employment (Figure 5). Moreover, industry’s environmental footprint presents a challenge, with the intensity of Ukraine’s industrial water use (Figure 6), raw material consumption (Figure 7) and CO₂ emissions (Figure 8) considerably surpassing the EU’s average. Hence, there is a pressing need to prioritize policy initiatives aimed at advancing Ukraine’s industrialization in alignment with the SDG targets.

FIGURE 4: SHARE OF MVA IN GDP, 2010–2022

Source: National Accounts, United Nations Statistics Division (accessed September 2023).

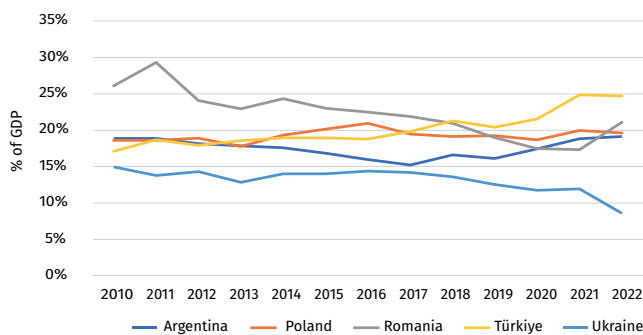


FIGURE 5: SHARE OF INDUSTRY EMPLOYMENT, 2010, 2015 AND 2021

Source: World Bank, *World Development Indicators* database (accessed September 2023).

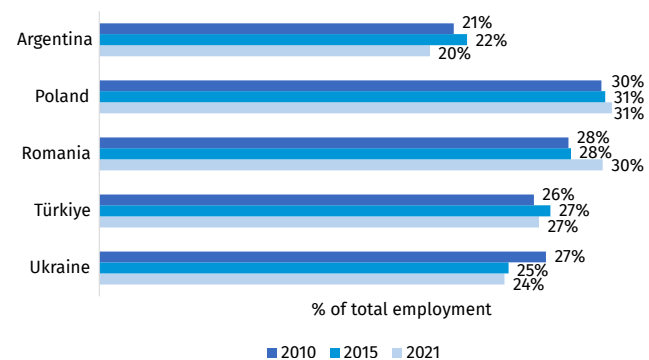
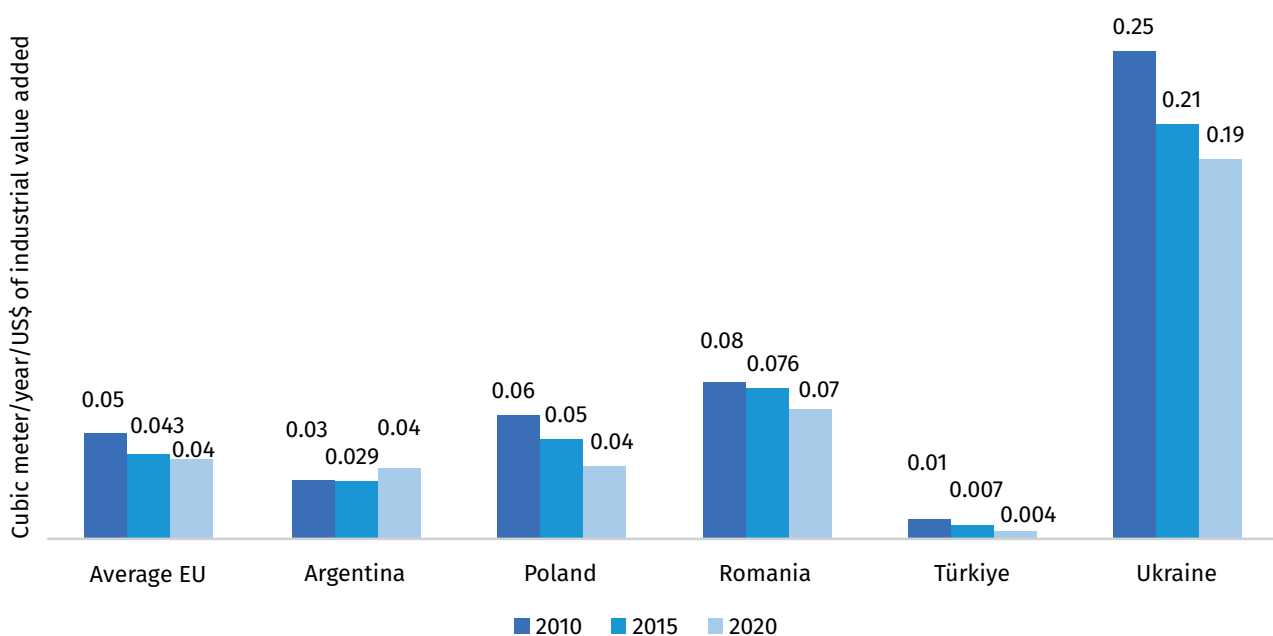


FIGURE 6: INDUSTRIAL WATER USE INTENSITY, 2010, 2015 AND 2020

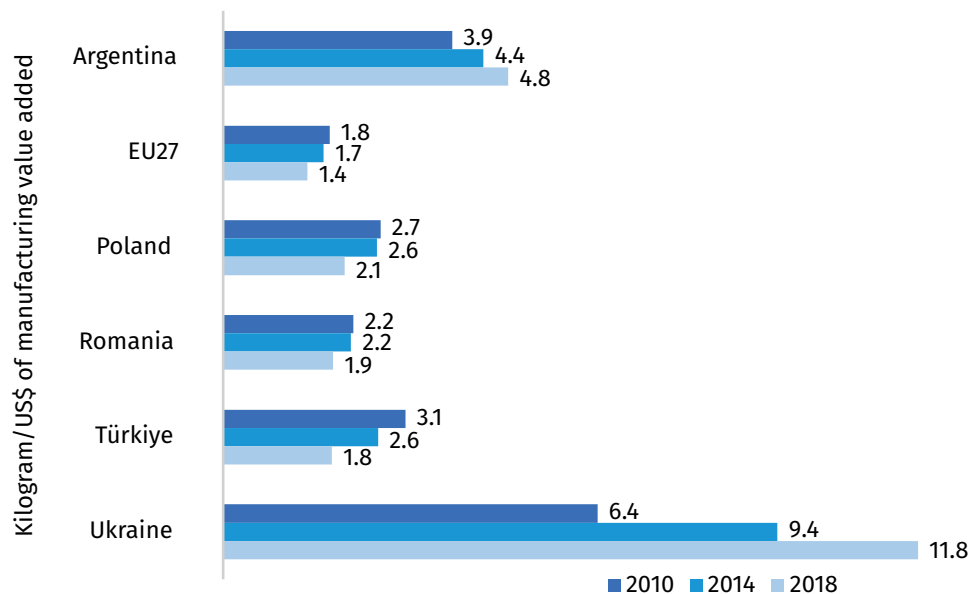
Source: UNIDO elaboration based on AQUASTAT, Food and Agriculture Organization (FAO) (industrial water withdrawal) and World Bank, *World Development Indicators* database (industry value added) (accessed September 2023).



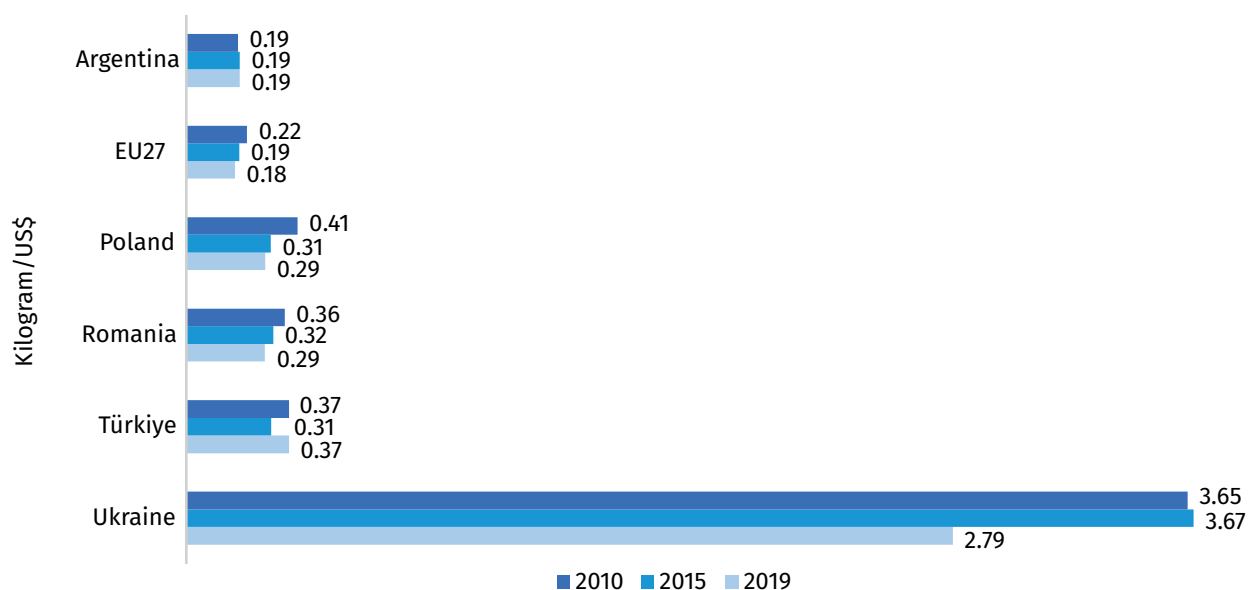
Note: The EU’s average industrial water use intensity corresponds to that of all European countries.

FIGURE 7: RAW MATERIAL CONSUMPTION INTENSITY, 2010, 2014 AND 2018

Source: UNIDO, based on Hotspot Analysis Tool for Sustainable Consumption and Production, Vienna University of Economics and Business (raw material consumption) and World Bank, *World Development Indicators* database (MVA) (accessed September 2023).

**FIGURE 8: MANUFACTURING CO₂ EMISSIONS INTENSITY, 2010, 2015 AND 2019**

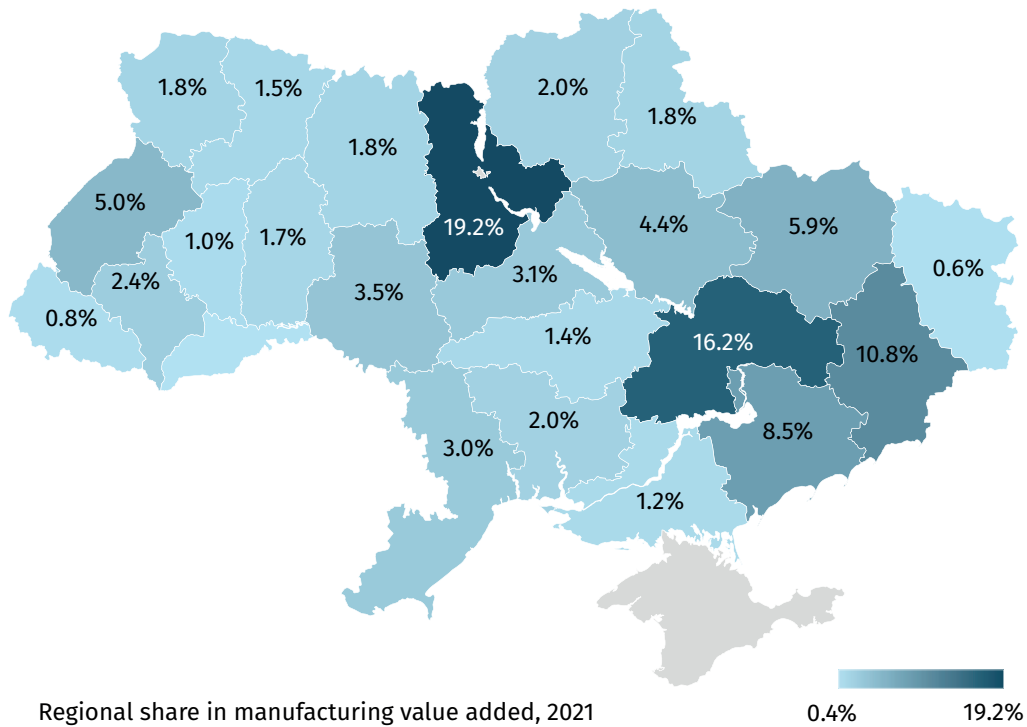
Source: UNIDO, based on OECD (manufacturing CO₂ emission) and World Bank, *World Development Indicators* database (MVA) (accessed September 2023).



