



EASTERN PARTNERSHIP
Civil Society Forum



Ministerstvo zahraničních věcí
České republiky



**National Endowment
for Democracy**

Supporting freedom around the world

MACHINE INDUSTRY TRANSFORMATION in Belarus, Ukraine, and Moldova

Analytical report

Sierž Naŭrodski, Dzmitry Babicki

Minsk, 2016



Analytical report "Machine industry transformation in Belarus, Ukraine and Moldova" prepared by CASE Belarus staff (Sierż Naūrodski and Dzmitry Babicki) within the framework of the project "Vulnerable employment in machinery in Belarus, Moldova and Ukraine: setting a common policy agenda" led by Belarusian Congress Of Democratic Trade Unions in collaboration with Confederation of Free Trade Unions of Ukraine, Labour Institute (Moldova) and CASE Belarus (Poland). Authors acknowledge valuable contribution from Levitskaya Natallia (Confederation of Free Trade Unions of Ukraine) and Pořtan Liliana (Labour Institute) to this report. The project is realized under re-granting Scheme of the Eastern Partnership Civil Society Forum.

Through its Re-granting Scheme, the Eastern Partnership Civil Society Forum (EaP CSF) supports projects of EaP CSF members with a regional dimension that will contribute to achieving the mission and objectives of the Eastern Partnership Civil Society Forum.

The donors of the re-granting scheme are the European Union, National Endowment for Democracy and Czech Ministry of Foreign Affairs.

The overall amount for the 2016 call for proposals is 307.500 EUR. Grants are available for CSOs from the Eastern Partnership and EU countries.

Key areas of support are democracy and human rights, economic integration, environment and energy, contacts between people, social and labour policies.

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Union.

Contents

1. Machine building sector development patterns in Belarus, Ukraine, and Moldova.....	9
2. Analysis of companies performance in the machine building sector.....	16
3. Local government initiatives as the industrial growth enhancer	30
4. Central government efforts towards machinery transformation: institutional reforms in Belarus, Moldova, and Ukraine.....	36
5. Policy directions: SWOT analysis	43

List of abbreviations

CEE — Central and Eastern Europe	SME — Small and Medium Enterprises
CIS — Commonwealth of Independent States	SO — Strengths, Opportunities
CIT — Corporate Income Tax	SOEs — State-owned enterprises
DCFTA — Deep and Comprehensive Free Trade Area	SRRE — Socially Responsible Restructuring of Enterprises
EBRD — European Bank for Reconstruction and Development	ST — Strengths, Threats
EEU — Eurasian Economic Union	SWOT tables/analysis — Strengths, Weaknesses, Opportunities, Threats tables/analysis
ENPI — European Neighborhood Policy Instrument	UN — United Nations
EU — European Union	US — United States
FDI — Foreign Direct Investment	USSR (SSR) — Union of Soviet Socialist Republics
FEZs — Free Economic Zones	V4 — Visegrad Four (Visegrad Countries)
GDP — Gross Domestic Products	VAT — Value Added Tax
HS code — Harmonized System code	WT — Weaknesses, Threats
ILO — International Labour Organization	WTO — World Trade Organization
ISO — International Organization for Standardization	WO — Weaknesses, Opportunities
JSC — Joint Stock Company	
LHS — Left Hand Scale	
MFN — Most Favorable Nations	
NACE codes — Nomenclature of Economic Activities	
OECD — Organization for Economic Co-operation and Development	
PIT — Personal Income Tax	
p.p. — percentage points	
PPP — Purchasing Power Parity	
RHS — Right Hand Scale	
R&D — Research and development	
SMC — Small and Micro Size Companies	

Executive summary

The machine building sectors in Belarus, Ukraine and Moldova are to a large extent a legacy of Soviet times, and, correspondingly, they have retained a significant role in industry. The three countries still find themselves in the process of structural adjustment as they move from a Soviet-type industry to a market-based one, although the pace of transformation is different in each country. During the transition period, machinery in Belarus, Moldova, and Ukraine has been evolving from labor-intensive production of technologically simple products to capital-intensive machinery building that produces more sophisticated products with relatively high value added and know-how content. Moldova appears to have the fastest track record in this process of transition as evidenced by the sector structure change and performance, while Belarus and Ukraine lag behind, as their machinery remains more labor-intensive and underinvested. Machinery export data shows that the machine building sector accounts for a relatively higher share of total exports in Moldova, which indicates that exported machinery products produced in Moldova boast a comparatively higher value added than those manufactured in Belarus and Ukraine.

There is currently significant need for restructuring the machine building enterprises in Belarus and increasing the role of private small and micro-engineering producers. Large and often state controlled companies produce

most of the machinery output in Belarus, with poor competitiveness of machinery products in terms of quality and prices, both domestically and abroad. Along with ineffective investment, excessive employment and export dependence on Russia this results in sinking output and bad financial results in the situation of slow demand in the Russian market and a devaluation of Russian ruble.

The key vulnerability factors that apply to Ukraine machine building companies are relatively low quality of products and outdated equipment and technology, which result from sector underinvestment. Cheap domestic raw materials and a rather weak corporate culture in Ukraine lead to underinvestment and consequently to low domestic and international competitiveness. At the same time high dependence on Russian market will hit the sector hard in the case of escalating of Ukrainian-Russian political conflict over Donbass.

The machine building producers in Moldova has been contributing a growing share of industrial production since 2001. Compared with Belarus and Ukraine, the machine building sector contributes far less to GDP, but the sector has experienced a surge in its investment intensity and productivity and there is an increased focus on the machine building sector as an engine of industrial growth in Moldova. This indicates that the country's machinery has undergone deep structural

changes and has managed to attract green-field investments.

Decentralization issues receive poor attention in Belarus, Moldova, and Ukraine, while mere research is available on relationship between the industrial reform and local governance development. Decentralization is perceived to be a critical element of industrial reform process to enhance local support of changes and to empower local initiatives towards a sound business environment. Moldova and Ukraine have initiated deep decentralization reforms just recently, while Belarus has all necessary conditions for further local administration reforms. However, it is difficult to assess at the moment how the recent fiscal decentralization reform contributes to inflation of industry investment in general and machine building in particular.

Different approach to institutional reforms resulted in different governmental rulings and support of machinery in the three countries. Belarus uses the widest range of potential instruments, as they take various forms of economic stimuli, subsidies (hidden and explicit), soft budget constraints, and preferential lending that benefit companies in the machine building sector directly and indirectly. In Ukraine and Moldova, institutional burdens are significantly lower than in Belarus, and their regulation is currently moving towards providing tax initiatives in different forms, including free economic zones. However, institutional reforms in Ukraine and Moldova are far from end and need continuous policy improvement, primarily in the field of corporate governance issues.

Despite differences in machine building policies and approaches to its transformation in Belarus, Moldova, and Ukraine since 1991, machinery employment remains one of the key common vulnerability factors of the sector in all the three countries. As Belarus and Ukraine have more labor-intensive machinery comparing to Moldova, the issue remains more vulnerable for Belarus and Ukraine, but less vulnerable in case of Moldova. A contin-

uous reductions in the number of employees in the machine building sector in the three countries suggest that the period of transition from more labor-intensive and technologically simpler machinery products to more advanced products is still ongoing. This transition requires proactive steps from governments towards more intensive investments into human capital as well as targeted social policies towards those who loose their jobs in order to mitigate the social consequences of transformation period.

Focus and structure of the report

The scope of the machine building industries in Belarus, Moldova and Ukraine used for this report is NACE codes 26-30. Despite some national practices, subsectors 24 (Manufacture of basic metals) and 25 (Manufacture of fabricated metal products, except machinery and equipment) were excluded from the definition due to the facts that a) Ukraine's metallurgy sector is one of the core economic sectors in terms of production and exports and it is not the topic of the current report, and b) in Belarus and Moldova subsectors 24 and 25 were quite often presented as a single industry, which effectively leads to excluding subsector 24 (Manufacture of basic metals) from the analysis.

The report concentrates on current situation in machinery and its recent transformation based on the three-side analysis of a) machinery companies performance, b) local governments attitude towards industrial development in their local areas, and c) central governments efforts of industrial reform. Previous research and evidence from the Visegrad countries (Czech Republic, Hungary, Poland, Slovakia) shows that it is the combination of these three dimensions that allows for better understanding of current machinery problems including vulnerability issues of the sector in the three countries.

The structure of the report is the following. Chapter 1 looks broadly at macroeconomic perspective of machine building sector in Belarus, Moldova, and Ukraine. Chapter 2 deals with analysis of companies' performance in machine building sector in the three countries. Chapter 3 investigates state-of-the-art of decentralization reform as one of the enhancers of industrial growth in considered countries. Chapter 4 guides through existing governmental rulings and support of machine

building industry in Belarus, Moldova, and Ukraine. The report is concluded by Chapter 5 providing SWOT tables along with proposition of the key directions of sector development for each country.

1. Machine building sector development patterns in Belarus, Ukraine, and Moldova

1.1. Pace and form of changes in industrial specialization patterns

Belarus, Moldova and Ukraine are still in the process of implementing structural adjustment of the economy from a Soviet-type market model to a free market model, although the pace is different in each of these countries. As evidence from other post-socialist countries tells, this transition period includes a structural move from more labor-intensive and technologically simpler products to more advanced industries and products, a development that

gradually shifts these industries towards becoming engineering-based industries.

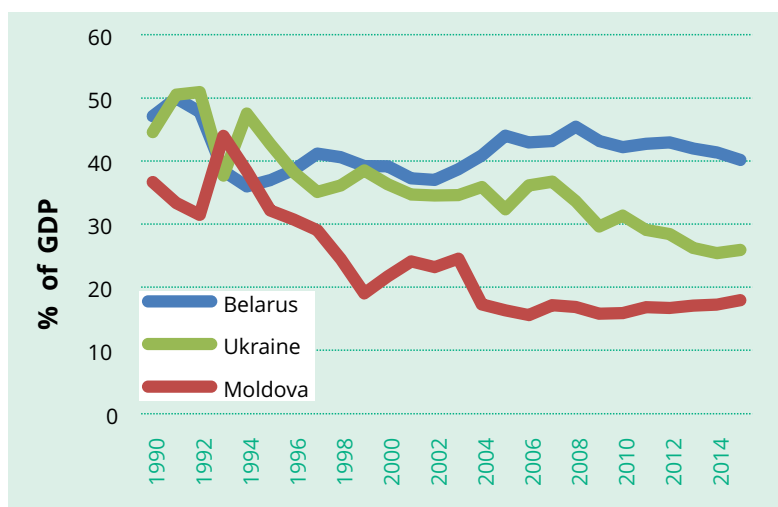
Changes in industrial specialization patterns have different form and speed in the three countries. In 1990s Belarus, Moldova, and Ukraine used to have alike level of industrialization, but different development trends later on brought different results: industry contribution to GDP remains high for Belarus, shows declining trend in case of Ukraine and recovering trend for Moldova (Figure 1).

In 2015, industry accounted for 40.1% of Belarusian GDP, a figure that is reflective of its average share of GDP over the last 25 years since 1990. Industry in Ukraine and Moldova substantially shrank from shares of 44.6% and 36.7% of GDP, respectively, in 1990 to 25.9% and 17.9% of GDP, respectively, in 2015. Industrial production in Moldova felt more significantly in 90s as compared to Belarus and Ukraine, but it has been slightly recovering since 2009.

Manufacturing remains a key component of industrial value added in Belarus, Ukraine, and Moldova and illustrates the distinction in industrial development. Its role has been changing divergently indicating that countries

Source:
the World Bank

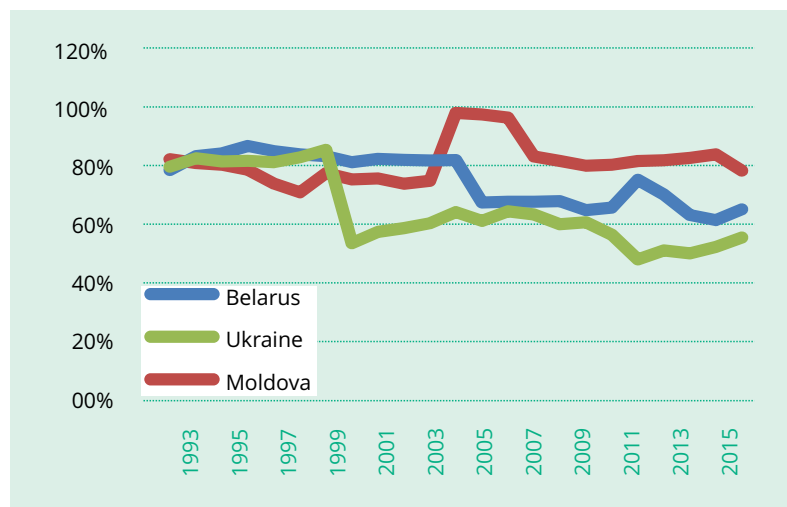
Figure 1. Industry value added, % of GDP, 1990–2015



Note: The indicator comprises value added in mining, manufacturing, production of electricity, water, and gas, as well as construction

Source: Authors calculations based on the World Bank's data

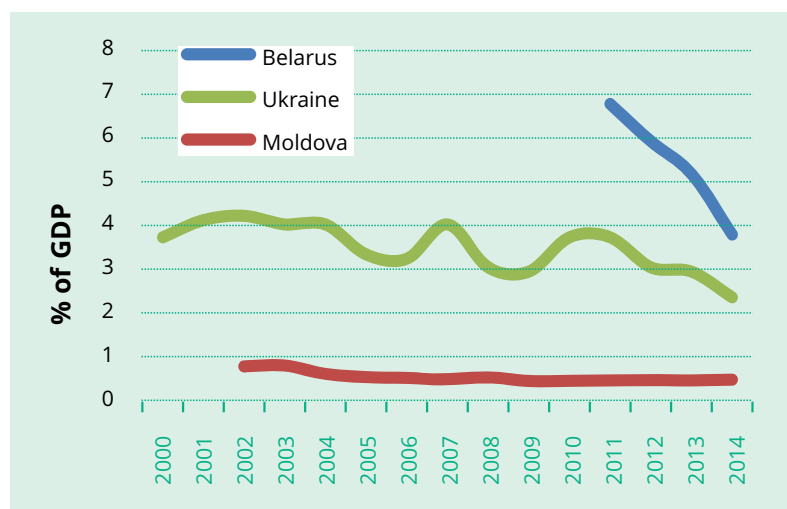
Figure 2. Manufacturing value added, % of industry, 1993-2015



Note: Industry classified as above

Source: Authors calculations based on national statistics data

Figure 3. Machinery and transport equipment value added, % to GDP, 2001-2014



followed different framework or industrial policy. After the USSR breakdown in 1991, the three countries used to have the identical level of manufacturing contribution to industry (Figure 2). In Moldova, this contribution fluctuated but remained close to 80% on average indicating a significant role of manufacturing in industrial recovery in 2000s. In case of Belarus, manufacturing division kept relatively stable importance before 2004, and then reduced to 65% mostly due to the fast growing role of construction sector since mid 2000s¹. In Ukraine, manufacturing lost significantly its potential as industrial driver since 1999 and pulled the total industrial growth down.

The role of machinery in the economies of these countries is different. As of end of 2014, machinery has been providing relatively more value added in Belarus (3.8% down from 6.8% in 2011²) compared to Ukraine (2,3%) and Moldova (0,4%) (see Figure 3). The picture of contribution of machine building sector to industrial performance is pretty much the same as contribution to GDP, and it exhibits recent fast downward trend for Belarus (from 22% in 2011 to 14,6% in 2014) and volatile contribution in case of Ukraine (11.1% in 2011) and Moldova (3.1% in 2014).

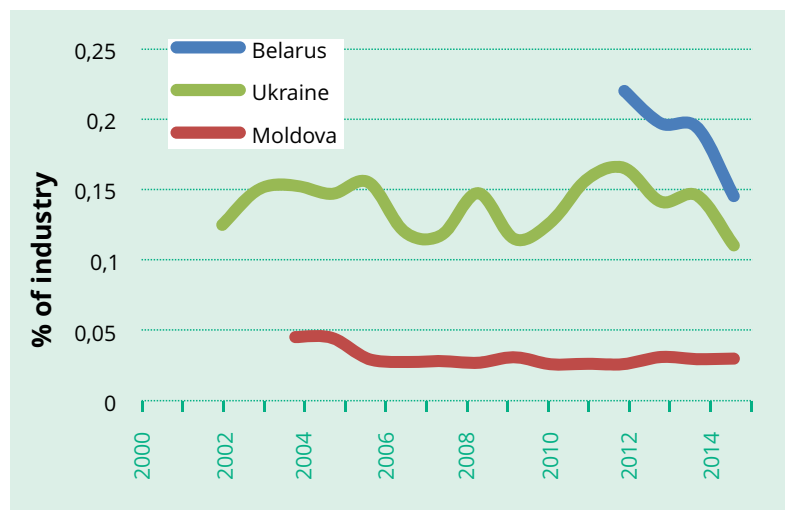
The machine building sectors in Belarus and Ukraine take up a significant share of the industry employment of these countries, while in Moldova this ratio is considerably lower (Table 1). However, the share of investment

1 As evidenced from Belarusian official statistics: contribution of construction to GDP increased from 6,7% in 2006 to 10,5% in 2014 (http://www.belstat.gov.by/ofitsialnaya-statistika/makroekonomika-i-okruzhayushchaya-sreda/natsionalnye-scheta/godovye-daniye_11/struktura-valovogo-vnutrennego-produkta-po-vidam-ekonomicheskoi-deyatelnosti/)

2 Calculation of value added in machinery for Belarus was made based upon Input-Output tables provided by Belarusian Statistical Committee and available only for 2011-2014

Source: Authors
calculations based
on national statistics
data

Figure 4. Machinery and transport equipment value added, % to industry, 2001-2014



in the machine-building sector in Belarus and Ukraine is below its share in both value added and output, while in Moldova it absorbs a higher share of investments as compared to its share in value and output. In terms of its contribution to exports, the machine building sector accounts for a relatively higher share of total exports in Moldova, indicating that Moldovan exported machinery products offer a comparatively higher value added than in Belarus and Ukraine.

The imbalances between value added, output, employment, investments, and export in

Table 1. Main indicators of the machine building industry in Belarus, Ukraine, and Moldova

	Belarus		Ukraine		Moldova	
	2005	2014	2005	2014	2005	2014
Machine building value added, % of GDP	n/a	3.8	3.3	2.3	0.4	0.4
Machine building value added, % of industry	n/a	14.6	12	11.1	2.8	3.1
Machine building output, % of industry	19.0	14.6	12.3	8.6	2.2	1.9
Employment in machine building sector, % of industry	29.2	25	21.8	17.4	10.5	7.1
Investments to machine building sector, % of industry	11.3	7.6	6.4	6.3	1.9	8.4
Export of machine building sector, % of industry	n/a	25.7	n/a	n/a	6.9	19.6
Export of machine building sector, % of total export of all commodities	n/a	11.2	8.3	10.5	5.6	14.4

Source: own calculations based on national statistics data from:
National Statistical Committee of the Republic of Belarus (<http://belstat.gov.by/>)
State Statistics Service of Ukraine (<http://www.ukrstat.gov.ua/>).
National Bureau of Statistics of the Republic of Moldova (<http://www.statistica.md/index.php?=ru>)

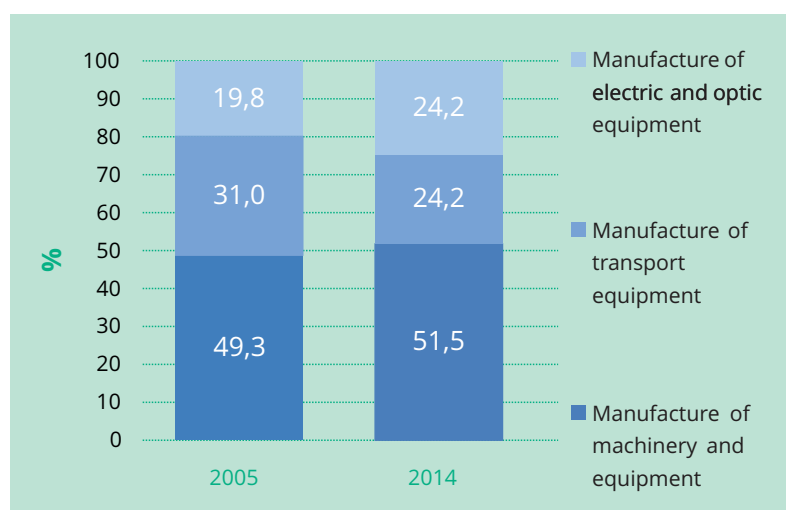
Source: Eurostat, 2015.

Table 2. Main indicators of the machine industry in the V4 countries

	Czech Republic		Hungary		Poland		Slovakia	
	2005	2013	2005	2013	2005	2013	2005	2013
Industry value added, % of GDP	32.3	41.0	36.5	37.9	14.6	n/a	30.1	45.2
Machine building value added, % of GDP	8.0	9.8	7.7	8.5	3.5	n/a	5.1	6.5
Machine building value added, % of industry	28.5	35.1	34.8	38.5	16.0	n/a	19.6	28.6
Employment in machine building sector, % of industry	27.9	32.1	29.6	34.3	19.4	17.8	23.9	29.3
Export of machine building sector % of total export of all commodities	51.2	55.0	62.0	53.0	39.6	38.4	44.9	57.9

Source: National Statistical Committee of the Republic of Belarus (<http://belstat.gov.by/>)

Figure 5. Machinery output structure in Belarus, 2005 and 2014, %



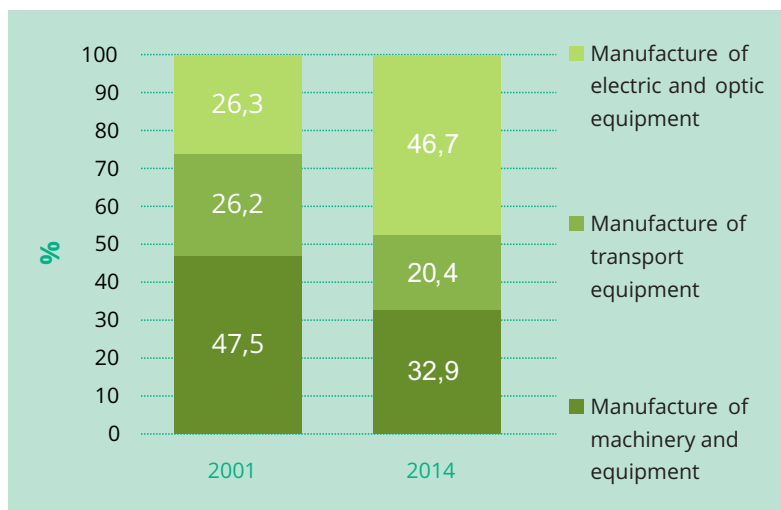
Belarus, Ukraine, and Moldova become more evident when comparing to the Visegrad group of countries (V4, Czech Republic, Hungary, Poland, and Slovakia). The V4 countries undergone deep institutional and structural industrial changes in 90s and 2000s and became regional leaders in car manufacturing³. Table 2 allows drawing three important conclusions from V4 example to be used as a benchmark for post-communist industrial development: i) there is positive development dynamics in all components of machine building sector as well as industrial growth since 2005; ii) there is no divergence between the output, employment, and investment share of the sector; and iii) machinery is highly export oriented in the V4 countries with high export value (export value relative to GDP significantly exceeds gross output relative to GDP).

As the result of government support programs, machinery structure in Belarus has remained almost unchanged. Today, the production of machinery and equipment remain the core of the machine building sector

⁵ See Naurodski, S. (editor), Benc, V., Lacny, V., Lafiuk, I., Valetka, U. (2016) Machine Industry Report: Comparative Analysis of Machine Building Industry in Belarus, Moldova, and Ukraine. Hungarian Academy of Sciences / Central European University

Source: State Statistics Service of Ukraine (<http://www.ukrstat.gov.ua/>)

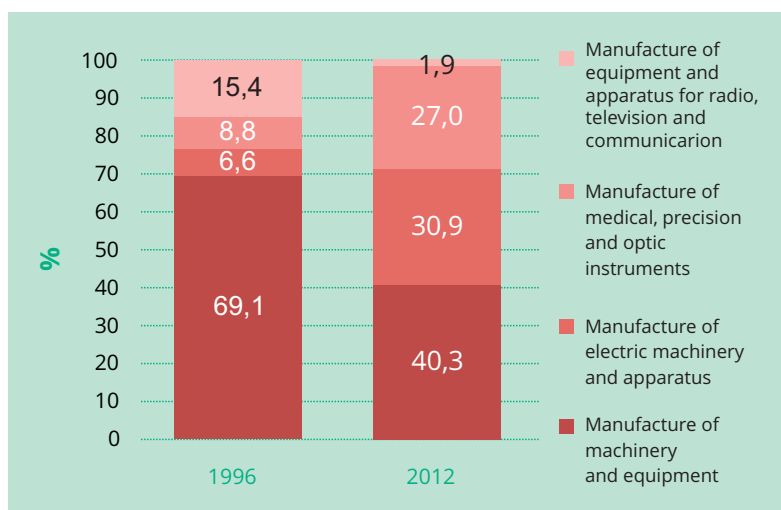
Figure 6. Machinery output structure in Ukraine, 2001 and 2014, %



in Belarus, producing more than half of the sector's total output (Figure 5). Manufacture of transport vehicle equipment dropped from a 31% share in the sector in 2005 to 24.2% in 2014. Output of electrical and optical equipment climbed to a 24.2% share of machinery output in 2014. Some of Belarus machine-building companies were close to restore levels of production of Soviet times in 2000s, mostly thanks to administrative

Source: National Bureau of Statistics of the Republic of Moldova (<http://www.statistica.md/index.php?!=ru>)

Figure 7. Machinery output structure in Moldova, 1996 and 2012, %



support from the Belarusian government. In most cases, administrative measures taken by the Belarusian government proved most vital for the recovery of production in the 2000s, due to the following reasons: i) the sector has always been one of the major employers in the country, and privatization and restructuring of this industry would have resulted in high social costs; ii) large industrial plants have been huge exporters and sources of foreign currency for the Belarusian economy, making them relatively important for macroeconomic reasons. Subsidized loans from state-owned banks⁴ and direct negotiations between the Belarusian government and the Russian Federation or Russian regions⁵ made it possible for Belarusian machinery giants to expand their presence in the Russian market in 2000s.

Machinery in Ukraine currently seems to find itself in the process of structural and technological adjustment. Problems with internal demand and instability in the external markets have led to a significant decline in machinery production over the last decades⁶. Good times in the 2000s have not led to the modernization of equipment or the introduction of innovations. Sub-sectors seem to lack an incentive to accelerate the transition to the production of higher value added industrial products. During the transformation period the structure of machinery in Ukraine has changed significantly, with the transport equipment subsector producing almost half of all machinery output (Figure 6). Different pace of growth between 2001 and 2008 in some subsectors as compared to others and a post-2009 decline of all three

⁴ The share of directed loans in total loans of commercial banks was 60% on average from Q2 2009 to Q3 2011 (See Akulich.U., Naurodski.S., Valetka.U. 2015. Labour and Capital Market in Belarus: equal status for long-run growth. CASE Belarus Policy Papers, February 2015 (accessed at http://case-belarus.eu/wp-content/uploads/2015/04/FINAL-Belarus-Capital-and-LM_2015.pdf)

⁵ For instance, in 2011-2012 Russia's biggest bank "Sberbank" issued over \$600m in subsidized loans to Russian regions to finance the procurement of Belarusian machinery items after the Belarusian and Russian governments agreed on a corresponding deal (see <http://www.belta.by/economics/view/sberbank-rf-igotno-prokreditoval-postavki-belorusskoj-tehniki-v-rossiju-na-summu-svy-she-600-mln.-97375-2012>)

⁶ InvestUkraine, Deloitte, 2012. Machine building industry/ Industry overview (accessed at http://ccipu.org/ua/industry_analy-sis/machine_building/)

machinery subsectors resulted in relatively better development of the transport equipment manufacturing subsector compared to the subsectors of manufacturing of electrical and optical equipment or machinery and equipment. In terms of output, transport equipment presently dominates in the sector structure, while the subsectors manufacturing of electrical and optical equipment and machinery and equipment saw their relative share of output diminish between 2001 and 2014.

Machine building sector in Moldova has been contributing to a more significant share of industrial production since 2001. Compared with Belarus and Ukraine, the machine building sector contributes far less to GDP, but the sector has experienced a growth in its productivity⁷ and there is an increased focus on the machine building sector as an engine of industrial growth in Moldova. This indicates that the country's machinery has undergone deep structural changes and has managed to attract greenfield investments in the area of machinery components⁸. Deep production decline in 1990s resulted in a transformation in the structure of the machinery sectors, and pushed it towards a more balanced and technology-oriented output structure (Figure 7). The weight of the machinery and equipment subsector dropped from 70% to 40% of total output, while the subsectors manufacturing of medical, precision, and optical instruments and manufacture of electrical machinery and apparatus expanded to about 30% each.

7 As it will be show later in Chapter 2

8 There are currently seven free economic zones and six industrial parks in Moldova. By the end of 2013, total investment into FEZs amounted to roughly \$200m (See Free economic zones: way out for Moldova? BusinessClass No93, 2014 (accessed at http://www.businessclass.md/mema/Svobodnie_ekonomicheskie_zoni_/))

1.2. Institutional triangle of machinery development: companies, local governments, central government.

In order to approach the understanding of institutional changes in machine building industry in Belarus, Ukraine, and Moldova, we propose to use three-sided analysis of the sector as shown in Figure 8.

Such approach is dictated by evidence from other post-communist countries⁹. It assumes that in order to be successful, industrial transformation needs to be led by joint efforts of companies, local governments, and central government. In other words, to succeed in industrial development, companies have to provide flexible response to markets, local authorities have to be able to provide coordinated initiatives, while central government has to provide instant institutional reforms.

As a benchmark we use the Visegrad region countries (Czech Republic, Hungary, Poland and Slovakia) experience. Machinery devel-

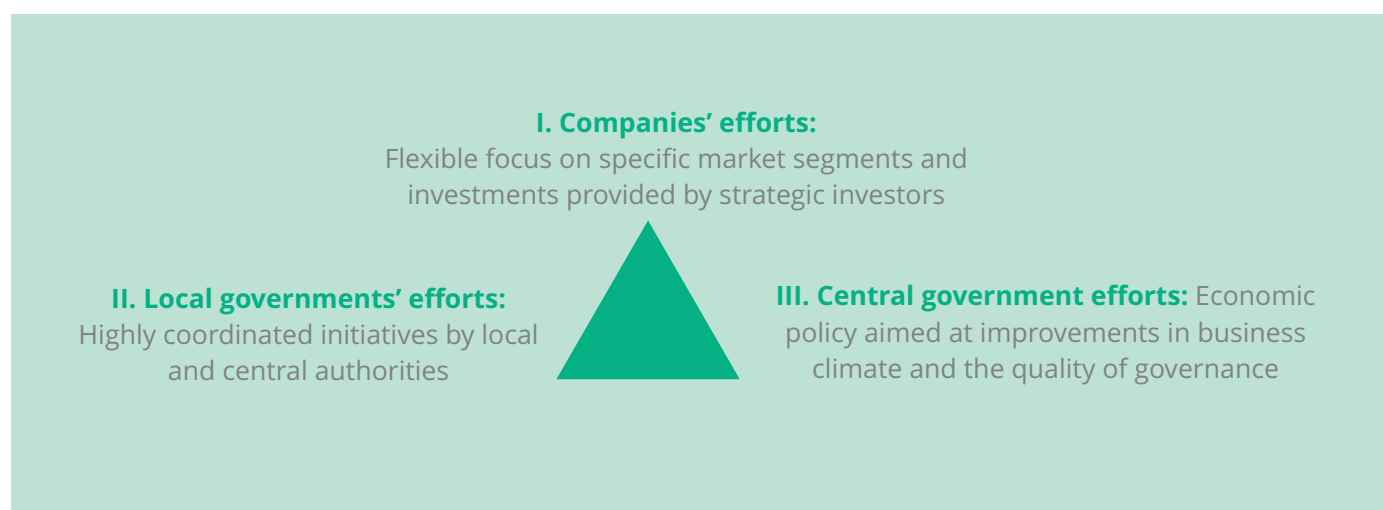
opment in the V4 countries at the company level was driven by a focus on specific market segments and by FDIs provided by strategic investors. Flexible and innovative SMEs in the V4 succeeded thanks to unique and specialized product as well as flexible response to the needs of coming FDIs. Industrial structural changes were accompanied by unprecedented local government initiatives to create or expand industrial zones. At the same time, economic policy transformations at the central government level included improvements in business climate and governance quality, i.e. price liberalization; opening the markets; increased transparency in privatization (regardless of whether it was rapid or gradual); creating an SME friendly business environment; development of the banking sectors; as well as institutional development, including efforts at greater protection of property rights and the elimination of corruption¹⁰.

⁹ See Naurodski et al. 2016.

