



MINISTRY
OF ECONOMIC DEVELOPMENT,
TRADE AND AGRICULTURE OF UKRAINE

STUDY

EXPORT STRATEGY FOR MACHINERY SECTOR



2019-2023



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ACRONYMS AND DEFINITIONS

ATR	Avions de transport régional
CAGR	Compound Annual Growth Rate
CBI	Centre for the Promotion of Imports
Chamber of Commerce	Ukrainian Chamber of Commerce and Industry
CMU	Cabinet of Ministers of Ukraine
Customs Service	State Customs Service of Ukraine
DCFTA	Deep and Comprehensive Free Trade Area under the EU-Ukraine Association Agreement
EBRD	European Bank for Reconstruction and Development
ECA	Private Joint Stock Company «Export Credit Agency»
EEN	Enterprise Europe Network
EPO	Export Promotion Office of Ukraine
EU-UA MRA	EU-Ukraine Mutual Recognition Agreement
GVC	Global Value Chain
ITC	International Trade Center
MEDT	Ministry of Economic Development, Trade and Agriculture of Ukraine
MES	Ministry of Education and Science of Ukraine
Ministry of Finance	Ministry of Finance of Ukraine
MFA	Ministry of Foreign Affairs of Ukraine
Ministry of Justice	Ministry of Justice of Ukraine
NBU	National Bank of Ukraine
OECD	Organization for Economic Cooperation and Development
SME	Small and Medium Enterprises
SMEDO	SME Development Office of Ukraine (Advisory body within the MEDT)
SPS	Sanitary and Phytosanitary Measures Agreement
Statistics Office	State Statistics Service of Ukraine
TBT	the Technical Barriers to Trade Agreement
UkraineInvest	State Institution «Ukraine Investment Promotion Office»
WDI	World Development Indicator

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EXECUTIVE SUMMARY

Ukraine is a relatively important industrial manufacturer by international comparison with a long-standing tradition. The sector is dominated by light machinery, including turbo propellers, gas turbines, pumps and insulated wires and cables for vehicles.

This sector strategy is a joint response to orient Ukraine's trade development, to tackle constraints, and to embrace opportunities for export development in the machinery sector a practical manner.

Under an overall vision of *«Building an innovative, state of the art, Ukrainian machinery sector connected to GVCs»*, the sector strategy elaborates three strategic objectives:

To realize the vision statement, strategic objectives have been formulated which provide orientations that are to guide the implementation of the strategy in the three strategic areas where the action is required over the following five years to bring about changes. The three strategic objectives are as follows:

1. To improve the basic conditions to produce exportable machinery products and services

Enterprises require a conducive business environment to be able to put together the right offering. This creates important challenges for policymakers and businesses alike. When the aim is to produce products that can compete in the international markets, these challenges become even more critical.

This strategic objective aims at the constraints currently impacting the production of an adequate offering of machinery products that can compete internationally. To ensure the long-term development of the sector, the emphasis is placed on creating the right conditions for entrepreneurship and innovation to take off in the mid-term.

An outstanding business environment eases the effort for entrepreneurs and investors, boosts firms' competitiveness, and lowers the cost of doing business in the country. It is crucial that competitiveness moves hand-in-hand with broad socio-economic development. This translates into ensuring that the benefits of export-led growth trickle down to the entire population. Particularly for the young and most vulnerable segments of the population.

2. To strengthen the competitiveness of the machinery sector in foreign markets

The relatively small size of the national market restricts the opportunities for local firms to grow and exploit economies of scale. Hence, the sector needs to be outward-looking to grow. Overseas growth opportunities will only be seized with adequate regulations that are consistent with those of the target markets. Regulatory harmonization with the EU is a critical topic for the sector.

A combination of home-grown capacity enhancements with selective knowledge and capacity-enhancing foreign investments is proposed as the way forward. This strategic objective directly aims at attracting selective investments in the short term while strengthening the competitiveness of the business environment in short to medium-term. A key component of this objective consists of ensuring that foreign investments stimulate innovation, economies of scale and an improved business environment. In the long run, fostering collaborations on innovation between enterprises and educational institutions is a key element of this strategic objective. A strong branding initiative and marketing effort can help to support this objective.

A long term view of this strategic objective would involve Ukraine improvements in the regulatory environment will reduce the regulatory burden and the costs of doing business for the firms. Expanding the national productive capacity requires strengthening the firms to be able to produce and to sell their products profitably.

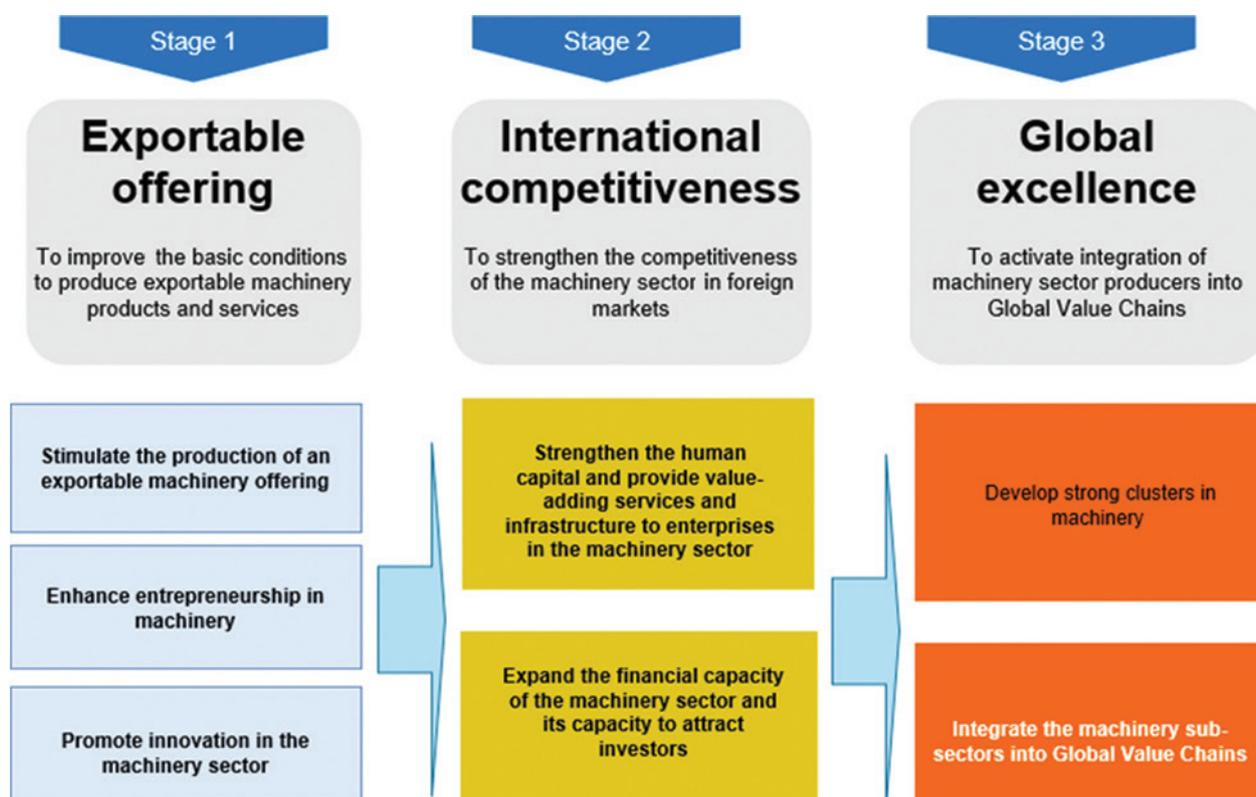
3. To activate the integration of machinery sector producers into Global Value Chains (GVC)

Improving export competitiveness ultimately hinges on the capacity of Ukrainian firms to plug into existing and future international value chains. Given the geographical proximity to the countries that offer GVC opportunities and the success of neighbouring EU countries in tapping the same, Ukraine's machinery sector has plenty of opportunities in this area.

This strategic objective specifically targets customs' transit times and procedures. In parallel, the sector needs to establish long-term partnerships with international players that can pave the road towards GVCs. Ensuring the formation of competitive clusters is a key component of this objective. Working together the machinery sector firms have a better chance of entering international value chain trade. This objective focuses on creating opportunities for GVC trade among Ukrainian firms.

Figure 1 outlines the relation between the strategic and operational objectives. It also provides an overview of the sequencing of strategic actions. The first and second operational objectives (Stages 1 and 2) are intended to be implemented almost simultaneously in the first place. The final one can be implemented at a later stage. Let's review the process in more detail below.

Figure 1: Logical framework of the roadmap



Source: ITC and Strategy stakeholder consultations, 2018

Through extensive consultations with public and private sector operators, this sector strategy provides a systematic analysis of constraints that have impeded the sector from making progress on the objectives outlined herein. The Plan of Action offers a concrete plan of action to overcome them.

Implementation of the roadmap

This sector Strategy is part of a comprehensive Export Strategy of Ukraine. It is designed to identify constraints and opportunities to trade development as well as priorities that the country should focus on in order to develop the machinery sector. Simultaneously, it presents a plan of action to achieve results that are fundamental to further export competitiveness and development.

The roadmap caters for the necessary governance structures to ensure the correct implementation of the plan of action over the next five years. To obtain early results, this plan of action details a series of activities to be implemented in short- to a medium-term timeframe. The effectiveness of implementation is likely to be contingent on the sector's ability to align the efforts of the various institutions – public, private, and civil society – with the priorities identified. The public-private dialogue platform, created within the framework of the Strategy, should play a leading role in its implementation. It should be strengthened further to enable the successful management, monitoring, and measurement of the implementation phase.

MACHINERY SECTOR IN UKRAINE

◇ Global perspective

In developed economies, a strong manufacturing sector is praised for creating quality employment and ensuring the country's technological progress. And while the sector might no longer be the key source of large-scale job growth, as the services sector could be, it remains a critical contributor to employment, productivity, innovation, and trade. On the other hand, a declining manufacturing sector can be regarded as the strengthening of the services economy, or as one of the symptoms of economic decline. In developing economies, a rising manufacturing sector is considered a proof - and engine of development, lifting agrarian populations out from poverty, and transforming poor nations into globally competitive players. Thus, the sector also provides a path to middle and high-income status for developing economies¹.

The manufacturing sector, despite the rising emergence of the services economy, continues to have a predominant position worldwide: it accounts for approximately 16 percent of the global GDP and 13 percent of employment (WDI & OECD, 2017).

Industrialization Patterns: Giving birth to the services economy

A recent analysis finds that when countries start their industrialization process, manufacturing employment and output rise rapidly. However, once manufacturing's share of GDP reaches 20-35% of GDP, the sector starts contracting, along with its share of employment. This is mainly due to the fact that, as wages rise, consumers have more money to spend on services, and therefore the sector's growth accelerates, making it more important than manufacturing as a source of growth and employment.

The manufacturing sector is also evolving in ways that make the traditional view, i.e. that manufacturing and services are completely separated. The service inputs in production represent an increasing share of the manufacturing activity. For example, in the United States, every dollar of manufacturing output requires 19 cents of services. And in some manufacturing industries, more than half of all employees work in service roles, such as Research & Development and office-support staff.

Source: McKinsey (2012)

As highlighted in the Export Strategy of Ukraine, Ukraine is a relatively important industrial manufacturer by international comparison, with the sector being dominated by light machinery, including turbo propellers, gas turbines, pumps and insulated wires and cables for vehicles². Thus, the present sector Strategy has focused its attention on the light machinery sector, covered by Chapters 84 and 85 of the Harmonised System (HS), corresponding to «Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts thereof» and «Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Reproducers; Television Image and Sound Recorders and Reproducers, Parts and Accessories of such Articles», respectively.