The ongoing conflict in Ukraine has exacerbated the challenges on the path towards inclusive and sustainable industrial development. The generation of MVA is concentrated in five regions (oblasts): Kyiv (19.2 percent of MVA), Dnipropetrovsk (16.2 percent of MVA), Donetsk (10.8 percent of MVA), Zaporizhzhia (8.5 percent of MVA) and Kharkiv (5.9 percent of MVA). Together, these regions accounted for 60.6 percent of the country's MVA and 60.2 percent of capital investment in 2021 (Figures 9 and 10). The geographic location of these regions in Ukraine's east and southeast, where the armed conflict is concentrated, has rendered the manufacturing sector in these areas particularly vulnerable to the war's impacts.

FIGURE 9: UKRAINE'S REGIONAL DISTRIBUTION OF MVA, 2021

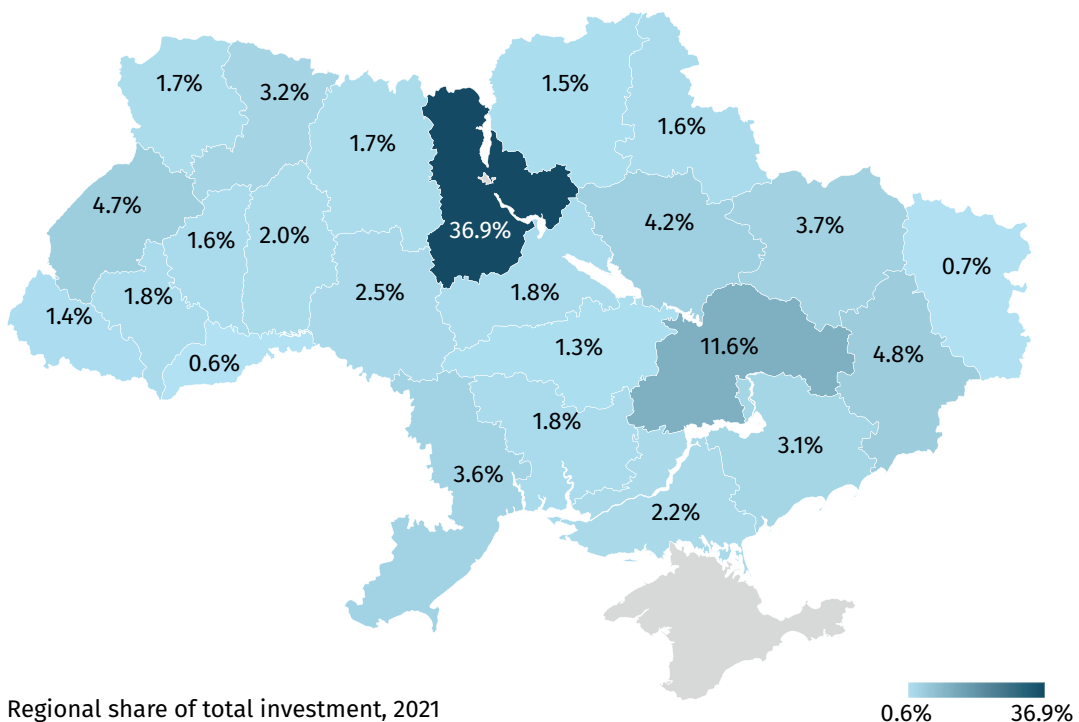
Source: State Statistics Service of Ukraine (accessed September 2023).



Note: The boundaries, names and designations on this map do not imply UNIDO's official endorsement or acceptance.

FIGURE 10: UKRAINE'S CAPITAL INVESTMENT BY REGION, 2021

Source: State Statistics Service of Ukraine (accessed September 2023).

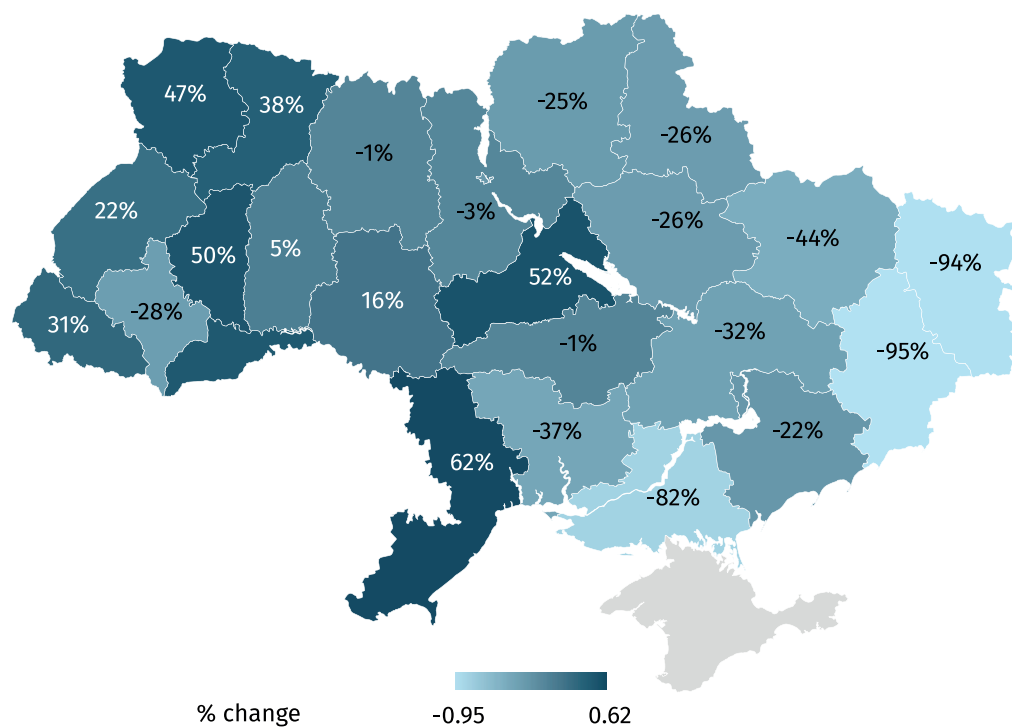


Note: The boundaries, names and designations on this map do not imply UNIDO's official endorsement or acceptance.

Figure 11 presents an overview of Ukrainian regions' export performance in 2022 compared to the three-year average from 2019 to 2021. The data reveal substantial variations across regions, with exports from backline regions clearly outperforming other regions. All regions, with the exception of Ivano-Frankivsk located further away from the front line, witnessed an uptick in their exports in 2022, resulting in an overall increase of 21 percent in their export volumes. All front-line regions, on the other hand, experienced a significant downturn, with their aggregate exports plummeting by 58 percent in 2022 relative to the average between 2019–2021.

FIGURE 11: REGIONAL PERCENTAGE CHANGE IN GOODS EXPORTS IN 2022 RELATIVE TO THE AVERAGE BETWEEN 2019–2021

Source: State Statistics Service of Ukraine (accessed September 2023).



Note: The boundaries, names and designations on this map do not imply UNIDO's official endorsement or acceptance.

FINDINGS OF BLOCK 1

To address the existing challenges, **Block 1** outlines the following five thematic areas of recommendations for immediate action:

1) Recommendations to reverse Ukraine's pre-war deindustrialization trend and promote economic recovery



Put industrial development at the top of the political agenda with the aim of catalysing economic recovery through a structural transformation geared towards bolstering manufacturing to leverage positive externalities, including innovation and productivity growth, knowledge spillovers, skills development, employment generation, the creation of forward and backward linkages and technological upgrading. This strategic initiative requires close coordination and cooperation between the government and the private sector as well as the provision of targeted support to the latter.



Stimulate the creation of high-quality jobs, particularly in more labour-intensive sectors with strong potential for value addition and product differentiation, including the food and wood product industries, the manufacturing of energy equipment and agricultural machinery and the construction industry (**Block 2** presents further in-depth sectoral insights). Looking ahead, the allocation of resources to vocational and technical training programmes will be crucial to upskill the manufacturing workforce, aligning their competencies with the evolving demands of industry.

2) Recommendations for diversification and competitiveness to achieve economic resilience



The redistribution of productive activities across Ukraine's regions will mitigate vulnerability, increase resilience and foster greater regional inclusivity in industrialization. To achieve this goal, regional and municipal administrations must more proactively promote productive development in their jurisdictions. Despite the growing focus on governance decentralization, both private-sector actors and policymakers currently underestimate the significant role municipalities can play in industrial development. Addressing this gap requires raising awareness about the relevance of local authorities and bolstering the governance and policy capabilities of municipalities and regions to initiate commercial diplomacy between big business, municipal and state authorities. Leveraging tools such as "smart specialization strategies" and the "Investment Passport", which several regions initiated in 2015, could strengthen the development of industrial infrastructure.



Structural transformation processes should be intensified to rebalance productive activity at the sub-sectoral by improving existing medium-high technology (MHT) industries and diversifying towards emerging MHT industries, considering the positive externalities these can generate. At the same time, resource-based subsectors such as food processing – which the country has a comparative advantage in and which play a pivotal role in achieving other policy objectives such as food security, employment generation and value-added creation – should not be neglected.



Accelerating the recovery of the country's production infrastructure is crucial for advancing the diversification and sophistication of production. Pursuing an export diversification strategy that increases the number of exported products and that enter new markets while further deepening trade relations with existing partners will be crucial for intensifying the country's industrial development trajectory, reducing vulnerability to external shocks and bolstering resilience. Closer EU integration, which opens access to EU and G7 markets, would facilitate export diversification. However, for Ukraine's recovery and modernization plan to succeed, it must be aligned with key EU principles on the rule of law, product quality and safety, green transition and digital transformation.



Ukraine's efforts to restore its competitiveness and strengthen its capacity to export manufactured goods must be underpinned by commitment and coordinated support from both the public and the private sectors. The prospect of EU integration and access to G7 markets would further reinforce these efforts. A number of challenges must be addressed to harmonize Ukraine's and the EU's legislative frameworks, including strengthening adaptation and compliance with standards and regulations on product quality; accelerating industry's decarbonization, in particular of export-oriented industries; establishing certification centres for product certification and reducing obstacles to obtaining business permits; improving access to trade finance; modernizing infrastructure; upgrading firms' technical and technological base; expanding cross-border business relationships and economic policy networks; and creating transnational industrial enterprises that produce high-added-value goods.

3) Recommendations for technological upgrading, innovation, digitalization and investment



Boosting innovation requires concerted efforts from both public and private sector actors, in particular the reinvestment of revenue in business development; joint innovative efforts by the government, research institutes, universities and big business; the creation of research and development (R&D) centres; and the promotion of competitive and innovative technological solutions. Against the backdrop of a recent survey's findings among firms –indicating that 77 percent of respondents consider innovation to be irrelevant in the context of the ongoing conflict – raising awareness about the significance and benefits of innovation will be key for the country's reindustrialization and the path towards recovery.



More financial resources will be necessary to re-establish robust digital infrastructure, foster the development of digital skills and increase business digitalization efforts. Moreover, incentives will need to be offered to prevent brain drain and encourage information technology (IT) experts to return to Ukraine.