¹⁰ *ibid.*

Source: authors contribution

Figure 8. Institutional triangle of industrial development



2. Analysis of companies performance in the machine building sector

2.1. Belarus: machinery is highly dependent on Russian market

Causality chain: Based on large and often state-controlled enterprises > quality of products changes slowly > low effectiveness of investment > competitiveness remain dependent on exchange rate > low export diversification

Machine building has been historically one of the sectors of specialization of the Belarusian economy and is quantitatively one of the most important industrial sectors in terms of employment and production. During Soviet times, administrative decisions were taken to place the vital and powerful machine building plants in the territory of what was then the former Soviet Socialist Republic of Belarus. Among the reasons were the qualified labor force and the fairly well-developed road infrastructure. But such decisions had a significant strategic disadvantage for Belarus: production was based on imported raw materials and components from other republics of the Soviet Union. Moreover, the main R&D capacities were located in Russia, which resulted in the fact that a substantial share of research and innovation products were consumed in Russia¹¹. As a result of

this situation the country became a so-called “assembly shop” of Soviet industry. In the Soviet (command and control) economy, demand was guaranteed regardless of the quality of the product offered.

After the collapse of the Soviet Union, the production of many kinds of goods declined significantly due to the fact that the Belarusian machine building sector had specialized in the production of unsophisticated low-price products for the captive Soviet market, and particularly for Russia as the biggest Soviet and post-Soviet market. In 1990, the manufacture of machinery and metallurgical industry sectors accounted for 34.2% of all industrial output. By 1995 their share had dropped to 23.3%¹². Due to the facts that i) Belarus' machine plants had to start performing independent marketing and contractual activities, ii) their products were of insufficient quality because of low-level innovation capacities, and iii) a rapid depreciation of fixed capital in key machine building factories, the share of the sector continued to fall in the 90s.

¹¹ Belarusian model for assembly: Prospects for the development of the assembly shop in Eastern Europe. Quality Certificate - Industrial Magazine (accessed at http://www.znk.by/archiv/04_05/12.html)

¹² Belarus country economic memorandum, 2005

Some of Belarus machine-building companies were close to recover levels of production in 2000s, mostly thanks to administrative support from the Belarusian government. In most cases, administrative measures taken by the Belarusian government proved most vital for the recovery of production in the 2000s, due to the following reasons: i) the sector has always been one of major employers in the country, and the privatization and restructuring of this industry would have resulted in high social costs; ii) large industrial plants have been huge exporters and sources of foreign currency for the Belarusian economy, making them relatively important for macroeconomic reasons. Subsidized loans from state-owned banks¹³ and direct negotiations between the Belarusian government and the Russian Federation or Russian regions¹⁴ made it possible for Belarusian machinery giants to expand their presence in the Russian market¹⁵.

As far as advances in 2000s are concerned, one might point to some improvements in quality (for instance the introduction of international quality certificates, such as the ISO 9001 in the early 2000s), the development of new products (in passenger transportation, for example) and some energy intensity improvements. For example, in the production of heavy trucks energy consumption per unit had dropped to almost a third of the 2005 level by 2014; in tractor manufacturing, it fell by a rate of 1.6. In the macroeconomic measure of toe per thousand of 2000 US\$ PPP, Belarus' energy intensity level is 15–20% below the average of the Post-Soviet states,

13 By 2011 the share of bank loans in the total amount of financing investment in fixed assets in the economy reached 38.8%, with more than 50-65% of these loans being subsidized or favourable (See Akulich et al., 2015)

14 For instance, in 2011–2012 Russia's biggest bank "Sberbank" issued over \$600m in subsidized loans to Russian regions to finance the procurement of Belarusian machinery items after the Belarusian and Russian governments agreed on a corresponding deal (see <http://www.belta.by/economics/view/sberbank-rf-igotno-prokreditoval-postavki-beloruskoj-tehniki-v-rossiju-na-summu-svy-she-600-mln.-97375-2012>)

15 Valetka U., Institutional barriers for industrial restructuring / The Geopolitical Aspects of the Transformation Process in Central and East-Central Europe / ed. by T. Michalski. – Gdynia: Wydawnictwo Bernardinum, 2006. – P. 197-209

though it almost twice as high as the OECD average¹⁶.

Today, Belarus' machine building sector finds itself in a very difficult position and requires new reforms. Critical dependence on Russia on account of the high share of imported components and fossil fuels, as well as the high share of exports going to Russia reflects general structural problems of the Belarusian machine building sector and the absence of deeper institutional reforms over the last 25 years. Key directions of reforms in Belarus machine building seem to be an increasing role of small and micro size companies (SMC) along with restructuring of large state-owned enterprises (SOE).

Small and micro machine manufacturers need more favorable conditions including better access to internal investment financing sources, access to international capital, as well as inclusion in the alternative to Russian supply chains at regional and international level. Data from the Table 3 illustrates the scale of the problem. The proportion of the number of SMC in the machine building industry in 2015 was 85%, while their share in production volume was only 16%. Large companies still dominate the market despite the fact that there is a positive trend in this direction in Belarus over the last 5 years as the share of SMC increased by 6 percentage points and sector average employment per company dropped from 158 to 98 employees.

Domination of large engineering companies including SOEs lead to situation when the quality and competitiveness of machinery goods changes slowly leading to poor financial result of the sector. Return on sales dropped substantially in all the machinery subsectors (see Table 3). Net income in the sector has been decreasing for the four consecutive years with the net loss records over the last two years. Contribution of machine building industry to the total net income in the economy was negative as much as -4.7%

16 Belarusian web portal on energy efficiency (accessed at <http://ee.energybel.by/en/industry/>)

Table 3. Main indicators of the machine building companies in Belarus, 2015

Subsector	Manufacturing of machinery and equipment		Manufacturing of electrical and optical equipment		Manufacturing of transport equipment	
	2011	2015	2011	2015	2011	2015
Indicator						
Number of companies	962	1122	1031	1084	115	139
Share of small and micro companies, % of total number of companies	81.8	83.5	90.4	89.9	52.5	64.0
Share of small and micro companies, % of production	13.2	24.8	23.8	26.7	1.6	5.8
Average number of employed per company	149	110	70	54	551	336
Return on sales, %	12.2	-7.6	11.5	3.5	21.5	-5.1
Share of production in total industrial output, %	7.9	6.7	3.5	3.6	4.5	3.0
Share of employment in total industrial employment, %	13.5	13.4	6.7	6.3	6.0	5.1
Share of export in total industrial export, %	12.2	13.9	4.9	5.6	11.5	4.9

in 2014 and -15.2% in 2015. The ratio of value added to investments¹⁷ for Belarusian machinery companies for 2011–2014 (Figure 9) indicates falling effectiveness of investments into the sector over the last years.

Slow quality improvement makes Belarus machinery export competitiveness highly dependent on the exchange rate of the national currency (Figure 10). In 2014, after Russia joined the WTO and the Russian ruble was devalued substantially due to fall in oil prices, Belarusian machinery output dropped by 16.5% in the same year and 15.4% in 2015.

In 2015, the contribution of machine building industry to total exports of goods and services fell to 9.9% or the lowest level ever. For

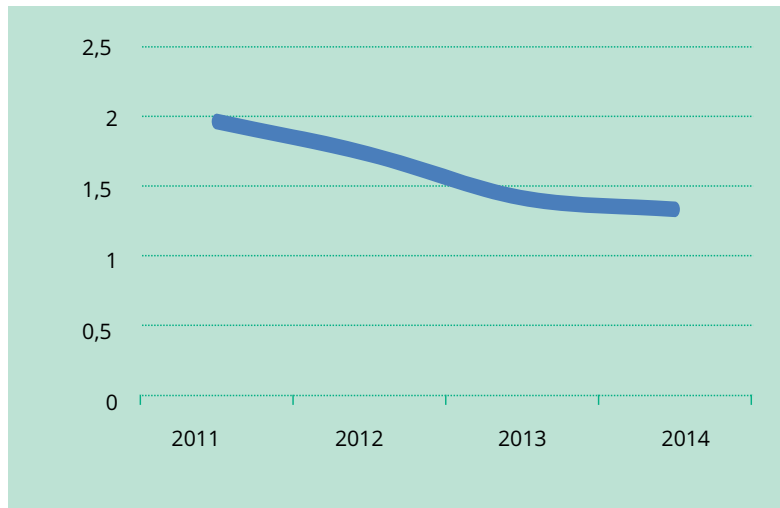
¹⁷ The ratio shows how much value added (as a share of machinery value added to GDP) produces 1% of investments into machinery (as a share of total investment in the economy). In other words, $R = MVA / MI$, where MVA is machinery value added (% to GDP), and MI is machinery investments (% to total investments)

comparison, in 2011-2013 the average value of this contribution was equal to 13.6%.

Belarus has maintained the lowest level of export diversification as compared to Ukraine and Moldova. Table 4 presents changes in the levels export diversification over the last 15 years. It has changed only slightly in Belarus: in 1998, 86.4% of commodities produced by the machine building sector were sold in the CIS market, while 76.4% were exported to Russia. By 2013, export to the CIS market had increased to 90.6%, while during the same period the importance of the Russian market decreased by 3 p.p. (73.4%). In 1998, Moldova had the low level of export diversification (77.2% of its exports went to the CIS market). Nonetheless, by 2013 year this number has dropped significant to 27.5%. The data indicate that Moldova's dependence on the Russian market has been relatively low (from 32.8% in 1998 to 21.3% in

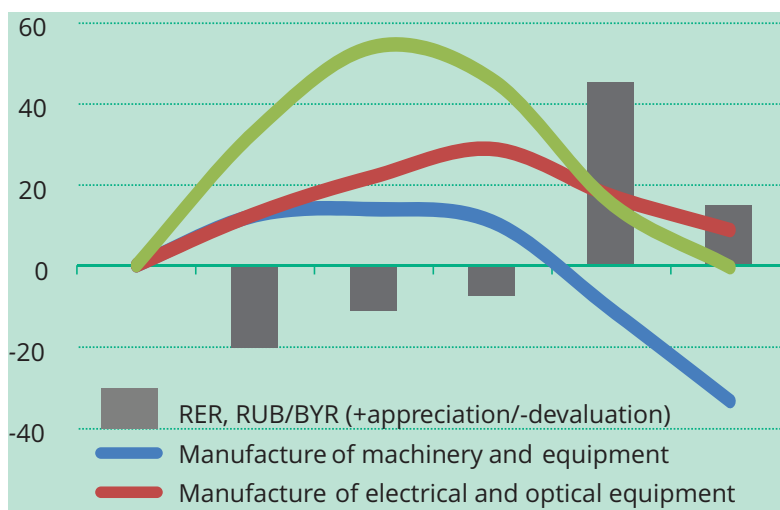
Source: Own calculations based on Belarusian Statistical Committee data

Figure 9. Value added to investment ratio in Belarus machinery industry, 2011–2014



Source: Own calculations based on Belarusian Statistical Committee and National Bank of Belarus data

Figure 10. Output growth and exchange rate change, % to 2010, 2011–2015



2013). In Ukraine, the level of diversification of its machinery exports to the CIS has slightly increased (61.2% to 62.8%), while dependence on the Russian market has increased by 8 p.p. (43.9% to 51.9%) since 1998.

According to Moody's report, Belarus, Ukraine, and Moldova are massively dependent on Russia as a result of a combination of factors, to wit export dependence, FDI dependence, and dependence on remittances. The risk map (Table 5) shows that Belarus' high level of dependence on Russia is explained by the huge values of its export going to Russia, while in the case of Moldova the high level of dependence on Russia is mostly explained by the high value of remittances. For Ukraine, it is explained by a combination of these factors.

Excessive employment and the wage burden also constitute significant problems and contribute to low competitiveness of the machinery sector in Belarus. Substantial pie of the machinery output is produced by large state-owned enterprises (SOEs), which enjoy privileged access to low-cost financing from state subsidy programs, often at a level of interest that is lower than inflation. Combined with administrative wage targeting at SOEs, this increases the share of labor in machinery products and contributes to its lacking export competitiveness. This is especially true in case of the transport equipment subsector (Figure 11).

To summarize, there is currently significant need for restructuring the machine building sector in Belarus and increasing the role of small and micro engineering producers. Large and often state controlled companies produce most of the machinery output, with poor competitiveness of machinery products in terms of quality and prices, both domes-

Table 4. Machinery export diversification in Belarus, Moldova, and Ukraine, 1998 and 2013

(HS Code)	Russian Federation		CIS + Ukraine+ Turkmenistan	World	
Machine building sector	1998	Belarus	76.4	86.4	100
		Ukraine	43.9	61.2	100
		Moldova	32.8	77.2	100
	2013	Belarus	73.4	90.6	100
		Ukraine	51.9	62.8	100
		Moldova	21.3	27.5	100

Source: UN Comtrade Database (<http://comtrade.un.org/>)

Table 5. Risk map of dependence on Russia

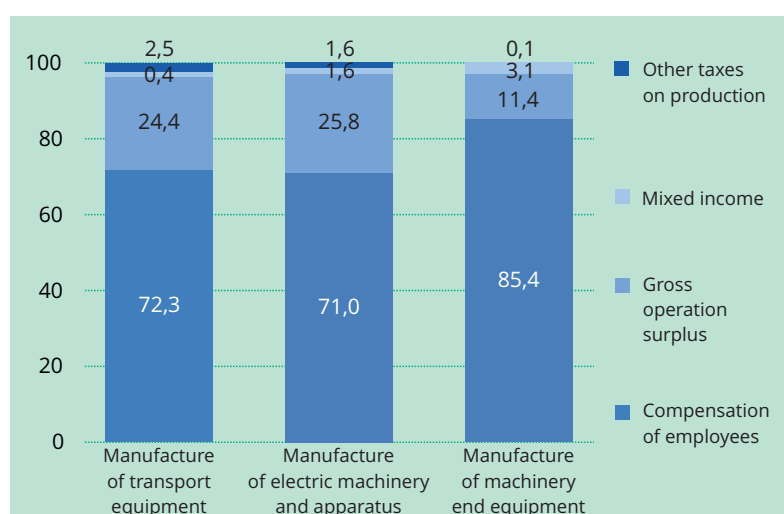
Country	Degree of dependence on Russia	Export to GDP (2013),%	FDI to GDP (2013),%	Remittances (2013) to GDP, %
Belarus	25.2	23.5	1.2	0.6
Ukraine	10.6	8.4	0.3	1.9
Moldova	24.5	7.9	0.5	16.0

Source: Moody's (<https://www.moody.com/>)

	more than 10% GDP
	5—10% GDP
	less than 5% GDP

Source: Belarusian Statistical Committee (<http://belstat.gov.by/>)

Figure 11. Added value of the machine building sector in Belarus by source of income, 2013, %



tically and abroad. Along with ineffective investment, excessive employment and export dependence on Russia this results in sinking output, bad financial results in the situation of slow demand in the Russian market and a devaluation of Russian ruble. Dramatic results in 2015 may be continued beyond if no reforms are taken to change the status-quo.

2.2. Ukraine: machine products are of low competitive advantage

Causality chain: Dependent on cheap domestic raw materials located in Eastern Ukraine / often vertically integrated > ownership issues and low corporate governance quality > unwillingness to reinvest profits > capital and technology deficit > low productivity (two-thirds of the national average) > low domestic and international competitiveness

The Soviet Union left an impressive legacy for Ukraine, but in the 1990s machinery experienced a significant slump. During Soviet times, Ukraine was one of the key producers of energy and metallurgy equipment, machine tools, agricultural equipment, and railway cars in the USSR. In some of the sub-sectors, like specialized types of combines and rotor excavators, Ukraine retained a monopoly in the market. Ukraine's comparative advantage was the presence of significant natural resources (iron ore) for machinery production¹⁸. The more technologically advanced machinery sectors at that time included rocket industry, space industry, aviation industry, and mechanical engineering. The share of machine building in the output of the Ukrainian SSR in 1990 was below 30%, while its share of industrial employment was 35%¹⁹.

In the 1990s, after the fall of the USSR, economic collapse, problems with the supply of components from other post-Soviet countries, as well as changes in ownership structure pushed Ukraine's machinery into a decade-long slump. Large-scale privatization launched in 1995 triggered a process whereby private investors were competing for buying previously state-held machine production assets at prices significantly below the market. By 1999, the specific situation

of Ukrainian privatization resulted in a push for equity accumulation by investment funds and trusts, but at the same time this led to poor management and a lack of incentives for investments and technological recovery²⁰.

In the 2000s, machine producing companies had been recovering quickly, but the global financial crisis hit the sector severely. Among the key reasons for the recovery were rapidly growing internal demand combined with favorable external conditions that increased demand for Ukrainian exports²¹. For example, the production of agricultural machinery in Ukraine increased significantly because of fast development of the agricultural sector. However, the quality of domestically produced equipment and machines barely improved, while the product range had not changed much²². As a result, there was a significant reduction in manufacturing and machinery production in 2009 because of the global crisis, which led to a collapse in domestic investments in fixed assets. Since then, machinery has been following a new downward trajectory with few signs of recovery.

Today, the most developed sub-industries of the machine building sector in Ukraine are dependent on domestic raw materials and are located in the East of Ukraine in order to reduce the distance between production companies and the supplier of raw materials (mainly, steel)²³. The sub-industries referred to above are railway machine building, heavy machine building and machine building for agriculture.

18 Heavy industry in Ukraine during 20 years of independence. Delo.ua (accessed at <http://delo.ua/ukraine/tjozhelozja-promyshlennost-ukrainy-za-20-let-nezavisimosti-163752/>)

19 According to the 1996 Ukraine Statistical Yearbook

20 Forbes Ukraine. #10 December 2011. Privatization (accessed at <http://forbes.net.ua/magazine/forbes/1332853-privatizaciya>)

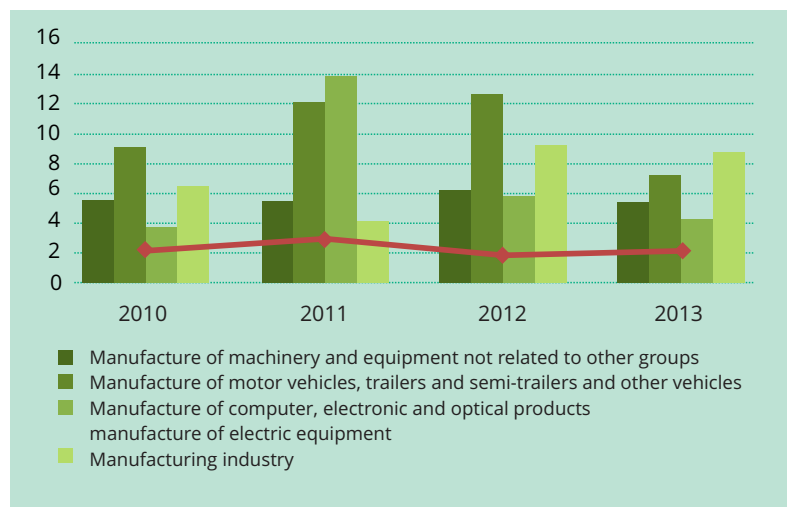
21 See InvestUkraine, Deloitte, 2012

22 ibid.

23 ibid.

Source: State Statistics Service of Ukraine (<http://www.ukrstat.gov.ua/>)

Figure 12. Profitability in the Ukrainian machine building, 2010-2013, %



Evidently, the existence of enormous reserves of raw materials seems to contribute to the conservation of the status quo in machinery structure and discourages a transition to the production of high-tech products. The average depreciation rate of fixed assets is close to 70%, but some sub-industries report even higher numbers²⁴. A considerable part of Ukrainian enterprises still have Soviet era equipment and prevailing technologies, too, is from the same era²⁵. For example, in the “Machine building for agriculture” sub-industry, between 70% and 90% of the domestic machine park of agricultural machinery is fully depreciated or obsolete. As a result, productivity in machine building is only two-thirds of the national average, which is an indication of capital and technology deficits, and also suggests problems with international competitiveness²⁶. Results for 2014 illustrate that machinery overall shrunk by over 20%, while some subsectors (mostly those

24 InvestUkraine, Deloitte, 2012

25 Prime Minister considers discriminatory quota system for Ukraine in the framework of the Association Agreement with EU (accessed at <http://www.rbc.ua/rus/news/premier-rf-schitaet-diskriminatsionnoy-dlya-ukrainy-sistemu-15122014081500>)

26 Saha D., Guicci R., Naumenko D., Kovalchuk A., Ukrainian machine building: strategic options and short term measures in view of trade disruptions with Russia / D. Saha, R. Guicci, D. Naumenko, A. Kovalchuk. – German Advisory Group Institute for Economic Research and Policy Consulting. – 19 p.

oriented towards the Russian market, like railway machine building) have dropped by over 60%.

The financial results of machine-building companies remain in the positive domain and demonstrate that profits have not been reinvested into acquiring new technologies, modern equipment and know-how (Figure 12).

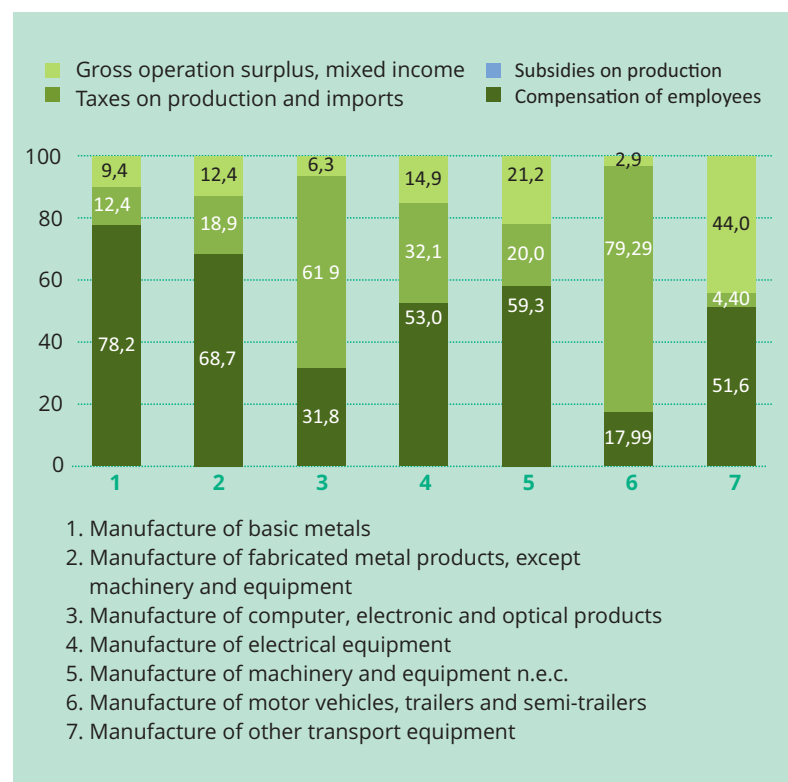
Statistical data on value added calculated by income in Ukraine’s machinery subsectors confirms that companies do generate operational surplus, but its level differs substantially across subsectors (Figure 13). Employee compensation also varies, but, unlike in Belarus, it does not impose a wage burden on the industry. Imported components provide major value added in the case of the manufacture of computers, electronic and optical products, and motor vehicles.

FDI statistics also show that machinery remains relatively underinvested in Ukraine, as it attracts roughly 7% of all industry investment. Compared to metallurgy and manufacturing of fabricated metals, machine building is 5.5 times less likely to receive foreign investment. In terms of the distribution of FDI stocks among manufacturing sectors, machine building ranks only fourth (metallurgy dominates, followed by food, beverages, and tobacco; oil processing, chemicals, rubber, and plastics). This makes Ukraine a special case with respect to the distribution of FDI when compared to the sectoral structure in other Eastern European countries, since Ukraine has attracted comparatively less FDI into export-oriented industries. In particular, the main targets of FDI in Ukraine are not machine building and chemical industry (which are the most important subsectors for instance in Poland and Romania) but metallurgy and food processing. Finally, the high share of FDI in the Ukrainian financial sector means that shareholder loans account for about 14% of the total reported FDI stock²⁷.

27 Kirchner.R., Kravchuk.V., Ries.J. Foreign Direct Investments in Ukraine: Past, Present, and Future. German Advisory Group and Institute for Economic Research and Policy Consulting Policy Paper Series. PP/02/2015. Berlin/Kyiv, June 2015

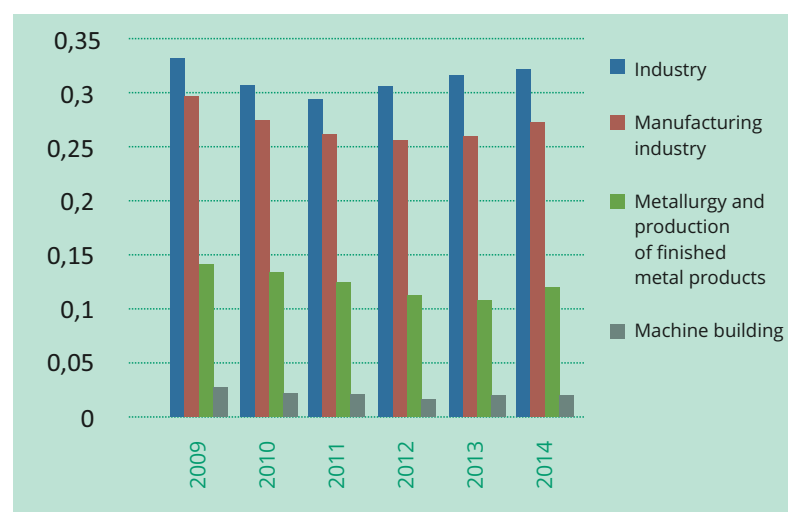
Source: State Statistics Service of Ukraine (<http://www.ukrstat.gov.ua/>)

Figure 13. Added value of machine building sector calculated by source of income in Ukraine, 2013, %



Source: State Statistics Service of Ukraine (<http://www.ukrstat.gov.ua/>)

Figure 14. FDI (paid in capital) in Ukraine, shares in total FDI stock, 2009–2014, %



As a result, the share of machinery in total FDI stock has diminished from 2.8% in 2009 to 2.2% in 2014 (Figure 14).

Along with the cheap raw materials, a possible explanation for underinvestment in machinery may be related to the weak culture of corporate governance in the country's industry, which stems from certain specific aspects of the transition process. Leading market players, often vertically integrated²⁸, are mainly controlled by local business groups / oligarchs, while only a few companies are state-owned²⁹. As Andrey Movchan, the Director of the Economic Policy Program of Carnegie Moscow argues,³⁰ Russian-style corporate development relies on a strategy of "cash-flows" maximization instead of "equity" growth. Even though the shares of some Ukrainian machinery giants such as Kryukiv Car, Stahanov Car, Luhanskteplovoz, Motor Sich are actively traded on the national stock exchange, corporate development may take years and needs stimuli to achieve change. The ratio of value added to investments³¹ for Ukrainian machinery companies (Figure 15) suggests falling long-run trend of sector investment effectiveness since 2001.

Low productivity and the low level of technological advancement make Ukrainian machinery sensitive to energy price increases, which undermines the competitiveness of Ukrainian machinery producers. Between 1991-1995 Ukraine's economy energy intensity grew by 30%, then stabilized in the period 1995-1999, while between 2000–2005 energy intensity dropped by 40%³². As of 2012, it is about 45% more energy efficient than it was in 1990, based on IEA open source data. The existing

28 See, for instance, Nusinov V. Y., Kolesnikov D. V. Vertically Integrated Structures: Essence and Specific Features of Functioning in the Mining and Smelting Complex of Ukraine. Business-inform, No10, 2013, pp.187-193

29 InvestUkraine, Deloitte, 2012

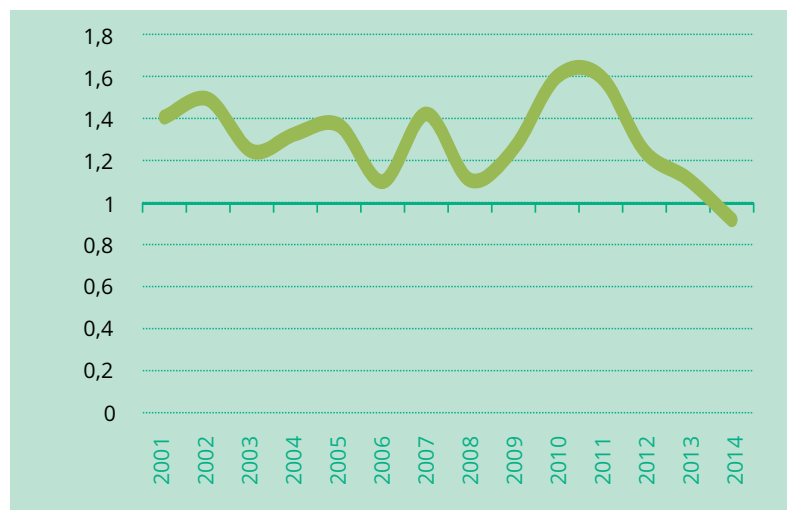
30 For further details see <http://carnegie.ru/commentary/experts/?fa=1057>

31 As in case of Belarus, the ratio shows how much value added (as a share of machinery value added to GDP) produces 1% of investments into machinery (as a share of total investment in the economy). $R = MVA / MI$, where MVA is machinery value added (% to GDP), and MI is machinery investments (% to total investments)

32 Evans M.Murray I., Efficient Policies? Energy Efficient Policy in Ukraine, Russia and Belarus (accessed at http://ocee.org/files/proceedings/2006/data/papers/SS06_Panel8_Paper05.pdf)

Source: Own calculations based on Statistics Service of Ukraine data

Figure 15. Value added to investment ratio in Ukraine machinery industry, 2001–2014



improvements in energy intensity have not resulted from sectoral shifts in the economy but from technological improvements in individual sectors³³. For instance, according to the energy balance of Ukraine, in 2014 energy consumption in industry fell by 60% as compared to 2007, while energy consumption in the machine building sector fell by a factor of 2,1 in the same period³⁴. However, there is a need for further reductions in energy intensiveness in the various sectors of industry, including machinery, in order to be competitive in domestic and foreign markets. Underinvestment in new technologies and energy-saving contribute to the fact that significant segments of the agricultural machines and metallurgy and mining subsectors mainly supplied the domestic market³⁵.

Trade liberalization has led to increased competition in the Ukrainian internal market and has also laid bare the low international competitiveness of Ukrainian products. Following the country's WTO accession in 2008, import duties on Ukrainian products, including machinery products, were reduced by the mem-

33 *ibid.*

34 In thousands tons of oil equivalent

35 InvestUkraine, Deloitte, 2012

ber countries of the WTO to the level extended to most favorable nations (MFN). However, the expected export boom has not happened yet³⁶. Apparently, the Ukrainian foreign trade volume has experienced fast growth over the past decade. Besides, the year of Ukraine's accession to the WTO coincided with the global crisis, which was followed by a domestic political and economic crisis in 2014–2015.

Despite the fact that the exports of the Ukrainian machine building sector are more diversified than those of the corresponding Belarusian subsector, the Russian factor is still crucial in Ukraine, too, specially if one accounts for the current situation in Eastern Ukraine and the political tensions with Russia. Before the collapse of the Soviet Union, exports of machinery and equipment from Ukraine to Russia were 2.7 times higher than exports from Belarus. The significance of the Russian market largely stems from the historical economic ties between the two countries. Good knowledge of trade partners, shared production standards, and customized products were assumed to make such long-standing trade relations mutually beneficial, and it is thus sensible for both parties to maintain these ties. At the micro-level of sub-sectors and enterprises, the Russian factor is sometimes crucial. For example, 62% of Ukrainian heavy machine building exports go to Russia. Prior to the Ukrainian-Russian conflict, the Luganskteplovoz company used to sell around 94% of its locomotives to Russia, while less than 1% went to Kazakhstan and roughly 5% to other countries³⁷.

A possible loss of access to the Russian market would hit the sector hard, as export diversification and productivity are low in most subsectors. A relevant calculation suggests that a complete loss of machine building exports to Russia would directly reduce Ukrainian GDP by 1.1% compared to

36 Kolesnikova I. WTO Accession and Economic Development: Experience of Newly Acceded Countries and Implications for Belarus, - 2013 (accessed at http://www.case-research.eu/sites/default/files/WTO%20Accession%20and%20Economic%20Development%20Experience%20of%20Newly%20Acceded%20Countries%20and%20Implications%20for%20Belarus_1.pdf)

37 InvestUkraine, Deloitte, 2012

the baseline of 2012³⁸. Most imports from Ukraine will be readily replaceable by imports from other countries or domestic Russian production, although possibly at higher prices.

Summing up, the key vulnerability factors that apply to Ukraine machine building are relatively low quality of products and outdated equipment and technology, which result from sector underinvestment. Cheap domestic raw materials and a rather weak corporate culture in Ukraine lead to underinvestment and consequently to low domestic and international competitiveness. At the same time high dependence on Russian market will hit the sector hard in the case of escalating of Ukrainian-Russian political conflict over Donbass.

38 Saha D., Guicci R., Naumenko D., Kovalchuk A., Ukrainian machine building: strategic options and short term measures in view of trade disruptions with Russia / D. Saha, R. Guicci, D. Naumenko, A. Kovalchuk. – German Advisory Group Institute for Economic Research and Policy Consulting. – 19 p.

2.3. Moldova: turning into machinery components supplier

Causality chain: Privatization and liberalization of trade > relatively high capital intensity (as compared to BY and UA) > development of tier 2 suppliers³⁹ of fabricated metal products and equipment, as well electrical machinery > better export diversification > increasing share in GDP > however, ownership issues and Transnistria machinery sector unrealized potential

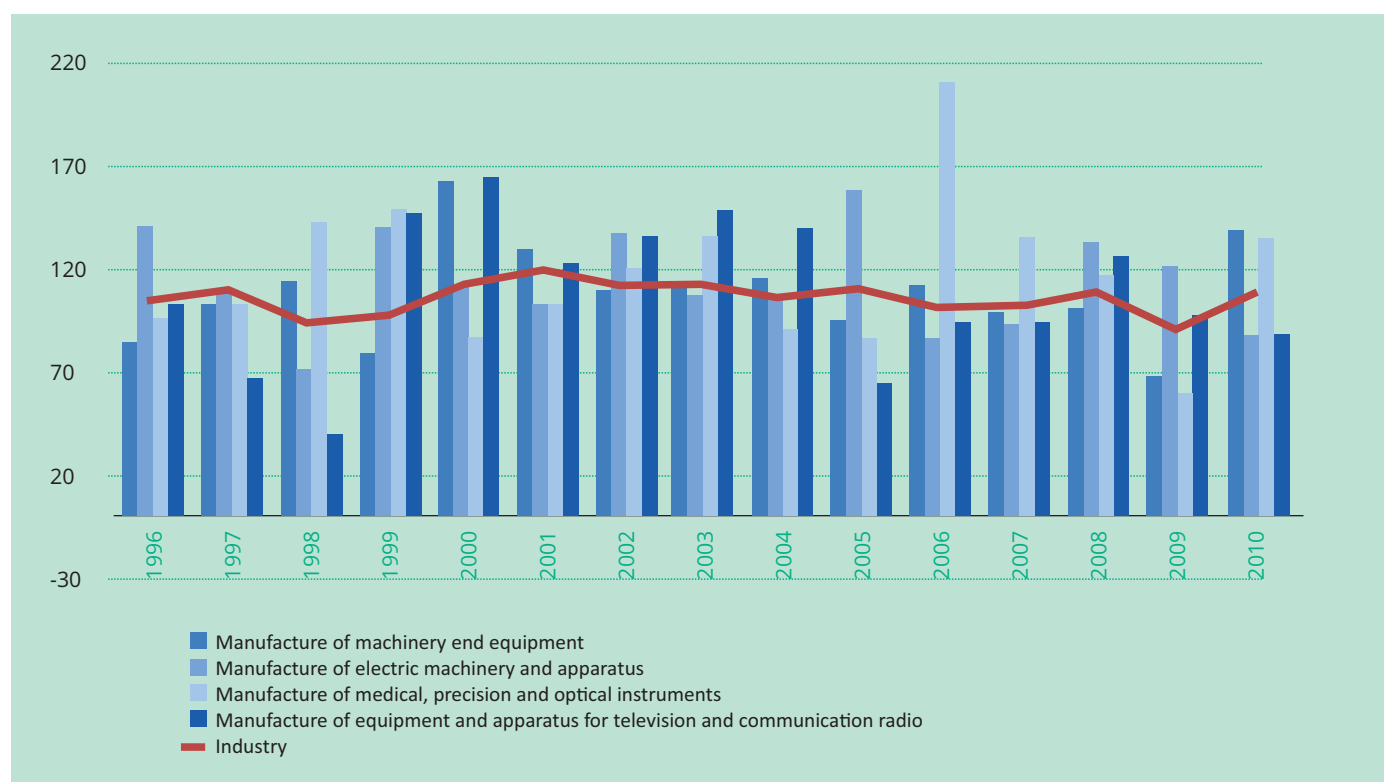
In Moldova, machinery has undergone significant transformation through privatization and changes in its output structure since the country gained independence in 1991. The machine building sector in Moldova had been formed mainly in the 1960-1980s, during the time of the Moldovan Soviet Socialist Republic within the USSR. At the time it was primarily aimed at the development of the subsectors of agricultural machine building, and electronics and precise machine tools (later as a part of Soviet defence industry)⁴⁰. Throughout

39 Tier 2 suppliers are an integral part of the supply chain of the manufacturing industry (originally in auto industry) and sell finished products to tier 1 companies who then make the final accessories and sell them to OEM (Original Equipment Manufacturing) suppliers

40 ОБРЕТЕТ ЛИ МОЛДОВА ПРОМЫШЛЕННОСТЬ? Point.md (accessed at <http://point.md/ru/novosti/ekonomika/obretet-li-moldova-promishlennostj>)

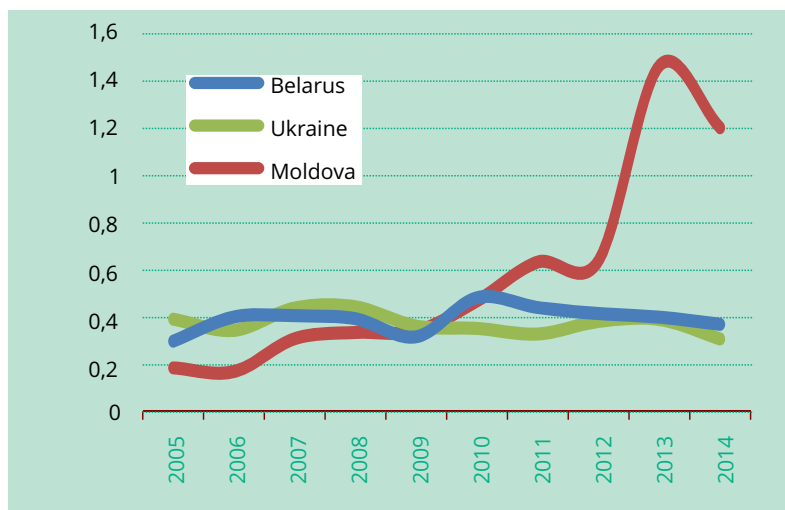
Source: National Bureau of Statistics of the Republic of Moldova (<http://www.statistica.md/index.php?l=ru>)

Figure 16. Productivity growth in Moldova, 1996–2010, (y/y)%



Source: Own calculations based on national statistics offices of Moldova, Belarus, and Ukraine

Figure 17. Machinery investment intensity in Moldova, Belarus, and Ukraine, 2005–2014



the 1990s, after the economic reforms were launched, there was a sharp decrease in Moldovan machinery production. As a result of coupon-based mass privatization, by 2001 93% of the machine building sector's output was produced by non-state enterprises, and 90% of the sector's workers were employed by private companies. Those numbers were higher than the average industry figures at that time, indicating the authorities' direct or indirect willingness to reform the sector. After privatization, the machine building sector registered only limited investment, which – with few exceptions – led to a decline in the competitiveness of the sector. Some of the companies in the sector switched from producing parts for military equipment and parts for industrial giants in Russia to manufacturing household goods. Many companies went through bankruptcy procedures, stopped producing, and rented out their assets to private companies.

Since 2001, machine building has achieved a more significant share of Moldovan industrial production, and there is an increased focus on the machine building sector as the engine of industrial development in Moldova. Pro-

ductivity growth in various machine building subsectors has exceeded the industry average in the 2000s (Figure 16). Figure 15 also depicts the negative impact of the 2008-2009 global financial crisis on Moldovan industry and machinery specifically. Industry productivity fell by 10% in 2009, while productivity in the manufacture of medical, precision, and optical instruments subsector fell by 40%.

Currently the crucial difference between Moldovan, Belarusian, and Ukrainian patterns of industrial development lies in relatively higher investment intensity in Moldova, which goes a long way towards explaining growth in Moldovan machinery output and exports in post-financial crisis period. The data illustrates different trends in machinery investment intensity⁴¹ between 2005 and 2014 (Figure 17). There is the downward trend of machinery investments intensity in Belarus, a rather unstable trend in the volumen of investments going into the machine building sector in Ukraine, and a clear upward trend in Moldova machinery investment intensity.

By 2001 Moldova almost fully opened up its economy to foreign trade, however, it advanced the process of small scale privatization and price liberalization by late 2000s⁴². This was in contrast to reforms in Ukraine, which started with advanced price liberalization as well as small scale privatization, while trade reform advanced in late 2000s. Since 2004, when Moldova joined the European Neighborhood Policy (ENP) and signed the Moldova-EU action plan in 2005, there has been a growing interest by European investors in Moldovan industry. After the EU – Moldova Association Agreement, including the Deep and Comprehensive Free Trade Area (DCFTA), was signed in 2014, Moldova became attractive for 2nd tier and 3rd tier suppliers of automotive components⁴³. Western companies show increasing interest in the production of components, and also in

41 Investment intensity was measured as ratio of machinery investment (% to industry) to machinery employment (% to industry)

42 See chapter 4

43 Introduction to the Automotive Sector, Republic of Moldova/ Invest in Moldova

outsourcing component production, assemblies, and machines, which indicates that the country is turning into a component supplier for both Western and Eastern markets. This is also apparent in the growing importance of machinery in both industry and manufacturing in Moldova since 2010. Labor intensive production sites are attractive for foreign investment, as Moldova offers the most competitive labor costs in Europe, in competition with Ukraine⁴⁴.

Previous empirical studies have shown that in the manufacturing sectors of the economy, firms with foreign capital perform better in the region than domestic companies⁴⁵. In Moldova foreign investments were directed into the financial, wholesale and retail, manufacturing industry, energy, transport, and communication sectors. FDI intensity has contributed to changes in the structure of the Moldovan economy⁴⁶. According to data provided by the National Bank of Moldova, as of mid-2015 manufacturing industry accounted for 22.3% of FDI stock in Moldova. The top five investing countries (not counting investments in the financial sector) are Russia, the Netherlands, Italy, the US, and Cyprus. WTO accession had a positive impact on FDI flows. Statistical data on foreign direct investment shows significant growth: FDI increased seven-fold between 2002 and 2008⁴⁷.

FDI plays a different role in the development of the machinery sector of Moldova, Belarus, and Ukraine. Integration into multinational value chains, which leads to higher investment intensity and improved modernization processes, only seems to be prominently present in Moldova, it is less frequent in

Ukraine and Belarus. One of the drivers of growth came from the major investments of global automotive components producers in 2006, 2007 and 2010. Reinvestments have become an important source of innovation. According to the Moldovan Statistical Office, investments in fixed assets are relatively high in the manufacture of electrical machinery and apparatus subsector, where foreign investors tend to be very active. This resulted in sharp growth in the export figures of the electrical machinery and apparatus manufacturing subsectors, which jumped from 53.1 m USD in 2006 to 315.9 m USD in 2012. FDI in Moldova appears to force changes in the ownership structure of Moldovan industry and mitigates the impact of the Russian factor, since Russian business controls several strategic enterprises in the metallurgy and machine building subsectors [11]. The share of active Russian business is decreasing, especially since the signing of the Association Agreement between the EU and Moldova in 2014. Apart from the electrical machinery and apparatus subsector, machine building subsector also registers increasing investments and outsourcing opportunities from EU companies. Free economic zones (FEZs) and industrial parks have emerged as one of the instruments in attracting investment to Moldova. There are currently seven free economic zones and six industrial parks in Moldova. By the end of 2013, total machinery investment into FEZs amounted to roughly \$200m while they employ about 7,000 people in total⁴⁸. Since 2010, industrial parks have been actively developing as instruments of export and industrial potential promotion. Nevertheless, thus far industrial parks have registered less investment activity by international companies than FEZs.

Export data confirms that ownership changes in the machinery sector in Moldova in the 1990s paved the way for the subsequent expansion of exports and its diversification. There are clearly two different trends in machinery export development: stagnation in

44 *ibid.*

45 See for instance: a) Tytell I., Yudaeva K., 2006. The Role of FDI in Eastern Europe and New Independent States: New Channels for the Spillover Effect, Development Working Papers 217, Centro Studi Luca d'Agliano, University of Milano; b) Akulova M., Vakhitova G., 2010. The Impact of FDI On Firm's Performance Across Sectors: Evidence From Ukraine. BERO Working Papers No 10, June 2010; c) Djankov S., Hoekman B., 2000. Foreign Investment and Productivity Growth in Czech Enterprises. World Bank Economic Review 14, 49-64.

46 Popa A., Foreign direct investment in economy of Republic of Moldova and perspectives for their grow in the framework of neighboring with EU. Epert Grup publication (accessed at www.expert-grup.org/.../717_b5d57491d1e...)

47 See Kolesnikova I., 2013

48 Free economic zones: way out for Moldova? BusinessClass No93, 2014 (accessed at http://www.businessclass.md/mema/Svobodnie_ekonomicheskie_zoni/)

1990s and early 2000s, and fast growth since 2003. The new ownership structure and the promotion of free economic zones allowed for especially rapid growth in 2008 (63%)⁴⁹. Poor external conditions interrupted growth in 2009, but the slump was followed by even faster growth in 2011 (74%). Despite the global crisis of 2008–2009, the share of Moldovan machinery in total exports kept increasing over that period, indicating that machinery products enjoyed a relatively strong position among all export items. WTO accession in 2001 also contributed to the growth of Moldovan exports. Moldova joined the WTO on the terms that apply to a developed country, with a transitional period of just four years. To do that, the Moldovan government almost fully opened the country's market. In addition, Moldova joined most of the optional sectoral initiatives, with the exception of the initiatives relating to alcohol. Joining the WTO led to an increasing import dependence of the Moldovan economy, but over the years of WTO membership total foreign trade has grown five-fold⁵⁰.

Moldova has made significant improvements in machinery export diversification. Back in 1998, Moldova used to have a low level of export diversification (77.2% of its exports went to the CIS market). By 2013, CIS dependence has dropped to 27.5%. The country dependence on the Russian market, specifically, is also relatively low: 21.3% of Moldovan machine building exports were sold to Russia in 2013 (down from 32.8% in 1998).

However, the role of the Russian factor in Moldova merits a discussion in the context of the ownership question. Russian or Russia-related businesses own substantial stakes in enterprises in the metallurgy and machine building sectors on the both sides of the Dniester River, with an especially major impact on the left side of the river⁵¹. Russia tops the list of countries that have FDI stock in Moldo-

va, and Russians are also the top investors within each sector of the economy except for banking. The total stock of Russian investment exceeds 200m USD⁵². Nevertheless, the share of CIS countries in the stock of FDI in equity capital drops to 11.2%, far behind the EU countries' 52.1% share⁵³. Earlier acquisitions of privatized Moldovan state enterprise by Russian investors resulted in limited technology transfer and know-how for specific industrial companies. Some companies went bankrupt and others are struggling to survive by investing their own capital into modernizing their business, and are looking for market diversification. In recent years, ca. 35% of the exports of Moldova's troubled Eastern regions – the Transnistria region – were oriented towards EU, while 40% went to Moldova and 15% to the Russian Federation⁵⁴.

Summing up, the machine building sector in Moldova has been contributing a more significant share of industrial production since 2001. Compared with Belarus and Ukraine, the machine building sector contributes far less to GDP, but the sector has experienced a surge in its investment intensity and productivity and there is an increased focus on the machine building sector as an engine of industrial growth in Moldova. This indicates that the country's machinery has undergone deep structural changes and has managed to attract greenfield investments in the area of machinery components. Apparently, liberalization of trade and prices, combined with the benefits of the country's geographical location may attract new investments into the sector, which will serve to enhance machinery development and may turn the country into an important regional machinery components supplier.

49 *ibid.*

50 Kolesnikova I., 2013

51 Russia's claims prove to be true to Moldova: Moldova week (accessed at <http://www.moldova.org/pretenzii-rossii-k-moldavii-okazalis-obosnovannimi-moldaviya-za-nedelyu-3996-rus/>)

52 POZIȚIA INVESTIȚIONALĂ INTERNAȚIONALĂ A REPUBLICII MOLDOVA LA 30.06.2015. National Bank of Moldova (accessed at http://www.bnm.org/files/attachments/na_pii_0.pdf)

53 *ibid.*

54 Official website of Chamber of Commerce and Industry of Pridnestrovie (<http://tiraspol.ru/en/news/vitse-prezident-tpp-pmr-yuriy-ganin-i-posol-velikobritanii-v-rm-fil-batson-obsudili-problemyi-vneshney-torgovli/>)

3. Local government initiatives as the industrial growth enhancer

A critical element of industrial reform process seems to be the enhancement of local support of changes and the empowerment of local initiatives towards a sound business environment in which firms start, invest, and expand. Creating these conditions requires far-reaching administrative reforms to provide more opportunities for local governments and improve governance more broadly. Governance decentralization is the key component of these processes. It brings government nearer to the investors, creates conditions for increasing its efficiency as well as it provides more choices of development paths at the local level. Decentralization issues receive poor attention in Belarus, Moldova, and Ukraine. Little research finding is available on local governments and decentralization reform in those countries, while none of the studies is concerned about relationship between the industrial reform and local governance development.

When talking about decentralization, we primarily refer to fiscal decentralization — the amount and modality of local level financing, particularly the degree to which the local authorities dispose of local revenues of their own and to which they depend on central government cash-flows⁵⁵. Beside finances, we keep in mind also legislation endowing local authorities with necessary competencies, availability of a qualified and motivated personnel, as well as organizational capacities

to compete for foreign investments at the regional, national, and international level.

Poor progress of administrative reforms towards financial decentralization seems to discourage local investment initiatives currently in Belarus, Ukraine, and until recently in Moldova. This can be explained by four reasons: i) absence of optimal administrative-territorial organization; ii) low level of local revenues and equalization rules of intergovernmental transfers; iii) poor optimization of local expenditures for provision of public services at the local level; iv) weak public investment management related to infrastructure projects.

After series of attempts of reforms, optimal administrative-territorial organization is not achieved yet in all the three countries and creates inefficiencies in public expenditures at the local level. According to the World Bank calculations, rationalizing the territorial administrative structure could yield savings that could be used for much-needed improvements in public services at the local level⁵⁶. As it comes out of Table 6, Belarus seems to have the most consolidated territorial administrative structure, as average number of country citizens per bottom tier jurisdictions is almost twice higher in Belarus compared to Ukraine and Moldova. In Belarus, major administrative changes took place in 2013 and

55 As of Baldersheim, et al., 1996

56 The World Bank, 2014. Moldova Public Expenditure Review. Reforming Local Public Finance for More Efficient, Equitable, and Fiscally Sustainable Subnational Spending, Report No. 87268-MD.

effected in consolidation of the bottom tier jurisdictions. The consolidation was targeted to optimize number of state service employees and to lower wage burden for central and local budgets⁵⁷. In the result, the number of bottom tier jurisdictions was contracted from 1346 to 1163⁵⁸. A significant reform of territorial administrative structure in Ukraine has been initiated in 2014⁵⁹ and continued in 2015–2016. According to the Concept of the reform, it is proposed to reduce number raions to about 100 (down from 490 currently) and consolidate bottom tier units to total number of 1500 jurisdictions (down from 11.5 thousands). As of late 2016, the process of bottom tier units volunteer consolidation has been in place while the revenues of newly created larger administrations have increased significantly⁶⁰. In Moldova, the administrative reform resulting in a new division of competences and resources took place in 1998–1999, but it was later reversed in 2001–2003 by the newly elected Communist party with significant reductions in local autonomy. However, the National Decentralization Strategy was approved by Law in 2012–2013 “to ensure the financial autonomy of local public authorities, maximizing the efficiency and equity in allocation of resources while maintaining fiscal discipline”. The reform doesn’t aim at the consolidation of the smallest municipalities, but at least prevents from further fragmentation.

Local revenues and intergovernmental transfer modes need to be further reformed in Belarus, Moldova, and Ukraine in order to reduce political influence over transfer allocations, eliminate disincentives for local governments to raise their own revenues as well as rationalize their expenditures. Among the three countries, Belarus has the most centralized system of setting tax bases, which

are uniformly set by national law. Moldova in 2014 and Ukraine in 2015 abandoned the tax bases as proposed by theory and best practice⁶¹. According to the new system in Moldova, local taxes are assigned from a closed explicit list of taxes, while tax autonomy is granted for setting tax rates (often between maximum and minimum rates). Since 2015 in Ukraine the system of vertical balancing of all local budgets replaced with the system of horizontal fiscal capacity equalization (by the revenue per capita). As for the rates of the current conventional local revenue taxes (property tax and non-tax revenues, see Table 6), there is a room for increase in Moldova (it is currently half of the collections in Ukraine and Czech Republic) and substantial increase in case of Belarus (the conventional local tax rates are lowest in the region).

Despite the tangible progress in recent years in Belarus of its system of intergovernmental fiscal relations, for example, developing a formula-based methodology for the allocation of general-purpose grants, in the current Belarusian framework of general revenue sharing and gap-filling transfers the central government equalizes norm-based needs of local authorities with actual revenues. In such framework actual local revenues significantly in excess of assessed expenditure are transferred to the higher level budget for the purpose of further equalizing transfers⁶². Such practice was discontinued in Moldova and Ukraine, and the reforms introduced systems of special-purpose transfers for delegated and shared functions (primarily education, healthcare, and social protection). For the remaining (own) local functions intergovernmental financing is now coming in the form of general-purpose transfers. The general-purpose transfers are aimed at equalizing dis-

57 As of Presidential Ruling No168 as of 12.04.2013 the number of civil servants was reduced by 25% on average

58 Calculations based on 2009 Census and “Belarus Regions 2016” statistical databases available at www.belstat.gov.by

59 The Concept of Local Government and Administration Reform was approved by Ukrainian Government on April 1, 2014, Ruling No 333

60 For example, in Dnepropetrovsk region 16 larger municipalities have been voluntary created in 2016 and their revenues increased 1.7 times (see <http://decentralization.gov.ua/news/item/id/3458>)

61 See Martinez-Vazquez, J., 2013. “Tax Assignments at the Regional and Local Levels,” in E. Ahmad and G. Brosio (eds.) Handbook on Fiscal Decentralization. Edward Elgar, Cheltenham, U.K.

62 For instance, the City of Minsk has three times more locally-derived revenues per capita than the poorest region, after the allocation of intergovernmental transfers this gap narrows to only 18 percent. The sub-region districts have 8 percent lower levels in locally-derived revenues per capita than the cities’ average, the districts end up with 40 percent more revenue per capita than the cities after the allocation of grants (Eckard, Martinez-Vasquez, Tmofeev, 2014. Efficiency cost of fiscal equalization: the case of Belarus. ICPP Working Paper 14-01).

Sources: National authorities, Eurostat and authors' calculations.

Table 6. Key facts about current level of fiscal decentralization in Belarus, Moldova, Ukraine, and Czech Republic

Descriptive blocks	Belarus	Ukraine	Moldova	V4 example: Czech Republic
Population	9,5 mln (2009)	45.5 mln (2014)	3,6 mln (2012)	10.4 (2011)
Tiers of government	I level: 1 city + 6 regions II level: 128 top tier jurisdictions – (118 raions + 10 cities) III level: 1191 bottom tier jurisdictions (1167 village councils + 10 upper village councils + 14 municipal councils)	I level: 2 cities + 1 AR Crimea ³ + 24 regions II level: 668 top tier jurisdictions (490 raions + 178 cities) III level: 11 520 bottom tier jurisdictions (10279 village councils + 783 upper village councils + 458 municipal councils)	I level: 2 cities + 1 ATU Gagauzia II level: 32 top tier jurisdictions - raions III level: 896 bottom tier jurisdictions	I level: 1 city + 13 regions are top tier jurisdictions II level: 6253 municipalities are bottom tier jurisdictions
Minimal size of bottom tier jurisdictions	< 1000	< 500	< 1000	<500
Yield of conventional sources of local revenue, % of GDP, total (2012), including:	0.2	1.7	0.85	1.6
Property tax revenues, % of GDP	0.1	0.8	0.35	0.4
Non-tax revenues ⁴	0.1	0.9	0.5	1.2
Total outstanding local government debt, % of GDP ⁵	1.4	0.7	0.7	2.5
Per capita local expenditures coefficient of variation	0.18	n/a	0.09	n/a
Median raion population, thousands people	41,7	52.7	75	n/a

parities in locally derived revenue capacities (revenue per capita). In that way the reforms remove the subordination in the financial relations between top and bottom tiers of subnational jurisdictions, set sharing rules for revenues from a tax (PIT, CIT or VAT), and define formulas for the allocation of equalizing general-purpose transfers (on the bases of revenue capacity)⁶³.

The optimization of local expenditures by renouncing the model of bridging fiscal disparities may lead to improvement of public services provision at the local level. Eckard, Martinez-Vasquez, and Timofeev suggest the presence of economies of scale in the main functions of raion governments in Belarus⁶⁴. As evidenced by the World Bank on the example of Moldova, the significant economies of scale (water supply, solid waste disposal or public transportation services) can be achieved due to revised functional organization of services provision at the level of raions⁶⁵. Table 6 shows that the median population of top tier jurisdictions (raions) is different in the three countries, which suggests different approaches to organizational optimization. Organizational cooperation between utilities, the establishment of adequately sized regional utilities could thus, with strong leadership from central government, help reap the benefits of regionalization and improve affordability and equity of access to services⁶⁶. A good example of improvement in the effectiveness of local services is primary and secondary education reform in Moldova. The nationwide system of per student financing was introduced in 2013 while changing the responsibility of schooling from bottom-tier municipalities to raion councils. Through school network optimization, increases in class size and student-teacher ratio, the existing facilities are used more efficiently, freeing

up resources for quality-enhancing inputs⁶⁷.

The sound domestically funded capital investment is one of the key choice factor for industrial investors when choosing investment venue. This brings to the agenda the issue of public investment management quality in Belarus, Moldova, and Ukraine. Currently in those countries local capital spending is mostly funded through cash transfers from the central governments. Such allocation of capital grants to local authorities shows that the current process of direct selection of local capital repairs and investments by the central government (and parliament) lacks transparency and may result in insufficient prioritization. Another problem is the quality of monitoring systems that are criticized for being especially weak for local government projects.

In Eastern European transition economies, such as the Czech Republic, the introduction of local self-government in the 1990s led to excessive fragmentation of local administration. Most of the post-Soviet countries⁶⁸ undertook reforms that abolished the middle level of the Soviet hierarchy (regions or raions) and transferred local services provision to municipalities. Alongside with fiscal decentralization, local governments could localize their needs and revive necessary instruments to foster local development and compete for international investors. Some of the municipalities managed to create more working places than the number of local citizens⁶⁹, others succeeded in attracting investments multiple of their yearly budgets⁷⁰. The calculations show that over 500 thousands new jobs in total were created in V4 countries in special economic zones and industrial parks since 1991.

Moldova and Ukraine have initiated deep

63 For full description of Moldova's decentralization reform see The World Bank, 2014, Report No. 87268-MD. The Ukrainian reform is comprehensively described at the website of the Ministry of Finance of Ukraine (www.minfin.gov.ua) and the devoted website www.decentralization.gov.ua

64 Eckard, Martinez-Vasquez, Timofeev, 2014. Efficiency cost of fiscal equalization: the case of Belarus. ICP Working Paper 14-01

65 The World Bank, 2014. Report No. 87268-MD

66 The World Bank, 2013. Water Sector Regionalization Review.

67 The World Bank, 2014. Report No. 87268-MD.

68 Lithuania in 1995, Czech Republic in 2000, Georgia in 2006, Latvia in 2009 among others

69 For example, Kechnec village in Slovakia has 1053 inhabitants while over 2500 employees are working at Kechnec Industrial Zone

70 For instance, Zarów commune (Poland) expenditure in 2014 was about 13 mln EUR, while total investments into Zarów's area (part of Wałbrzych Special Economic Zone) is over 200 mln EUR

decentralization reforms just recently, while Belarus has all necessary conditions for further local administration reforms. There is a hope that Moldova and Ukraine will be able to spur industrial development at the local level in the coming years. However, it is difficult to assess at the moment how the recent fiscal decentralization reform contributes to inflation of industry investments in general and machine building in particular.

Local/urban development and production site localization

Physical placement of production facilities is a complicated issue in the context of local economies, urban planning and ecology. The problem of abandoned and/or underutilized industrial sites became a common one all over the world, yet it is even more cutting in post-soviet countries. Today, industrial sites constitute up to 50% of territories of some post-soviet cities (compared to 5-6% of the territory of Western cities like London or Paris). Belarus, Moldova and Ukraine have specific features of localization of industrial sites given their common Soviet past. In the Soviet Union massive industrialization took place in 1960-80s when majority of existing industrial enterprises were constructed. Almost all of them were placed in specially designed and developed industrial parks. In total 450 such parks were created in the USSR.

According to the source⁷¹ that provides some data on industrial parks in Belarus, there are 55 of them in the country. They stand for 75% of all industrial production in the country. It should be noted that industrial zones occupy 30% of the territory of Belarusian cities, so if one considers a typical city one-quarter of it will be a large industrial park.

Industrial parks seem to be a huge problem for modern urban planners since industrial

sites are commonly underutilized. A research made by CASE Belarus in 2009 reveals⁷², for example, that in a public urban transit company one bus occupies 700 sq.m. of land and 180 sq.m. of buildings. The same situation is common for the majority of industrial enterprises that never paid the market price for the land they use and, generally speaking, enjoy the privilege of soft budget constraints. Moreover, there are vacant territories within existing industrial parks: they were reserved for future development when parks were designed, or construction of sites could not have been finished because of the collapse of the Soviet Union. In Belarus, 20% of industrial parks territories are vacant.

On the other hand, the abovementioned vacancy of ready-to-use industrial land plots provides great opportunities for greenfield investment. Wide international evidence⁷³ shows that greenfield projects are generally cheaper than brownfields and foreign investors are more willing to invest in them. Typical industrial park is a plain territory over 50 ha provided with perfect irrigation, roads and high-voltage electricity network, often equipped with rail tracks, and divided into quarters. Majority of industrial parks sit outside residential areas. Due to these factors greenfields placed inside the industrial parks are very attractive places for investment.

Local authorities in Belarus, Ukraine and Moldova have rather vast possibilities of brownfields redevelopment. Currently a large chunk of real sector in the above-mentioned countries makes losses and shrinks in terms of output and employment, thus it heavily underutilizes production facilities, first of all land. Yet the majority of SOEs stay unreformed and simply lease their premises and land to numerous emerging private businesses. In Belarus, development prospects of industrial parks are hindered by a lack of specific policy (no information was available to the authors on current situation in indus-

71 От промышленного поселения до технопарка: территориальные объекты промышленной архитектуры / Е.Б. Морозова. – Минск.: БНТУ, 2014.

72 <http://case-belarus.eu/wp-content/uploads/2011/07/Concept-of-privatisation.pdf>

73 The management of brownfields redevelopment. A guidance note. World Bank, 2010.

trial parks in Moldova and Ukraine). It can be argued though that local authorities can play an important role in attracting new investors by transmitting clear message as to the possibilities of localization production facilities in the industrial parks they are in charge of.

It can be concluded that cities in the region have underestimated territorial potential for localization of machinery building production lines either it's a direct investment, or development of greenfields or brownfields. This potential is still to be realized and local authorities seem to be a key player in the process of future reforms.

4. Central government efforts towards machinery transformation: institutional reforms in Belarus, Moldova, and Ukraine

Institutional reforms in Belarus, Moldova, and Ukraine significantly influence industrial performance and explain the differences in machine sector development across the three countries. The different pace of reforms in Belarus, Ukraine, and Moldova since independence in 1991, and the different models these countries have used, have contributed to different structural transformations of their economies, including the underlying industrial specifics. As the EBRD Transition Indicators⁷⁴ (Figure 18) show, Belarus remains the least advanced in all six components of transition reforms. Moldova has fully opened up its economy to foreign trade as the first step, and has almost completed the process of small-scale privatization and price liberalization. Unlike in Moldova, Ukraine has started with price liberalization, later advancing with small-scale privatization and trade reform. However, all three countries show poor performance as for governance and enterprise restructuring and competition policy as those indicators range between low levels of 1.7 and 2-2 for the three countries.

⁷⁴ The measurement scale for the indicators ranges from 1 to 4+, where 1 represents little or no change from a rigid centrally planned economy and 4+ represents the standards of an industrialized market economy (See ebrd.com).

Different approach to institutional reforms resulted in different governmental rulings and support of machinery in the three countries. Belarus uses the widest range of potential instruments, as they take various forms of economic stimuli, subsidies (hidden and explicit), soft budget constraints and preferential lending that benefit companies in the machine building sector directly and indirectly (see Table 7). In Belarus state-owned enterprises all critical aspects of the operations of enterprises, including their choice of factors of production, and the targeted levels of output and distribution, are directly or indirectly affected by governmental policies. As discussed in Chapter 2, this often results in the inefficient allocation of resources and reduces the incentives for companies to introduce new technologies and innovations.

In Ukraine and Moldova, institutional burdens are significantly lower than in Belarus, and their regulation is currently moving towards providing tax initiatives in different forms, including free economic zones. However, institutional reforms in Ukraine and Moldova are far from end and need continuous policy improvement. For instance, poor reforms in

Source: EBRD

Figure 18. EBRD Transition Indicators for Belarus, Moldova, and Ukraine

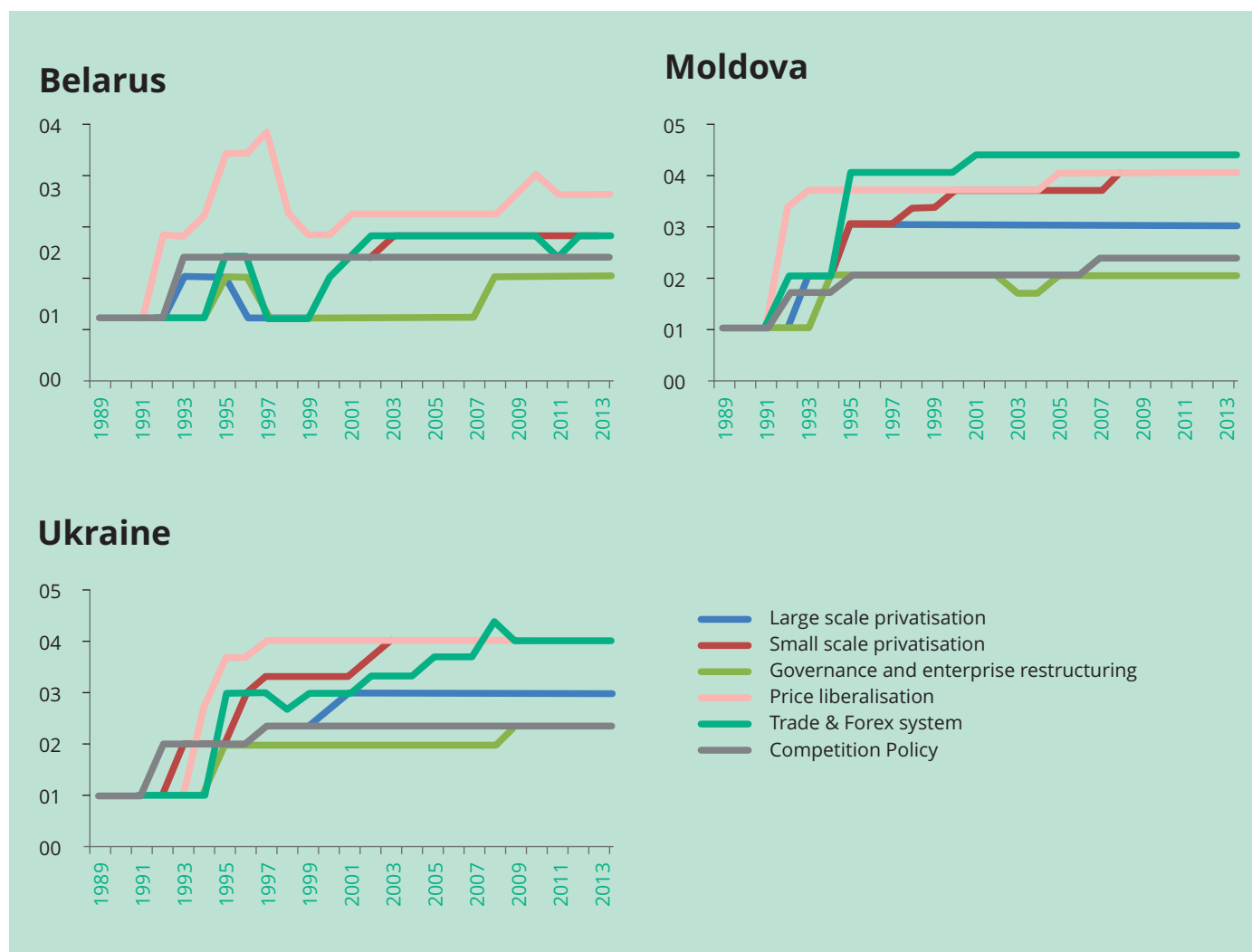


Table 7. Government support instruments in Belarus, Moldova, and Ukraine

Subsidy instruments	Belarus	Ukraine	Moldova
Energy subsidies	<p>YES</p> <p>Assuming that Belarus receives Russian energy subsidies for over two decades, and attains a comparatively high level of energy intensity in machinery, then the machine building sector receives substantial benefits through the underlying Russian subsidies.</p>	<p>NO</p> <p>After the escalation of the geopolitical conflict between the two countries, Russia increased the prices of oil and gas for Ukraine. Today Ukraine receives energy resources from Russia and the EU at global prices.</p>	<p>NO</p> <p>Moldova receives oil and gas from Russia at a price that tracks global prices.</p>

Subsidy instruments	Belarus	Ukraine	Moldova
Export subsidies	<p>YES</p> <p>There are preferential conditions for exporters in Belarus. Due to the fact that most machine building companies are exporters, they have access to export subsidies. Companies can get export credit from banks or loans from the budget. Enterprises also secure themselves against export risks by using government insurance companies. The most important document regulating export support is Presidential Decree № 534 of August 25, 2006 «On the promotion of exports of goods (works, services).»</p>	<p>NO</p> <p>There is no evidence of direct export support for Ukrainian machine building companies.</p>	<p>NO</p> <p>There is no evidence of direct export support for Moldovan machine building companies.</p>
Policy of import substitution	<p>YES</p> <p>Policy of import substitution is widely used by the government in Belarus, including active support of local producers in the machine building sector^{a)}.</p>	<p>YES</p> <p>Import substitution policy is currently used in the agricultural machinery and solar energy (panels) subsectors. But it is rather narrow in practice.</p>	<p>NO</p> <p>There is no evidence of import substitution policies in Moldova.</p>
Protectionist policy	<p>YES</p> <p>Protectionism is commonly used in Belarus^{b)}.</p>	<p>NO</p> <p>There is no evidence of protectionist policy in Ukraine as it is the member of WTO.</p>	<p>NO</p> <p>There is no evidence of protectionist policy in Moldova</p>
Preferential access to credit	<p>YES</p> <p>An expansive credit policy and soft monetary policy have been at the core of the Belarusian macroeconomic model. State-owned companies have direct access to credit under preferential conditions.</p>	<p>YES</p> <p>The Ukrainian economy used to feature state-backed loans. Currently preferential credit policies are used to subsidize the aircraft industry. State guarantees for loans are also used in a few industrial sectors (defense, nuclear).</p>	<p>YES</p> <p>Currently there is some preferential access to credits with lower interest rates for certain programs financed by international donors.</p>
Low interest rates	<p>YES</p> <p>A substantial level of support have been provided through the state-owned banking sector. This also includes interest rate compensation to make export products and domestic consumer electronic goods more attainable for customers.</p>	<p>NO</p> <p>Ukraine used to support local producers of agricultural vehicles and machines, including the partial compensation of the interest they paid on loans. But they seem to have abandoned this practice for the time being.</p>	<p>YES</p> <p>Low interest rates are applied to support big projects financed with funds provided by international donors.</p>

Tax benefits	YES Tax benefits for state-owned machinery producers have been widely used by the government in Belarus. This distorts competition in the sector for both local and foreign machine-builders. There are also special economic zones in Belarus, including newly created industrial parks (the Belarusian-Chinese industrial park, for instance).	YES Some machine building enterprises (space, aircraft subsectors) are seen as priority areas for economic policy and are expected to receive tax benefits. Ukraine has made some modest use of the practice of special economic zones, and has implemented direct tax benefits in that context.	YES Tax benefits in Moldova are provided through the creation of free economic zones.
SOE	YES Almost all large enterprises in the Belarusian machine building sector are state-owned or controlled by the government ^{c)} .	YES State-owned companies in Ukraine remain only in strategic subsectors of machinery like aircraft building, defense machinery, and nuclear technology.	NO There are only few SOEs in Moldova, and the government also intends to privatize these, too, in the near future.
Other forms of government support	YES Current instruments of support are: a) Government support for machinery sometimes taken an implicit form and is not readily apparent due to the fact that enterprises in the machine building sector are mostly organized as vertical networks. Vertical integration of machinery production facilities serves to ensure the better governance of state-owned enterprises. b) Leasing mechanism has been used as a support mechanism for the domestic machine building sector during the time of crisis ^{d)} . c) The Belarusian government often determines marketing and export policy with a view towards the interests of the largest enterprises of the machine building sector.	YES The following are among the recent forms of government support programs in Ukraine: a) State guarantees and state insurance for exporters. b) State acquisition of new rail-cars. c) Partial compensation of the costs of domestically produced agricultural machinery. d) The acquisition of domestic agricultural machinery and equipment under a national financial lease program.	YES Government support can be used in the FEZs and, in limited forms, in the Industrial Parks.

Notes:

- a) Starting in 2009, Russia's biggest car producer "VAZ" has significantly reduced its imports of components from Belarus-based companies like BATE Borisov, "Avtogydrousilitel" Grodno, "BelKart." Those state-owned companies took part in the import substitution program for components, which was initiated by the Belarusian government using financial, organizational, and technical measures. The whole package of measures allowed those companies to increase their sales and to gradually recover from the crisis (See On-line conference of Mr. Sviderski (accessed at <http://old.soyuz.by/ru/print.aspx?guid=90712>))
- b) The macroeconomic policy of stimulating internal demand was widely used in Belarus between 2011-2015. However, to a significant extent it was based on protectionism, which limited competition and further distorted the country's macroeconomic balance (See Alachnovič A., Naūrodski S. (2011), Belarusian economy: structural crisis, CASE Belarus (accessed at <http://case-belarus.eu/wp-content/uploads/2011/08/Belarusian-Crisis-CASE-Belarus-July-2011.pdf>; or Akulich et al., 2015))
- c) A finished product of a firm within a vertically integrated conglomerate is an intermediate product for another member of the conglomerate. Its price is thus often not subject to a clear market benchmark. According to procurement law, a tender is not required if the procurement of intermediary products is performed within a vertically integrated chain. Similarly, according to certain laws, the prices of internally traded goods and services are based on rigid unit costs rather than on market reference prices. Prices cannot be lower than a predetermined unit cost estimate, which is typically based on the existing cost structure of the enterprise. As such, enterprises with higher excess labor are able to pass on these excess labor costs and other inefficiencies along the vertically integrated supply chain. These sources of potential inefficiency are very difficult to offset (See Favaro E., Smits K., Bakanova M.. Structural challenges for SOEs in Belarus: a case study of the machine building sector / E. Favaro, K. Smits, M. Bakarova. – eLibrary World Bank Group, 2012 – (accessed at <http://dx.doi.org/10.1596/1813-9450-6010>). – 22 p.)
- d) The state-owned leasing company "Promagroleasing" was created in Belarus to support industrial producers operating in both domestic and foreign markets. The company offered a 5-year lease for buying costly equipment at a low rate of interest.

the field of corporate governance and competition as suggested by EBRD indicators, create a pool of serious institutional problems. In Ukraine and Moldova some enterprises in the machine building sector are privatized, often controlled by local business groups and sometimes vertically integrated (see Chapter 2). The underinvestment in Ukraine's machinery and the state of corporate relations in Moldova suggest new reforms in upgrading the level of corporate governance rulings, fighting discrepancy between the existing corporate governance practices and globally accepted principles of corporate relations, as well as more competitive market in raw materials supply.

Evidence from V4 countries indicates that in order to succeed, a country needs to possess a set of continuous reform packages⁷⁵. The most vital reforms stimulating industrial development via huge inflow of FDIs in V4 countries were the following: i) development of infrastructure, ii) flexible labor market; iii) clear business environment and taxation. Belarus, Moldova and Ukraine lag behind V4 countries in all that areas, which is confirmed by EBRD 2016 Transition development snapshots⁷⁶.

Belarus, apart from poor liberalization, seems to have too many institutional barriers including wage regulation, non-tradability of land, low infrastructure management quality (including telecom, electricity, railway, and road), financial sector underdevelopment (absence of pension funds), as well as problems with competition and transaction environment. Ukraine's key issues according to EBRD come from limited tradability of land, poor quality of insolvency law, and low infrastructure management quality (including telecom, electricity, railway, and road). Moldova finds itself most closely to V4 countries transition development standpoints, as compared to Belarus and Ukraine, but still has much to do it with its infrastructure (including telecom, electricity, railway, and road) and its poverty.

75 See Naurodski et al., 2016

76 Accessed at <http://www.ebrd.com/what-we-do/economic-research-and-data/data/forecasts-macro-data-transition-indicators.html> on August 26, 2016

Even if we assume that the experiences of V4 countries on the one hand, and of Belarus, Moldova, and Ukraine on the other hand mostly do not lend themselves to a direct comparison, there are some common features in their respective developments. Firstly, improvements in corporate governance (also including the elimination of state management intervention in the case of Belarus) are among the key priorities. The practical application of the OECD's corporate governance principles may serve as a tool for achieving better accountability and improved relationship with investors, spurring investments into technologically advanced assets. Secondly, investment incentives should be targeting both local business and foreign investors with a better functioning tax system, a better educated workforce and better infrastructure rather than tax holidays, duty free zones or other political promises. Finally, smooth cooperation with investors at every level (government, municipality, company) and the requisite institutional capacities (to respond to requests and inquiries at extremely short notice, in proper English) is also among the decisive factors in the case of both the V4 and the CIS countries.

Employment related policies

Despite differences in machine building policies and approaches to its transformation in Belarus, Moldova, and Ukraine since 1991, machinery employment remains one of the key common vulnerability factors of the sector in all the three countries, more vulnerable for Belarus and Ukraine, but less vulnerable in case of Moldova. In mentioned countries there has been a trend of continuous reductions in the number of employees in the machine building sector, even as the respective industries remain among the largest employers in these economies. In Ukraine 114,6 thousands (23,8%) machinery employees lost their jobs since 2010; 54,3 thousands (19,2%) in Belarus; and 1,3 thousand (15,1%) in Moldova. The employment in the sector is

falling down both absolutely and relatively to total industrial employment (see Table 1).

The huge numbers from above suggest that the period of transition from more labor-intensive and technologically simpler machinery products to more advanced products is still in ongoing in all the three countries. Such a transition period normally requires proactive steps from governments in two directions:

- a) policies towards more intensive investments into human capital to start workforce inflow, since a skilled labor force is a key factor in machinery development and in gains in productivity;
- b) targeted social policies towards those who loose the jobs in order to mitigate the social consequences of transformation period.

Investment in human capital is one of the components of a successful transition to the production of higher value-added machinery and better sales. One of the key assets of Belarus, Ukraine, and Moldova is the skilled labor force and the high level of technical education in these countries. However, evidence from post-Soviet countries shows that technical education without proper investments into human capital during employment period does not lead to increase in employment. The experience from V4 countries indicates that greenfield-investment-friendly policies of Czech, Hungarian, and Slovak governments resulted in increasing employment in machinery over last decade (see Table 2). Drastically falling machinery employment is another reason for governments in Belarus, Moldova, and Ukraine to think about continuous reforms to stimulate greenfield investments into the sector.

Social restructuring based on the ILO approach should become the key component of further industrial transformation in Belarus, as well as in Ukraine and Moldova. The International Labour Organization (ILO) in the Convention No 158 and Recommendations No 166 approaches the process of

termination of employment, including in the context of the dismissal of workers during the process of companies restructuring. The documents emphasize that the development of a company can be viewed as a continuous process of restructuring, accompanied by social costs, affecting not only workers and employers, but almost everyone who has anything to do with the business. The ILO highlights that the key task during the process of restructuring is to make a company competitive, at the same time reducing to a minimum the risks of social disruptions, such as those associated with the forced change of residence, displacement, worsening quality of working life, and others. There is an extensive list of publications of ILO and other institutes defining social responsibility and restructuring along with presenting restructuring practices in selected countries⁷⁷.

Due to differences in industrial transition and current state-of-the-art of the machine building sector, Belarus, Moldova, and Ukraine should follow the alternative concepts of social restructuring. In Belarus such approach has received much of attention in recent years by efforts of UNDP office in Belarus. UNDP in cooperation with Ministry of Labour and Social Protection of Belarus prepared the number of publications on social restructuring in the country containing detailed recommendations on how this instrument can be used not only to mitigate social consequences of restructuring but also to allow for labor inflow into more effective sectors reducing excessive employment⁷⁸. In Moldova and Ukraine the concept is currently receiving much less of attention most probably due to fact that governments in the both countries correlate industrial restructuring with industrial privatization which is formally close to be completed. The ILO approach to

77 See for example Starcher, G. Socially responsible enterprise restructuring. Joint working paper of the ILO and the EBBF. Geneva: ILO, 1999; or *Serving Workers in Transition: A guide to Peer Support*. Human Resources Development Institute, 1995; or *Socially Sensitive Enterprise Restructuring in Asia: Country Context and Examples* / ed. by N. Rogovsky and R.S. Schuler. Tokyo: Asian Productivity Organization, 2007.

78 See for example joint publication of UNDP and Belarusian Ministry of Labour and Social Protection in Russian titled "Социально ответственная реструктуризация предприятий" edited by Valetka, U., 2013

transformation is much wider and calls for more actions from the governments. There is definitely a need for more socially responsible governmental industrial policy in Moldova and Ukraine, which requires changes in the status quo towards industrial transformation currently taking place.