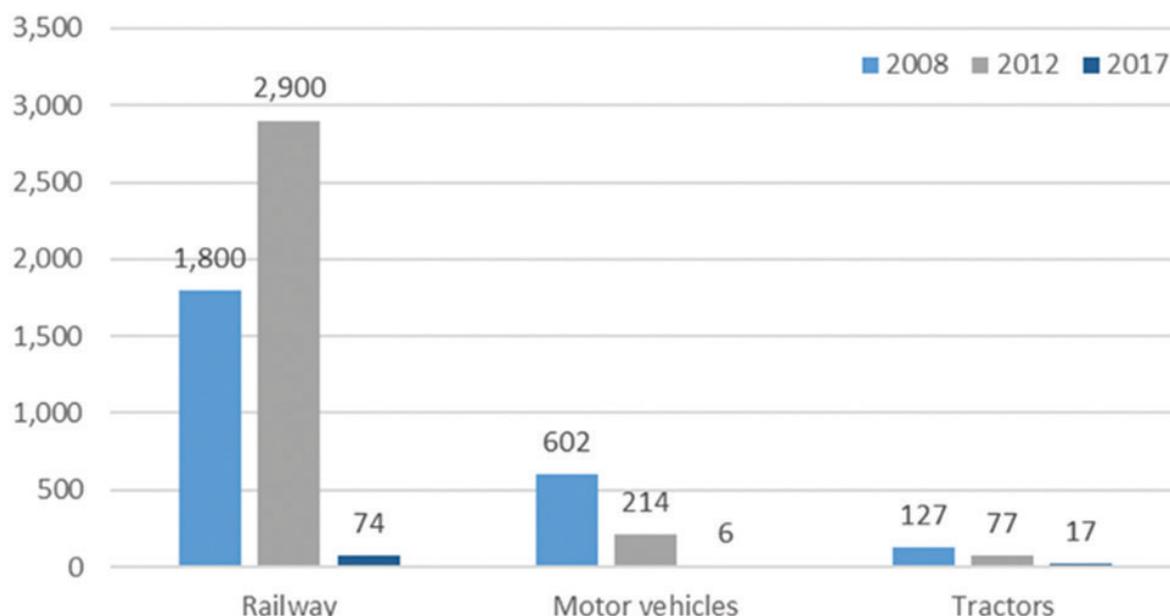
¹ Manyika, J. et al (2012). Manufacturing the future: The next era of global growth and innovation. McKinsey Global Institute & McKinsey Operations Practice.

² An overview of the existing situation of the sector in Ukraine is presented in the next section.

During the consultation process, it was decided that the heavy machinery sector should not be the focus of this Strategy, due to the existing level and pattern of trade, as shown in Figure 2 below.

In the case of railways and motor vehicles, total exports between 2012-2017 decreased by more than 97%, while exports of tractors decreased by more than 75% during the aforementioned period, merely representing some 13% of the total exports achieved in 2008.

Figure 2 - Evolution of Ukraine's Exports under HS86-87



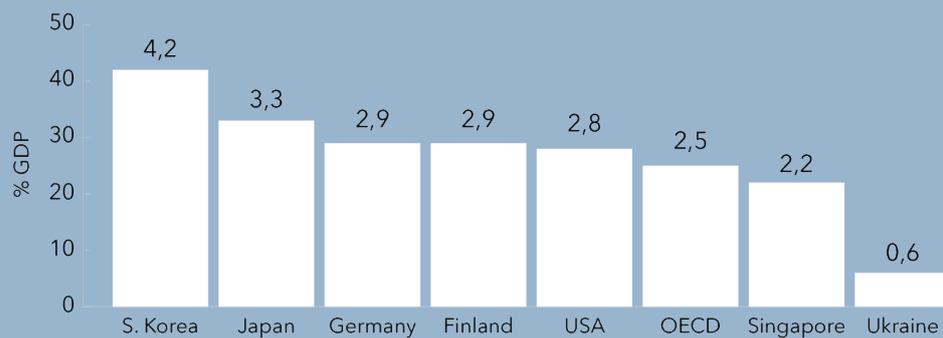
Source: ITC Trademap

The Role of Industrial Policies

The aforementioned situation represents a forced de-industrialization of the economy. One of the different ways through which the country can improve its manufacturing sector performance is adopting a targeted industrial policy. Japan, Korea, the United States, China, etc. developed and implemented appropriate industrial policies. Although each of the implemented policies was unique, there were some features in common:

- Need of a strong, unified and shared **national vision**. Without a new and common vision challenging the current trend and pessimistic rhetoric, it will be difficult for Ukraine to come up with a viable economic strategy for the future. In this context, Japan's aspirations to become a super-power car manufacturing led to the creation of Toyota and to surpass the US as the biggest car manufacturer (in 1955, the US produced 7 million cars, against 70,000 for Japan). Finland's industrialization was led by its desire to compete in the most difficult industries with the best nations in the world.
- A strong **institutional setup**. While best practices adopt different institutional infrastructures, a 'joined-up' government, with good communication between national, regional and municipal institutions, has been proved to be effective in avoiding coordination problems. It is also worth highlighting the key role of intermediate institutions, such as Chambers of Commerce and Associations, play in promoting communication and cooperation between the government and the PS, enhancing innovation, diffusion of technologies, skills formation, and developing world-class SMEs.
- The relevance of **innovation**. All analyzed countries show a strong commitment to innovation and technological developments, showed as expenditure on Research & Development as a percentage of the GDP.

Figure 3-R&D expenditure, as % of GDP (2015)



Source: WB's WDI

- **Managing Trans-National Corporations.** While the objective of such companies is to maximize their benefits whilst keeping the costs as low as possible, there are series of measures that can ensure that the profits and know-how obtained by such enterprises effectively benefit the local population, such as joint venture requirements, hiring of local labor, technology transfer, and the conduct of R&D in the host country, amongst others.
- The importance of **SMEs.** In most of the analyzed countries, SMEs are highly financed through different institutions and mechanisms. Some include cooperative arrangements for high fixed-cost activities - like export marketing, R&D, and the purchase of technical or management consultancy services.
- Focus on **Skills and Training.** Industrial competitiveness requires to reduce the existing skills gaps and mismatches. These hinder the country's firms' capacities for transforming and translating research outputs into industrial activities at the shop-floor level.

Source: Chang, H-J; Andreoni, A. & Kuan, M. L. (2013). International Industrial Policy experiences and Lessons for the UK. Foresight, Government Office for Science.

Due to the broad spectrum of products within the aforementioned chapters, the present Strategy focusses on those products where Ukraine appears to have a significant comparative advantage: HS 8411 «Turbo-jets, turbo-propellers and other gas turbines», and HS 8544 «Insulated wire, cable and other electric conductors, connector fitted or not; optical fibre cables of individually sheathed fibres, whether or not assembled with electric conductors or fitted with connectors». Ukraine is a major player in the production of aviation gas turbines (HS8411), with total exports accounting for approx. USD 400 million in 2017, while, in that same year, it exported USD 2.5 billion worth of electrical machinery and equipment (HS 8544).

Trends in the Aerospace Parts Sector

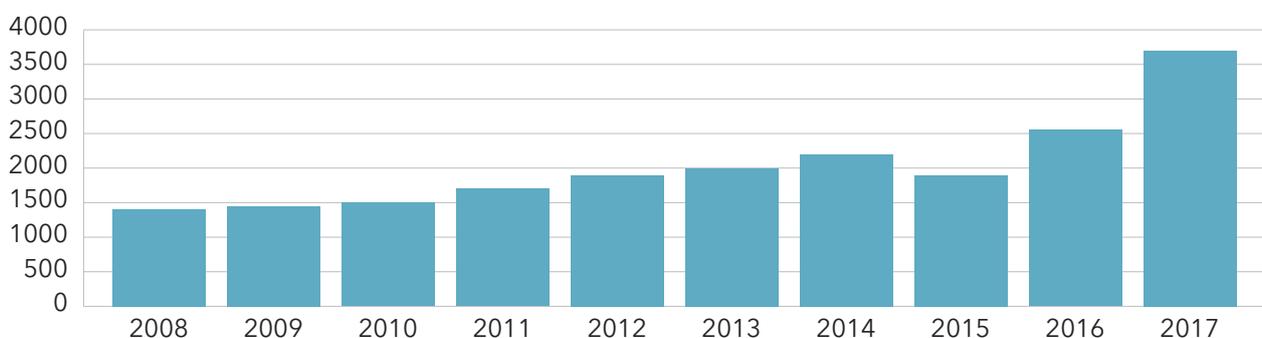
Analysing the sector's international market, it is worth highlighting that the major determinant in the demand of aerospace parts, like engines, is related to the investment activity in the end-user industries for aerospace equipment, such as the defence or civil aircraft industry, and the demand for replacement or for new aerospace equipment. The international market for this particular sector is expected to experience significant growth, moving from a total market size of USD 64 billion in 2015 to USD 82 billion in 2020, equivalent to an annual growth rate of 4.1%. According to ATR (2016), an average growth rate of 3.9% is expected to be achieved until 2035, mainly due to the increase of regional air traffic satisfied by the airports of 2nd and 3^d levels, as well as due to increasing of regional connectivity ensured by the use of turbo-jets.

Overall, this scenario is expected to create global demand for an additional 8,000-10,000 helicopters by 2020, and 25,000-30,000 large civil aircraft, 20,000-25,000 business jets and 4,000-6,000 regional jets by 2030. Additionally, in the next few decades, between 1,000

and 2,000 planes (depending on the estimates) will be replaced by new ones, with the objective to cut fuel costs and reduce noise levels³.

In the particular area of turbopropellers, recent years have seen significant change in the market: whilst worldwide exports of this product remained relatively stable between 2008 and 2015, with an average growth rate of 4.7 percent, between 2015 and 2017 the market experienced a 41% yearly increase, moving from USD 1.9 billion to USD 3.8 billion (see Figure 4).

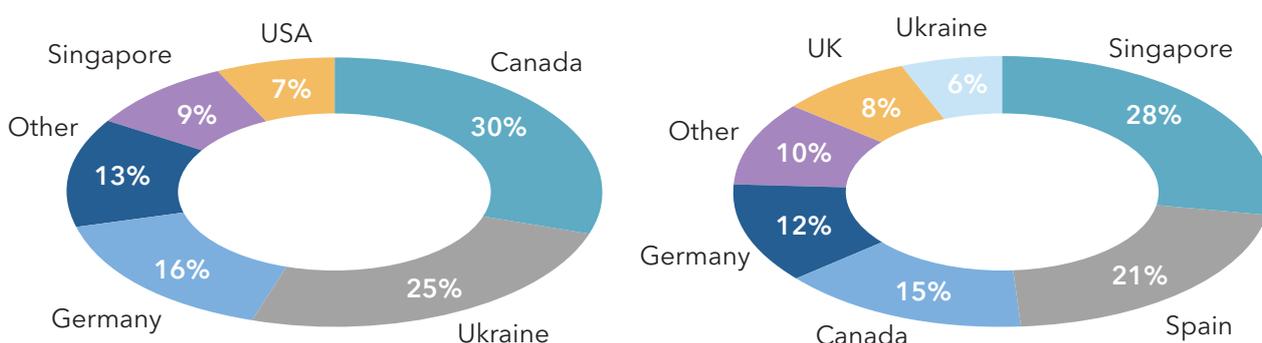
Figure 4 - Worldwide Exports of Turbopropellers, USD million



Source: ITC Trademap

Such increase was mainly due to the emergence in 2016 of Singapore as the product's leading manufacturer, with exports nine-folding, moving from USD 188 million in 2016 to USD 1 billion in 2017.

Figure 5 - HS 841122 Market Shares Worldwide, 2013 (left) 2017 (right)



Source: ITC Trademap

In terms of future demand, forecasts estimate that the market for turbopropellers will reach 3,020 aircrafts, confirming the interest for the up-to-90-seat planes for regional markets. The key driver for this positive outlook is traffic growth in regional connectivity, both from traditional markets where less connected locations are being connected through direct regional new routes, as well as from emerging markets, where the most viable solution for connecting people and transporting goods is turboprop air links⁴.

Nevertheless, other predictions suggest that the production of turboprop engines is expected to fall until 2029 due to the mergers and consequent strengthening of major airlines, leading to a decrease in demand for turboprop engines (Forecast International, 2018).

Trends in the Electrical Machinery and Equipment Sector

The global cable market (HS 8544) accounted for average growth of 1.3% from 2013 to 2017. During the economic crisis, 2009, the global market fell sharply by 7.7%. The slowdown in the construction sector, especially in developed markets, and the drop in the worldwide automotive industry, hit the cable revenues considerably. In addition, the low

³ CBI (2015). CBI Product Factsheet: Aerospace parts in Europe. CBI Market Intelligence.

⁴ ATR (2018) Turboprop Market Forecast 2018-2037. ATR, France.

demand for wire and cable products in other end-use sectors such as telecommunications and electronic equipment deterred market growth.

Since the last crisis, Asian countries have become strong players in the cables market. Particularly, Asia-Pacific is today not only the largest but also the fastest-growing regional market for insulated wire and cable worldwide. In contrast, developed countries are not expected to recover their former production peaks; as the cable industry is growing in developing countries, manufacturers will look to become more international players as their home markets mature. This will increase the competitive pressure, especially for those European manufacturers who are concentrated on specific product sectors.