The extensive damage inflicted on companies' assets and the country's industrial infrastructure will require substantial investments (both foreign and domestic) to facilitate the building back better of Ukraine's economy. The country's future industrial policy must incorporate strategic interventions geared towards mobilizing foreign and domestic investments to support and accelerate Ukraine's industrialization process. Public-private partnerships can contribute to the reconstruction of infrastructure that has been damaged, considering that both the required scale of investment and risk are high.

4) Recommendations to achieve inclusive and sustainable industrial development to create more and better opportunities for all



Ukraine's industrial development process must be built on inclusiveness, ensuring equal opportunities for all, including women, youth and disadvantaged groups. These groups faced structural bottlenecks even before the outbreak of the conflict, and are currently experiencing significant setbacks. This principle should also apply to micro-, small and medium-sized enterprises (MSMEs). To this end, there is a clear need to design and implement targeted programmes to support and upgrade MSMEs and empower women and youth, including the implementation of tailored initiatives to improve their access to education, vocational training and skills development with a specific focus on fostering innovative industrial entrepreneurial skills.

5) Recommendations to address climate change and emissions reduction, as well as foster material-efficient and cleaner production to build back better and greener



Ukraine still lags behind the EU and other comparators in terms of CO₂ emissions, with the country's industrial emissions intensity still significantly higher than that of many comparator countries. Ukraine's green recovery must embrace opportunities to promote green renewable energy sources, greener infrastructure and a shift towards lower energy-intensive industries. This presents an opportunity to implement greener industrial processes and diversify into new products that incorporate low-carbon technologies, which will contribute to the country's climate change agenda and improve resilience to potential supply chain disruptions.



Ukraine's material efficiency is currently low, and policymakers should therefore prioritize measures to enhance it as part of the circular economy approach. This will contribute to the recovery and recirculation of materials into the economy, increase reuse and extend their second-life use. The improvement of material efficiency may result in triple dividends as part of the country's sustainable industrial development agenda: 1) reducing dependence on the supply of raw materials; 2) lowering environmental pressure; and 3) improving industry's competitiveness.



The reduction of waste generation and the improvement of waste management systems represent challenges in Ukraine. The adoption of circular economy principles and regulations to enforce them will be key, focusing on waste prevention rather than on waste disposal; collecting data and information on waste generation and on the composition of waste; reviewing available technologies and treatment methods that can be used to recover value, in particular the processing of industrial waste and its export potential (e.g. rare earth materials) and recycling scarce materials for domestic use; the creation of circular bioenergy clusters; and the establishment of hydrogen transmission systems (HTS) infrastructure. Moreover, special attention must be given to raising awareness and improving consumer capacities to properly separate waste at the source.



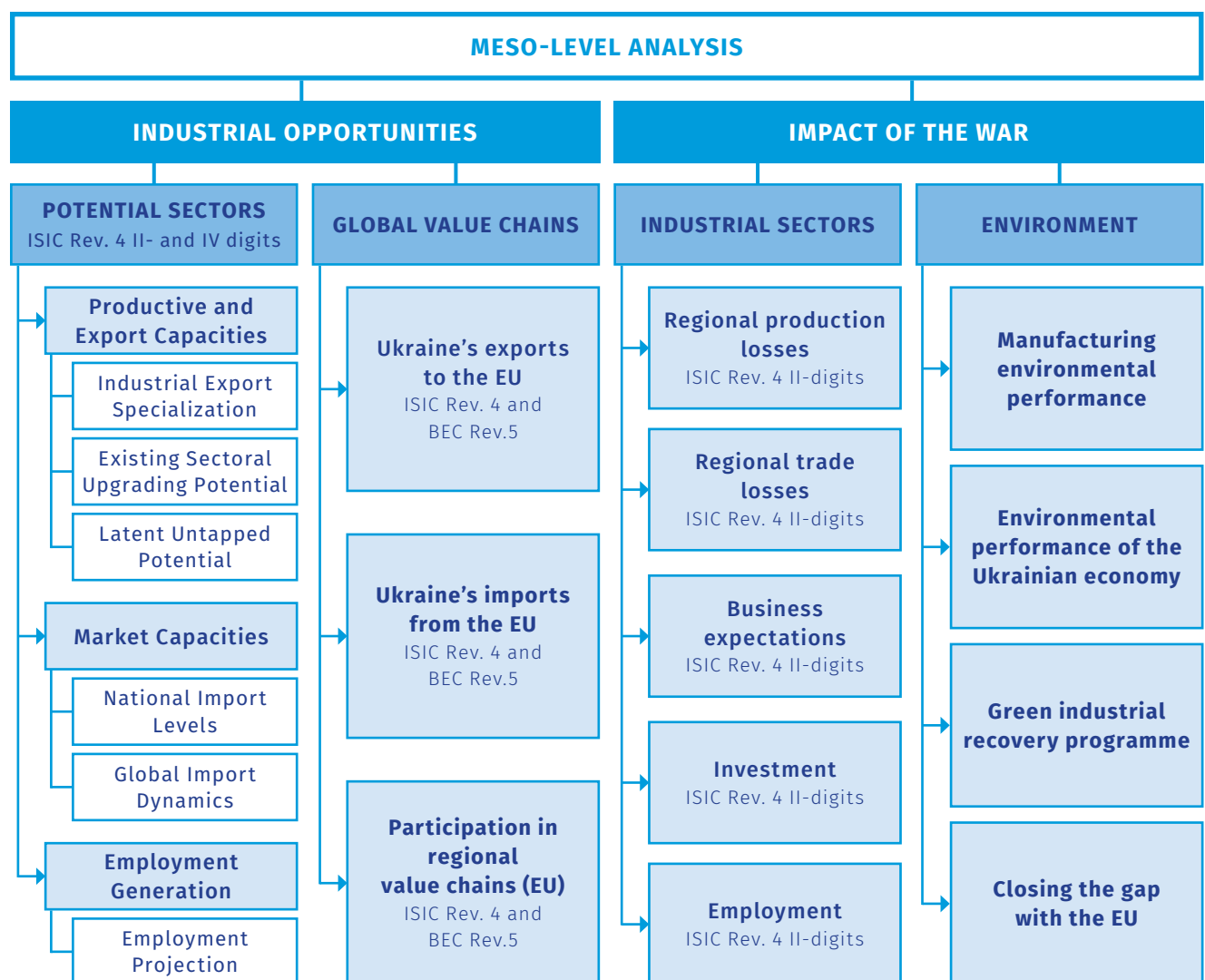
The transition in Ukraine to a circular economy is still fraught with obstacles. The absence of state-supported mechanisms to transition to a circular economy, including the unavailability of funding, limited capital investments in environmental protection, low acquisition for collaborative business projects with the EU, and limited green lending and preferential loans for MSMEs are among the major obstacles. Additionally, many enterprises lack the financial resources to restructure and modernize their production facilities. Lastly, there is a notable lack of information and consulting activities in the field of circular economy. It is therefore recommended to establish an agency that is dedicated to developing the circular economy in Ukraine, aligning with national legislation and EU directives. Addressing these challenges is essential for advancing circular economy principles in Ukraine.

BLOCK 2

Block 2 focuses on the vertical dimension of industrialization and provides an in-depth analysis of industrial sectors based on a comprehensive methodology (Figure 12). This meso-level analysis covers: 1) the industrial sector's potential considering its current strengths and comparative advantage, as well as industries that could be further developed; 2) industries that have been significantly affected by the ongoing conflict; 3) industries with greater potential for integration into the EU's value chains; and 4) the environmental and social impacts of the armed conflict on industries.

FIGURE 12: STRUCTURE OF BLOCK 2

Source: UNIDO elaboration.

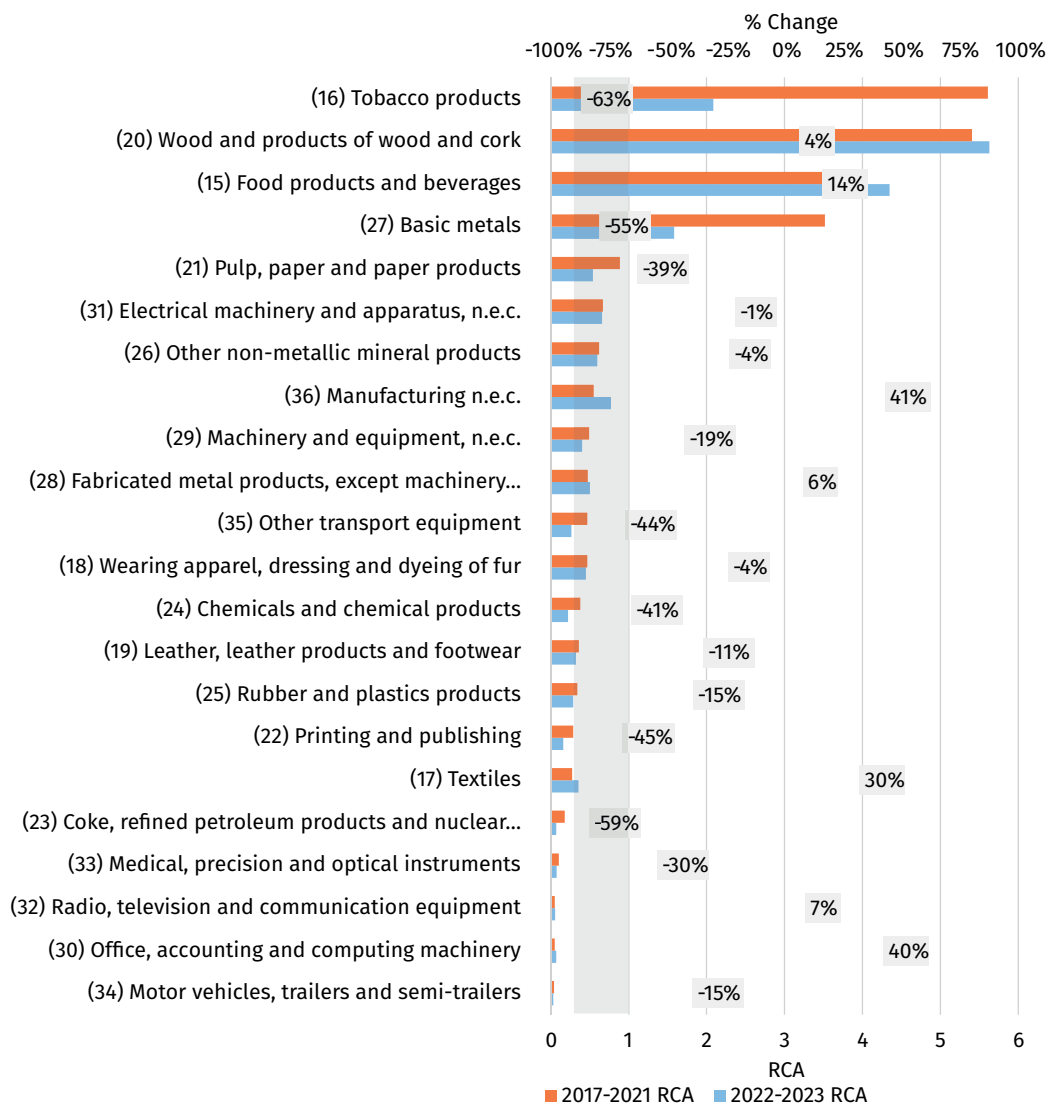


A country's revealed comparative advantage (RCA) is an indicator of its specialization in a given industry. An industry with an RCA > 1 signifies that the country is specialized in that particular industry. Four of Ukraine's 22 manufacturing industries had a comparative advantage prior to the outbreak of the armed conflict: 1) food and beverages; 2) wood products; 3) tobacco; and 4) basic metals. Despite the conflict, exports from the food and beverages and the wood product industries increased in 2022 compared to the 2017–2021 average, thus reinforcing these industries' comparative advantage and competitiveness (Figure 13). This demonstrates that in

the face of conflict, Ukraine can rely on a reservoir of capabilities. The loss of competitiveness of the tobacco and basic metals industries is attributed to their concentration in front-line areas of the conflict. Recovering these industries' competitiveness could prove more difficult and lengthier.