The experience of the ILO and other international and national organizations, resulting from the restructuring processes in more than 30 countries around the world, can be summarized and generalized for use in Belarus, Moldova, and Ukraine. The key lessons learned⁷⁹ demonstrate that in order to be successful, social restructuring must be organically woven into long-term strategy of enterprise development, the region and the country as a whole. The company's management must have information about the necessary steps in case restructuring is imminent, in particular in respect of the labor force. Social restructuring should be based on a joint agreement of employers, workers and their representatives, as well as the government. Mass layoffs should be considered as a least case when no other options are possible. If cuts are unavoidable, they should be socially responsible by using job search assistance, both inside and outside the enterprise; assistance in the creation of small and medium-sized businesses; promoting mobility; early retirement; retraining; changes in work schedule; flexible dismissal; psychological support; severance payments, income support of disadvantaged groups.

Another reason to introduce social restructuring is to mitigate impact of external shocks on machinery employment and social stability in the three considered countries. As evidenced from the Chapter 2, machinery in Belarus, Moldova, and Ukraine is exposed to external shocks, such as falling oil prices, global

crisis, demand turndown, Russian-Ukrainian conflict, etc. Employment estimations for machinery sector show that external shocks currently add to total employment loss in the sector in Belarus and Ukraine and are likely to continue this impact in the next 5 years. The net impact of all these effects however will vary according to the size of the enterprise, the type of activity, and the economic conditions.

The SWOT analysis is used to identify the key country-specific points by summarizing weaknesses and strengths, the common problems for and opportunities of machine building sectors in Belarus, Moldova, and Ukraine. SWOT approach makes it possible to define the current situation of machinery in these countries as well as to propose key directions and strategies for machinery development, drawing on their opportunities and strengths, and to overcome the weaknesses and threats that machinery faces in these countries. Each country has four blocks of strategies, two per block. Strategies move from less radical and less time consuming to implement (SO strategies) to more reform intensive (WT strategies).

It seems to be the easiest for Belarusian government to implement the first set of strategies (SO strategies in order to employ sector strengths and external opportunities) by using existing administrative instruments. However, the government should pay more attention to threats, and stop ignoring all kinds of weaknesses. Addressing these would be necessary to change the core situation in the sector. To overcome the difficulties that Belarusian machinery faces today, the WT strategies in Belarus appears vital. The government might directly apply the scenario set out in the WT strategies (the ideal scenario), or move gradually by using the ST and WO approaches.

In all scenarios for Belarus, the government should keep in mind the so called socially responsible restructuring of enterprises (SRRE), a recognized tool in the world to mitigate the negative effects of the social reformation of

79 Ibid. Three examples to mention are metallurgy restructuring in Czech Republic (number of employees of the three largest enterprises the sector was 240 thousands in 1989, and 41 thousands after restructuring in 2005); mining in Poland (employment in the sector went down from 415 thousands in 1989 to 216 thousands in 2005); more generally in Eastern Germany where employment reduced by 3,7 mln people from 1989 to 1993, and specifically in industrial employment in Berlin (number of employed reduced from 300 thousands in 1990 to 98 thousands in 2005).

industrial sectors. It is used to prevent unemployment and decreasing the welfare of the population as well as it improves competitiveness of products along with higher labor productivity and better wages. It creates the conditions to ensure effective employment by promoting the reallocation of labor resources in favor of sectors with higher productivity as well as to create new productive jobs, which is critical to improve the country's economic potential⁸⁰.

Bearing in mind the economic recession in Ukraine, Donbass conflict, as well as political and economic tensions with Russia, it seems reasonable to launch comprehensive but sustainable reforms using the set of either WO or WT strategies. Improvements in the management quality of machinery companies in Ukraine is the area where the Ukrainian government's attention is most needed. Attracting investment requires better investment climate in Ukraine as it is one of the worst in the region⁸¹. There is also the need to stimulate productivity increases in the Ukrainian economy, including the machine building sector. These intensive efforts require a targeted approach by the government but could contribute to sustainable economic growth in the future.

Moldova is the candidate to follow the experience of V4 countries and attract massive foreign investment into its engineering sector. The prerequisite for this is a continuation of reforms with the focus on targeted use of corporate governance best practices, stimulation for SMEs active in the machinery sector, and infrastructure development. Simply speaking, Moldova has to create business conditions in the entire country as good as in industrial zones and parks. Such policy will surely pave the way to improve management quality, attract more capital into the economy and spur development in the sector and in the economy overall.

80 For more information on socially responsible restructuring of enterprises in Belarus see Valetka U., Institutional barriers for industrial restructuring / The Geopolitical Aspects of the Transformation Process in Central and East-Central Europe / ed. by T. Michalski. – Gdynia: Wydawnictwo Bernardinum, 2006. – P. 197-209.

81 For example, Ukraine is placed 83rd in Doing Business 2016 ranking of the World Bank, while Belarus is 44th and Moldova is 52nd. Another example is Global Competitiveness Report (GCR) 2015-2016 provided by the World Economic Forum where Ukraine is place 79th and Moldova is 84th. Belarus is not officially included into GCR, but latest calculations of CASE Belarus show that Belarus could be between 55th and 61st places in 2012-2014 rankings (see http://case-belarus.eu/index.php/2015/08/gci_belarus/)

5. Policy directions: SWOT analysis

The SWOT analysis is used to identify the key country-specific points by summarizing weaknesses and strengths, the common problems for and opportunities of machine building sectors in Belarus, Moldova, and Ukraine. SWOT approach makes it possible to define the current situation of machinery in these countries as well as to propose key directions and strategies for machinery development, drawing on their opportunities and strengths, and to overcome the weaknesses and threats that machinery faces in these countries. Each country has four blocks of strategies, two per block. Strategies move from less radical and less time consuming to implement (SO strategies) to more reform intensive (WT strategies).

Table 8. SWOT analysis of machinery in Belarus

		Internal Factors	
		Strengths (S)	Weaknesses (W)
External Factors		<ul style="list-style-type: none"> -Access to preferential financing mechanisms provided by Belarusian government -Well-educated staff and strong engineering education in the country -Own research base and deep cooperation with national research institutes -Renowned machinery history and goodwill towards Belarusian machinery products in the region 	<ul style="list-style-type: none"> -Low capacity utilization -High level of imported components -Outdated equipment and technology -Labor-intensive production -Excessive employment -Relatively low quality of products -High inventory volume -Low export diversification -High level of government interference in strategic management -Lack of innovation incentives for top management -Vertical integration of huge state-owned companies
Opportunities (O)	<ul style="list-style-type: none"> -Comparatively low energy costs -Preferable export conditions to the large market of the Eurasian Economic Union (EEU) and specifically Russia -Zero-tariff import of ore and components from the countries of the Eurasian Economic Union and specifically Russia -Strong machinery lobbying circles in the government 	<p>1. SO Strategies</p> <p>a) More effective utilization of investments b) Increasing share of high value added engineering products</p> <p>Both strategies aim to improve the competitive positions of Belarusian machinery producers in the EEU market and to diversify the range of products available for export. Both could be used to utilize the potential of Belarus technical education and national research base.</p>	<p>3. WO Strategies</p> <p>a) Product quality improvement and price reduction b) Improving corporate governance practices and eliminating state interventions</p> <p>This approach could be used to unload existing stocks and to ensure a better position in the EEU market as the producer of «cheap but reliable machinery products.» Improving corporate governance in line with the relevant OECD principles, in both state-owned and private companies, would ensure the sustainability of this approach.</p>
Threats (T)	<ul style="list-style-type: none"> -High importance for the economy in terms of share in GDP -Social vulnerability due to high number of employees -Decreasing volumes of export and share in the country's exports -High level of dependence on Russia -Increasing dependence on the CIS market -Lack of national iron ore resources -Excessive number of state subsidy instruments 	<p>2. ST Strategies</p> <p>a) More effective utilization of investments b) Development of machinery components</p> <p>A combination of the two strategies is needed to diversify the sector's export and import risks. The development of components could yield improvements in trade balance and export diversification. This, in turn, could mitigate the vulnerability of the sector in Belarus.</p>	<p>4. WT Strategies</p> <p>a) Structural change in machinery through privatization (partial or full) b) Improving corporate governance and eliminating state interventions</p> <p>This constitutes the most radical approach for machinery reform in Belarus. Changes in ownership and in the structure of the sector, along with improvement in the quality of management, would allow for attracting foreign investors and technologies, increasing productivity, and cutting cost, which would in turn contribute to improved product quality, launching new products, and expanding into new markets.</p>

It seems to be the easiest for Belarusian government to implement the first set of strategies (SO strategies in order to employ sector strengths and external opportunities) by using existing administrative instruments. However, the government should pay more attention to threats, and stop ignoring all kinds of weaknesses. Addressing these would be necessary to change the core situation in the sector. To overcome the difficulties that Belarusian machinery faces today, the WT strategies in Belarus appears vital. The government might directly apply the scenario set out in the WT strategies (the ideal scenario), or move gradually by using the ST and WO approaches.

In all scenarios for Belarus, the government should keep in mind the so called socially responsible restructuring of enterprises (SRRE), a recognized tool in the world to mitigate the negative effects of the social reformation of industrial sectors. It is used to prevent unemployment and decreasing the welfare of the population as well as it improves competitiveness of products along with higher labor productivity and better wages. It creates the conditions to ensure effective employment by promoting the reallocation of labor resources in favor of sectors with higher productivity as well as to create new productive jobs, which is critical to improve the country's economic potential⁸².

82 For more information on socially responsible restructuring of enterprises in Belarus see Valetka U., Institutional barriers for industrial restructuring / The Geopolitical Aspects of the Transformation Process in Central and East-Central Europe / ed. by T. Michalski. – Gdynia: Wydawnictwo Bernardinum, 2006. – P. 197-209.

Table 9. SWOT analysis of machinery in Ukraine

		<i>Strengths (S)</i>	<i>Weaknesses (W)</i>
		Internal Factors	<ul style="list-style-type: none"> -Convenient geographic location close to ore sources and metallurgical plants -Relatively low labor costs -Competitive price of domestic machine building products compared to world prices -Well-educated staff and strong engineering education -Own research base and deep cooperation with national research institutes -Long machinery history and ties with key clients in the region
External Factors			
Opportunities (O)	<ul style="list-style-type: none"> -Developed metallurgy industry in combination with significant reserves of raw materials that are sufficient to cover the needs of production -Access to European markets within the framework of the DCFTA agreement -Recent marketing successes in Africa and Asia -Significant potential of national technological research -Large national market -Migration of EU engineering companies to Eastern Europe 	<p style="text-align: center;">1. SO Strategies</p> <p>a) Increasing share of high value added engineering products b) Expanding access to world markets</p> <p>SO strategies are used to optimize the structure of Ukrainian machinery exports in order to open up new markets and expand existing ones. More advanced products will be also in demand in the large local market. However, implementation of SO strategies requires new and more active steps of Ukrainian government towards engineering sector.</p>	<p style="text-align: center;">3. WO Strategies</p> <p>a) Improving corporate governance in order to stimulate companies invest more b) Assets modernization via both greenfield and brownfield investment</p> <p>Improving corporate governance based on the relevant OECD principles seems to be the core goal for WO strategies. Better accountability and improved relationship with investors is expected to automatically contribute to the process of increasing investments in technologically advanced assets. In the same time, Ukraine has much to offer (land and existing real estate assets) for potential EU investors to locate their engineering business in Ukraine. The latter will be possible if corporate governance improvements are accompanied by series of instruments to attract greenfield and brownfield investment into Ukraine.</p>
Threats (T)	<ul style="list-style-type: none"> -Significance for the economy in terms of GDP share -Social vulnerability due to high number of employed -High level of dependency on Russia -Decreasing share in total exports over the last years -Ukrainian economic recession -Labor migration -Complex system of intellectual property rights protections -Lack of energy resources 	<p style="text-align: center;">2. ST Strategies</p> <p>a) Increasing share of high value added and engineering products b) Increasing productivity in the sector</p> <p>Increasing productivity and enhancing the output of higher value added products are the core steps that need to be performed during times of economic downturn and diminishing exports. These strategies contribute to export growth and create a foundation for sustainable output growth in the future.</p>	<p style="text-align: center;">4. WT Strategies</p> <p>a) Improving corporate governance in order to stimulate companies invest more b) Increasing productivity in the sector</p> <p>As in the case of the WO approach, the stimulation by the Ukrainian government of improvements in corporate governance seems to be the core to stimulate investment intensity of engineering. In combination with government efforts to promote increased productivity in the sector, this would contribute to attracting foreign investors and technologies, improved product quality, the launching of new products expansion into new markets.</p>

Bearing in mind the economic recession in Ukraine, Donbass conflict, as well as political and economic tensions with Russia, it seems reasonable to launch comprehensive but sustainable reforms using the set of either WO or WT strategies. Improvements in the management quality of machinery companies in Ukraine is the area where the Ukrainian government’s attention is most needed. Attracting investment requires better investment climate in Ukraine as it is one of the worst in the region⁸³. There is also the need to stimulate productivity increases in the Ukrainian economy, including the machine building sector. These intensive efforts require a targeted approach by the government but could contribute to sustainable economic growth in the future.

83 For example, Ukraine is placed 83rd in Doing Business 2016 ranking of the World Bank, while Belarus is 44th and Moldova is 52nd. Another example is Global Competitiveness Report (GCR) 2015-2016 provided by the World Economic Forum where Ukraine is place 79th and Moldova is 84th. Belarus is not officially included into GCR, but latest calculations of CASE Belarus show that Belarus could be between 55th and 61st places in 2012-2014 rankings (see http://case-belarus.eu/index.php/2015/08/gci_belarus/)

Table 10. SWOT analysis of machinery in Moldova

		<i>Internal Factors</i>	
		<i>Strengths (S)</i>	<i>Weaknesses (W)</i>
<i>External Factors</i>		<ul style="list-style-type: none"> -Good export diversification -Relatively low labor costs -Well-educated staff and relatively good engineering education -Cooperation with national research institutes -Increasing investments in the sector 	<ul style="list-style-type: none"> -Labor-intensive production in post-Soviet production sites -Low capacity utilization in local-owned companies -Weak protection of small shareholders -Low local management quality -More investments are needed in order to provide higher share in GDP
<i>Opportunities (O)</i>	<ul style="list-style-type: none"> -Better sector performance after deep structural change -Increasing share in the economy's total exports -Access to European markets within the framework of the DCFTA agreement -Interest from EU companies and investors -Migration of EU machine building companies to Eastern Europe 	<p>1. SO Strategies</p> <p>a) Stimulation of subsectors with high value added engineering products</p> <p>b) Expanding to the EU market and supply chains via targeted cooperation with European investors</p> <p>The further optimization of the structure of machinery by developing advanced engineering products will expand machinery exports and utilize a greater share of the local labor force. Cooperation with EU investors via infrastructure development and general improvement in business climate will provide new opportunities for Moldovan machinery products at the EU market and supply chains.</p>	<p>3. WO Strategies</p> <p>a) Improving corporate governance in order to stimulate companies invest more</p> <p>b) Modernization of assets via stimulation of greenfield investment</p> <p>Just as in the case of Ukraine, improving corporate governance based on the relevant OECD principles seems to be the core goal for WO strategies. It is necessary to enforce the principles of corporate governance at public companies, in order to achieve more accountability and better investor relations. This will contribute to increasing investments in technologically advanced assets. Greenfield investment is highly likely in Moldova if the government implements continuous and sustainable reforms to ensure better business conditions as compared to other countries in the region.</p>
	<i>Threats (T)</i>	<ul style="list-style-type: none"> -Concentration of machinery production in special economic and industrial zones -Russian factor in ownership (both in Moldova and Transnistria) -Labor migration -Lack of energy resources and iron ore -Narrow national market 	<p>2. ST Strategies</p> <p>a) Targeted cooperation with European investors</p> <p>In other words, persuade EU companies to relocate production to Moldova. Cooperation with shortlisted EU investors seems to be the only reliable strategy for overcoming existing threats. This strategy is rather easy to implement for the Moldovan government and will contribute to Moldova's expansion into the EU market, increase productivity, improve ownership structures, and management quality.</p> <p>b) Create new state incentive programs in order to stimulate greenfield and brownfield investments. Subsidies and incentives are necessary to manage tough competition from the region (subsidies offered for job creation in Serbia, Macedonia, etc, and for capital investment (equipment, buildings, etc) in Romania). Infrastructure and business environment in general need to be improved to offer similar conditions in the country as the ones that prevail in FEZs and industrial parks.</p>

Moldova is the candidate to follow the experience of V4 countries and attract massive foreign investment into its engineering sector. The prerequisite for this is a continuation of reforms with the focus on targeted use of corporate governance best practices, stimulation for SMEs active in the machinery sector, and infrastructure development. Simply speaking, Moldova has to create business conditions in the entire country as good as in industrial zones and parks. Such policy will surely pave the way to improve management quality, attract more capital into the economy and spur development in the sector and in the economy overall.