Particularly relevant for Ukraine are «ignition wiring sets and other wiring sets for vehicles, aircraft or ships» (HS854430). During the last decade, the market for this particular product experienced steady growth, moving from USD 23.3 billion in 2008 to USD 36.4 billion in 2017, representing a 5% average growth. The automotive wiring harness market is expected to reach USD 74.4 billion (EUR 65.5 billion) in 2022, experiencing a Compound Annual Growth Rate (CAGR) of 9.1%.

Wiring Sets: European Opportunities

The stagnant European market for cars causes the average age of vehicles to increase, which might lead to an increased need for spare wires on the aftermarket. At the same time, the unit production of cars in 2014 rose by 4.4%. Also, the insulation around electric wiring deteriorates over time. Spark plug wires need to be replaced periodically to prevent misfires and preserve the best performance of the engine.

The EU has a wiring consumption of EUR 11.4 billion. The demand for wires is met by production (EUR 7.6 billion) and imports (EUR 12.4 billion). With a total export value of EUR 8.6 billion, the EU is a net importer.

Source: CBI

The market has been traditionally dominated by Mexico (USD 8 billion - 20% of the world's exports), and China (USD 2.8 billion - 8). However, developing countries, such as Romania, Vietnam, Philippines, and Ukraine, have started to become important players in this market, by sourcing to big car producers, such as the US, in the case of Mexico, or Germany and Poland, in the case of Romania and Ukraine.

The key trends in this area include:

- Increasing the quality of ignition wiring sets;
- The demand for alternative wiring sets will increase further;
- More complex wiring harnesses;
- The demand for high-voltage wiring will increase;
- Environmental trends influence the use of wiring sets;
- Increasing demand for aluminium wiring;
- The 48-volt batteries will replace 12-volt batteries⁵.

With regard to production in individual countries, Germany shows something interesting. The production value of vehicle wiring in Germany halved in 2013. This may be caused by manufacturing companies moving production to other countries (such as Macedonia). Romania and Spain showed a steady increase in the value of production.

Key takeaways

- In developed countries the machinery sector is a critical contributor to employment, productivity, innovation, and trade despite the trend manufacturing companies moving production to other countries;
- The manufacturing sector, despite the rising emergence of the services economy, continues to have a predominant position worldwide: it accounts for approximately 16 percent of the global GDP and 13 percent of employment.

⁶ CBI - Exporting wiring for vehicles to Europe. CBI Market intelligence.

◇ Local perspective

Machine building, even with a significant decline in production over the past decades, is among the leading sectors of the Ukrainian industry. It is provided by other sectors of the economy, the country's population by products of industrial use (machines, equipment, tools), means of transport, household goods (cars, washing machines, refrigerators, etc.). The level of development of mechanical engineering largely determines the general state of the country's economy.

At the time of the collapse of the USSR, 100% of maize harvesters, beet harvesters and rotors, 95% of coal combines, 36.9% of electric motors, 50% of power transformers, 40% of blast furnaces and steelmaking equipment were produced in Ukraine (% of the total Union indicator). 26,3% of agricultural machinery, 29.6% of excavators, 35.8% of televisions, 28.6% of tape recorders. Ukraine was also a major producer of airplanes, freight cars, buses, sea vessels etc. According to the range of products, the number of branches of machine building Ukraine practically did not yield to the majority of European countries, including developed. In 1990, machine-building accounted for 32.9% of the total industrial output of Ukraine, 43.1% of industrial production personnel and almost 28% of the value of fixed assets.

During 1991-1998, the share of machine building in the structure of industrial production in Ukraine decreased from 38.7% to 15.1%, while the share of workers in the industry was 40% to 14%. According to the estimates of the scientists of the Council for Ukraine's Productive Forces Studies of the National Academy of Sciences of Ukraine in 1998, the physical output of mechanical engineering was only 10% of the 1990 figure. The scale of the decline in the production of certain types of products was very striking. Thus, during 1990-1998 production of tape recorders decreased by 74 times, color TVs - by 400 times.

In recent years, the machine-building industry in Ukraine is developing very unevenly. Relatively successful (2004-2008) periods are replaced by periods of a significant drop in production volumes. The revival of the industry is selective.

However, even if there is a significant reduction in production, machine building of Ukraine is a rather powerful, investment-attractive branch of the country's industry. It includes almost 1.5 thousand diversified enterprises. In engineering, more than 22% of the main industrial assets of the industry are concentrated and employs about 400 thousand workers (20% of full-time industry workers). Machine-building enterprises produce almost 3,5 thousand names of machines and equipment, and the technical means produced on them allow to mechanize up to 85% of work in agriculture.

The export potential of the industry remains rather significant, although the export structure is predominantly represented by machinery and equipment of average complexity (boilers, agricultural machinery, transformers, turbines).

According to a National Bank of Ukraine survey on Ukraine's balance of payments, the share of machinery, equipment, vehicles and devices in the structure of Ukrainian merchandise exports declined from 16.4% in 2007 and 14.4% in 2013 to 7.2% in 2017.

The main indicator of the significance of any production in the country's economy is its share in the structure of industrial production. As of 2017, machine-building accounts for only 6.4% of industrial production.

◇ Structure of the machinery sector in Ukraine

Machine-building is a combination of many industries, the interaction between which gives grounds to talk about the existence of the same complex. In total, about 60 structural divisions are allocated to the engineering industry. The enlarged units, which are divided into smaller subdivisions, include heavy, transport, agricultural, energy, electrical, and technological engineering.

The leading positions in the structure of machine-building in 2017 were automotive production (36.8%) and machinery and equipment not belonging to other groups (35.5%).

The analysis of the more detailed structure of machinery, which is presented in the reports of the State Statistics Service of Ukraine, suggests that the leaders of this branch were the production of electric motors and transformers (6.7%), general-purpose machinery and equipment (10%), railroad cars and locomotives (9.2%), motor vehicles and trailers (13.9%).

Placement of machine-building enterprises is determined by the influence of many factors – consumer, raw material, labor resources, etc. Since there are quite a lot of machine-building sub-sectors, they can be classified according to the location of enterprises.

For example, enterprises in the production of electrical engineering, devices, aircraft, rocket and space technology in their placement are guided by skilled personnel. Instead, the placement of such sub-sectors as shipbuilding, agricultural machinery is determined by the influence of the consumer factor.

The development of scientific and technological progress, globalization processes, the effect of market factors make adjustments to the placement of mechanical engineering enterprises, cause the transformation of its branch structure, the change of the specialization of individual enterprises, the peculiarities of forming cooperative ties in the composition of industrial units etc.

◇ Machinery trade in Ukraine

The lion's share of machine-building products was exported to Russia.

Table 1. Export of machine-building products, mln. US\$

	2017	Share of machinery in total export of the sector / sub-sector in 2017, %
Export of machine-building products	5054,3	100,0
GENERAL MACHINERY	1427,1	28,2
Heavy machine building	1004,0	19,9
Machine-tool construction	22,9	0,5
Production of equipment for light and food industry	216,0	4,3
Power machine building	85,0	1,7
Agricultural machine building	82,2	1,6
Tractor machine building	17,1	0,3
TRANSPORT MACHINE BUILDING	608,8	12,0
Airspace manufacturing	29,0	0,6
Automotive	115,6	2,3
Railway engineering	219,7	4,3
Shipbuilding	244,5	4,8
Precision engineering	2794,3	55,3
Electronics	628,3	12,4
Electrical engineering	2011,8	39,8
Instrument making	154,2	3,1
Other types of machine building	224,0	4,4

Table 2. Main product items in export of machinery sector

Name of the commodity item	2013, mln US \$	2017, mln US \$	Product share in total export of industry in 2013, %	Product share in total export of industry in 2017, %
Export of machine-building products, total	10391,7	5054,3	100	100
Insulated wires, cables	1081,1	1318,1	10,4	26,1
Engines turbojet	1058,4	434,5	10,2	8,6
Accumulated electric water heaters	96,1	245,7	0,9	4,9
Telephone sets and parts	56,5	236,0	0,5	4,7
Cruise ships, excursions	44,3	206,4	0,4	4,1
Parts to railway locomotives	513,6	154,3	4,9	3,1
Pumps for liquids	287,2	124,1	2,8	2,5
Electric transformers	404,0	94,7	3,9	1,9
Electrical apparatus for switching or protecting electric circuits (relay type)	120,6	93,1	1,2	1,8
Air or vacuum pumps	224,3	83,4	2,2	1,6
Ball or roller bearings	124,5	82,2	1,2	1,6
Engines and generators, electric	192,7	72,2	1,9	1,4
Parts for equipment of commodity positions 8425-8430	164,6	71,1	1,6	1,4
Transmission shafts	127,3	71,0	1,2	1,4
Parts and appliances of motor vehicles of commodity positions 8701-8705	115,8	67,2	1,1	1,3

Table 3. Export dynamics of Ukraine's machinery products

Назва товарної позиції	2013, mln US \$	2017, mln US \$	Product share in total export of industry in 2013, %	Product share in total export of industry in 2017, %	Growth, 2017 by 2013, mln US \$
Export of machine-building products, total	10391,7	5054,3	100,0	100,0	- 5337,5
Insulated wires, cables	1081,1	1318,1	10,4	26,1	+237,1
Telephone sets and parts	56,5	236,0	0,5	4,7	+179,5
Cruise ships, excursion	44,3	206,4	0,4	4,1	+162,1
Accumulated electric water heaters	96,1	245,7	0,9	4,9	+149,6
Disks for storing information	8,1	31,3	0,1	0,6	+23,2
Printing equipment	23,9	39,2	0,2	0,8	+15,2
Electric shavers, hair clippers	3,4	14,9	0,0	0,3	+11,6
Lighthouses floating, firefighting, dredgers	1,7	9,5	0,0	0,2	+7,8
Baby carriages and their parts	0,5	5,5	0,0	0,1	+5,0
Nuclear reactors	13,0	17,6	0,1	0,3	+4,6
Electroacoustic equipment	12,2	15,6	0,1	0,3	+3,4
Glasses, safety glasses	0,7	3,5	0,0	0,1	+2,8
Carbon electrodes	32,5	34,1	0,3	0,7	+1,6
Machines for the preparation of textile fibers	0,6	1,9	0,0	0,0	+1,3
Image projectors	0,1	1,2	0,0	0,0	+1,1
Electronic integrated circuits	8,9	9,9	0,1	0,2	+1,0

Table 4, Table 5.

Consuming countries with the most growing import of Ukraine's machinery products, 2017 compared to 2013

Country	mIn US \$ 2017 year	Country's share in total exports, %
Total	5054,3	
EU	2685,3	6,2
Russian Federation	1109,8	2,6
China	215,2	0,5
Belarus	123,9	0,3
India	102,8	0,2
Moldova	92,5	0,2
Kazakhstan	83,2	0,2
USA	53,8	0,1
Marshall Islands	48,9	0,1
United Arab Emirates	44,2	0,1
Turkey	34,6	0,1
Georgia	30,2	0,1
Saudi Arabia	28,9	0,1
Uzbekistan	24,5	0,1
Pakistan	23,2	0,1

Country	Growth, mIn US \$
Total	+5337,5
EU	+556,3
Marshall Islands	+48,0
Saudi Arabia	+27,4
Pakistan	+15,6
Panama	+14,4
Liberia	+13,3
Ethiopia	+13,2
Bahamas	+13,2
Canada	+8,4
Belize	+6,7
Algeria	+6,1
Mexico	+5,3
Bangladesh	+4,6
Indefinite countries	+4,5
Moldova	+4,1
Kuwait	+4,1
Guinea	+3,5
Colombia	+3,3
Seychelles	+3,1

The rapid switch towards the EU, away from Russia, brought quite a lot of convergence issues, i.e. technical standards. At the end of 2017, there were identified products/sectors where Ukraine's market share in the EU was significantly less than its market share in world markets, despite the substantial benefits of the DCFTA. Ukraine's industrial sectors that were underperforming in the EU, despite the presence of tariff preferences under the DCFTA are captured in Table 6.

Table 6. Ukraine's industrial sectors underperforming in the EU

	Ukraine Exports to the World (€ mn)	Ukraine's export to the EU (€ mn)	Share of Ukraine exports to EU compared to share in World imports
Pumps for liquids (HS 8413)	149,2	6,7	0,66
Electric motors and generators (HS 8501)	88,4	1,1	0,11
Taps, cocks, valves (HS 8481)	79,0	5,1	0,74
Machinery, plant or laboratory heating equipment (HS 8419)	63,3	3,0	0,65
Radar Apparatus (HS 8526)	39,1	0,9	0,16
Stoves, ranges, grates, cookers, and parts thereof of iron or steel (HS 7321)	18,3	1,3	0,56
Air Conditioning machines (HS 8415)	18,1	0,1	0,10
Gas, liquid or electricity supply meters (HS 9028)	17,5	0,03	0,02
Total	472,9	18,23	

The reasons for «underperformance» could relate to policies in Ukraine, internal industrial problems in Ukraine, the AA/DCFTA regime itself, or market issues within the EU.