FIGURE 13: REVEALED COMPARATIVE ADVANTAGE (RCA) CHANGE IN UKRAINE, BY II-DIGIT ISIC REV. 3, 2017-2021, 2022-2023

Source: United Nations, *UN Comtrade Database* (accessed September 2023).



Note: $RCA_r = m_r / M_r$, where m_r is the export share of industry r in country i 's total export, while M_r is the export share of industry r in the world's total export.

Ukraine's industrial specialization patterns are spread across regions, albeit with varying degrees of heterogeneity. In 2022, among a set of 15 manufacturing industries, the number of industries with an RCA >1 ranged from three in regions such as Cherkasy to 11 in Kharkiv. In terms of productive diversity and capabilities, the following regions were the most competitive: Ivano-Frankivsk, Kharkiv, Lviv and Kyiv. Luhansk has been the most adversely affected region by the war (Figure 14).

Some industries are concentrated in a few regions only, such as "(27-28) Manufacture of basic metals and fabricated metal products" and "(24) Chemicals & chemical products". Only three regions (Dnipropetrovsk, Donetsk and Zaporizhzhia) had a high level of specialization in the manufacture of basic metals and fabricated products before the start of the conflict, indicating that they were the only regions with established production

and export capabilities. This continues to be the case. However, Donetsk had experienced a drastic drop in comparative advantage since 2014, and lost its comparative advantage following the full-scale invasion of Ukraine.

In the case of “(24) Chemicals & chemical products”, the Mykolaiv, Luhansk, Ivano-Frankivsk, Rivne, Kharkiv regions and the City of Kyiv had exhibited a high level of specialization before the outbreak of the armed conflict. Since the onset of the conflict, Mykolaiv has ceded part of its comparative advantage in chemicals to the Rivne region, while Luhansk also lost its comparative advantage in the same industry.

FIGURE 14: CHANGE IN UKRAINE'S REGIONAL SPECIALIZATION, BY II-DIGIT ISIC REV. 3, 2017-2021 VS 2022

Source: State Statistics Service of Ukraine (accessed September 2023).

Cherkasy	-0.9	-0.9	0	0	-0.6	0.2	0	0.6	0.1	-0.3	0	-0.1	-0.6	0.1	-1.2
Chernihiv	0.5	0.1	-2.1	0	-0.9	-2.7	0	0.3	0.2	0.1	0.1	-0.2	-0.2	0.1	-0.3
Chernivtsi	-0.3	-4.2	-0.5	0.3	-3.5	0.3	0	0.1	1.4	0.3	0.2	-0.8	-0.2	0.3	-3.6
Dnipropetrovsk	0	-0.2	-0.1	0.1		-0.4	-0.9	-0.5	0.2	0.4	1.3	-0.2	-0.1	0.5	-0.1
Donetsk	0.3	0	0	0		0	15.4	1.3	0.1		-3.4	-0.5	0	-0.2	0
Ivano-Frankivsk	0.1	0.2	0.4	-1.9		0.1	-1.4	-0.7	-1.1	0.5	0.3	0.8	2.5	0.1	0.1
Kharkiv	-0.6	-0.2	0.2	0.4		0.7	0.1	0.3	0.3	-0.3	0.2	-0.7	-1.6	0.6	-0.9
Kherson	0.3	-0.2	0	-2.6		-0.4		0.1	-0.5	-0.1	-0.1	-0.4	0.5	-5.6	0
Khmelnytsky	0.1	-0.9	0	0		0	0	0.2	0.4		0.1	-0.3	-1.3	1	-0.1
Kirovograd	-0.4	-0.3	0	-0.1		0	0	0.2	-0.1		0	-0.6	0	-0.2	0
Kyiv city	-0.4	-0.1	-0.1	0.1	0.1	-0.1	-0.5	0.4	-0.1	0.1	0	0.1	-0.2	0.2	-0.3
Kyiv	-0.2	-0.3	-0.1	-1.3	-0.4	-1.5	0.6	0.1	-1.2	-1.3	0.1	0.1	-0.8	0.6	0
Luhansk	-0.6	-5.5	0.4	-0.1		-35.6	-0.2	-4.8	-2		-0.3	0.1	-10.2	9.8	-1.7
Lviv	-0.1	-1.1	-0.5	-3.9		1.1	-0.4	0.2	0.2	0.7	0.1	-0.1	0.2	0.2	-1.8
Mykolaiv	0.7	-0.1	0	-0.5	-0.3	0	0	-3	0		0	-0.1	0	0.1	0
Odesa	-0.6	0	-0.3	0.1		0	0.2	0	0.1		0.1	-0.2	0.1	-2.3	-0.1
Poltava	0	-0.8	0	-0.1	0.2	0.4	-1.8	0.2	0	1	-0.1	-0.1	-0.2	-1.1	0
Rivne	0.2	-1	0	0.1	-6.1	0.2	0	4	0		0.1	-0.1	0.3	-0.3	-5
Sumy	-0.6	-0.1	-1.8	-0.1			0	-0.2	1.8	0	0.4	-0.1	-0.1	0.4	0
Ternopil	0.1	-0.3	0	-0.2		0.2	0	0.8	0.6		0	-1.9	0	0.1	-1.3
Vinnitsia	-1	-0.5	0	-0.2		0	0	0	0.1		0	-0.2	0.1	0	0
Volyn	0.3	-1	-0.1	0		0.8	0.2	0	0.5		0.1	-2.2	0	-1.4	-1.3
Zakarpethian		-2.1	-1.9	-2.4		0.1	0	-0.3	0.1	0	0.1	-1.3	1.7	-0.1	-2.2
Zaporizhzhya	-0.3	0	-0.2	0		0.1	-0.6	0	0	0.1	2.8	-0.7	-0.2	-0.3	0
Zhytomyr	0.2	0	-0.9	1.3		2.7	0	0.2	0.1		0.1	1	0.6	0	0.1
	(15)+(16) Food, beverages and Tobacco	(17) Textiles	(18) Wearing apparel	(19) Leather	(20) Wood and wood products	(21) Pulp and paper products	(23) Coke, refined petroleum & nuclear fuel	(24) Chemicals & chemical products	(25) Rubber & plastics products	(26) Other non-metallic mineral products	(27)+(28) Basic metals, Fabricated metals	(29)+(30)+(31)+(32) Machinery, instruments and appliances	(33) Medical, precision & optical instruments	(34)+(35) Transport equipment	(36) Manufacturing n.e.c.

Note: Entries are the difference between regional average RCA for 2017 and 2021 and a region's RCA in 2022. Red denotes positive values, while blue represents negative ones. Darker colours signify higher values.

FINDINGS OF BLOCK 2

The findings of **Block 2** on industrial sector prioritization reveal the following:



Presence of strong industries: Basic metals, food, tobacco and wood products are the industries that will continue to play an essential role in the country due to their strong RCA. Wood products and basic metals could benefit from current global trends in world trade.



Industries with an emerging comparative advantage or a latent untapped potential: Industries such as textile/leather/wearing apparel, motor vehicles, furniture, and coke and refined petroleum show a promising trend, with a gradually improving RCA or untapped potential. Drone production is also emerging as a potentially valuable capability that could find applications beyond military use.



Import substitution opportunities: Such opportunities should be explored for products with a high level of import per capita, such as refined petroleum products, motor vehicles, pharmaceuticals, machinery (for example agricultural and forestry machinery), and chemicals (for example plastics). Reducing import dependency on more advanced and technology-intensive products such as chemicals and machinery could mark a relevant turning point for Ukraine. As shown in **Block 1**, the contribution of MHT industries to total manufactured exports declined from 30.1 percent in 2010 to 20.8 percent in 2021, and R&D expenditure in total GDP dropped from 0.8 percent in 2010 to 0.4 percent in 2020. Ukraine is lagging behind other comparator countries in terms of digitalization diffusion. Moreover, Ukraine can further reinforce the diversification of its industrial system by strengthening value chains in two relevant directions: 1) increasing the value addition of relevant resource-based value chains including, milk products, grains, oilseeds, wood products, minerals and metals, among others; and 2) building on existing value chain relationships with the EU, e.g. through intermediate products such as wood and food or capital goods such as electrical machinery and other transport equipment.



Mitigation measures for industries impacted by the war: Production and trade of many industries have been heavily impacted by the ongoing conflict including, among others, tobacco products; printing and publishing; coke, refined petroleum products, and nuclear fuel; chemicals and chemical products, other non-metallic mineral products; basic metals; machinery and equipment, and other transport equipment. They require special attention, and mitigation measures will need to be developed and implemented. Many of these industries are located in or in close proximity to regions that are more heavily affected by the conflict, with some facilities having been destroyed and others have partially relocated. Ensuring their recovery and operation poses several challenges.



Employment generation: Several industries, including food, basic metals, non-metallic minerals, fabricated metal products and machinery show the highest levels of employment in Ukraine. These industries will also play a strategic role in Ukraine's recovery and infrastructure development. Food, basic metals, machinery and equipment, and non-metallic mineral products also belong to the top five industries in Ukraine in terms of share in MVA; food, basic metals and machinery belong to the top five industries in terms of share in total exports. Considering the period from 2017 to 2021 (and from 2017 to 2022), basic metals has been among the most dynamic sectors in terms of world trade exchanges. Fabricated metals generate a level of employment that is higher than in other low- and middle-income countries. However, labour shortages are expected in all industries due to population migration and mobilization.



Policy alignment: Many industries are aligned with the priorities established in Ukraine's National Recovery Plan and the EU Action Plan (Table 1). Both plans focus on "processing industries" while se-

veral other industries highlighted in this report are recognized as providing potential opportunities for Ukraine's recovery and development.



Environmental considerations: Some industries, particularly basic metals and non-metallic minerals, may require special attention from an environmental perspective due to their high level of emissions intensity per unit of value added. The EU's Carbon Border Adjustment Mechanism (CBAM), which requires importers of certain carbon-intensive goods to pay for their products' embodied carbon emissions, will enter into force in 2026. The CBAM covers iron and steel, aluminium, cement, fertilizer, hydrogen and electricity. According to the CBAM Exposure Index developed by the World Bank, this policy measure could have a significant impact on the competitiveness of Ukrainian exports to the EU. Ukraine ranks highest in the CBAM Exposure Index among exporting countries to the EU. In the likely case of deeper integration of the Ukrainian economy with the EU, stricter environmental regulations must be considered in the reconstruction efforts of CO₂-intensive industries. Prior to the outbreak of the conflict, Ukraine had made significant progress in its green energy industry, ranking among the top countries in terms of renewable energy development, especially in solar energy. The ongoing conflict has disrupted the country's green energy capacity, particularly in areas that are more heavily affected by the conflict, emphasizing the need to align the green or low-carbon energy recovery with the country's overall economic recovery given the dominance of energy-intensive industries. Decarbonization efforts include the further diffusion of renewable energy and industrial energy efficiency and the introduction of low-carbon technologies, the reconstruction of plants that have been destroyed, and the promotion of distributed renewable energy resources and small-scale power plants to meet consumers' needs. Effective coordination among stakeholders, financial mechanisms and incentives are essential to support Ukraine's journey towards green growth.

According to **UNIDO's NICE tool**, the following findings can inform a green industrial recovery programme for Ukraine:

1. **Short-term recovery:** Prioritizing recovery investments in specific industries will lead to partial short-term recovery. Full recovery to pre-conflict levels is likely to be achieved in the medium- to long run. The industrial country diagnostic indicates that the collapse of foreign direct investment after 2022, a low ratio of firms' bank credit/GDP and firms' access to capital are bottlenecks that call for a substantive loan, grants and investment programmes for a green recovery.
2. **Sector-specific recovery:** Channelling recovery funds towards priority sectors will result in direct sector-specific recovery with positive effects on the broader economy through indirect impacts.
3. **Green infrastructure:** The recovery process may coincide with increased emissions. Environment friendly production systems should be promoted through investments in green infrastructure.
4. **Labour and productivity:** Labour gains may exceed value-added gains, particularly in labour-intensive industries. Simultaneous measures are necessary to enhance productivity and promote environmental efficiency, aligning with EU policy goals.

TABLE 1: SUMMARY OF BLOCK 2 FINDINGS ACROSS UKRAINE'S INDUSTRIES

Source: UNIDO elaboration. The table is created only for synthesis purposes and may not fully follow rigorous statistics criteria. The full text includes more details.

ISIC rev. 3	Sector Description	RCA>1	ECA	LUP	IMS	GDD	EG	GC ^A	Impact of war		CO ₂ intensity	Policy ^E
									Production ^B	Exports ^C		
									EU-UKR (GVC) ^D	Intermediates		
15	Food products and beverages	X			X		X	Low	Low	Low	Intermediates	
16	Tobacco products	X						High	High	High		
17	Textiles		X	X				Low				Priority
18	Wearing apparel, dressing, and dyeing of fur			X				Low	Low	Low		
19	Leather, leather products and footwear			X						Low		
20	Wood and products of wood and cork	X				X		Low	Low	Low	Intermediates	Priority (reconstruction)
22	Printing and publishing								High	High		
23	Coke, refined petroleum products and nuclear fuel			X	X			High	High			
24	Chemicals and chemical products				X	X		High			Intermediates	Priority
26	Other non-metallic mineral products						X		High	High		Priority (reconstruction)
27	Basic metals	X				X	X	High	High	High	Intermediates	Priority
28	Fabricated metal products, ex. machinery & equipment						X	High				Priority
29	Machinery and equipment. n.e.c.				X		X	Low	High	High	Capital	Priority (defence)
30	Office, accounting and computing machinery							Low			Capital	Priority
31	Electrical machinery and apparatus. n.e.c.							Low	Low		Capital	Priority
32	Radio, television and communication equipment					X		Low				
34	Motor vehicles, trailers and semi-trailers			X	X			High	Low	Low	Intermediates	
35	Other transport equipment							High	Low	High	Capital	Priority (defence)
36	Manufacture of furniture; manufacturing n.e.c.		X	X				Low		Low		

Note: ECA = emerging comparative advantage; EG = employment generation; EU-UKR = European Union and Ukraine; GC = geographical concentration; GDD = global demand dynamics; GVC = global value chain; IMS = national imports levels; LUP = latent untapped potential; n.e.c. = not elsewhere classified; RCA = revealed comparative advantage. A: 'High' indicates less ubiquitous industries. 'Low' indicates ubiquitous industries. B: 'High' indicates the top five industries that experienced the highest decline in industrial production. 'Low' indicates the five industries that experienced the least decline in the index of industrial production (% change). C: 'High' indicates the top five industries with a decline in exports in 2022 relative to the 2019–2021 average. 'Low' indicates the top five industries with an increase or least decline in exports in 2022 relative to the 2019–2021 average (% change). D: 'Intermediate' indicates that the sector contains industries whose intermediate exports to the European Union grew by more than 20% and constituted a large share of total manufacturing intermediate exports (over 2% in the last 7 years). 'Capital' indicates that the sector contains industries whose capital goods exports to the EU fulfilled the previous conditions. E: Based on the 2022 National Recovery Plan, the Resolution of the Cabinet of Ministers of Ukraine "On Approval of the Procedure for the Formation and Maintenance of the State Register of Import Substitution and Cooperation in Strategic Industries" of 30 January 2019, No. 127. Legislation of Ukraine. URL: <https://zakon.rada.gov.ua/laws/show/127-2019-%D0%BF#Text> and the Ukraine Plan under the project the Ukraine Facility for the EU Financial Support of Ukraine in 2024–2027.

BLOCK 3

Block 3 analyses the bottlenecks to business that Ukraine's firms currently face (Figure 15). The analysis identifies fundamental problems that need to be addressed in project design and policy priorities to facilitate the establishment of a conducive business environment. The analysis is based on 1) existing international data sets; and 2) data from UNIDO's survey of firms.

FIGURE 15: STRUCTURE OF BLOCK 3

Source: UNIDO elaboration.



According to available data, the most critical bottlenecks to business in Ukraine before the outbreak of the war included corruption, informal sector competition, access to finance, political instability, tax rates and inadequate skill sets. These bottlenecks were particularly prevalent in MSMEs, domestically owned firms and non-exporters. They therefore deserve special policy attention (Table 2).

TABLE 2: UKRAINE'S BOTTLENECKS (SUMMARY), AVERAGE OF 2008, 2013 AND 2019

Source: World Bank, *World Bank Enterprise Survey: Ukraine ECA (Eastern Europe and Central Asia)*.

Obstacle	Manufacturing	Domestically-owned	Exporter	Foreign owned	Medium-high technology	Large firms	Low technology	Manufacturing East European Union	Non exporter	Non manufacturing	Micro-, small and medium-sized enterprises
CORRUPTION	31%	41%	12%	3%	7%	9%	24%	18%	32%	13%	35%
COURTS	15%	20%	7%	2%	4%	6%	11%	12%	15%	7%	16%
CRIME	17%	23%	8%	2%	4%	5%	13%	9%	17%	8%	19%
CUSTOMS	12%	14%	7%	2%	3%	4%	8%	8%	9%	4%	12%
ELECTRICITY	22%	26%	9%	2%	5%	7%	17%	29%	20%	7%	22%
FINANCE	25%	33%	9%	2%	6%	8%	19%	15%	25%	9%	27%
INFORMAL SECTOR	22%	31%	8%	2%	4%	6%	18%	15%	25%	11%	27%
LABOR REGULATION	10%	13%	5%	1%	2%	3%	8%	16%	9%	4%	10%
ACCESS TO LAND	19%	25%	8%	2%	5%	6%	14%	10%	19%	8%	21%
LICENSING	13%	17%	6%	1%	3%	4%	10%	11%	13%	6%	14%
POLITICAL INSTABILITY	37%	50%	14%	3%	9%	11%	29%	23%	39%	16%	42%
TAX ADMINISTRATION	17%	22%	7%	2%	4%	6%	13%	21%	16%	7%	18%
TAX RATE	34%	46%	12%	3%	8%	10%	26%	36%	37%	15%	38%
TELECOMMUNICATION	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
TRANSPORTATION	15%	20%	7%	1%	3%	5%	12%	16%	14%	6%	15%
INADEQUATE SKILLED LABOR FORCE	22%	28%	10%	2%	5%	8%	17%	28%	21%	9%	23%

Note: Share of firms that identified an obstacle as major or very severe. The top six bottlenecks for manufacturing firms are shaded in darker blue. Percentages for non-manufacturing subsets that are higher than the manufacturing percentage are also shaded in darker blue.

These results reveal similar patterns across firm sub-groups, independent of their location (Kyiv, west, east, north and south macro-regions). The groups that are relatively more affected across all regions include domestically owned firms, low-tech firms, non-exporters and MSMEs.

Prior to the outbreak of the war, MSMEs produced over half of all products and employed 75 percent of the employed population. In 2020, MSMEs accounted for approximately 99.9 percent of economic entities in the country (of which close to 83 percent were micro-enterprises), producing 66.3 percent of all manufactured goods.

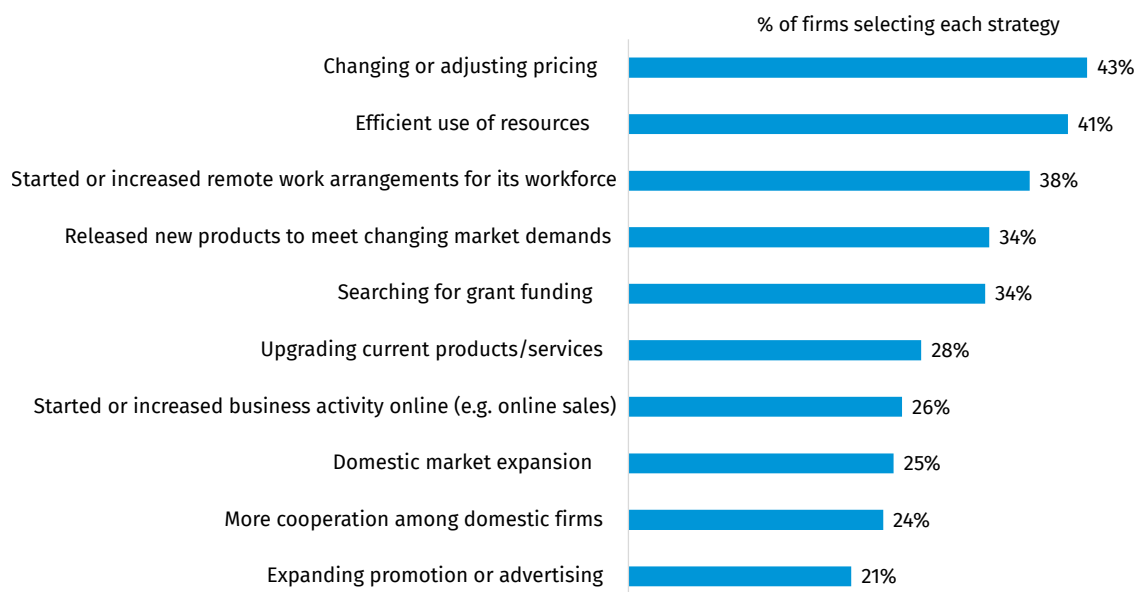
The largest share of MSMEs is regionally registered within large urban agglomerations: Kyiv and the Kyiv, Dnipropetrovsk, Odesa, Kharkiv and Lviv regions. With the onset of the armed conflict in 2022, 65 percent of enterprises were located in regions affected by the conflict. The share of these enterprises in the gross sales volume of Ukrainian MSMEs is 73 percent.

Based on a sample of responses from 501 firms (80 percent manufacturing firms) from a UNIDO survey conducted in Ukraine in October-December 2023, the results indicate that the bottlenecks to business in Ukraine have intensified, especially in terms of availability and/or cost of factors of production, such as energy, materials and labour. It also revealed that financial bottlenecks related to firm activity, such as problems with liquidity and access to finance, have increased. When asked to compare their sales in 2021 (i.e. before the outbreak of the armed conflict) and 2023 (i.e. during the war) around 64 percent of firms reported a decrease in sales. In terms of employment, the majority of firms reported having fired at least one worker as a result of the war. The share of female employees in these layoffs was around 13 percent for temporary workers and 20 percent for permanent workers. Approximately half of the sample reported that they employ people with disabilities, with 12 percent of responding firms reporting that they employed persons who acquired a disability as a result of the war. The average damage/loss per firm is estimated to be about USD 900,000. MSMEs, domestic non-exporting firms were particularly vulnerable to the war's impacts and require tailored technical assistance.

A significant number of firms (Figure 16) has successfully implemented resilience strategies to adapt to the new context. These strategies include changing or adjusting pricing (43.1 percent), optimizing resource use (41.3 percent), introducing or increasing remote working (37.7 percent) or launching new products (34 percent).

FIGURE 16: FIRMS' RESPONSE TO THE WAR

Source: UNIDO enterprise survey, 2023



Note: The number of respondents is 501.