Main obstacles for machine building export in Ukraine

Inaccessibility of funding is often cited among the main obstacles to export development. Funding is required for the acquisition of fixed assets, as well as for the expansion of working capital for new orders. The obstacles are the high cost of loans and the limited timeframe for which they are issued.

The lack of workforce is the second problem. It involves a shortage of both highly skilled and low-skilled workers. The reason for this is labor migration, the presence of large labor-intensive enterprises and the lack of supply of labor from local vocational schools and universities.

The lack of state support ranks third. The industry suffered the most from the loss of the Russian market, which accounted for more than 60% of sales by 2014. As of 2018, enterprises in this sector were not able to fully compensate for these losses. Access to the European market remains a challenge due to product certification requirements in the absence of local certification laboratories accredited in accordance with EU standards, as well as high competition in European countries. Enterprises complain about the lack of government procurement, in particular, in the defence sector, opaque tenders, and the lack of a mechanism for government support to reduce financing costs, in particular through leasing programs for the purchase of domestic machine-building products.

Key takeaways

- The machine-building industry in Ukraine in recent years has developed very unevenly.
- The rapid switch towards the EU, away from Russia, has brought to light significant convergence issues on technical standards.
- Funding is required for the acquisition of fixed assets, as well as for the expansion of working capital for new orders. The obstacles are the high cost of loans and the limited timeframe for which they are issued.
- There is a shortage of both highly skilled and low-skilled workers.
- There is an absence of detailed and reliable statistics that can be used to inform industrial policies.

SECTOR DIAGNOSTICS

A country's competitiveness depends on a number of factors that impact the capacity of its firms to compete in the marketplace, connect with its customers and adapt to the changing environment. For an export strategy to be effective, it must address a broader set of constraints across all three dimensions of competitiveness. Figure 6 illustrates the integrated approach of the SME Competitiveness Grid framework.

Figure 6: The SME Competitiveness Grid

Pillars of competitiveness	Compete	Quantity and Cost Requirements
		Logistics requirements
		Quality requirements
	Connect	Connecting to buyers
		Connecting to suppliers
		Connecting to institutions
	Change	Financial requirements
		Skills requirements
		Innovation and IP requirements

◇ Compete in national and foreign markets

Compete is the static dimension of competitiveness. It assesses whether current production is efficient and meets market requirements.

Box 1: Competitiveness constraints: Compete

Compete in national and foreign markets

Quantity and cost requirements

- Outdated production methods and equipment are widely used in the sector.
- Labor taxes have a large negative impact on the competitiveness of the products.
- The high cost of electricity and its unreliability does not suit the needs of the firms.
- Tariffs on key imported intermediate products erode the competitiveness of the sector.
- The border compliance costs when importing components and exporting final products are high.

Time requirements

- The local business culture shows little respect for deadlines.
- Customs clearance procedures are very long and do not satisfy the time requirements of the sector.
- The existing regulations on foreign exchange holdings penalize trading companies.

Quality requirements

- The lack of adequate infrastructure of certification laboratories raises the costs for the firms.
- Manufacturing firms struggle to comply with international technical regulations and widely accepted standards.

Quantity and cost requirements

Outdated production methods and equipment are widely used in the sector. Companies not being able to such equipment explain the absence of new methods of production. The lack of technical competences of the firms affects the competitiveness of the products. For example, agriculture machinery and traction subsectors use low tier technologies. Imported inputs play an important role.

Technologies used are outdated and lagging the European industry, especially modern equipment with integrated control technologies and meeting tough energy efficiency requirements. Years of the crisis have strained adaptive capacities of many machinery producers (i.e. pumps, electric motors and generators, taps, cocks, valves, heating equipment) and blocked innovation. Without funding and industrial upgrading, the production of those goods remains outdated and not competitive on a long-run.

Plan of Action reference: Activity 1.1.2, 1.3.2, 1.3.3 and 3.1.1.

Labour taxes have a large negative impact on the competitiveness of the products. Taxes represent roughly half of the salary of the workers. In turn, salary costs represent almost three-quarters of total production costs in the sector.

Plan of Action reference: Activity 1.1.1.

The high cost of electricity and its unreliability does not suit the needs of the firms. Energy is expensive and unreliable. The problem is particularly acute in the connections to the grid (the last-mile delivery of electricity). In addition, the time it takes firms to connect to the grid is very high. It can take up to 3 months for the utility company to process an application.

Through not transparent mechanisms, an energy monopoly has been formed; thus access to energy for businesses is said to be difficult, and costly. In some parts of Ukraine, infrastructure

constraints hinder further development (mainly, bad roads). Ukrainian Railways is also slowly expanding its rolling stock to accommodate larger shipments towards Europe (not enough container capacity).

Plan of Action reference: Activity 1.1.4.

Tariffs on key imported intermediate products erode the competitiveness of the sector.

The high cost of imported inputs hampers the production capacity of domestic enterprises and significantly raises their cost structure. The sector has a high propensity to import given the fact that many components have to be sourced internationally. For example, many of the components for the domestic production of agricultural machinery are imported. Local products cannot compete with imported products on quality, quantity, cost, or variety. Furthermore, foreign inputs are expensive due to the high cost of transportation, high import duties, and other charges. The tariff policy is not aligned with the development of the sector. Intermediate goods are taxed heavier than final goods. Under the Deep and Comprehensive Free Trade Areas (DCFTA), the tariff is 0% on imported spare parts (down from 5%): what is a significant advantage.

Plan of Action reference: Activity 1.1.3.

The border compliance costs when importing components and exporting final products are high. This limits the capacity of the firms to outsource effectively. The procedures for customs clearance, inspections by other agencies, port or border handling, and the processing of document are very costly and time-consuming. Competitors like Hungary and Poland do not face this type of situation.

Plan of Action reference: Activity 3.1.4.

Time requirements

The local business culture shows little respect for deadlines. Deadlines do not matter. Delivery times of suppliers are not respected because the legal enforcement of contracts is precarious.

Plan of Action reference: Activity 3.1.5.

Customs clearance procedures are very long and do not satisfy the time requirements of the sector. Informality at the customs and ports affects the competitiveness of the sector. One-stop-shop/customs: high levels of corruption. Outdated inspection equipment and other customs clearance issues cause frequent delays in the delivery of components and parts. The single window is not fully implemented, and as a result, there is no one-stop-shop. For the time being, it is only a cabinet decision, not a law. Lack of Authorized Economic Operators programme. Although the proposal exists, it has not been ratified, enacted or put into effect. Customs/trade facilitation-service offering for transport repairs.

Companies find it very hard to provide extensive warranty and services in the EU as export procedures in Ukraine take too long (up to one week). Maintaining a stock of spare parts in the EU is too onerous because the export volume is still small. Customs also put severe constraints on returned, used parts to be returned and serviced in Ukraine.

Plan of Action reference: Activity 3.1.4.

The existing foreign exchange regulations remain a significant risk factor for the sector's enterprises. Despite the currency control liberalization efforts, it should be noted that practical result thereof still cannot serve as grounds to rule out related risks. Indeed, currency control is being changed sporadically and unexpectedly; often results thereof does not meet the expectations of the business. Therefore, sustainable policy on the liberalization of the currency control regulations remains on the agenda.

Plan of Action reference: Activity 2.2.2.

Quality requirements

The lack of adequate infrastructure of certification laboratories raises the costs for the firms. Products have to be sent to Hungary or Poland for certification. This takes time and it is costly. As a result, competitiveness is affected. Lack of domestic laboratories to carry out the certification process. The MEDT has a Technical Regulation Department for conformity acceptance system that is currently negotiating an EU-UA MRA for conformity assessment. The agreement with the EU would cover equipment: Low voltage/ Electromagnetic / Pressure. Any equipment produced in these sectors would be recognised in the EU. Certification of

compliance is demanding (takes up to 3 months), is very helpful for the industry. The export promotion office does not support SMEs on customs issues, technical requirements, or certification.

Plan of Action reference: Activities 1.1.1, 2.1.3, 2.1.6, and 3.1.1.

Manufacturing firms struggle to comply with international technical regulations and widely accepted standards. The production meets domestic regulations, but the local certification body is not internationally accredited. Firms complain of the lack of information on certification. Complying with Rules of Origin is not a problem. Obtaining certificates of origin is not problematic. The problem relates to testing, assurance, and complying with TBTs and SPS requirements. The absence, or limited availability, of certified bodies and laboratories, exporters are forced to seek the competent international expertise of accredited inspection, product testing and certification companies to have their products certified. These costly services contribute to the high certification costs faced by local operators.

This issue is particularly acute for EU technical standards. Companies struggle to understand EU Technical standards. These are often considered expensive and onerous to apply. There is no awareness that the EU often applies self-certification, and no further laboratory testing is required. Ukraine's National Accreditation Agency (NAAU) is not yet Member of the European Committee for Standardisation (CEN). An additional constraint is seen in industry standards, not only Government standards stipulated in EU legislation; eventually, such standards might require «digital» processing while companies in Ukraine do still «analogical» work. Companies might need to buy the standards before having found clients for their products; thus Ukrainian producers are reluctant to spend their last cash-flow on those standards.

Plan of Action reference: Activities 1.1.5, 1.2.2, 3.1.1, and 3.2.2.

◇ Connect to suppliers, markets and clients

Connect is the connectivity dimension of competitiveness. To be competitive, enterprises must link to customers, businesses, institutions, and be literate in information and communications technology.

Box 2: Competitiveness constraints: Connect

Business environment constraints
Connecting to buyers <ul style="list-style-type: none">• Trade promotion activities linked to the machinery and engineering sectors are suboptimal.• Ukrainian products enjoy a generally poor reputation in the foreign markets.• SMEs do not rely on market research and analysis to make strategic decisions on target markets.
Connecting to suppliers <ul style="list-style-type: none">• There is no mapping or registry of the locally produced machinery parts and components.• The lack of cooperation and trust among firms hinders the development of clusters and linkages among different subsectors.• Lack of adequate facilities to dispose of industrial waste.
Connecting to institutions <ul style="list-style-type: none">• Adequate intelligence on the machinery sector at the national government level is missing.• The efficiency and responsiveness to SME needs of the business associations is low.• The policy responsiveness of the government does not take sufficiently into account the preferences of the firms.• The firms expect the trade support network to offer them different services.

Connecting to buyers

Trade promotion activities linked to the machinery and engineering sectors are suboptimal.

This limits contacts and linkages with potential foreign customers. The absence of promotional activities combined with weak state participation and funding towards attending trade fairs limits the visibility and awareness of Ukrainian industrial products abroad. SMEs cannot afford to fund their own participation in trade missions and fairs.

Plan of Action reference: Activities 2.1.6, 3.1.2, and 3.1.3.

Ukrainian products enjoy a generally poor reputation in the foreign markets. Ukraine has a bad reputation. The level of trust of Ukrainian products in traditional EU markets is low. Buyers also fear the lack of protection from a judiciary system perceived as inefficient. Language and even cultural differences are also important barriers for managers to conduct business beyond Eastern Europe.

Plan of Action reference: Activity 3.1.3.

SMEs do not rely on market research and analysis to make strategic decisions on target markets. SMEs are not aware of the return on investment of research and analysis. They find it costly and challenging to carry out, because poor knowledge of data sources. They expect the state to support them with market intelligence. However, firms do not value this information, and therefore do not request it from the government. Firms are largely unaware of support programmes offered by the EBRD and EPO.

There are also administrative impediments. For example, when it comes to accessing the Public Procurement market in the EU. Companies complain that despite having the chance to bid in EU public procurement, their chances are minimal as several preconditions like submitting revised accounting for three years according to «Generally agreed accounting principles» (GAAP). Ukrainian companies usually use other accounting principles, thus participating in EU PP would require them to redo the whole accounting system.

Plan of Action reference: Activity 1.3.2.

Connecting to suppliers

There is no mapping or registry of the locally produced machinery parts and components.

The absence of a central platform identifying companies, their products and services by subsector represents a cost for the firms in the entire machinery sector. There is a high transaction cost on the identification of suitable suppliers of specific parts. Often firms end up making poor choices for lack of knowledge of suitable and/or more affordable alternatives.

Plan of Action reference: Activity 1.2.1, 3.1.1, 3.1.5, and 3.2.1.

The lack of cooperation and trust among firms hinders the development of clusters and linkages among different subsectors. Existing relations along the value chain could be better exploited to generate additional business opportunities. The lack of trust among producers constrains the development of clusters. At the policy planning level, linkages among the different economic sectors are not encouraged. Mistrust in Government and Associations: This leads into a sort of stalemate as many companies will not react anymore with Government solicitations, making it also hard for the Government to consult and adopt policies to the need of business community (which is one of the main wishes from the latter).

Plan of Action reference: Activity 1.3.1, 3.1.5.

Lack of adequate facilities to dispose of industrial waste. The suppliers of such services are not very developed. The legislation to support these practices is underdeveloped.

Plan of Action reference: Activity 1.1.5.

Connecting to institutions

Adequate intelligence on the machinery sector at the national government level is missing.

Statistics on machinery and engineering firms are weak and not made widely available. The MEDT can access the existing data but cannot make it further available. There are no improvements in data collection, coverage, and frequency. This is particularly important for production data. Incapacity to identify trends, receive and process statistical data, and

distribute it timely and adequately, limits the capacity of policymakers to design adequate policies to support firms. The absence of an open data platform makes it difficult for enterprises to obtain relevant statistics and market information.

Plan of Action reference: Activity 1.3.2.

The efficiency and responsiveness to SME needs of the business associations is low. The agenda of the associations is captured by the weight of monopolistic companies and oligopolistic practices. Associations do not have capabilities to provide advisory services, although some exceptions exist (mainly related to training, etc.). Associations are mainly used for lobbying. Some efficient associations exist, but the quality of the messages is not high. For example, Donetsk's Chamber of Commerce is helping companies to find export markets and provide training to members on a paying basis. A Business Association for machine building «Ukr mashbud» exists to use resources better, exchange experience and to lobby (the club has 30 members). The gap between the authorities and businesses has narrowed, but it is still significant. Need to foster the creation of business associations and to improve their management. Businesses and enterprises lack trust in local associations.

Plan of Action reference: Activity 2.1.6.

The policy responsiveness of the government does not take sufficiently into account the preferences of the firms. In many aspects that affect the operations of the firms, there are no local representatives in the production areas - they are all in a central location in Kyiv. The dialogue between MEDT and the business community is not always efficient. There are gaps in the understanding of the government of the needs of the industry. However, the firms are also aware that their ability to articulate their needs and voice them at the policy level is also a problem. For example, there has been no government response to resolve the long-standing issues on tax invoices. Lack of government support on investment in the advertisement. Trade representatives in embassies do not provide services to exporting SMEs.

Plan of Action reference: Activity 2.1.3.

The firms expect the trade support network to offer them different services. The trade support institutions provide a number of services that can facilitate enterprises operations. However, most firms do not use them because they are either not aware of these services offered or they find them not suitable to their needs. There is a gap between the Export Promotion Office (EPO) and the businesses on the understanding of the kind of information that firms need. Firms prioritize identification of new partners, first communications and contacts, information on market requirements, and potential market analysis.

Adequate export support institutions and instruments still missing: companies deeply criticize that Ukraine has not yet implemented an export guarantee scheme although the law (the «Law of Ukraine on Providing for Large-Scale Export Expansion of Goods (Works, Services) Originating in Ukraine through Insurance, Guarantees and Cheapening of Export Credits») was adopted several years ago. Thus, Ukrainian companies cannot operate on the same footing as their EU competitors.

Plan of Action reference: Activity 2.1.4, 2.2.1.

◇ Changes, innovations and new trends

Change is the dynamic dimension of competitiveness. It assesses whether enterprises have the capacity to make human and financial investments to adapt to fast-changing markets.

Box 3: Competitiveness constraints: Change

Changes, innovations and new trends

Financing requirements

- Enterprises have limited access to affordable long term financing, which constrains the development of the sector.
- The existing regulations do not allow firms to offer loans to their clients.
- Lack of coordination, collaboration, and alignment for institutional support between trade and investment support institutions.

Skills requirements

- A mismatch exists between the skills that firms require and those that the educational system produces.
- Firms lack required management skills in areas such as marketing, budgeting, planning, and customer service.
- Qualified technicians and engineers migrate to competing sectors and countries offering better salaries.

Intellectual property and innovation requirements

- Firms are not sufficiently aware of how research and analysis can add value to their businesses.
- The absence of incubation or acceleration/support system hinders the creation of start-ups and new enterprises.
- The absence of a long-term pro-innovation culture exacerbates the concentration of the offering of the sector.

Financing requirements

Enterprises have limited access to affordable long term financing, which constrains the development of the sector. Despite a large number of financial services providers in Ukraine, access to finance poses a constraint to the businesses because of high-interest rates and difficulties to comply with the high collateral requirements that banks require. Financial institutions value working machinery assets as scrap metals and demand high levels of collateral and offer short deferment periods⁶. Consequently, firms find it very difficult to purchase new equipment. State support is supposed to be channelled through the Export Credit Agency, but the agency has not been launched yet, and there are fears that it could be underfunded.

Ukrainian SMEs find it very hard to get access to finance, and when they do, it is too costly as interest rates are very high. Companies are financially strained after years of crisis and without adequate financing instruments, are not able to upgrade their products/production or explore new market opportunities.

Plan of Action reference: Activities 2.2.2, 2.2.3, and 3.1.2.

The existing regulations do not allow firms to offer loans to their clients. Firms cannot offer even 180-day credits. Competitors in neighbouring countries extend credit to their clients. In addition, there are problems with the refund of VAT to the enterprises. With the current VAT scheme, the reimbursement procedures can take up to two years. Already financially strained companies run into great troubles because their money is unnecessarily helping back in bureaucratic reimbursement procedures. Companies also complain that investment goods are taxed, with the exception of foreign direct investment, creating an unfavourable market for local enterprises.

Plan of Action reference: Activity 1.1.2.

Lack of coordination, collaboration, and alignment for institutional support between trade and investment support institutions. The limited cooperation and coordination between multispectral agencies and entities result in a lack of a single vision to support trade development and poor planning of trade-related activities. There is no policy/no strategy in place to guide government agencies efforts, which leads to misallocation of resources. In addition, the insufficient level of institutional support and lack of structured dialogue between state authorities and businesses encumbers the development of the private sector.

Plan of Action reference: Activities 1.1.1, 1.1.2, and 2.1.3.

Skills requirements

A mismatch exists between the skills that firms require and those that the educational system produces. The educational infrastructure including Technical and Vocational Education

⁶ For example, a firm with more than 60 million on sales is only able to obtain 1 million overdraft.

and Training (TVET) and tertiary education are underdeveloped to cater the needs of the industry. For example, there is no engineering centre for dedicated consultations. Areas such as electronics, automation, robotics or aviation are not covered. Qualified labour-force with managerial competencies are scarce. When graduates enter the job market, they have little to no practical experience due to minimal opportunities of apprenticeship during their studies. For example, graduates seldom have sufficient knowledge to forecast resource expenditure.

Plan of Action reference: Activities 1.2.4, 2.1.1, 2.1.2, and 2.1.4.

Firms lack required management skills in areas such as marketing, budgeting, planning, and customer service. The limited availability of human resources with effective client-oriented managerial skills results in inefficient workflow management. The lack of capacity building initiatives to introduce new methods of production and technology and few on-the-job training to build skills, hinder human capital expertise and experience. Limited availability of affordable quality training for existing exporters and producers hamper their development competencies. Human resources with outstanding English skills are scarce.

Plan of Action reference: Activities 2.1.5.

Qualified technicians and engineers migrate to competing sectors and countries offering better salaries. The development of the tourism sector has affected the capacity of the machinery sector to retain qualified workers. Labour force has left the industry to work in the tourism and hospitality sectors. In addition, there is a brain drain issue where qualified individuals migrate, mainly to EU countries. The problem disproportionately affects the youth. The gender gap in the sector is vast.

Labour migration is felt by companies as impacting the competitiveness of Ukraine negatively. Companies fail to recruit qualified workforce, also due to the salary gap between neighbouring EU countries. In addition, companies that would be willing to hire their own apprentices criticize the existing vocational education and training (TVET) programme and related handling of approvals by the Ministry of Education and Science of Ukraine (MES). It is also underpinned that technical and vocational education is not focused on market needs. TVET in Ukraine is more focussed on technical schools than an apprenticeship in companies.

Plan of Action reference: Activity 1.2.3, and 1.2.4.

Intellectual property and innovation requirements

Firms are not sufficiently aware how research and analysis can add value to their businesses. At the institutional level, there is a general lack of cooperation and coordination between the business community and universities. Firms do not take advantage of the consulting opportunities offered by universities, think tanks or research institutes. This contributes to the perceived low pace at which changes are implemented, and innovation takes place in the sector.

Plan of Action reference: Activities 3.1.3, and 3.2.1.

The absence of incubation or acceleration/support system hinders the creation of start-ups and new enterprises. Currently, there is no organized business incubation programme for the machinery sector that can provide physical infrastructure and support services for firms. There is also no specific agency with a mandate to assist with the development of business incubation, promotion and facilitation of knowledge creation, innovation and entrepreneurship activities.

Plan of Action reference: Activities 1.2.3, and 1.2.4.

The absence of a long-term pro-innovation culture exacerbates the concentration of the offering of the sector. There is no innovation strategy based on incentives and rewards for businesses adopting innovative approaches. Firms face multiple difficulties to innovate: lack of financial resources and human capacity are among them. However, more importantly, policymakers lack a conceptual framework for how innovation in the sector is to take place. In the absence of adequate innovation policy, it is complicated to generate the right conditions to ensure that firms find it profitable to invest in innovation.

Plan of Action reference: Activity 3.1.5.

THE WAY FORWARD

Based on the comprehensive analysis of the machinery sector in Ukraine, the «way forward» lays down the key strategic framework of the sector strategy comprising the vision statement, the strategic and operational objectives, a selection of priority sectors and cross-sector functions, as well as the Plan of Action.

◇ Vision and strategic objectives

To guide the implementation of the sector Strategy in the next three to five years, the vision statement set out below has been formulated and agreed upon by stakeholders who participated in the consultations for the design of this Strategy⁷. It represents the ambitions of the country as well as a consensus among stakeholders over the role of the machinery sector's exports in the Ukrainian economy today and in the near future.

The following is a delineation of the proposed vision and strategic approach in this direction agreed with all national stakeholders.

«Creating an innovative and modern machinery sector in Ukraine connected to GVCs as a reliable partner»

To realize the vision statement, strategic objectives have been formulated which provide orientations that are to guide the implementation of the Strategy in the three strategic areas where the action is required over the following five years to bring about changes. The three strategic objectives are as follows:

1. To improve the basic conditions to produce exportable machinery products and services

Enterprises require a conducive business environment to be able to put together the right offering. This creates important challenges for policymakers and businesses alike. When the aim is to produce products that can compete in the international markets, these challenges become even more critical.

This strategic objective aims at the constraints currently impacting the production of an adequate offering of machinery products that can compete internationally. To ensure the long term development of the sector, the emphasis is placed on creating the right conditions for entrepreneurship and innovation to take off in the mid-term.

At the operational level, the following sub-objectives have been conceived:

- **Stimulate the production of an exportable machinery offering.** The Ukrainian machinery sector needs some major upgrading. The first areas that require priority intervention have to do with fundamental productive issues. In addition, removing barriers and unnecessary burdens or regulations on the firms and potential investors is a priority while ensuring that good governance and convergence to EU regulations in areas such as VAT and foreign exchange holdings prevails. The way forward involves adapting existing trade regulations by cutting red-tape and reducing bureaucracy.
- **Enhance entrepreneurship in machinery.** Attracting young people to machinery-related education programmes and develop opportunities for expatriated Ukrainian talent. For the sector to survive into the future, it is crucial to increase its capacity to attract students who want to develop their career in a machinery-related field. Women, in particular, are currently very underrepresented in this domain. This includes both university training and Technical and Vocational Education and Training (TVET). This operational objective includes offering opportunities for expatriated Ukrainian talent and expertise. In the long run, growth hinges on the capacity to retain competencies and know-how locally.

⁷ These consultations took place in Kyiv during the June, September and November of 2018. Key stakeholders of the machinery sector discussed aspects related to trade and export performance, regulations, the innovation and investment framework, the institutional landscape, development plans, and the light machinery competitiveness constraints.

- **Promote innovation in the machinery sector.** The way forward involves doing new things and adapting existing processes to become more competitive. Existing best practices in the sector should be widely publicised and extended.

An outstanding business environment eases the effort for entrepreneurs and investors, boosts firms' competitiveness, and lowers the cost of doing business in the country. It is crucial that competitiveness moves hand-in-hand with broad socio-economic development. This translates into ensuring that the benefits of export-led growth trickle down to the entire population. Particularly for the young and most vulnerable segments of the population.

2. To strengthen the competitiveness of the machinery sector in foreign markets

The relatively small size of the national market restricts the opportunities for local firms to grow and exploit economies of scale. Hence, the sector needs to be outward-looking to grow. Overseas growth opportunities will only be seized with adequate regulations that are consistent with those of the target markets. Regulatory harmonization with the EU is a critical topic for the sector.

A combination of home-grown capacity enhancements with selective knowledge and capacity-enhancing foreign investments is proposed as the way forward. This strategic objective directly aims at attracting selective investments in the short term while strengthening the competitiveness of the business environment in short to medium term. A key component of this objective consists of ensuring that foreign investments stimulate innovation, economies of scale and an improved business environment. In the long run, fostering collaborations on innovation between enterprises and educational institutions is a key element of this strategic objective. A strong branding initiative and marketing effort can help to support this objective.

At the operational level, there are the following sub-objectives:

- **Strengthen the human capital and provide value-adding services and infrastructure to enterprises in the machinery sector.** This operational objective is about improving the quality of business and trade support services offered to exporting firms. The sector needs a coordinated network of institutions that provide effective, value-adding and affordable services. The way forward also involves ensuring effective decision-making through better data collection and dissemination for policy-makers, investors, and businesses. In addition, this operational objective also focuses on improving the quality of the training and technical education in machinery-related fields. This includes medium education as well as certified training. The training dimension of the Strategy should also focus on enhancing the skills, knowledge, and competencies required to succeed in international markets. This would consist of strengthening the skills and competencies that managers need to engage in international trade;
- **Expand the financial capacity of the machinery sector and its capacity to attract investors.** Attracting financing and knowledge and capacity-enhancing foreign direct investment in the machinery sector. This operational objective consists of improving the investment attraction capacity with the aim to expand the sector and to retain value-added locally. The way forward consists of partnering with international firms to invest in Ukraine.

A long term view of this strategic objective would involve Ukraine improvements in the regulatory environment will reduce the regulatory burden and the costs of doing business for the firms. Expanding the national productive capacity requires strengthening the firms to be able to produce and to sell their services profitably.

3 To activate the integration of machinery sector producers into Global Value Chains (GVC)

Improving export competitiveness ultimately hinges on the capacity of Ukrainian firms to plug into existing and future international value chains. Given the geographical proximity to the countries that offer GVC opportunities and the success of neighbouring EU countries in tapping into these opportunities, Ukraine's machinery sector has plenty of opportunities in this area.

This strategic objective specifically targets customs' transit duration and procedures. In parallel, the sector needs to establish long-term partnerships with international players that can pave the way towards GVCs. Ensuring the formation of competitive clusters is a key component of this objective.

At the operational level, there are the following objectives:

- **Integrate the machinery sub-sectors into Global Value Chains.** International value chains offer untapped upgrading opportunities for Ukrainian machinery products. Over time, this operational objective will contribute to re-build the good reputation of the national machinery industry.
- **Develop strong clusters in machinery.** Clusters are efficient structures for companies in related areas of work to share prosperity. Working together, the sector will be able to make further inroads into GVCs than firms operating by themselves. This operational objective is about laying out the foundations for the machinery clusters.

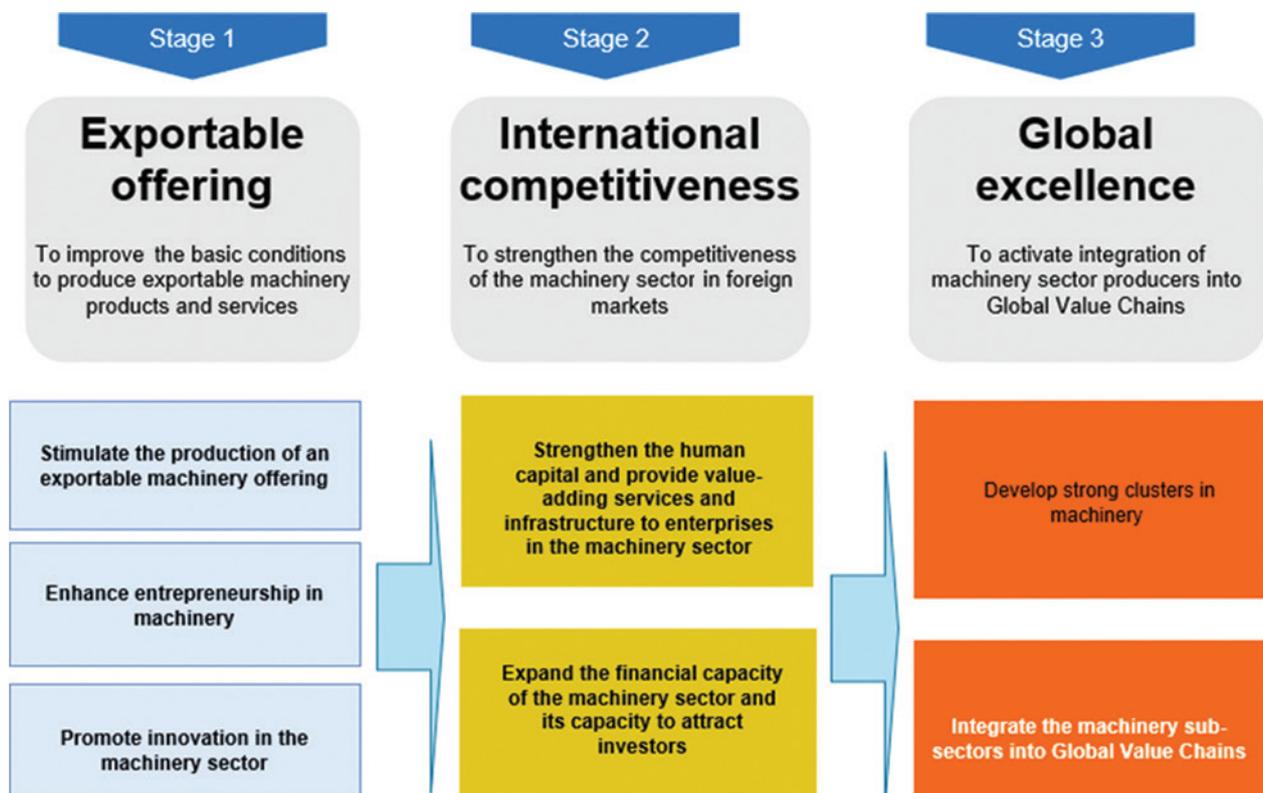
Working together the machinery sector firms have a better chance of entering international value chain trade. This objective focuses on creating opportunities for GVC trade among Ukrainian firms.

◇ Development trajectory

From a strategic standpoint, the rationale for focusing on a concrete set of objectives over others has a lot to do with the type of development process that the Strategy intends to trigger. In a way, the choice of objectives determines the type of developmental process that will follow. This is the reason why the objectives have taken into consideration not only the potential for export expansion but also seek to have an impact on overall development areas such as stopping “brain drain” and fostering intangible assets like the reputation of the country.

Figure 7 outlines the relation between the strategic and operational objectives. It also provides an overview of the sequencing of strategic actions. The first and second operational objectives (Stages 1 and 2) are intended to be implemented almost simultaneously in the first place. The final one can be implemented at a later stage. Let’s review the process in more detail below.

Figure 7: Logical framework of the roadmap



Source: ITC and Strategy stakeholder consultations, 2018

The first strategic objective is about developing the basics: an exportable offering that can compete internationally. It is the first and most important pillar of the Strategy because without a competitive offer, export cannot take place.

But in order to develop a competitive offering, it is essential to gradually expose the sector to the competitive forces of international trade. This is why the second strategic objective (stage 2) is intended to take place almost at the same time as the first one. There are a number of regulatory aspects that will need to be addressed to fix the business ecosystem and nurture the growth of the machinery sector. These can be addressed while engaging in trade.

The first two strategic objectives are supposed to re-enforce one another and need to be implemented simultaneously. It is necessary to develop top skills and know-how, to improve the availability of resources for the firms and to promote innovation and interest from international investors. This is what the combination of the first and second objectives intend to achieve by focusing on training and skills. Significant importance is attached to stopping Ukrainian expertise to move abroad, and there are a number of recommendations to try to bring back some of the expertise that has left the country in the past.

Finally, today's world trade is dominated by GVCs. The mid- to long-term success of the sector crucially depends on the machinery firms being able to make some inroads into this form of trade. A collaborative way forward based on a cluster approach is proposed.

Following the above logic, the strategic activities have been grouped around the three main clusters of the strategic objectives. Each strategic objective is further broken down into two or three more pragmatic or operational objectives.

PLAN OF ACTION

Strategic Objective 1: To improve the basic conditions to produce exportable machinery products and services

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency	
1.1. Stimulate the production of an exportable machinery offering	1.1.1. Implementation of stimulatory and compensatory mechanisms at the state, regional and local levels to support the priority sub-sectors of the machine-building subject to export.					
	1.1.1.1. Defining and approving criteria for providing support to machinery sub-sectors (availability of R&D units; issuing key components for the finished product; integration potential of the sub-sector (enterprises); competitiveness and high demand for products in the domestic market; successful export experience.	Priority sub-sectors determined; Regulation procedures approved	2019	2021	MEDT, SMEDO, Ministry of Finance of Ukraine, regional state administrations, local councils	
	1.1.1.2. Development and approval of the provision on partial compensation of R&D value in the priority sub-sectors of machine-building from state, regional and local budget.					
	1.1.1.3. Development and approval of the provision of interest-free loans (loans) and targeted financing on a non-refundable basis in the priority engineering sub-sectors for the establishment and expansion of export activities.					
	1.1.1.4. Development and approval of the provision on compensation (partial, full) of expenses for the international certification of products of enterprises of priority sub-sectors of machine-building in case of increasing export.					
	1.1.1.5. Set up a task force to review the impact of existing policies on taxation of labour.					
	This activity aims to provide a general package to stimulate machinery production in the short run.					
	1.1.2. Providing the most-favored supporting investment regime in the different sub-sectors of machine-building.					
	1.1.2.1. Determination of the list of privileges and preferences for investors in the priority sub-sectors of machine building (VAT exemptions for the import of over-complex technological equipment and equipment for R&D activity, exemption from payment for land, etc.).	Priority sub-sectors determined; Regulation procedures approved	2019	2021	MEDT, SMEDO, Ministry of Finance of Ukraine, regional state administrations, local councils	
	1.1.2.2. Development and approval of the provision on the application of the most-favored-nation treatment regime in priority engineering sub-sectors.	List of preferences determined. Regulation procedures developed and approved.	2019	2021		
1.1.2.3. Conducting benchmarking of the conditions for the location of enterprises and the export of products to the machine building sector in neighboring countries (Belarus, Poland, Slovakia, etc.), the development and implementation of appropriate recommendations for the domestic sector of machine building.	Benchmarking conducted, recommendations developed	2019	2020	MEDT, SMEDO, MFA		

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
	1.1.2.4. Develop a three-year plan to synchronize with the EU all relevant Ukrainian legislation and practices. This includes VAT reimbursement procedures that should be equated to existing procedures in the EU to ensure that Ukrainian firms can compete on equal footing.	Short term. Inventory of the regulatory base that will be included in the process of harmonization with the EU legislation and impact on technical assistance activities			CMU, Ministry of Justice
	This activity aims to facilitate international investment into machinery.				
	1.1.3. To review and adapt the existing tariff-setting policies and practices to take into account the importing needs of the sector.				
	1.1.3.1. Raise awareness among the policymakers in charge of negotiating trade agreements and determining tariffs of the nature of the machinery and engineering-related sectors.		2020	2021	State Fiscal Service of Ukraine, MEDT
	1.1.3.2. Ensure that representatives of the machinery sector can take part in trade negotiations or at least find a structured two-way communication mechanism that allows negotiators to use the inputs of the industry.		2020	2021	MEDT, MFA
	1.1.3.3. Establish a plan to gradually reduce customs duties on imported inputs widely used in the sector over the next five years.	Exemption from VAT of technological equipment imported into the territory of Ukraine for use in the provision of services	2020	2021	State Fiscal Service of Ukraine, MEDT, State Custom Service of Ukraine
	This activity aims to reduce the tariffs that the sector has to pay to import key inputs.				
	1.1.4. To reduce the number of formalities and the time it takes authorities to process applications and correspondence.				
	1.1.4.1. Implement the digital signature for activities of the sector.		2020	2021	MEDT, Ministry of Digital Transformation of Ukraine
	1.1.4.2. Make customs and tax regulations more flexible.		2020	2021	State Fiscal Service of Ukraine, State Custom Service of Ukraine
	1.1.4.3. Review, update and shorten the list of dual-use products.		2021		MEDT, Ministry of Defense of Ukraine
	1.1.4.4. Set up an inter-ministerial task force with the mandate to harmonise and simplify the requirements to deal with requests from industrial and engineering companies.		2019		MEDT, SMEDO
	This activity aims to reduce the administrative burden of dealing with public regulators.				

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
	1.1.5. To improve waste management by raising awareness on the issue and ensuring that the appropriate legislation is enforced.				
	1.1.5.1. Adopt a voluntary environmental high standard for the entire sector in order to maximize recycling, re-utilization and to minimize waste generated by industrial activities.		2021		Ministry of Energy and Environmental Protection of Ukraine
	1.1.5.2. Review and update the existing legislation on waste management. The existing regulations are not enforced and judged too complicated. Develop new legislation to adopt high environmental regulations for the machinery sector.	Simplify the certification process of components containing dangerous substances	2021		
	The impact of industrial activities on the environment can be quite important. This activity aims to create a conscience among the firms producing machinery products and adequate legislation.				
1.2. Enhance entrepreneurship in machinery	1.2.1. To strengthen the capacity to attract new value-adding investments by pursuing a proactive strategy.				
	1.2.1.1. Align the investment attraction plans to the needs to develop a strong network of local producers of certified machinery products.		2020	2021	MEDT, UkraineInvest
	1.2.1.2. Provide incentives (fiscal or otherwise) to investors that improve the competitiveness of the machinery sector.		2021		MEDT
	1.2.1.3. Reduce the processing time of investment proposals by streamlining the reviewing procedures.		2019		MEDT
	1.2.1.4. Set up a single entry point to deal with each investment proposal received and allocate responsibilities to ensure that investment proposals receive immediate attention.		2019		MEDT
	1.2.1.5. Ensure the coherence and relevance of the existing and future trade and investment policies. Develop a joint plan involving machinery firms, and the trade and investments teams at MEDT.		2020	2021	MEDT
	This activity aims to extract more investment from existing investors and to attract new investors.				
	1.2.2. To conduct information and awareness-raising campaigns in schools and university campuses to promote careers in engineering among young people and women.				
	1.2.2.1. Include practical projects in study curriculums at universities and business schools.	Informing on the prospects for the development of the sector in Ukraine, target groups of potential entrants – graduates of secondary education institutions.	2020	2021	MES
	1.2.2.2. Organize «engineering awards» in cooperation with the private sector.				MES
1.2.2.3. Establish internship programmes in enterprises for students. Positive discrimination towards women.	MES				
1.2.2.4. Strengthen the existing school-to-work programmes in machinery companies by providing public incentives and support.	MES				

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
	1.2.2.4. Provide benefits to the employers for employing «young specialists»- graduates from universities as their first employment.	Informing on the prospects for the development of the sector in Ukraine, target groups of potential entrants – graduates of secondary education institutions.	2020	2021	MES, MEDT
	This activity aims to encourage the development of vocations in machinery-related fields.				
	1.2.3. To stimulate entrepreneurship in machinery-related sectors.				
	1.2.3.1. Establish an incubator and a business accelerator programme focused on machinery and connected with training institutions (universities, polytechnics and technical schools).		2020	2021	MEDT, MES
	1.2.3.2. Organize a promotional awareness campaign to showcase success stories and share experience about entrepreneurship and business development in machinery subsectors.				MEDT, SMEDO
	1.2.3.3. Identify the specific areas of the machinery business where innovation will lead to greater productivity, sales, profits and the emergence of clusters around existing export sectors. This includes areas such as artificial intelligence applied to machines, big data analysis of sensor data, etc. Provide incentives to entrepreneurs in these areas.				MEDT
	This activity aims to draw attention to entrepreneurship in the machinery subsectors as a career option, to raise the visibility of young entrepreneurs and to raise the profile of entrepreneurship as an activity that has a lot to offer to the society.				
	1.2.4. To develop a national programme to bring back or attract overseas talent.				
	1.2.4.1. Develop a public-private sector partnership to attract foreign or expatriated talent who can innovate to the sector.	Carrying out informational work on promotion of the image and activities of the sector.			MEDT, MFA
	1.2.4.2. Introduce courses on innovation in educational institutions with the support of regional organizations.й.	Carrying out an annual study of the labor remuneration system in the sector and publicize the results.	2020	2021	MES
	1.2.4.3. Commission an in-depth sector-wide salary study to fully understand the existing «wage gap» that is causing Ukrainian workers to migrate to neighbouring countries.		2020	2021	MEDT, MFA, business associations, international donors
	1.2.4.4. Develop a public-private dialogue platform to discuss ways in which the «wage gap» can be closed. This might include public subsidies, tax rebates and other sorts of incentives for the firms in the machinery sectors to be able to offer better conditions to their workers.		2019		MEDT, business associations, international donors
	This activity aims to ensure that sufficient qualified and experienced workers are available to guarantee the long-term development of the sector.				

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
1.3. Promote innovation in the machinery sector	1.3.1. To develop and implement a promotion campaign among enterprises in the machinery sector on the benefits of clustering, establishing vertical and horizontal links between SMEs and large corporations.				
	1.3.1.1. Development and implementation of an information campaign among enterprises of the machinery sector on the benefits of international product certification for entering the promising export markets.	Promoting campaign developed and conducted	2019	2020	MEDT, SMEDO, Business associations, international donors
	This activity aims to create public awareness of the benefits of innovation.				
	1.3.2. To improve the statistical capacity of the institutions involved in the sector by regularly collecting and analysing relevant firm-level data.				
	1.3.2.1. Explore the creation of a body within the sector that can handle statistics on machinery and engineering issues. A model could consist of providing closed club statistics analysis when participants provide their figures to one organisation on a confidentiality basis and on exchange obtain anonymous feedback.		2019		Statistics Office and MEDT
	1.3.2.2. Strengthen the statistical capacity of the Statistics Office, and the Ministry of Economic Development, Trade and Agriculture of Ukraine to collect, analyse, and disseminate data that enhances their understanding of the sector.		2020	2021	Statistics Office and MEDT
	1.3.2.3. Design a data collection system covering all the aspects of the trade, production, and employment data with strategic value. Establish a system for collecting the data (e.g. by phone, online template etc.). A focal point should be assigned this task at the MEDT.		2020	2021	Statistics Office and MEDT
	1.3.2.4. Create incentives and trust among the firms to share the relevant information with the authorities. Raise awareness among the firms on the importance of providing statistical data.		2021		Statistics Office and MEDT
	1.3.2.5. Organise a yearly conference to present and discuss the results of the analysis of the existing data on the sector among all concerned stakeholders. The discussions should focus on evidence-based policies to address their needs.		2021		Statistics Office and MEDT
	1.3.2.6. Ensure that the Statistics Office has the necessary resources to collect and compile the data that informed policy-making requires. In particular, trade data should be published on a government site and kept updated regularly.		2019		Statistics Office and MEDT
	This activity intends to enhance policymakers' understanding of the strengths and weakness of the machinery sector. Policymakers will be able to design their export promotion and firm-level support programmes and services better, and use the results to make evidence-based policy decisions (i.e. select FTA partners, select strategic export markets for export promotion).				
	1.3.3. To carry out an inventory of innovative solutions and applied scientific developments in specialized research and academic institutes in the machinery sector.				
	1.3.3.1. Identification of needs (inquiries) of enterprises of priority machinery subsectors regarding innovative solutions (new technologies, materials, etc.)	Inventory conducted, Needs identified	2019	2021	MEDT, SMEDO, Business associations
	1.3.3.2. Creation of an online platform «Exchange of Innovations» as a commercial B2B platform between enterprises of the machinery sector, research and academic institutions, laboratories for implementing innovations in productions	Platform created and launched	2019	2019	MEDT, SMEDO, National Academy of Sciences of Ukraine, R&D, Universities, business associations
	1.3.3.3. Design and introduction of an online monitoring system for tracking import-export operations for each subsector of machine-building, broken down by region and country as a whole for the development and implementation of import substitution activities				
This activity aims to map out the existing work that is relevant for innovation on machinery.					

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency	
Strategic Objective 2: To strengthen the competitiveness of the machinery sector in foreign markets						
2.1. Strengthen the human capital and provide value-adding services and infrastructure to enterprises in the machinery sector	2.1.1. To improve the university training system of engineers.					
	2.1.1.1. Signing direct contracts between machine-building enterprises and universities for the training of engineers.	University training system improved	2019	2021	MEDT, SMEDO, MES, business associations	
	2.1.1.2. Introduction of practical training of students and faculty in the real sector of the economy.					
	2.1.1.3. Introduction of compulsory student exchange with foreign universities.					
	2.1.1.4. Annual national competitions (hackathon) for students of engineering specialties.					
	This activity aims to strengthen the university training areas relevant for the machinery sector.					
	2.1.2. To improve the TVET system for enterprises of the mechanical engineering sector.					
	2.1.2.1. The introduction of dual education in the training of workers in the professions in the ratio of 30:70 between the theoretical and practical component of learning through the introduction of amendments to the relevant legislation.	TVET-system improved	2019	2021	MEDT, SMEDO, MES, business associations	
	2.1.2.2. Introduction of online education in the training of workers in the labor professions.					
	2.1.2.3. Involvement of vocational schools in participation in international competitions (Worldskills, etc.).					
	2.1.2.4. Creation of modern technological TVET-centers for training personnel of machinery sector (at least 1 in the region).					
	This activity aims to develop the TVET system on areas relevant to the machinery sector.					
	2.1.3. To raise awareness among enterprise managers of the existing regulations and agencies with a regulatory responsibility on the sector.					
	2.1.3.1. Develop an exhaustive directory of the agencies and government departments with engineering and machinery related functions, map out the services they offer to the firms and maintain updated records.		2020	2021	MEDT	
	2.1.3.2. Develop an exhaustive directory of the agencies and government departments with legislative authority and responsibilities over the machinery sector. Maintain updated records.		2020	2021	MEDT	
	2.1.3.3. Make an independent evaluation of how firms perceive the quality of the regulatory environment and take appropriate actions.		2020	2021	MEDT, international donors	
	2.1.3.4. Disseminate the information generated above along the entire value chain of the machinery sector.		2020	2021	MEDT	
	This activity intends to raise awareness on «who does what» on the legislation affecting the machinery.					

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
	2.1.4. To bridge the existing skills gaps by reforming the parts of the TVET and university system that are related to the machinery sector.				
	2.1.4.1. Review the current TVET offering on machinery-related areas. Involve the firms on the development of a new TVET system that is better aligned to the real needs of the firms.	Kick-off meeting and an agenda for the following meetings.	2021		MES
	2.1.4.2. Develop opportunities for engineering students to gain practical experience through apprenticeship during their studies.	The annual meeting of industry firms to assess needs for knowledge and skills that need improvement during their training.	2020	2021	MES
	2.1.4.3. Employ multiple pathways for persons to receive skills certification, including recognition of prior learning, dual education, and workplace assessments.	Development the regulatory documents. Cooperation with the Ministry of Education and Science of Ukraine and specialized higher education institutions for the introduction of dual education in the specialties that are used in the sector.	2020	2021	MES
	2.1.4.4. Develop and execute an advocacy plan for TVET training to include stakeholder engagements, media activities and targeted surveys and implement mechanisms to obtain, analyse, store and share labor market intelligence.		2020	2021	MES
	2.1.4.5. Regularly monitor and evaluate all the elements of the TVET training delivery system to ensure quality and standards compliance.	Conducting a «benchmarking» exercise compared with education and training institutions in East and Western Europe.	2020	2021	MES
	2.1.4.6. Monitor the utilisation and impact of TVET output such as employment of trainees, the satisfaction of private sector need etc.	Attract the best entrants to the speciality courses that are used in the sector, including dual education programs.	2020	2021	MES
	2.1.4.7. Determine the training needs of participating companies and provide guidance on setting up a training program at their workplace.	Finding partners in Western and Eastern Europe who carry out certified training for joint projects in Ukraine.	2020	2021	MES
	2.1.4.8. Creation of an «Exchange of needs of executors of the services of the machinery in the developments» for attracting students to the higher educational institutions to solve them by implementing diploma projects, thematic research projects.	Profile higher education institutions for the sector.	2020	2021	MES
	2.1.4.9. Development of the Concept of TVET - a mechanism for improving the skills of the workers.	Development of normative base of implementation of TVET- mechanism.	2020	2021	MES

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
	This activity aims to develop dual education in areas related to machinery and to provide the basis for the development of the educational infrastructure including TVET and tertiary education in order to cater the needs of the engineering and machinery sectors.				
	2.1.5. To ensure a coherent and relevant offering of training on relevant business management skills directed to managers of machinery firms.				
	2.1.5.1. Map out the current educational offers on business management, find gaps, duplications, and conduct a quality benchmarking exercise against international best practices.		2019		MES, MEDT
	2.1.5.2. Develop a joint programme among machinery sector firms, the educational institutions, and the public sector to strengthen the weak areas and fill the existing gaps identified. Some preliminarily identified areas include the following: financial and quality management, local sourcing, English language, performance monitoring, information systems, international marketing, and contract negotiating skills international trade.		2019		MES, MEDT, business associations
	2.1.5.3. Survey local firms to identify the skills that are not sufficiently available.		2019		Business associations
	2.1.5.1. Improve SME ability to apply for loans. Practicing bankers to provide training to machinery firms about their eligibility and application requirements and risk assessment practices.		2019		Business associations
	This activity aims to strengthen the training on business management skills and to generate a pool of expertise and skills in crucial areas that firms require for their development. This includes training to firm managers to learn to apply for finance more easily.				
	2.1.6. To raise awareness among firm managers of the existing trade-related support services at their disposal and improve the number and quality of export promotion activities linked to the engineering and machinery sectors.				
	2.1.6.1. Develop an exhaustive directory of the agencies and government departments with engineering and machinery-related functions, map out the services they offer to the firms and maintain updated records.		2019		MEDT
	2.1.6.2. Develop an online platform that collects and disseminates information about the coming events. The business support function is currently decentralized around several ministries.		2020	2021	EPO
	2.1.6.3. Extend the same level of business support services currently provided to large companies to smaller firms.		2020	2021	SMEDO, business associations
	2.1.6.4. Survey the firms on their perception of the quality of the specific trade-related support services on offer. Use the results to develop an ambitious reform agenda to avoid duplications and service gaps.		2020	2021	SMEDO, business associations
	2.1.6.5. Organize a workshop between the service providers and the sector stakeholders to discuss the adequacy of existing export support programmes.		2020	2021	EPO
	2.1.6.6. Design and implement an effective communications platform to facilitate dialogue between stakeholders and keep them apprised of trade development opportunities.	Long term			MEDT
	This activity intends to raise awareness on underused export promotion services and provide access to the smaller enterprises to support services similar to the ones provided to the large companies.				

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
2.2. Expand the financial capacity of the machinery sector and its capacity to attract investors	2.2.1. To provide bank and insurance guarantees for the participation of enterprises of priority subsectors in international tenders, insurance and reinsurance of export contracts.				
	2.2.1.1. Conducting promoting campaign on possible mechanisms of international financing (loans, grants): Horizon 2020; EEN; EBRD, etc.	Promoting campaign conducted	2019	2021	MEDT, SMEDO, Chamber of Commerce, EPO
	2.2.1.2. Launch the Export-Credit Agency.	ECA launched	2019	2021	MEDT, SMEDO, Ministry of Finance, ECA
	This activity aims to eliminate inefficiencies in the long term in the insurance markets.				
	2.2.2. To facilitate the roll-out of machinery-focused financial products and services at banks.				
	2.2.2.1. Implement a survey of demand for different machinery banking services to assess potential size of the banking services market.		2019		MEDT, Chamber of Commerce, Statistics Office, business associations
	2.2.2.2. Banks to be encouraged to build on the machinery banking services survey undertaken to establish the financing, transaction and savings products demanded by the firms.	Short term. Establishment of a platform for the public-private dialogue, in particular between the banks and the governments on the matters of establishing of internationally recognized safe e-payment system			NBU, State Customs Service of Ukraine, CMU
	2.2.2.3. Organize workshop to disseminate information about current and innovative machinery credit scoring and risk management practices.	Short term. Further liberalization of currency control			NBU
	2.2.2.4. Banks to streamline application processes for loans from machinery firms to focus on key information, rather than replicate information needs from larger corporate loans. Also, introduce more revolving working capital facilities where appropriate and reduce reliance on overdrafts to reduce risk and improve borrower financial management discipline.	Short term			NBU
	2.2.2.5. Banks to consider organizing their marketing and risk personnel so that they can develop specialism on the engineering and machinery sector.	Short term			SMEDO, business associations
2.2.2.6. Banks to explore the feasibility of offering specific products tailored to the engineering and machinery sector.		2020	2021	SMEDO, business associations	
2.2.2.7. Reduce cash and fixed asset collateral requirements for loans. Commission a study on the demand for and barriers to leasing equipment (such as equipment or stock of spare parts and components) and machinery. Enact necessary legislation or amendments.		2020	2021	SMEDO, business associations	
his set of activities aims to facilitate banks' roll-out of products and services tailored for machinery makers.					

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
	2.2.3. To develop opportunities for angel investments in the engineering and machinery sectors.				
	2.2.3.1. Develop the legislative options for introducing loan/equity hybrid products such as convertible securities (e.g., bonds and preference shares) that preserve entrepreneur control, while protecting investor exposure and offering them appropriate returns for taking equity risks.		2020	2021	SMEDO, business associations
	2.2.3.2. Pass necessary amendments to strengthen the protection of investors and enable them to repatriate the returns on their investment as they see fit.		2020	2021	MEDT, NBU, SMEDO, business associations
	2.2.3.3. Establish a private or public sector angel investment network operator.		2020	2021	Business associations
	2.2.3.4. Establish a database of successful entrepreneurs in the diaspora interested in becoming angel investors in local engineering and machinery projects.		2020	2021	MEDT, NBU, SMEDO, business associations
	This activity aims to increase the availability of angel equity finance for SMEs by creating the right legislative ecosystem.				
	Strategic Objective 3: To activate the integration of machinery sector producers into Global Value Chains				
	3.1.1. To establish and develop international cooperation with global machinery developers and manufacturers.				
3.1. Integrate the machinery subsectors into Global Value Chains	3.1.1.1. Identification of niches (segments) where Ukrainian machine-building enterprises are competitive in terms of price and quality ratio.	Niches identified. Catalogues created	2019	2021	MEDT, EPO, Chamber of Commerce, business associations
	3.1.1.2. Preparing and presenting the catalogues of products with export potential in foreign markets.				
	3.1.1.3. Develop cooperation in the area of testing, assurance and complying with TBTs and SPS requirements.	Medium-term			
	This activity aims to create alliances between local machine-building enterprises and international players.				
	3.1.2. To organize an annual international machine-building forum in Ukraine for the presentation of high-tech export-oriented products.				
	3.1.2.1. Develop a marketing plan for the sector in key markets. Explore the possibility to develop a brand for high-value-added Ukrainian goods and services.	Forum organized and conducted	2019	2021	MEDT, EPO, Chamber of Commerce, business associations
	3.1.2.2. Develop an international promotion campaign to create a positive image of Ukrainian high-value products and services. Target key decision-makers, bloggers, trendsetters, etc.		2019		
	3.1.2.3. Develop a marketing plan for the sector in key markets.		2020	2021	
	This activity aims to provide visibility to the offering of the national machine-building industry.				
	3.1.3. To provide information and organizational support for the participation of Ukrainian machine-building enterprises in foreign investment forums.				
	3.1.3.1. Providing information and organizational support for participation of Ukrainian machine-building enterprises in specialized trade fairs: Hannover Fair, World Manufacturing Forum (WMF), China International Import Expo, ChinaOverseasInvestmentFair, Canton Fair 2019 Spring; Air Cargo Europe, Paris Air Show 2019, Aviation Expo China, Elektrotechnik; Exposhopping Expomaritt, Sea Asia, Chilventa, Euroshop	Information and organizational support provided	2019	2020	MEDT, EPO, Chamber of Commerce, business associations
	3.1.3.2. Organization and conducting of business missions of representatives of priority machinery sub-sectors to perspective countries for Ukrainian exports: Countries of Africa, Asia, Latin America	Business missions organized and conducted	2019	2020	MEDT, EPO, Chamber of Commerce, business associations
	This activity aims to project a positive image of the Ukrainian high-value-added goods and services.				

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency
3.1.4. To improve the efficiency and transparency of customs by streamlining procedures, reducing compliance costs and transit times.					
	3.1.4.1. Simplify customs procedures on spares parts and components. In particular, simplify the process to obtain permissions on cross-border transfer of dual-use goods	Implementation of the accelerated procedure (at a higher fare) for the permission to cross the border dual-use goods and services.	2020	2021	State Customs Service of Ukraine
	3.1.4.2. Identify all the trade-related transactions that can take place online and implement an electronic single window for all export, import, and transit procedures and formalities.	Implementation of the system of electronic licensing in the field of export control.	2020	2021	State Customs Service of Ukraine
	3.1.4.3. Identify the export, import, and transit procedures and formalities that cannot be implemented online in a straightforward manner and develop a plan to streamline them. For example, by reducing the paperwork involved in clearing goods, or minimizing physical inspections.		2020	2021	State Customs Service of Ukraine
	3.1.4.4. Hold regular consultations between the Customs office, and the machinery firms to develop joint initiatives. The purpose of these consultations is to reach a common understanding of the real needs of all sides involved and to define joint proposals and funding priorities that are ready for government action.		2020	2021	State Customs Service of Ukraine
	3.1.4.5. Develop an incentive scheme for customs that enhances productivity. For example, partially linking pay to productivity how efficiently customs employees are in clearing the goods).		2021		State Customs Service of Ukraine
	3.1.4.6. Revise the existing legal requirements to the export of components by excluding goods of dual-use.		2020	2021	State Customs Service of Ukraine or other authorities
	3.1.4.7. Simplify export control procedures in order for these to take less time and money.		2019		State Customs Service of Ukraine or other authorities
This activity aims to reduce the cost and the time of exporting and importing and to simplify the procedures for granting permission to cross the border of goods and services of dual-use. This activity aims at reducing the border compliance costs in an effort to make exports more competitive.					
3.1.5. To increase the local sourcing of inputs by creating new linkages among the different economic sectors and strengthening the existing ones.					
	3.1.5.1. Promote and strengthen the existing ties between local suppliers and top machinery producers. Work with international companies with Ukraine operations to increase their local sourcing for their international operations.		2020	2021	Chamber of Commerce, business associations
	3.1.5.2. Create new ties between potential local suppliers of parts and components and global machinery producers. Analyze the specific components for which the value chain could make more use of local inputs.		2019		Chamber of Commerce, business associations
	3.1.5.3. Develop on-line platform for publishing machinery orders. Organize common events not only for machinery businesses but also for other related sectors such as chemicals, textile, manufacturing etc.		2019		Chamber of Commerce, business associations

Operational objective	Activity	Implementation target and timeframe	Start	Complete	Executing agency	
	3.1.5.4. Develop a pilot «buy local programme» on a selected group of components where producers of parts and components work together to develop products in local clusters. Roll out other clustering programmes based on the success of the pilot programme.		2020	2021	SMEDO	
	3.1.5.5. Make international investors aware of potential opportunities for joint ventures.		2020	2021	MEDT, MFA, UkraineInvest	
	This activity aims to create domestic clusters on machinery parts, components and services and to ensure that domestic suppliers can become partners of choice for the machinery sector. Developing the country's industries is crucial for the long term development of the sector.					
3.2. Develop strong clusters in machinery	3.2.1. To establish chains for scientific, technical and production cooperation between large domestic consortia and SMEs for the production of parts and components.					
	3.2.1.1. Identify business leaders who are capable of acting as the core of an export cluster of the relevant machinery subsector.	Export targeted clusters created	2019	2021	MEDT, SMEDO, MES, Ministry of Finance, regional state administrations, local councils	
	3.2.1.2. Applying the stimulus and compensatory mechanisms on export clusters at the state, regional and local levels.					
	This activity aims to foster collaboration with other national firms to produce part and components. This activity is linked to 1.1.1.					
	3.2.2. To ensure that locally produced spare parts and components comply with international technical regulations and widely accepted standards.					
		3.2.2.1. Seek an international certification for the Ukrainian certification body.		2020	2021	MEDT, MFA
	3.2.2.2. Improve the local availability of certified bodies and laboratories accredited for inspection, product testing and certification companies to have their products certified.		2020	2021	MEDT, SMEDO	
This activity aims to upgrade the certified quality of the national inputs for the machinery sector.						

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