A considerable percentage of firms have reported changes in behaviour of workers, employees and managers (43 percent); production process modalities (20 percent); firm organization (29.5 percent) or energy infrastructure (25 percent) to improve energy efficiency. In response to the shortage of inputs generated by the conflict, around 20 percent of firms have introduced process innovations and 24 percent of firms have adopted new business models. Around 15 percent of the firms reported an increase in the use of digital technologies, with 9 percent introducing new digitalization technology. Between 9 percent and 18 percent of firms have adopted circular economy practices during the war. The combination of these changes, coupled with a swift recovery in sales and profits (the share of firms claiming a loss in sales and in profits was lower in 2023 vs 2022 compared to 2023 vs 2021), indicates significant dynamism, adaptability and resilience of Ukrainian businesses. This suggests a fertile environment for future technical assistance.

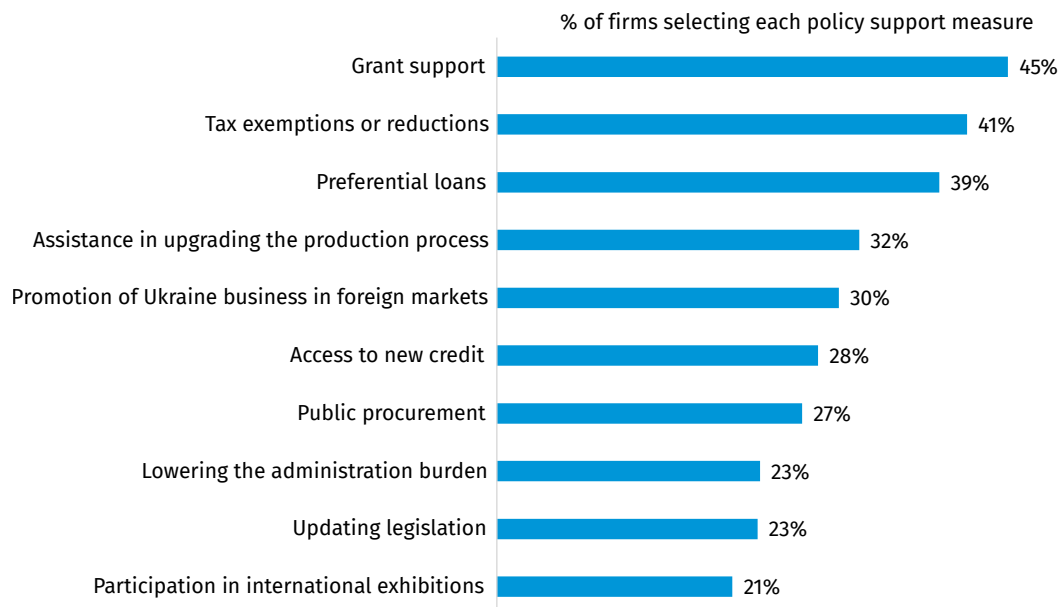
The Government of Ukraine, international organizations and the domestic private sector have been particularly active in supporting Ukrainian businesses. Results indicate lower levels of support from local government, non-government organizations and foreign private companies. A considerable number of policy measures such as tax exemptions or reductions (25 percent), grant support (20 percent), access to new credit (17 percent), deferral of credit payments (15 percent), and preferential loans (14 percent) were ranked among the top five ongoing policy measures deemed most beneficial. Respondents to the UNIDO survey indicated the need for specific interventions for recovery such as financial resources (58 percent), dealing with red tape (45 percent), access to new international (34 percent) and national markets (20 percent) and public procurement (22 percent of respondents).

The policy responses initiated by the Government of Ukraine and international funding bodies are generally well-aligned with the demands of Ukraine's businesses. The top 10 most effective support measures, according to the survey conducted among Ukrainian businesses, which could be implemented in the future include financial measures such as tax exemptions or reductions (41 percent of respondents), access to new credit (28 percent), grant support (45 percent), preferential loans (39 percent) (Figure 17). Firms also expressed the need for reforms, namely the reduction of administrative burdens and amendments to legislation (23 percent of firms), public procurement (27 percent of firms) as well as technical assistance to penetrate new markets. The urgency to upgrade production processes was stated by 32 percent of firms, while 30 percent flagged the importance of promoting Ukrainian businesses in foreign markets. Furthermore, 21 percent of firms called for greater participation in international exhibitions, and 20 percent of firms emphasized the need for enhanced cooperation with foreign businesses. The main bottlenecks identified by firms in UNIDO's survey to closer integration and stronger economic partnership with the EU to seize market opportunities include a lack of clients and partners, insufficient financial resources, and limited access to information and language barriers. Despite these obstacles, 15 percent of manufacturing firms have successfully redirected their business activities towards the EU in response to the conflict.

Firms perceive the role of municipalities as marginal, with only 5 percent stating that they have received support from the local government. The proactive engagement of municipalities in promoting green recovery could be pivotal in the future. All types of firms stated that local government should prioritize *support for better infrastructure and buildings, access to finance, support for recruitment*. These findings once again confirm the need for support in the post-war recovery process, including repairing the infrastructural damages and addressing employment losses suffered by businesses as a result of the conflict.

FIGURE 17: MOST EFFECTIVE POLICY SUPPORT MEASURES ACCORDING TO FIRMS IN UKRAINE, 2023

Source: UNIDO enterprise survey, 2023.



Note: The number of respondents is 501.

FINDINGS OF BLOCK 3

The main findings of **Block 3** emphasize a shift in firms' perceived bottlenecks to conducting business:



The conflict's impact on Ukraine's business financing: Financial considerations have emerged as the most pressing issue for Ukrainian businesses and business activity since the outbreak of the conflict. Similar to many developing countries, Ukraine's private sector had long grappled with a lack of financing, marked by high interest rates or overly stringent financing conditions, even before 2022. Problems related to access to finance had already long been a pressing concern. The ongoing conflict has only exacerbated these problems. However, the results of UNIDO's survey reveal that financial interventions rank among the most commonly implemented measures by all funding bodies, including the national government, international organizations and the private sector, and are particularly valued by firms.



Governance issues and policy recommendations: Another set of structural bottlenecks to conducting business that was highlighted by the firms were related to governance. **Block 1** identifies gaps in industrial policymaking and bottlenecks related to governance. The Government of Ukraine has already implemented several policy measures aimed at increasing firms' resilience to the war-related impacts. At the same time, findings from the UNIDO survey of 2023 indicate a need for further efforts to improve existing legislation and facilitate new market opportunities for firms. Many firms are calling for additional policy measures to address these challenges. A greater involvement of actors in decision-making, such as local governments, and improved coordination between the public and private sectors are necessary to strengthen the country's policy interventions and to remove bottlenecks for closer economic integration with the European Union.



Shifting business priorities amid the conflict: The conflict has caused significant damage to Ukraine's infrastructure, exacerbating problems related to infrastructure and factors of production. In contrast, issues related to governance have decreased in significance. Interestingly, political instability does not appear to be among the most pressing concerns for businesses. One possible explanation for this finding could be that political unrest is no longer considered a business-related problem as such, as the realities of the armed conflict have shifted businesses' focus towards more pressing day-to-day issues, such as reliable electricity supply or skilled labour shortages. This has been confirmed in consultations with private firms that are currently operating in Ukraine and corroborated by the results of UNIDO's survey. Survey respondents identified bottlenecks to business that have significantly deteriorated since the outbreak of the war, namely: 1) lack of reliable energy supply, which is the direct result of the bombings of energy infrastructure; 2) labour shortages due to a wave of migration and conscription into military service; 3) high costs of factors of production, including shortages and rising costs of materials; 4) problems with liquidity and access to finance.



Resilience of Ukrainian firms: Firms have been significantly affected by the war, especially small and medium enterprises. However, despite facing daunting circumstances, UNIDO's survey highlights that a relevant share of firms managed to adapt to the crisis by introducing innovations in the modalities of production and organizational structures and reconciling business upgrading and environmental sustainability in line with the principle of green recovery. Future technical cooperation in the country could build on the dynamism of Ukraine's industrial system.

In summary, the results reveal a notable shift in focus among Ukrainian businesses in response to the conflict. While the focus was previously on governance-related bottlenecks, it has shifted to those in infrastructure, factors of production and financial issues. The most pressing problems currently include deficiencies in

transport infrastructure, access to and cost of energy, shortages of skilled labour and liquidity problems. At the same time, the government is implementing several policy initiatives to improve the country's business environment, including direct financial assistance, tax reductions and exemptions, deregulation, upgrading of transport infrastructure, ensuring uninterrupted energy supply and promoting Ukrainian products on the international stage. Yet additional interventions are necessary, particularly in terms of policy and regulatory reform and in supporting Ukrainian firms' competitiveness.

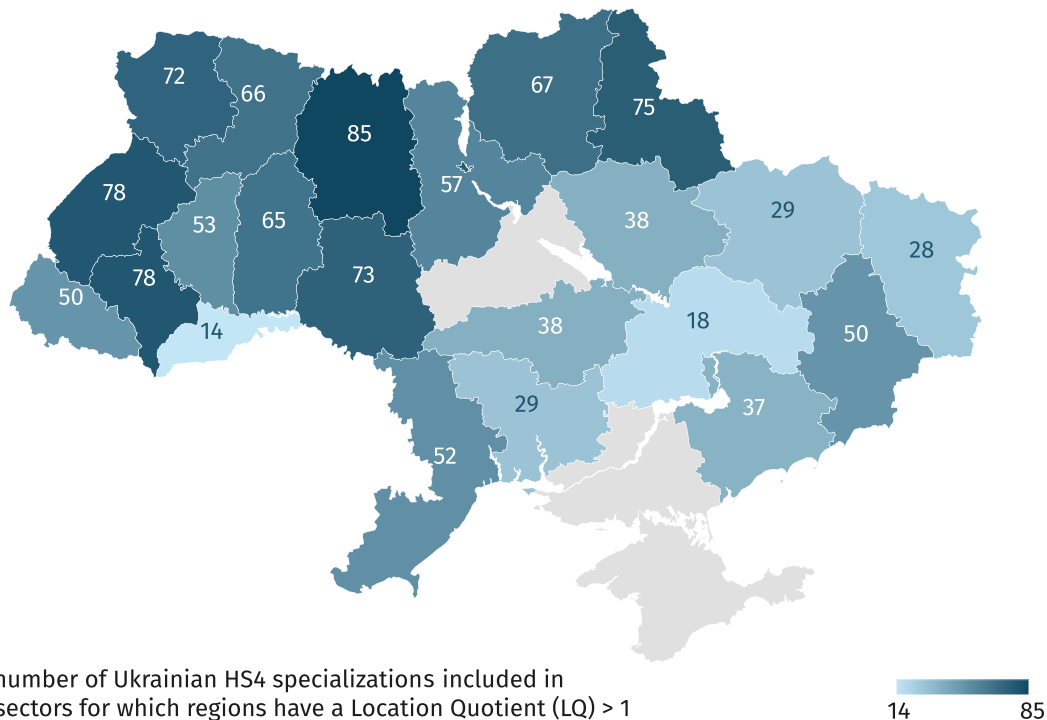
BLOCK 4

Block 4 applies UNIDO’s Diversifying Industries and Value Chains for Exports (DIVE) tool to explore potential diversification strategies in Ukraine to strengthen the industry’s comparative advantage in new products. The starting point of this discussion is that Ukraine’s product diversification is relatively low (see **Block 1**) and, most importantly, is quite heterogeneous across the different regions. **Block 4 further elaborates the analysis conducted in Block 2** by considering products at a more disaggregated level, with a focus on products for which Ukraine does not currently have an RCA but could develop an RCA in the future.

Block 4 finds that while the share of manufacturing activities before the outbreak of the war was mainly concentrated in eastern regions of Ukraine, western regions were more diversified (Figure 18).

FIGURE 18: GEOGRAPHICAL DISTRIBUTION OF UKRAINIAN EXPORT SPECIALIZATIONS, 2017–2021 AVERAGE

Source: UNIDO elaboration based on State Statistics Service of Ukraine and Centre d’Études Prospectives et d’Informations Internationales (accessed September 2023).



Note: Boundaries, names and designations on this map do not imply UNIDO’s official endorsement or acceptance.

FINDINGS OF BLOCK 4

The UNIDO DIVE analysis highlights the following key points:



Comparative advantage and export dynamics: Ukraine had an RCA in approximately 210 products before the outbreak of the war. In 2022, while losing comparative advantage in 47 products, Ukraine gained an advantage in 35 products, with 25 registering an increase in exports. Among the 163 products in which Ukraine maintained a comparative advantage, 42 recorded a rise in exports, indicating that the country has a reservoir of skills and capabilities, as discussed in **Block 2**.



Diversification opportunities and product classification: Ukraine has several product diversification options, including those related to existing capabilities (short jumps) and products that are related less to current industrial capabilities (long jumps). Short jump products can be further categorized as “few competitors” (Group 1) or “many competitors” (Group 2) based on the number of countries successfully exporting these products. Long jumps are ambitious diversification targets and can be classified as “low entry barriers” (Group 3) where the experiences of other countries demonstrate that these products can be successfully exported, even if they are not strictly related to the country’s existing capabilities set. Such products can also be classified as “capability advantage” (Group 4), depending on Ukraine’s capabilities relative to those of other lower middle-income countries. These product categories are further filtered based on current import trends to the EU as well as global import trends, indicating product categories’ potential for economic integration with the EU and the world. The tables below present the products ranked according to their EU integration potential. They are also attractive because they offer potential “complexity gains” for Ukraine’s exports as they are more sophisticated, on average, than Ukraine’s current export basket. The products in Tables 3-6 are included among those already present in the export baskets of countries at a similar level of development as a further reality test, but the full list of products for diversification contained in the main text are not necessarily selected by applying this filter.



Regional diversification possibilities: Diversification opportunities are spread across various regions in Ukraine, suggesting that recovery plans can be implemented nationwide without leaving any region behind (Figure 19). There is potential for dedicated intervention packages in eastern regions once conditions stabilize.



Import substitution and untapped industrial potential considerations: A list of products suitable for import substitution is provided alongside export opportunities, enhancing the scope for economic self-sufficiency and domestic production (Table 7). Moreover, a number of products have an industrial production capacity that is lower than that of lower middle-income (LMI) countries but are catching up. These could be interesting for further development (Figure 20).

TABLE 3: SHORT JUMPS WITH A HIGH PATH DEPENDENCE AND MANY COMPETITORS

Source: UNIDO elaboration based on BACI and Gravity, Centre d'Études Prospectives et d'Informations Internationales and World Bank, *World Development Indicators* database (accessed September 2023).

HS 4-digit product code	Harmonized System 4-digit product description	Product sector	Complexity gain (USD, 2021)	Global trade % growth (2019-2021)	Import Penetration Index for Ukraine (World)	Import Penetration Index for Ukraine (EU markets)	Provinces with a export share higher than the country average in the HS2 sector
7604	Aluminum bars	Metals	5228	36.7	1.17	1.79	Khmelnytsky region, Kyiv region, Odesa region
401	Milk	Agriculture	9018	16.9	1.14	1.75	Ivano-Frankivsk region, Khmelnytsky region, Kirovograd region, Kyiv region, Poltava region, Rivne region, Sumy region, Ternopil region, Vinnytsia region, Volyn region, Zhytomyr region
4008	Vulcanized rubber plates	Chemicals	16074	10.9	1.19	1.55	Kirovograd region, Kyiv region, Luhansk region, Zhytomyr region
8716	Trailers and semi-trailers	Vehicles	10518	19.1	1.22	1.53	Dnipropetrovska oblast, Kharkiv region, Poltava region, Rivne region, Sumy region, Transcarpathian region, Volyn region, Zaporizhzhya region
8433	Harvesting or agricultural machinery	Machinery	10119	29.4	1.25	1.52	Donetsk region, Ivano-Frankivsk region, Kharkiv region, Kirovograd region, Sumy region, Volyn region, Zaporizhzhya region, Zhytomyr region
9406	Prefabricated buildings	Textiles	8195	15.8	1.22	1.50	Chernivtsi region, Kharkiv region, Khmelnytsky region, Kyiv region, Lviv region, Rivne region, Ternopil region, Transcarpathian region, Volyn region, Zhytomyr region

Note: Products are ranked by relevance for export potential to the EU market measured by the import penetration index. This list is not exhaustive. The main report contains the full list.

TABLE 4: SHORT JUMPS WITH A HIGH PATH DEPENDENCE AND FEW COMPETITORS

Source: UNIDO elaboration based on BACI and Gravity, Centre d'Études Prospectives et d'Informations Internationales and World Bank, *World Development Indicators* database (accessed September 2023).

HS 4-digit product code	Harmonized System 4-digit product description	Product sector	Complexity gain (USD, 2021)	Global trade % growth (2019-2021)	Import Penetration Index for Ukraine (World)	Import Penetration Index for Ukraine (EU markets)	Provinces with a export share higher than the country average in the HS2 sector
7007	Safety glass	Stone	24536	10.9	1.06	1.49	Kharkiv region, Kyiv region, Luhansk region, Rivne region, Zhytomyr region
7415	Screws and similar articles of copper	Metals	12449	26.0	1.08	1.48	Donetsk region, Volyn region, Zaporizhzhya region
9029	Meters	Machinery	7095	-2.1	1.12	1.43	Kharkiv region, Khmelnytsky region, Kyiv city, Kyiv region, Luhansk region, Odesa region, Transcarpathian region
8701	Tractors	Vehicles	10188	11.5	1.15	1.26	Dnipropetrovska oblast, Kharkiv region, Poltava region, Rivne region, Sumy region, Transcarpathian region, Volyn region, Zaporizhzhya region
8507	Batteries	Electronics	9823	61.4	1.00	1.26	Chernivtsi region, Ivano-Frankivsk region, Khmelnytsky region, Lviv region, Ternopil region, Transcarpathian region, Volyn region, Zhytomyr region

Note: Products are ranked by relevance for export potential to the EU market measured by the import penetration index. This list is not exhaustive. The main report contains the full list.

TABLE 5: LONG JUMPS WITH A LOW PATH DEPENDENCE, HIGH FREQUENCY OF ENTRY AND FEW COMPETITORS

Source: UNIDO elaboration based on BACI and Gravity, Centre d'Études Prospectives et d'Informations Internationales and World Bank, *World Development Indicators* database (accessed September 2023).

HS 4-digit product code	Harmonized System 4-digit product description	Product sector	Complexity gain (USD, 2021)	Global trade % growth (2019–2021)	Import Penetration Index for Ukraine (World)	Import Penetration Index for Ukraine (EU markets)	Provinces with a export share higher than the country average in the HS2 sector
3215	Ink	Chemicals	18891	2.8	1.16	1.56	Kyiv city; Sumy region.
8505	Electromagnets	Electronics	8913	27.9	0.94	1.17	Chernivtsi region; Ivano-Frankivsk region; Khmelnytsky region; Lviv region; Ternopil region; Transcarpathian region; Volyn region; Zhytomyr region.
9018	Medical instruments	Machinery	6772	12.6	1.01	1.00	Kharkiv region; Khmelnytsky region; Kyiv city; Kyiv region; Luhansk region; Odesa region; Transcarpathian region.
2932	Heterocyclic compounds with oxygen hetero-atom(s) only	Chemicals	17646	24.4	0.97	0.98	Ivano-Frankivsk region; Kirovograd region; Luhansk region; Odesa region; Poltava region; Transcarpathian region; Vinnytsia region.
8521	Video recording apparatus	Electronics	5242	24.4	0.91	0.77	Chernivtsi region; Ivano-Frankivsk region; Khmelnytsky region; Lviv region; Ternopil region; Transcarpathian region; Volyn region; Zhytomyr region.

Note: Products are ranked by relevance for export potential to the EU market measured by the import penetration index. This list is not exhaustive. The main report contains the full list.

TABLE 6: LONG JUMPS WITH A HIGH PATH DEPENDENCE, LOW RELATEDNESS AND RELATEDNESS ADVANTAGE

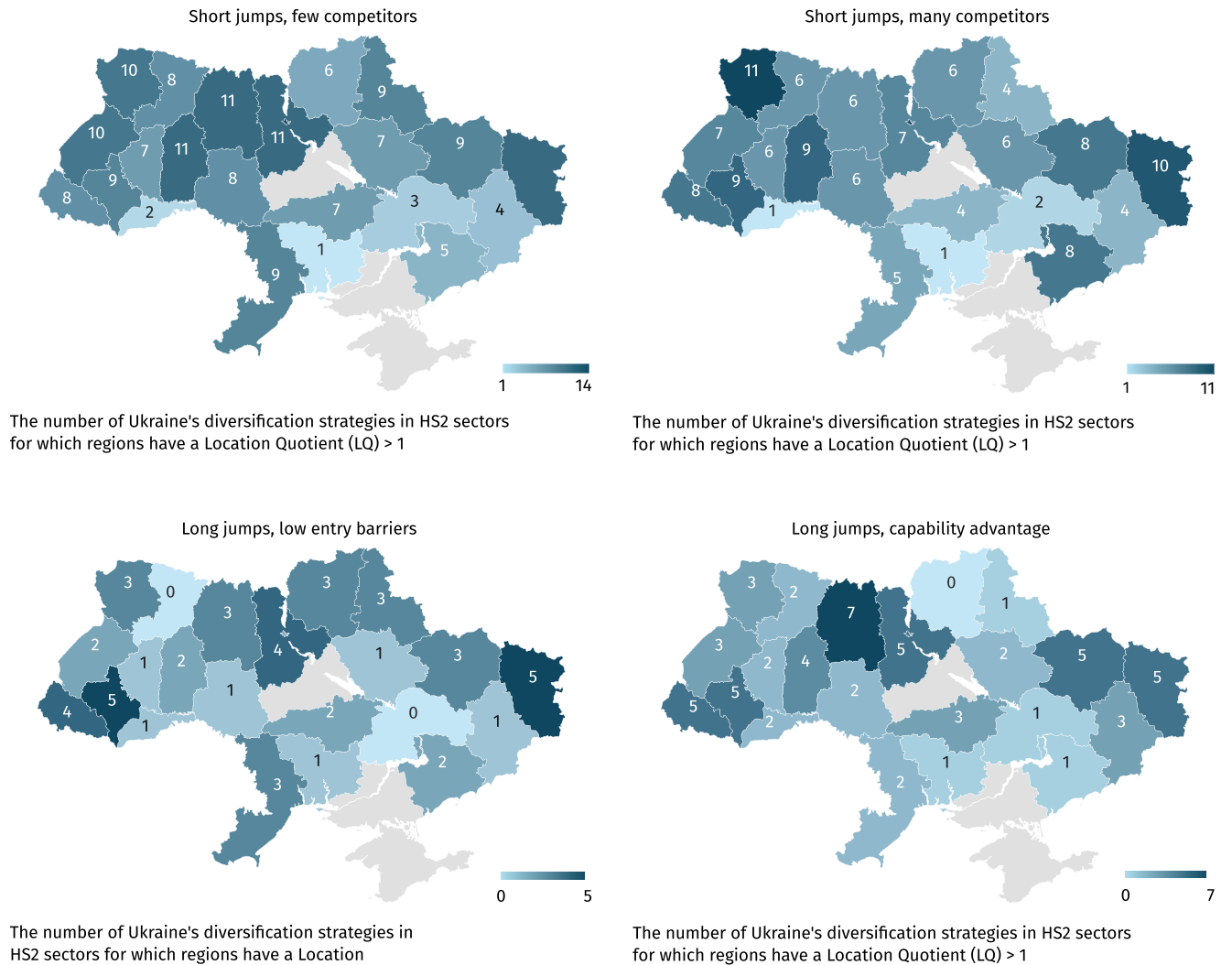
Source: UNIDO elaboration based on BACI and Gravity, Centre d'Études Prospectives et d'Informations Internationales and World Bank, *World Development Indicators* database (accessed September 2023).

HS 4-digit product code	Harmonized System 4-digit product description	Product sector	Complexity gain (USD, 2021)	Global trade % growth (2019–2021)	Import Penetration Index for Ukraine (World)	Import Penetration Index for Ukraine (EU markets)	Provinces with a export share higher than the country average in the HS2 sector
8519	Sound reproducing apparatus	Electronics	9266	16.6	1.18	1.56	Chernivtsi region; Ivano-Frankivsk region; Khmelnytsky region; Lviv region; Ternopil region; Transcarpathian region; Volyn region; Zhytomyr region.
2933	Heterocyclic compounds with nitrogen hetero-atom(s) only	Chemicals	38083	2.4	1.11	1.51	Ivano-Frankivsk region; Kirovograd region; Luhansk region; Odesa region; Poltava region; Transcarpathian region; Vinnytsia region.
2934	Nucleic acids and their salts	Chemicals	34076	38.5	1.03	1.01	Ivano-Frankivsk region; Kirovograd region; Luhansk region; Odesa region; Poltava region; Transcarpathian region; Vinnytsia region.
6914	Other ceramic articles	Stone	4957	26.4	0.96	0.94	Donetsk region; Kharkiv region; Khmelnytsky region; Kyiv city; Zhytomyr region.
9019	Therapy appliances	Machinery	16657	58.5	1.01	0.90	Kharkiv region; Khmelnytsky region; Kyiv city; Kyiv region; Luhansk region; Odesa region; Transcarpathian region.

Note: Products are ranked by relative relatedness advantage vis-à-vis other lower middle-income countries. This list is not exhaustive. The main report contains the full list.

FIGURE 19: GEOGRAPHICAL DISTRIBUTION OF UKRAINIAN LOCATION QUOTIENTS IN SECTORS WITH DIVERSIFICATION OPTIONS, AVERAGE OF 2017–2021

Source: UNIDO elaboration based on State Statistics Service of Ukraine and Centre d'Études Prospectives et d'Informations Internationales (accessed September 2023).

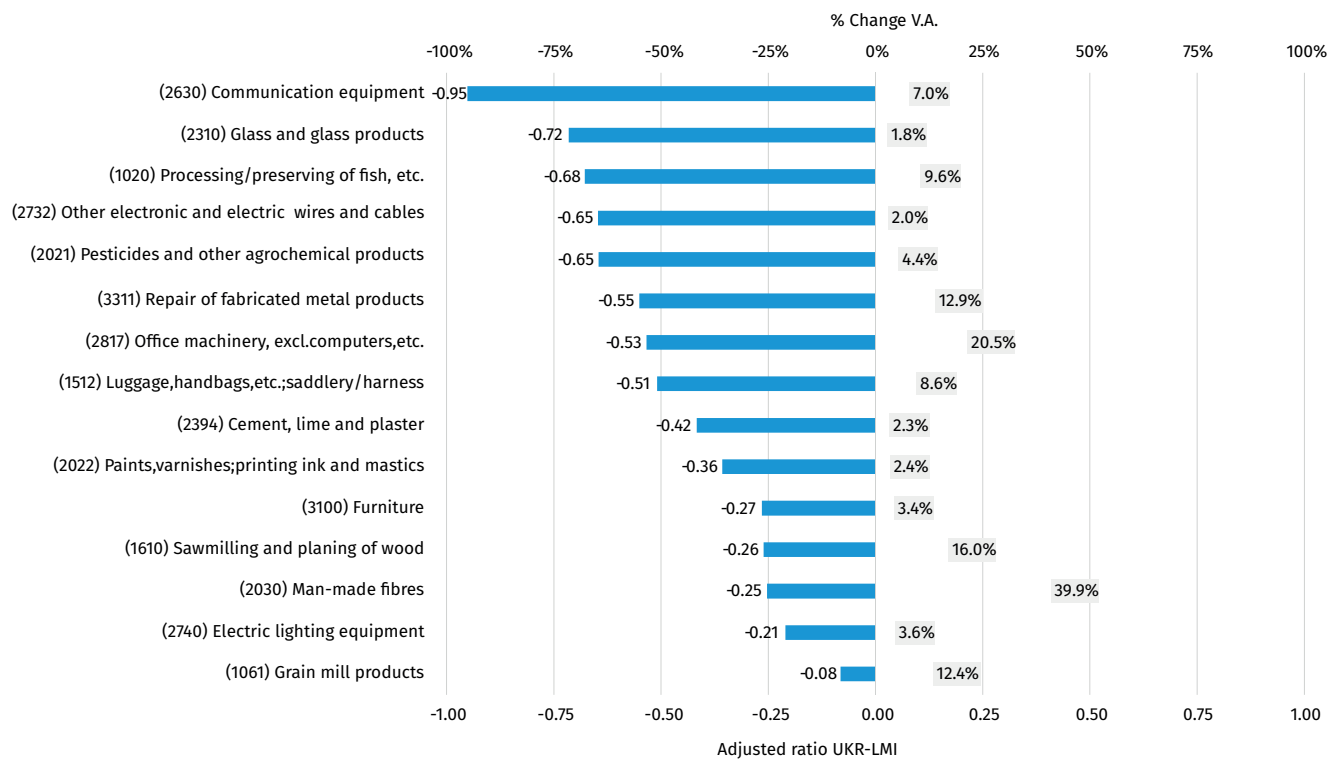


Note: Boundaries, names and designations on this map do not imply UNIDO's official endorsement or acceptance.

TABLE 7: US\$ PER-CAPITA IMPORT LEVELS ACROSS SECTORS IN UKRAINE, IV-DIGIT ISIC REV.3, 2017-2023

Source: United Nations, *UN Comtrade Database* and World Bank, *World Development Indicators* database (accessed September 2023).

ISIC rev3	Sector Description	2017	2018	2019	2020	2021	2022	2023 (January - July)
2320	Manufacture of refined petroleum products	107.4	145.3	139.6	95.2	156.3	252.8	98.3
3410	Manufacture of motor vehicles	64.1	70	103.4	98	124.3	106.7	47.8
2423	Manufacture of pharmaceuticals, medicinal and botanical products	39.2	43.6	48.3	49.1	60.7	46.2	20
2921	Manufacture of agricultural and forestry machinery	30.9	25.8	21.6	15.7	33.2	22.3	8.8
2413	Manufacture of plastics in primary forms and of synthetic rubber	28.5	30.2	27.5	22.6	37	30.2	12.8
2710	Manufacture of basic iron and steel	28.3	35.1	32.3	26.6	37.4	27.9	14.5
2520	Manufacture of plastics products	28	31.7	33	33	42.5	38.7	14.9
2412	Manufacture of fertilizers and nitrogen compounds	27.2	24.2	28.7	19.3	36.8	20.8	17
2421	Manufacture of pesticides and other agro-chemical products	20.9	21.7	21	20.2	23.3	24	15.1
3000	Manufacture of office. accounting and computing machinery	20.2	22.4	24.4	25.5	33	28	11.8
3220	Manufacture of television and radio transmitters	16.6	17.3	16.6	18.8	22.3	18.7	7.3
2411	Manufacture of basic chemicals, ex. fertilizers & nitrogen compounds	16.1	19	19.3	15.9	20.3	19.6	7.9
2101	Manufacture of pulp. paper and paperboard	14.6	16.7	15.7	14.6	17	13.6	6
2899	Manufacture of other fabricated metal products n.e.c.	14.5	16.6	17.8	16	22	16.1	6.3
2424	Manufacture of soap and detergents, and perfumes	14.4	16.5	17.5	18	21.1	16.7	8.3
2930	Manufacture of domestic appliances n.e.c.	12.6	15.6	17.1	19.7	22.6	17	6.6
2919	Manufacture of other general purpose machinery	12.5	15.1	15.9	16.5	21.1	13.3	5.6
3120	Manufacture of electricity distribution and control apparatus	11.9	14.6	16.4	14.6	17.6	13.4	6
3110	Manufacture of electric motors. generators and transformers	8	13.3	21.5	14.8	13.8	25	19.2

FIGURE 20: LATENT UNTAPPED POTENTIAL (LUP), CHANGE IN UKRAINE, BY IV-DIGIT ISIC REV. 4, 2012-2021Source: UNIDO, *INDSTAT* database (accessed September 2023).

Note: Adjusted Ratio (UKR-LMI) = (Ukraine value added per capita / LMI value added per capita) – 1. Sectors identified as LUP are in the shaded area.

CONCLUSION

The findings drawn from all industrial country diagnostics blocks are based on quantitative and qualitative information on different layers of the economic system (macro, meso, micro, product) and various dimensions of sustainability (economic, social and environmental). Consultations and quantitative data suggest some food for immediate thought and action:

- Reiterate the importance of industrial policy in the government's agenda to reverse the trend of deindustrialization;
- Approve an action plan for recovery and reconstruction;
- Take decisions on industry prioritization, territorial rebalancing of industrial development and product and market diversification to reduce vulnerability;
- Reverse the decline in the production of medium-tech products, innovation and digitalization within Ukraine's industrial economic system;
- Address the collapse of foreign and domestic investment since the outbreak of the war and the limited access of firms to credit by introducing a comprehensive programme of loans, grants and investment promotion initiatives for recovery, expansion and upgrading;
- Provide technical assistance to support MSMEs, youth and women to promote economic empowerment and improve their technical skills;
- Provide technical assistance to policymakers at the national and local levels to identify priority industrial sectors, products with growth potential, and value chains with strong prospects of increased value addition;
- Make technical assistance available to industrial sectors that are heavily affected by the conflict;
- Preliminary findings from a UNIDO survey suggest that tax exemptions or reductions, access to new credit, grant support and preferential loans are identified by businesses as current and future policy instruments that could mitigate the conflict's effects. Areas for expanded interventions include amending the regulatory framework (reducing administrative burdens, reforming legislation and public procurement) and business upgrading initiatives (upgrading production processes, promoting Ukraine's businesses in foreign markets and participating in international exhibitions);
- Financial resources, dealing with red tape and finding new international and domestic markets have been identified by Ukrainian firms as critical areas requiring government action;
- Intensify efforts to increase the relevance of Ukrainian products in the European market and align Ukrainian standards in alignment with EU requirements;
- Simplify regulations and improve the business environment;
- Review education programmes and technical and vocational education and training to improve connections with the industrial system;
- Improve statistics reporting for monitoring;
- Strengthen public-private partnerships;

- Promote sound environmental practices related to the circular economy, resources (water and energy), material efficiency and decarbonization to support the green transformation of the industrial sector and of the economy to boost business competitiveness;
- Decarbonize hard-to-abate industries, diversify towards low-emissions intensity products and promote structural transformation towards less emission-intensive sectors;
- Rebuild energy infrastructure and green the energy and electricity systems with a stronger focus on small plants to meet consumer needs (distributed energy);
- Improve governance through capacity development, stringent monitoring of policy measures and effective decentralization.



Vienna International Centre
P.O. Box 300, 1400 Vienna, Austria



Telephone: (+43-1) 26026-0



www.unido.org



unido@unido.org



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION