UNDP & UN FAO VALUE CHAIN ASSESSMENTS FOR SOUTHERN DONETSK AND SOUTHERN ZAPORIZHIA OBLASTS (AZOV SEA REGION)

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VALUE CHAIN: FARM MACHINERY, AUTOMATIVE PARTS, FOOD PROCCESING EQUIPMENT

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INTRODUCTION

The sector of Farm Machinery and Automotive has been developed historically since the 50s of the twentieth century. Before the collapse of the Soviet Union, there were factories with more than 500 workers. During three decades of economic developing, ex-managers from such factories began to construct new companies with a market-centered approach in business from 1991 to 2001. The management system of new companies included skilled engineers, designers and market specialists from former companies. Otherwise, the primary markets concentrated in former Soviet Union countries such as the Russian Federation, Kazakhstan, and Belorussia. The military conflict in 2013-2014 in Donbas has dramatically effected shrinking the number of companies in the region. Furthermore, the destruction of marketing relations with partners from the Russian Federation causes a decline in sales and volumes. Using outdated equipment, the companies meet the challenges to find a new market for its products. Many companies still use equipment constructed more than 50 years ago; therefore, the productivity in machinery in VC is low, and their final products are not competitive.The one decision of the problem, used by owners, is the implementation of close-circle production (laundry, welding, design, and construction). Mostly, management does not use any supply chain management system in their practice because of the lack of finance. The other issue is the ongoing migration of workers during the last five years due to developing relations with the European Union. Attracted by bigger wages, youth get primary professional experience at home and leave their cities to get additional income for a family. Contrarily to challenges owners meet, they are willing to increase their sales on new markets with updated products.

1. PEOPLE & Capability

1.1 Numbers

The immeasurable strength in company development is skilled employees. Historically, the Azov Sea region has an enormous potential of Farm Machinery and Automotive. Experience and skills are handed down from generation to generation. In 2018 the part of full-time employees in Farm Machinery and Automotive made up 13% (Donetska oblast) and about 20% (Zaporizhska oblast) from the total quantity of people, employed in the industry.

Table 1.1.1

Average number of full-time employees by type of economic activity in industry (thousand people)

Oblast, sector	2013	2014	2015	2016	2017	2018
Zaporizhska oblast*						
Manufacture of machinery and equipment, not elsewhere classified	6.8	6.0	5.2	5.1	5.9	6.3
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	27.8	25.7	21.9	22.2	21.9	to
Donetska oblast**						
Manufacture of machinery and equipment, not elsewhere classified	31.6***	19.5****	16.7	16.8	18.2	17.9
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	18.2***	11.7****	10.2	5.5	3.4	3.2

*Source: *Щорічник, 2018, стор 52, Щорічник 2013 стор 291*
***ShorichnikDonetsk (p 56-57)*
****Експрес випуск, робітники Донецьк, 2013*
***** Експрес випуск, робітники Донецьк, 2014*

Manufacture of machinery and equipment in Zaporizhska oblast has a stable trend during 2013-2018 and ranges from 5.1 to 6.8 thousand people. In Donetska oblast the number of full-time employees in this sector has dropped in twice from 31.6 to 17.9 thousand people.

The number of workers is gradually decreased. According to the interview with owners and managers, the important reasons might be:

- staff reduction due to reduced orders;
- internal and external migration of workers;
- experienced designers and managers began to open their own new company based on practice gained in a factory, where they worked;
- retraining and getting new profession;
- career opportunities in a company of a competitor.

Based on the survey of management in VC Azov, there is such type of enterprises:

1. Larch companies (with more than 251 workers) consist of 3 companies (two in Melitopol and one in Orihiv rayons). They have the practice to distribute in the external market. According to the results of the survey, the management of the group indicates

the necessity to train and hire proficient workers (4 from 5 scores). Owners emphasize the issue of lack of labor resources in the region. Two of the three companies look for new employees in on-line recruitment centers.

2. Middle companies (from 51 to 250 workers) consist of 11 (7 in Melitopol, 2 in Berdyansk, 1 in Orihiv, and 1 in Tokmak rayons). Four from eleven interviewees indicate that the lack of personnel in the Azov region influences plant development mostly. One from eleven interviewers emphasizes that this issue is significant. Nevertheless, 50% of owners from this group try to find their new workers through local newspapers. Moreover, management from Melitopol has recourse to the Melitopol Employment center to find new personnel.

3. Small companies (from 10 to 50 workers) consist of 22 (9 in Melitopol, 8 in Berdyansk, 3 in Orihiv, and Mariupol rayons). 14 from 21 interviewers point out that further development of the sector is crucially under a press of lack of labor resources. Such management evaluates the problem of qualified staff replenishment as a priority and rates it on 4.0 points. This company applies on-line resources to observe the local labor market. Mostly, they use work.ua and rabota.ua to present new vacancies.

4. Micro companies (less than 10 workers) consist of 5 plants (all from Melitopol). These companies do not have a problem to hire new personnel (4 from 5 answers). Their main purpose is to provide a job for a year.

According to focus group, it was revealed that the majority of companies in the VC Azovdo not use entire potential of plants (table 1.1.2).

Table 1.1.2

Usage of worked hours of workers in 2018 (average quantity on one person)

Oblast, sector	Worked hours	% of worked hours in timesheet fund
Zaporizhska oblast*		
Manufacture of machinery and equipment, not elsewhere classified	1766	88,6
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	to	to
Donetska oblast**		
Manufacture of machinery and equipment, not elsewhere classified	1764	88,5
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	1462	73,4

*Source: *Щорічник, 2018,*
***Shorichnik Donetsk (p 62)*

According to national statistical data, the percentage of worked hours in the manufacture of machinery and equipment is equal to 88.6 (Zaporizhska oblast) and 88.5 (Donetska oblast). Therefore, it means that each employee does not perform 227 hours per year. In the manufacture of vehicles, people work out only 73.4% of the timesheet fund. The gap between the worked hours in the manufacture of machinery and vehicle is 302 hours per worker. Results of the interview show that there are several reasons for an unprocessed time:

- Lack of orders;
- Underutilization of capacities;
- Equipment breakdowns;
- Worker sickness gaps.

While management declares about the lack of specialists, the list of unemployed workers in the processing industry is full. The main reason is that existing specialists on the labor market do not meet the required skills of companies in VC Azov.

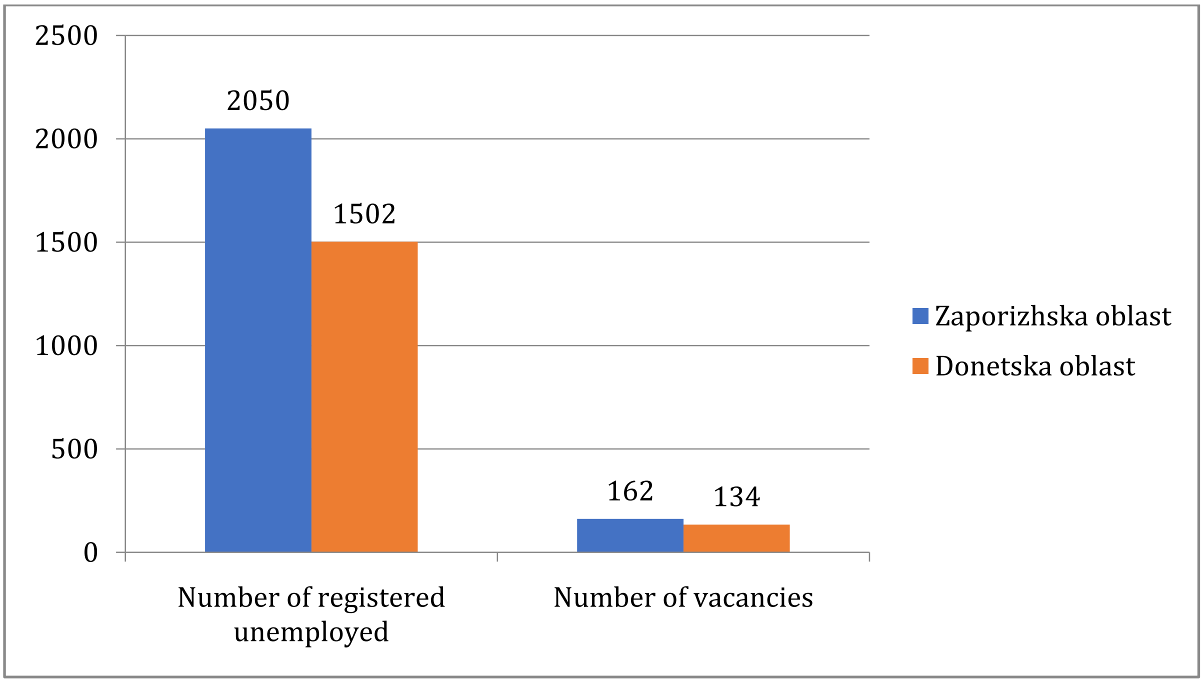


Fig 1.1.1 Demand and supply of personnel in processing industry, 2018

*Source: *Щорічник Запоріжжя, стор 49*

***Щорічник Донецьку, стор 11*

The number of unemployed workers in Zaporizhska oblast is 2050 people, and in Donetska oblast is 1502 people. The proportion of vacancies to unemployed workers is about 1:12 in Zaporizhska oblast. The proportion of its in Donetska oblast is 1:11. The gap between demand and supply proves a lack of connections between people who look for a job and people who look for a qualified worker. The results of the survey show that 75.6% of interviewers search specialists on-line, and 61.3 from them use the only work.ua to connect with potential employees. The other reason is that people traditionally register in a local unemployment center to get a state subsidy for a few months, working unofficially at the same time.

The dominant issue of Farm Machinery and Automotive is the updating of workers. While managers have modern skills and novel knowledge, workers do not improve their qualifications permanently. Moreover, the usage of updated technologies requires implementing new skills in both production and marketing. There are numerous educational institutes in the region where youth might get a graduate degree (metallurgical, mechanical, design, engineering). Furthermore, because of the location of many machinery plants, the region boasts of professional vocational schools.

Table 1.1.3

The quantity of educational institutions among VC Azov

Oblast, name of a school	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Zaporizhska oblast*						
Vocational (professional and technic schools)	47	47	46	44	40	38
High educational institutions						
Colleges and technical schools	17	14	14	13	13	13
universities, academies, institutes	10	10	10	11	11	11
Donetska oblast**						
Vocational (professional and technic schools)	111***	44	47	46	45	44
High educational institutions						
Colleges and technical schools	53	15	11	16	19	19
universities, academies, institutes	20	1	6	9	10	9

**Щорічник, 2018, стор 104, щорічник 2013 стор 365*
***Shorichnik Donetsk (p 106, 117)*
****Аналітичний звіт ООН (проф освіта) (стр 32)*

During the last six years, the quantity of TVETs in Zaporizhska oblast decreases from 47 to 38 schools. Interview with directors of TVET shows that the first reason is un-prestigious undergraduate professional education among youth. The second reason is the reduction in government funding on TVETs evolution. Moreover, during the last decade, TVETs have been subordinated to different levels of administration management (oblast, rayon and city council). Therefore, they have been funded irregularly. Because of the military conflict, the quantity of TVETs in Donetska oblast dramatically fell in three times.Based on the interviews, each school has a minimum limit group of attending students to return state investment. It varies from 15 to 25 students at a specialty. If the school has less than 15 students at the beginning of the educational year, education management might evaluate this group as inefficiency and refuse to open a class on state funds.

The number of colleges and technical schools significantly reduced. The gap between before and after the military conflict is 4 colleges in Zaporizhska oblast and 34 colleges in Donetska oblast. In 2018/2019 there were only 13 colleges in Zaporizhska oblast and 19 colleges in Donetska oblast.

1.2 Salaries

Association with European Unity has led to the migration of qualified workers to Poland and Slovakia. The main reason for it is a low salary in the region. According to the interviews and focus groups, if a worker has got a salary of more than 12 thousand UAN or € 407, he or she would be stimulated to stay in Ukraine and work in a local company. Nevertheless, the average salary of workers has been increased gradually for the last six years (table 1.2.1).

Table 1.2.1

Average monthly nominal salary of full-time employees, in Euro

Oblast, sector	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Zaporizhska oblast*						
Manufacture of machinery and equipment, not elsewhere classified	209,3	136,9	105,1	126,4	166,0	193,2
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	333,3	259,2	232,6	216,2	270,6	to
Donetska oblast**						
Manufacture of machinery and equipment, not elsewhere classified	359,1***	259,8****	218,4	226,0	299,7	339,6
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	314,0***	150,1****	117,6	103,4	162,6	270,3

Щорічник, 2018, стор 60, щорічник 2013 стор 315
***Shorichnik Donetsk (p 66-67)*
****експрес випуск зарплата, 2013, стр 8*
*****експрес випуск зарплата, 2014, стр 8*

Based on the interview, there is a practice of grey salaries for top managers and workers. The owners indicate that such type of salary increase productivity because workers might get extra income for produced commodities under the plan. Moreover, sales managers are stimulated to make contracts with new customers to increase sales. From this side, sales managers have an added grey salary from 30 to 50% of the total quantity of salary. It is revealed that workers might get a salary bigger twice to compare with the amount established if a worker makes a unique order and increase his or her productivity. Such preferences are established in a job contract, but not reflected in the accounting balance.This payroll option shadows a possible value chain that occurred during the developing of a unique good. The black salary is absent generally. State safety requirements necessitate owners to refuse a black salary. Interview of owners in Melitopol has revealed that HR management prefers to hire a person officially and pay a salary. As the owners say, industrial accidents occurred in a factory, which could result in significant financial fines if an employee is officially unworked or does not get an official salary. Therefore, specifically to peculiarities of the Machinery sector, most workers in the region do not get a black salary. Deep economic analysis based on financial reports of companies present the average official salary (table 1.2.2).

Table 1.2.2

Average salary at factories in VC Azov

Company	Salary (UAN)	Salary (Euro)
Kauchuk	7580	235.8
Berti	5600	174.2
Berdyansk Lifting Equipment Plant	5660	176.1
Melitopol Factory of tractor Hydraulic aggregates	5300	164.9
Tokmak Forging and Stamping Plant	4536	141.1
Berdyansk Reaping Machines	4160	129.4

The table presents a difference in wages in the Azov region. Workers from Mariupol get the highest wages, while workers from Tokmak and Berdyansk have the cheapest one. The break between salaries is 106.4 Euro. It should be emphasized, that salary in the companies is less than an average nominal salary. (see table 1.2.1). According to the focus group in Melitopol, reducing salary result in increasing profits. The survey of executives shows that costs on salary fluctuate from 5 to 40% of total operational costs. The smaller enterprise is, the bigger the share of the salary is. 8 of 41 companies have a salary cost of more than 25%. Most of the management spends from 15 to 20% of the total cost on salary expenditures.

1.3 Salaries % of Sales

VC Azov of Farm Machinery and Automotive is a region with a concentration of the essential part of labour resources. This sector is a pattern for others in the quantity of salary and income of citizens. Traditionally, executives base their estimation of expenditures for salary according to expected sales in the next year. Based on the interview with owners and top-management in various cities, the salaries are about 10% of the estimated sales.

Table 1.1.1

Salaries as a % of Total Sales Value (2013 – 18), %

Oblast, sector	2013	2014	2015	2016	2017	2018
Zaporizhska oblast*						
Manufacture of machinery and equipment, not elsewhere classified	12,74	9,89	7,01	7,18	8,43	10.21
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	14,92	14,22	12,23	21,49	15,72	to
Donetska oblast**						
Manufacture of machinery and equipment, not elsewhere classified	192,47	33,87	48,30	86,76	116,34	152,32
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	9,14	5,48	6,16	2,76	2,37	2,86

Source: calculated on results of table 1.2.1., 1.1.1, and 2.3.1

Each of the studied oblasts has its specific options in expenditures of sales. Firstly, the Manufacture of Machinery and equipment in Zaporizhska oblast has a bright trend of salary reducing total sales value. When the share of salary in 2013 was 12.74%, this indicator fell to 10.21% or about two and a half points. The same state is in the manufacture of vehicles in Donetska oblast. There is one major force, influencing this process. The quantity of salary grows more slightly compared with the growth of total sales volume.

The manufacture of machinery and equipment in Donetska oblast has an extremely negative tendency when expenditures on salary are higher, compared with total sales volume. For instance, in 2018 the costs of salary were bigger in 52.32% compared with a total sales volume. The causes are reducing sales orders and usage of outdated technologies, caused to small sales volume (47.9 mln Euro, see table 2.3.1).

Furthermore, based on the survey, financial incentive stimulates employees to work better. In companies (8 pcs) where salary cost is in limits from 25 to 50%, an average indicator of variety innovativeness is 24.7%. In companies (18 pcs) with salary costs from 15 to 25%, the index is 22.1%. In companies (15 pcs) where salary cost less than 15%, the index is 16.5%.

1.4 GVA per hour worked

Focus group show, type of equipment and technologies (outdated, automotive, manual, and novel) forces changing in production volume per hour. For example, a focus group in Melitopol has explained that productivity after renovation might improve on 20%. On the other side, one of the Orihiv plants has used a new management system of technological control for the last three years. The sales manager explains that a new approach to production has resulted in improving productivity in twice, compared with 2014.Based on the survey, 29% of interviewed persons point out that it is essential to bring up equipment, technology, and staff, who operate it. Nevertheless, only three of those, who outlines renovation as a necessary decision, want to implement a modern management system. It should be important to take into account that an entire quantity of interviewers claims that they are ready to produce for foreign clients. Based on the interview, 71% of executives answered that a consumer is satisfied with the quality of their products. Moreover, 20 companies outline that they deliver their products just in time.

From the other side, the majority of them answered that they have the potential of production growth only for 20-30 for the nearest future. All focus groups have affirmed that it takes not less than three to six months to train workers after the implementation of technologies or whatever management system. Moreover, one of the sale managers from Melitopol plant claims that it is impossible to increase production in twice for export orders because of various reasons:

- compliance standards in Ukraine and the European Union;
- getting certification;
- availability of resources of required quality;
- availability of the necessary technological equipment to make complete technological operations;
- ability to retrain workers in a short time;
- agreement with partners to supply outsourcing services just-in-time.

All of these forces might eliminate downtime and increase productivity. Therefore, if we consider the changing in Value Chain Farm Machinery and Automotive, we should take into consideration not the only issue of outdated technologies but also the problem of time to renovate it. Again, there are two different tendencies in both regions in researched manufactures. Each oblast has its direction for further Machinery sector development (table 1.4.1).

Table 1.4.1

GVA, per hour worked, 2018

Oblast, sector	Total Sales value in Sector. mln Euro	Total # Employees, thousand people	Average Hours Worked, hours	GVA per hour Worked of one employee, UAH	GVA per hour Worked of one employee, EURO
Zaporizhska oblast*					
Manufacture of machinery and equipment, not elsewhere classified	143.1	6.3	1766	413.3	12.9
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	366.4	to	to	to	to
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles in 2017	452.3	21.9	1756	352.8	11.8
Donetska oblast**					
Manufacture of machinery and equipment, not elsewhere classified	47.9	17.9	1764	48.75	1.5
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles	362.9	3.2	1462	2492.98	77.6
VC AZOV					
Manufacture of machinery and equipment, not elsewhere classified	190,9	24,2	3530	71,84	2,2
Manufacture of motor vehicles, trailers and semi-trailers and other vehicles (2017 in Zaporizhska oblast)	452,3	21,9	1756	352,83	11,8

*Source:*ЗапорізькаобластьЩорічник, 2018, стор*
***ShorichnikDonetsk (p)*

To compare two subsectors in Zaporizhska oblast, there were used indexes in the manufacture of vehicles of 2017. Zaporizhska oblast is specialized in the manufacture of machinery and equipment, where GVA is 12.9 Euro per hour. Selling on 452.3 mln Euro in 2017, GVA was only 11.8 Euros per worker in an hour. The most productive subsector is the manufacture of vehicles in Donetska oblast, where GVA is 77.6 Euro per hour. It should be outlined, that the manufacture of machinery and equipment is developed in Donetska oblast. During the project, only two companies were identified in the subsector such as Kauchuk (Mariupol) and Autoradiator (Mariupol).

1.5 Benchmarks

Nowadays, personnel does not affect dominantly on productivity and total sales. The interview with an owner shows that outdated technology does not allow increasing the total sales. Moreover, the owner claims that if he is going to distribute in Europe or another external market, he should innovate the process of production. It was revealed, that an R&D office only innovates components of resources and functional tasks of products. Mostly, they do not add value to their products such as digital functions or robotic advantages. These reasons limit companies to enter a new market.

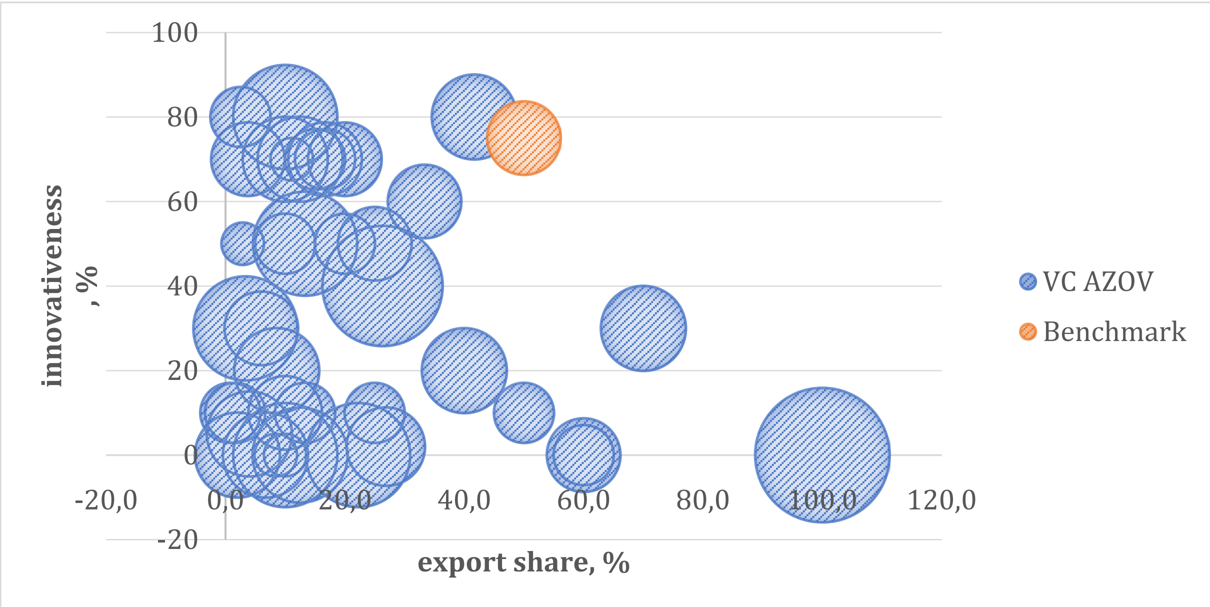


Fig 1.5.1. – Size of salary cost and the entering to external markets.
Source: results of survey

The results of the survey show, that there is no innovation plant, which uses its preferences to conquer the market. Based on the benchmark, only a few plants, such as Agroleader (Melitopol) and Rosta (Melitopol), direct costs directly on salary and innovations. Their management system allows them to expand the market and compete there. When management directs on salary about 15% of total costs and develops 50% of new products for the external market, it will have the most affordable conditions there.

The results of the survey show that management does not strive to improve the skills of their employees. During focus groups, owners emphasize that business training is not too useful as practical experience at a plant. Moreover, a lot of them prefer face-to-face communication with new partners. It makes them limit their opportunities to find new customers abroad.

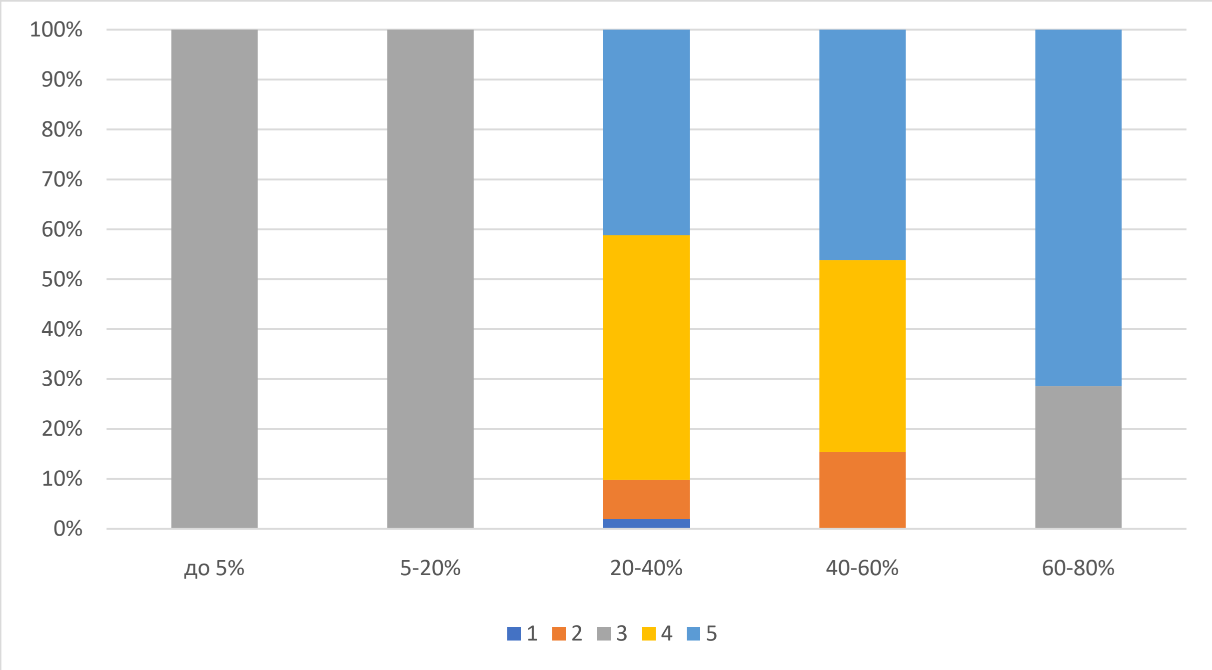


Fig. 1.5.2. –Willingness of management to train their employees,
Source: results of survey

Only a few owners form VC Azov pay attention to the training of staff and managers. The most perspective group of companies, which offer about 20-40% products to new customers, outline the necessity of training. Moreover, 8 from 11 companies in the group sale on the external market more than 50% of their products. All these companies use their site to promote the products. It is important to know that such companies use Google Adwords principles only for Ukrainian and Russian markets.

1.6 Context

There were revealed some special peculiarities on the labour market:

1. One of the reasons for the shrinking of the labor market is the internal and external migration of qualified workers. They are looking for the best job with a bigger salary in Kyiv, Kharkiv, Dnipro, or in countries of Eastern Europe.
2. Because of national currency depreciation, owners have begun stuff reduction to get whatever profit. The other decision, which HR managers use, is to cut salary or get a vacation of worker's own expense. The last option caused downtime in production.
3. The Azov region boasts of qualified professional workers because several generations of a one-family might have the same profession such as adjuster, welder, turner, layout designer.
4. HR management prefers to use an open policy of hiring staff in the Machinery industry. The central reason is to protect a company from a financial penalty if a worker does not employ officially.

5. The majority of staff do not own contemporary professional skills. There is a high demand for workers of specialty adjuster of numerically controlled machines.
6. Existing TVETs do not train potential workers with innovative professional skills because teachers ought to use outdated equipment in the educational process, which has not practically used in a plant.
7. One more reason for official unemployment is unauthorized entrepreneurship, called production in a garage. A local handyman offers services in individual orders of a small batch.
8. While young sales managers have contemporary skills and knowledge to distribute goods, the owners generally prefer face-to-face communication with customers. In this way, management limits the professional growth of newcomers. For instance, during an interview, some sales managers said that the entrepreneur had rejected the manager's proposition to take the training of Google AdWords because they "do not retail" and their customers "usually do not use social nets for business". Therefore, the entrepreneur does not understand the differences between various ads on the Internet.

2. PRODUCTS, PRODUCTION &MARKET PLACEMENT

2.1 Production

Nowadays, more than 120 companies present in VC Azov on Machinery and Automotive and Food processing sectors. Each of them has an individual niche for its product on an internal or external market. The main peculiarity of the sector is that companies do not compete with each other and normally communicate. They might produce a unique order because one of them can offer foundry services while the other can design the new construction. Such collaboration makes this region unique, so, this option might attract additional investments. In the focus group, some manager from Melitopol has pointed out that in union Melitopol entrepreneurs can create together a new tractor because each of them can produce a unique score part. On the other side, such collaboration occurs only at a local level. When managers from Orihiv complain about the quality of foundry and explain the necessity to order casting and raw materials in Turkish, they have not known about quality services offered in Melitopol. The same issue has Melitopol companies, which look for iron tubes and sheets abroad when Magma (Mariupol) produces high-quality resources. Each city council is developing a new strategy for 2020-2024, where will be present a catalog of the local plants. Inside Melitopol, Berdyansk, Orihiv, and Tokmak are located in the one oblast, there is any joint list of companies. In order to stimulate stable communication between cities, it might be a good idea to create VC Azov promotion materials.

Anyway, the list of products offered in VC Azov has more than 1000 pcs. As mentioned above, there is no product offered by entire plants. Table 2.1.1 presents the main products in both oblasts.

Table 2.1.1

Production of various products in Zaporizhska oblast, 2013-2018

Product	2013	2014	2015	2016	2017	2018
Hydraulic cylinder, pcs	68874	51326	40107	66506	104885	120589
Turbocompressors. pcs	22220	21978	28713	31271	36208	43052
Other refrigerating or freezing equipment, pcs	228	48	80	86	46	56
Machinery and apparatus for filtering or purifying air,pcs	4068	3340	2205	2010	5139	3583
Mowers, including cutter bars, designed to be carried on or hauled by a tractor, pcs	2196	2162	1965	3068	3240	1383
Grey iron castings for machinery and mechanical appliances, tons	4453	1516	1329	1556	1221	1275
Steel castings for machinery and mechanical appliances, tons	2318	960	1020	932	1123	783
Other structures principally of sheet: other, thousand tons						
Zaporizhska oblast*	64,2	42.6	19.3	18.4	25.0	24.1
Donetska oblast**	5.7**	8.9	5.4	4.6	6.4	7.5
Iron or steel reservoirs, tanks, vats and similar containers for gases, of a capacity > 300 litres (excluding compressed or liquefied gas, fitted with mechanical or thermal equipment), tons						
Zaporizhska oblast	6456	2637	1245	1544	914	961
Donetska oblast	6280**	5490	2190	44	715	22

**Запорізька область Щорічник, 2018, стор 195-197, Щорічник 2013 (стор 75-76)*
***Донецька область* http://donetskstat.gov.ua/statinform1/industry8.php

There are two different regions, which have their specialization. While plants from Zaporizhska oblast produce spare parts mostly, the plants from Donetska oblast are engaged in sheets and tubes. Moreover, the Main Department of Statistics in Donetsk oblast does not present data of spare parts and machinery production in the entire list of products, produced in Donetsk. The plants in Donetsk specialize mostly in the Heavy industry. Despite poor economic conditions in the region, companies have increased their production of both hydraulic cylinders and turbines in .75 times. Production of other commodities was diminished. For instance, plants have decreased grey iron and steel casting for machinery and mechanical appliances on 71.4% and 66.2% for six years.

It should be noted that economic and political forces have influenced mostly on the production of iron and steel reservoirs, tanks, vats and similar containers in both oblasts. In Zaporizhska oblast, it has been dropped in 3.7 times in 2014 and in 6.7 times, compared with 2013. In Donetska oblast, it has been dropped in 0.9 times in 2014 and in 285 times, compared with 2013. The situation in the subsector is a bright example of how the destruction of economic relations might result in shortening production.

The interview with owners shows that they are looking for new directions for their business for today. Mariupol and Orihiv entrepreneurs look at diversification because of a free market niche in their regions. Berdyansk entrepreneurs try to develop a new unique product. Berdyansk Lifting Equipment Plant, for instance, invents high-quality anchor chains offered in internal markets. Melitopol plants prefer directing their efforts on decreasing of costs. They use a close-circle cycle of production (foundry, casting, welding, and engraving), which makes them control quality among the value chain. To sum it up, if entrepreneurs use an option of diversification, production of the unique product or add some operational functions, they might compete on external markets. Nevertheless, only Melitopol companies make efforts to join in a cluster and offer on the external market a tremendous variety of machinery products.

2.2 Enterprises

It was identified 41 enterprises, engaged in Farm and Automotive Machinery., and Food Processing Machinery. There are such types of enterprises: one amalgamated company, 5 private entrepreneurs, 4 private joint-stock companies, and 31 limited liability companies. It is unfair not to mention, that a few enterprises have the same affiliate owner. Because of the absent data of a number of enterprises, engaged in the machinery sector, it is presented data from the entire industry in the region (table 2.2.1)

Table 2.2.1

Number and size of enterprises in Industry, 2018

VC / Industry	Location	Total	Large	Medium	Small	Micro
Farm Machinery and Automotive	VC Azov Identified (106 F&AP Machinery and 6 FP Machinery) 41 of them took part in survey	41	3	11	22	5
Industry	Zaporizhya*	2095	21	224	449	1422
	Donetsk**	1366	22	185	267	892
	Donettsk and Zaporizhzhya	3461	43	409	716	2314
	Ukraine***	44872	224	4846	9424	30378
	Part of the region in Ukraine	7,71	19,20	8,44	7,60	7,62

*Source:*Запорізька область Щорічник, 2018, стор 321*
***ShorichnikDonetsk (p313) JUSTINDUSTRY*
Статистичний щорічник України, 2018 стор 420

Our research found 106 Farm Machinery and Automotive Companies and 6 Food Processing Machinery Companies in the region with a concentration around Melitopol

City. 76% of F&AP companies and all FP companies are located within 100 km of Melitopol (Melitopol, Orihiv, and Tokmak).

The VC Azov of Farm and Automotive Machinery and Food Processing Machinery is 2% of the total industry in Zaporizhska and Donetska oblast. More than 89.6% of enterprises have a micro size in the region. However, enterprises of the value chain Azov are usually had medium or small size. They hire not more than 250 employees and get income not more than 3 mln euros. The share of the industry of Zaporizhska and Donetska oblast is 7.71% of Ukraine. There are concentrated large enterprises, presented in heavy industry and metallurgy. It should be mentioned that the concentration of enterprises is not similar in the VC Azov region.

Based on official data of the Main Department of Statistics in Zaporizhska oblast, ten enterprises form the Machinery sector implemented innovations into the operational process. In 2013, there were 23 enterprises, which used innovations in their business. (*ЗапорізькаобластьЩорічник, 2018, стор 353*).The number of such enterprises has been gradually decreasing for the last six years. To study such types of enterprises, three of them took part in the survey: Rosta (Melitopol), Turbocompressor (Melitopol) and Berdyansk Lifting Equipment Plant (Berdyansk). All of them mostly use innovation to enhance engineering options. Turbocompressor, for instance, uses a unique rubber billet to develop an iron propeller sheet. Rosta has a patent right for a knife, used in a seeder of vegetables. Nevertheless, there is no enterprise, using exclusive digital inventions such as perception and 3 D printing.

2.3 Production & Consumption

Manufacture of machinery and vehicles plays an essential role in the formation of the volume of production in Ukraine. Production in both oblasts varies from 38 to 55% in the sector in Ukraine. Actually, in 2014 and 2015 it was produced 51% and 55% of all national manufacture of machinery and vehicles. Three machinery giants such as AzovMach (Mariupol), MetInvest (Mariupol), MotorSich (Melitopol) are located here. On the one side, it makes this region attracted to creating jobs. From the other side, their existing companies create strong competition for small and middle companies. According to the focus group, there is the lobbying of large companies in the region in hiring persons that are more skilled, making orders of raw materials, or attaining a state tender.

The established transport network in the South part of Ukraine leads to the further evolution of machinery here. Moreover, it caused the invention of new varieties in the machinery business. The representatives of the Group of companies Turbokom (Melitopol) claim that they can produce a turbine for a vehicle such as a boat, a plane or a heavy machine. The concentration of large groups of the same companies, which produce half of the total machinery in Ukraine, might attract external investors to organize exhibitions here. Table 2.3.1 presents the value of production in 2013-2018 years.

Table 2.3.1

Value of production in the VC Azov Region, Euro, mln

	2013	**2014**	**2015**	**2016**	**2017**	**2018**
Zaporizhska oblast*						
manufacture of machinery and equipment, not elsewhere classified	134.0	99.7	93.6	107.8	139.4	143.1
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	745.3	562.3	499.8	268.0	452.3	366.4
Donetska oblast**						
manufacture of machinery and equipment, not elsewhere classified	70.7	179.5	90.6	52.5	56.3	47.9
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	750.5	384.6	233.6	247.5	280.2	362.9
VC Azov						
manufacture of machinery and equipment, not elsewhere classified	204.8	279.2	184.2	160.3	195.7	190.9
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	1495.9	946.9	733.4	515.5	732.5	729.3
Ukraine***						
manufacture of machinery and equipment, not elsewhere classified	3278.3	2132.6	1733.3	1771.1	1992.3	2185.4
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	4694.0	2497.5	1669.5	1494.7	2058.1	2438.2
VC Azov in Ukraine						
manufacture of machinery and equipment, not elsewhere classified	6%	13%	11%	9%	10%	9%
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	32%	38%	44%	34%	36%	30%

**Щорічник, 2018, стр 185-187*
***Tom's database "industrial output", page "Donetsk Econ" (2014-2018);*
http://donetskstat.gov.ua, Industry, Archive (2010-2013)
http://donetskstat.gov.ua/statinform1/ekonomichna-statystyka/ekonomichna-diialnist/promyslovist/obsiah-realizovanoi-promyslovoi-produktsii-tovariv-posluh-za-vydamy-ekonomichnoi-diialnosti/20100000-20130000/
*** ukrstat.gov.ua (Statistical information, Industry, Обсяг реалізованої промислової продукції (товарів, послуг) за видами економічної діяльності у 2010-2018 роках)

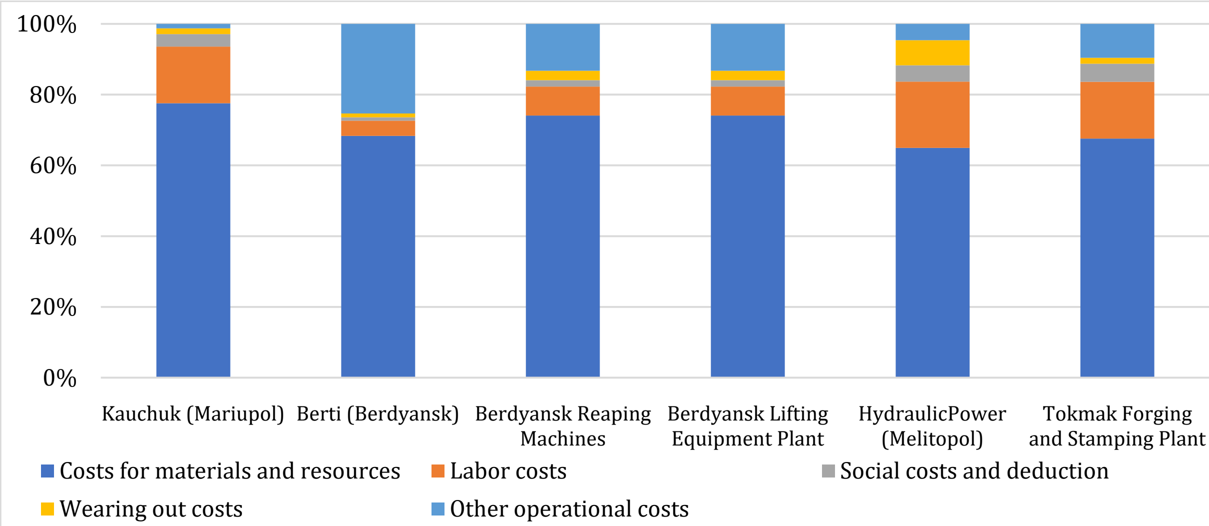
During four years, manufacture of machinery and equipment in Zaporizhska oblast has been gradually growing from 93.6 to 143.1, or about 52.88%. The other subsectors tend to decrease. Manufacture of machinery and equipment in Donetska oblast in 2018 diminish on 32.2% compared with 2013. Manufacture of vehicles decreases on 50.8 in Zaporizhska oblast and 51.6% in Donetska oblast. It leads to production shrinking in the VC Azov in the manufacture of machinery at 6.8% and the manufacture of vehicles on 51.3%.

The central element, which influences on net profit is the cost of production. According to the interview and focus group, the significant part of costs has raw materials and resources. Manufacturing costs are:

1. Costs of materials and resources 65-70%
2. Operational costs 15-20%
3. Labor costs 5-8%

4. Other costs 10%

Share of costs of distribution in total costs:Upon 30% (export-oriented companies (SWAG (Melitopol), Turbocom (Melitopol), Manufacture of reinforced machinery (Orihiv). Mostly, companies do not use the marketing mix in their activity and spend upon 5% of total costs. Such companies have no more than 50 workers. Deep analysis of cost of production in companies according their financial reports is presented in figure 2.3.1.



Source: financial reports of enterprises

Companies in Farm and Food processing machinery generally work in a B2B environment. Their central customers are leading enterprises that produce harvesters, tractors, and other heavy machinery. During the focus group, it was identified as a link between companies inside the sector in the Melitopol region. For example, hydraulic companies cooperate with factories with farm machinery to supply hydraulic parts for tractors.The other channel of distribution is direct deliveries to farms. Such channels use Orihiv factories (Orihavsilmach and Moroz factory) and Berdyansk factories (Berdaynsk reaping Machines). Companies practice creating their distributor centers to broaden their area of delivering. Swag Score Parts (Melitopol) has distributors in more than 10 cities of Ukraine. Companies that deliver their products abroad develop distributor centers in Kazakhstan and Uzbekistan, for instance. As a sales manager says, it helps a company to deliver commodities in time with lower costs.

Based on survey, it was calculated that distance of distribution is depend of a company's size and city, where it is established. It is calculated the share of markets:

1. An average micro company distribute in such proportion: local market –64%, national market –12%, export –24%.
2. An average small company distribute in such proportion: local market – 27%, national market – 39%, export – 33%.
3. An average middle company distribute in such proportion: local market – 20%, national market – 48%, export – 32%.

Firstly, micro-companies prefer to offer their products on local markets but do not limit their efforts to enter the European market. For example, Rosta (Melitopol) offers the most of the machinery for local small farms in the south part from Ukraine, engaged in vegetable production. On the other side, management takes part in expo exhibitions and sells seeders in Canada, Italy, and France through established direct contact. Secondly, small companies prefer to work in an internal market with national customers. Most of them have unique products, which make such companies competitive in the national markets. The factory of Moroz (Orihiv), for example, has invented the farm machine with the newest option of seeding. Therefore, it offers products to national farmers. Thirdly, the middle companies have used to distribute their commodities in former Soviet Union countries such as Kazakhstan, Russian Federation, Uzbekistan, and Belarus. It could be emphasized that the life circle of their products is in the pick of demand in those countries for today. Many companies have their affiliates, distributor centers or even registered companies. Nonetheless, they are looking for the European market to enlarge their incomes. Based on the focus group, it might be concluded that a major number of such enterprises have all the necessary certifications for their productions. The one question is non-compliance with products with the full requirements of European customers.

2.4 Output per Employee

We studied that that output per employee is still low in the Azov Sea region comparing with European countries. If the studied industrial group is planning to enter the external European market, it should enlarge productivity. For today, the level of production output does not allow companies to expand their production quantity. According to survey and peer review, it was revealed whatever company in VC Azov cannot enlarge its capacity more than twice. Based on the survey, an average capacity, which micro-companies can increase their production, is 38%, small companies – on 30%, and big companies- on 33%. Only 42 companies forecast their growth by more than 150%.

Furthermore, the more owners are planning to increase their incomes, the more they spend cost on salaries. We calculated that if management forecasts to enlarge a productive capacity of less than 50%, the average salary expenditures are about 16%. Only nine companies are going to increase their capacity by more than 50% and spend about 21% of total costs on salary. To sum it up, companies in the VC Azov prefer extensive to intensive manufacturing. It means that they used to increase volume but not value. However, because their financial capacity is limited, they cannot increase production more than twice. Results of the focus group show that there are many reasons of production limitation:

- Lack of knowledge (a manager of a company has noted that his company have finance for development but do not how to do improvement);
- Lack of skilled workers;
- Soviet approaches to lead business;
- Market illiteracy ignorance (what external customers need and how to communicate with them):
- Outdated technologies and equipment.

The above forces result in low level of productivity. In order to form propositions of further development of value chain in Machinery, we have evaluated the benchmark (figer 2.4.1).

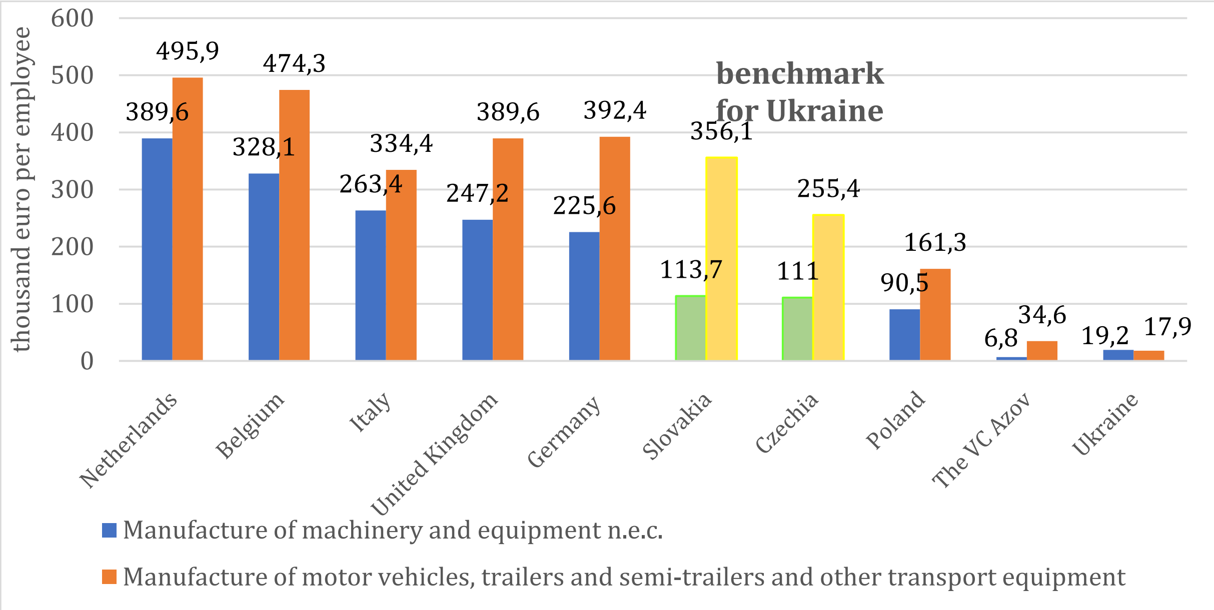


Fig. 2.4.1 – Production value per employee

https://ec.europa.eu/eurostat/data/database

Щорічник Запоріжжя

Щорічник Донецька область

Щорічник Україна

From the very start, it should be noticed that productivity in Ukraine and the Azov Sea region is so tiny to compare with European countries. While companies in the VC Azov produce an average of 6.8 thousand Euro per employee in machinery and equipment, the entrepreneurs from Poland produce 90.5 thousand per employee. The manufacture of vehicles and other transport equipment has the same state. The level of the Azov Sea region is less in 4.7 times than in Poland, and 7.4 times than Czech, and more than 10 times than in other European countries. An identical low level of productivity is in Ukraine too. Therefore, the most reliable level for the Azov Se sea companies is a practice of Slovakia and Czech, where production is more than 100 thousand Euro per employee in the manufacture of machinery and equipment and more than 200 thousand Euro in the manufacture of vehicles and other transport equipment. Achieving the level of companies from the Eastern European is a real aim for the local companies in the nearest three-five years.

It should be increased productivity to enhance the value chain in the region. If companies even negotiate with European partners about delivering, they would not meet all the requirements. Therefore, further investments should be directed to the implementation of the modern operational process. The digitalization of products and the implementation of modern software programs in manufacture are claimed by owners to be the most crucial in the nearest future. From this side, it would be useful to organize business trip owners from the Azov Sea region to the leading enterprises in Europe.

Figure 2.4.2 shows results of investment and workers' motivation on production value.

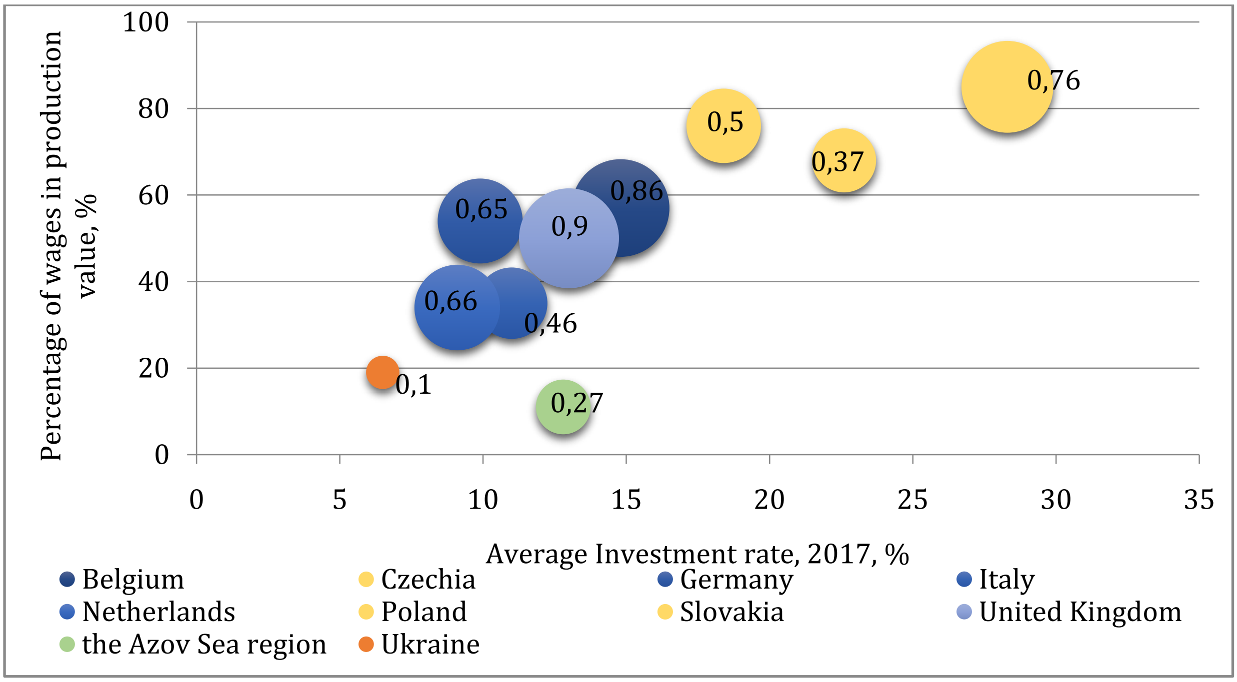


Fig.2.4.2 Production value per an average enterprise, 2018 mln Euro

https://ec.europa.eu/eurostat/data/database

Щорічник Запоріжжя

Щорічник Донецька область

Щорічник Україна

Benchmark model presents two groups of companies in the machinery of the European Union. A first group is a group of leaders in the sector such as Italy, Germany, the UK, and the Netherlands. Machinery companies from this group have invested about 5-15% into production, spending less than 60% of costs on wages. To achieve such level, the Eastern European countries have about 8-18% of an average investment rate and 68-85% of a salary percentage. Therefore, the VC Azov companies should reconstruct their economic police in investments and material incentives of their workers.

2.5 External market

Companies export the third part of total sales in the VC Azov. Based on the focus group and peer review, export is the strategical aim for further development of a company in the sector. As owners say, they are planning to enlarge distribution outside of Ukraine to take a niche in the external market. In spite of their willingness, they are not ready to compete with European companies by standards and innovative products. According to the survey, regional companies compete only by price. Each second interviewer claims that his or her company offers products by cheaper price comparing with European competitors. Moreover, each third person boasts of an option of deferred payments. But only 25% of interviewed managers emphasize that they manufacture unique products. Therefore, many owners prefer competition by price to the promotion of external options of their products. Anyway, some companies have success in exporting commodities to Europe. Agromaster plus (Melitopol), for instance, has distributed hydraulic cylinders to the European Union for 5 years. Its export share is about 80%. The other bright example of outstanding results on the external market is the experience of Factory Moroz (Orihiv), which has innovated its products according to European standards.

According to communication in focus group, it was reveal the central challenges of export distribution:

- non-compliance with European standards;
- ignorance of the features of the engineering market in Europe;
- high costs for participation in the exhibition;
- difficulties with opening affiliated firms.

Table 2.5.1. presents the results of export and import of the machinery sector in the Azov sea region.

Table 2.5.1

Export and import in Machinery sector in the VC Azov, $ mln

Oblast, group of products	2013	2014	2015	2016	2017	2018
Zaporizhska oblast*						
Machines, equipment and mechanisms; electrical equipment						
export	1274.7	964.5	668.0	389.0	551.5	514.3
import	390.2	247.2	155.4	199.0	256.7	416.5
nuclear reactors, boilers, machines						
export	852.4	731.8	562.4	313.3	445.7	346.6
import	280.2	184.4	123.7	164.1	207.2	209.0
electric machines						
export	422.3	232.7	105.6	75.8	105.8	167.7
import	110.0	62.8	31.8	35.0	49.4	207.4
Donetska oblast**						
Machines, equipment and mechanisms; electrical equipment						
export	564.2	373.7	194.3	159.4	171.8	236.9
import	509.0	205.1	73.1	104.9	186.9	225.7
nuclear reactors, boilers, machines						
export	493.4	324.6	165.9	146.4	161.4	221.7
import	358.7	146.3	54.4	86.8	140.7	174.5
electric machines						
export	70.8	49.1	28.4	13.0	10.4	15.2
import	150.3	58.8	18.7	18.1	46.2	51.3

*Source:*Щорічник, 2018 стор 267, 2013 стор 162*
***експрес випуск Донецьк, 2013, 2014, 2015, 2016, 2017, 2018*

Our research shows the export in the machinery and equipment industry has dramatically decreased from 2013 to 2018 in Zaporizhska oblast on 60.0%. Only the export of electric machines has growth in 2018 in Zaporizhska oblast. Compared with

2017, it rose by 58.6%. Export in Donetska oblast has the same tendency: gradual decline until 2017 and slight growth in 2018. The main export-oriented subsector is the distribution of nuclear reactors, boilers, and machines in both Donetska and Zaporizhska oblasts. It is unfair not to mention that import has steady growth from 2015. Moreover, in 2018 import of electric machines increases sharply in Zaporizhska oblast. Comparing with 2017, it soared in 4 times and exceeded the level of 2013 in twice.

The data of export and import distribution in Ukraine indicate a negative trade balance of entire groups of products for all six years (see Annex). Furthermore, the size of the negative export is continuously rising. The negative trade balance sector change by 20% in 2018, comparing with 2013. We revealed that on external market agricultural machinery for soil preparation (8432) and tractors (8701) has a maximum decreasing in the trade balance. Decreasing is about 21% (agricultural machinery) and tractors 42.1%. The export predominance of such a product might be a benefit for the further development of the VC Azov. Manufacturing new automotive parts for exporting agricultural machinery and tractors will allow local Azov companies to increase their volume on the domestic market.

2.6 Key imports (& possibilities for import substitution)

The import of Machinery creates a strong competition in the VC Azov. It has its cons and pros. On the one side, International companies usually compete with extra options of tools, timelines of order, and complicated-produced products. On the other side, regional companies compete by price and some financial benefits such as deferral of payments. As it is noticed above, the companies from the Azov Sea region boast of good engineering ideas, but they cannot offer a product with digital options. From this, it is very essential to create a modern R&D center on outsourcing to provide competitive services in design and construction. It is really will enhance the volume of the product. Furthermore, increasing imports might cause the growth of demand on score parts for foreign machinery such as harvesters and tractors (New Holland, Claas). From this side, the creation of the center of repairing parts for world-known machinery might create a new niche in the region.

Nowadays, import of Farm, Automotive and Food Processing Machinery is 3.3% from total Ukrainian import in 2018(table 2.6.1, annex).

Table 2.6.1

Imported products to Ukraine (2013-2018), EURO, thnd

Import value	2013	2014	2015	2016	2017	2018
Total value of sector	1463.8	846.4	758.6	1393.3	1765.1	1594.2
Total value of import (Ukraine)	57960.3	40911.4	33798.5	35464.5	43763.1	48423.6
Share of machinery sector	2,53%	2,07%	2,24%	3,93%	4,03%	3,29%

Source: trademap

The total volume of machinery import increases by 9%, compared with 2013. The most comprehensive import of machinery was in 2017 and equaled to $1.8 billons. For today, the influential import products are tractors (8701) and parts for them (8708). During six years, the import of tractors increased to $117.9 million, but the import of parts for tractors is less on 26/9 million. It should be noticed that there is stable growth in the import of harvesting or threshing machinery. It is only $283.1 million, but in 2017 it was more than $425 million.

The other sector of import is supplying of raw materials such as iron and steel (table 2.6.2).

Table 2.6.2

Imported value of raw materials to Ukraine, 2016-2018, thnd Euro

Exporters	2013	2014	2015	2016	2017	2018
Code72 Iron or steel						
World	1680.2	976.2	617.8	721.5	1004.0	1157.2
Russian Federation	613.4	326.3	182.9	226.3	298.1	325.7
China	364.6	165.8	117.4	162.3	204.0	222.2
Turkey	47.7	20.2	16.1	24.5	45.1	78.2
Belarus	8.6	18.9	4.1	4.0	28.6	66.9
Poland	87.6	62.3	51.4	63.5	59.9	66.0
Code 73 Articles of iron or steel						
World	908.1	631.9	470.3	584.8	713.2	819.6
China	175.5	118.5	87.7	119.0	133.4	212.3
Russian Federation	136.0	57.5	46.6	68.5	69.2	82.5
Poland	90.7	61.9	52.5	55.0	72.6	80.3
Germany	106.3	71.1	46.4	56.2	62.0	78.7

Source: trademap

Ukraine imports 1157.2 million Euro of Iron and Steel, and 819.6 million Euros of articles of iron and steel. Mostly, Ukrainian companies s buy iron and steel from the Russian Federation and Chinas, which supply these metals on 325.7 and 222.2 million Euro. There is the same tendency as the import of machinery changing, so raw materials changing. There is a little gap in volume in the 2014-2015 years.

According to the focus group, we revealed that numerous companies from the Azov Sea region order metal abroad (Prussian Federation, Poland, Turkish), claiming that Ukrainian raw materials have poorer quality. Nevertheless, when we asked to evaluate local suppliers, some companies did not remember even the name of local suppliers. Each rayon and oblast is working out the strategy of city development and making a list of companies. However, there no joint list of companies in the regions. So, many companies work separately in looking for resources and do not study the opportunities in the region thoroughly.

2.7 Key Exports

According to the focus group, we reveal two regions with different delivery directions. Orihiv companies, recently created, offer their products on the national market. According to the survey, four from five companies distribute on the national market from 70 to 90%. Zaporizhzhya Experimental Plant of Vehicles (Orhiv) sells in the local market mostly. Furthermore, all owners notice that they have not studied the external market, and they only have had the first experience. Nonetheless, they know numerous farmers in the region, who potentially might be their customers.On the other side, the focus group in Melitopol showed, the executives do not get information about local farmers, existing machinery, needs for repairing, etc. Some manager claims that a company does not need to know any information about local farmers because his company offers spare parts for Belorussian Machinery. Probably, if this company collects data about local farming, it would have new customers in its region. Companies use to sell through distributors in the national market and do not aggregate information about farmers' needs. Many of them evaluate their customers in link B2B and even do not reveal that a final customer of their clients could be their customer. It means that some local farmers could use a tractor from the Belorussian factory and the company from the VC Azov might supply to both the Belorussian factory and a local farmer, who is the client of the factory. The link in the value chain is broken here. Therefore, the more data about local farmers the companies will have, the more opportunities they could imply in the internal market.

Today, Ukrainian companies supply agricultural machinery and parts for tractors frequently (see table 2.7.1 and Annex). In 2018, Ukraine exports agricultural machinery on 34.6 mln Euro and parts for tractors and vehicles on 64.5 mln Euro. Reasonably, the value of export has gradually decreased for the last six-year. The value of export has reduced in agricultural, harvesting, milking poultry-keeping machinery. The export of agricultural machinery (8432) is declined from 45.6 to 34.6 mln Euro. The export of tractors and hydraulic turbines has dropped in 6.1 and 19.2 times.

Table 2.7.1

Exported products to Ukraine (2013-2018), EURO, mln

Export value	2013	2014	2015	2016	2017	2018
Total value of machinery sector	272.1	218.5	125.8	88.4	130.3	163.3
Total value of export (Ukraine)	47671.9	40559.3	34348.9	32854.5	38442.4	40081.0
Share of machinery sector	0.57%	0.54%	0.37%	0.27%	0.34%	0.41%

Source: trademap

Decreasing of export of various subsectors has resulted in a decline in the total value of machinery export on 40% for the six years. Ukraine has lost 110 mln Euro during the study period. The worst year of export for machinery was 2016 when Ukraine exported machinery on 88.4 mln Euro. The dominant part of export (56.8 mln Euro) was an agricultural and harvesting machinery.

Based on the focus group, it was revealed that the main issue of distribution in counties of Meddle Asia is quoted for transit from the side of the Russian Federation. It makes companies search for other directions. Nowadays, they have a little practice to sell in countries of Eastern Europe such as Poland, Hungary, and Bulgaria (table 2.7.2)

Table 2.7.2

The major direction of Ukrainian export, 2018, Euro, thousand

Value Chain	Group of products		Country 1	Country 2	Country 3
	8432 Agricultural, horticultural or forestry machinery for soil preparation or cultivation	Name	Russian Federation	Moldova	Germany
		Volume	17227	6892	2728
	8433 Harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers	Name	Russian Federation	Kazakhstan	Moldova
		Volume	12468	1681	1453
	8434 Milking machines and dairy machinery	Name	Russian Federation	Lithuania	Moldova
		Volume	745	133	130
	8435 Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices	Name	Moldova	Georgia	Russian Federation
		Volume	993	157	35
	8436 Agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery	Name	Lithuania	Russian Federation	India
		Volume	1027	1006	849
	8437 Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables	Name	Russian Federation	Uzbekistan	Lithuania
		Volume	4742	1657	1183
	8438 Machinery, not specified or included elsewhere in this chapter, for the industrial preparation	Name	Denmark	Russian Federation	Uzbekistan
		Volume	2808	2478	727
	842481 Agricultural or horticultural mechanical appliances, whether or not hand-operated	Name	Moldova	Kazakhstan	Russian Federation
		Volume	1721	345	295
	8701 Tractors	Name	Russian Federation	Moldova	Belarus
		Volume	5004	749	487
	8708 Parts and accessories for tractors, motor vehicles for the transport of ten or more persons	Name	Russian Federation	Belarus	Austria
		Volume	24334	9008	6291
	8410 Hydraulic turbines, water wheels, and regulators therefor	Name	Czech Republic	Tajikistan	India
		Volume	220	220	37

Source: trademap

Ukrainian companies used to export their commodities to former Soviet Union countries mostly. They distribute their products to Moldova, Georgia, Belarus, Uzbekistan. Based on the focus group the main forces of it are:

1. Farmers used to purchase soviet outdated equipment. Therefore, Ukrainian companies prefer to supply parts that have been designed in an earlier time.
2. There is a deep link between Ukrainian SME and companies of heavy machinery from post-Soviet Union countries because of uniform mentality and the same language of speaking.
3. Ukrainians companies design and construct parts for tractors, harvesters, and other transport according to existing technologies, equipment, and knowledge. The numerous plants, demanding parts and appliances, are located in post Union countries.
4. The market of Soviet Union countries is not flexible. Therefore, companies do not need to take a lot of time to redesign a new order of parts or appliances.

The majority-exported country is Russian Federation(Fig. 2.7.1).

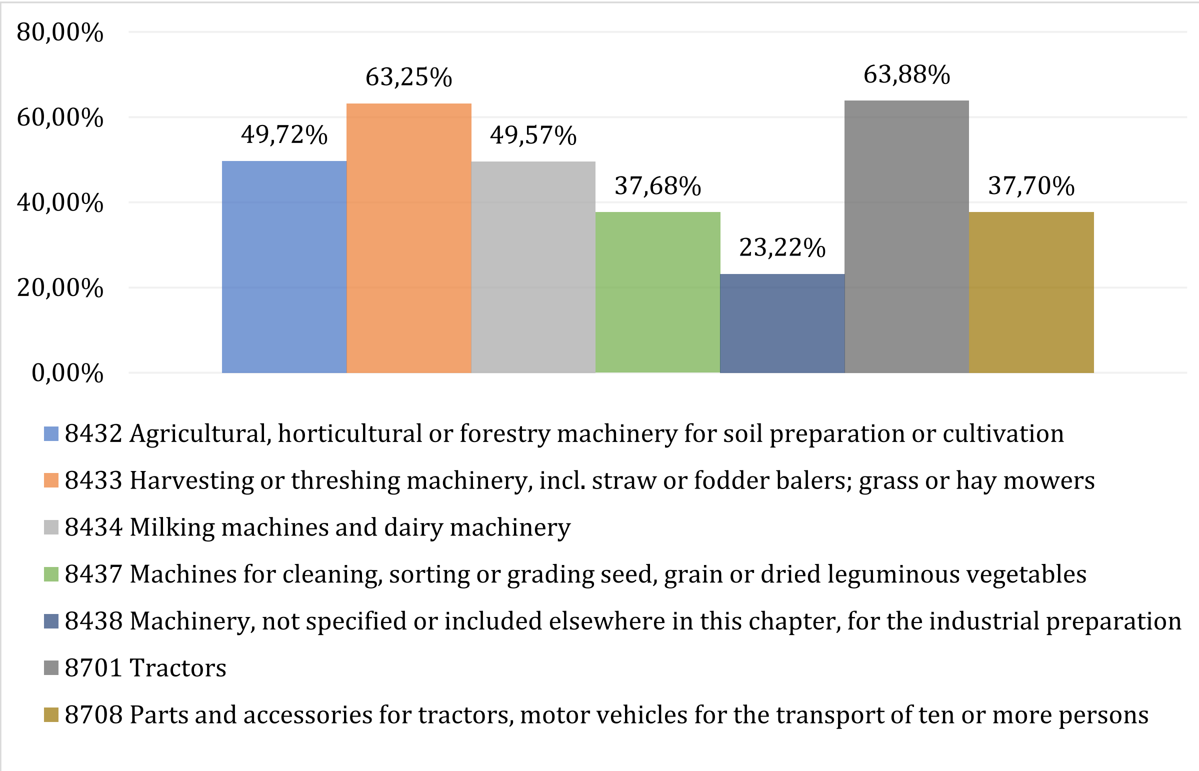


Fig. 2.7.1 Export of Farm, Automotive and Food Processing Machinery to Russian Federation from Ukraine, 2018

Source: trademap

Ukrainian companies supply the most export-oriented products to the Russian Federation. It was evaluated that in 2018 63.2% of harvesting machinery and 64% of tractors were exported to the Russian Federation. Moreover, about 50% of agricultural and dairy machinery was sold there too. To sum it up, the insignificant value of export of machinery, which consisted of 0.41% of the total value of export in Ukraine, was directed to the Russian Federation mostly.

2.8 Key Selling Points & Value Proposition

1. Standardization of products to requirements of European market. Most companies produce parts and tools that cannot be used in further utilization in European market. Moreover, some products from variety are for manual production, what make them outdated on external market.
2. Increasing of employee motivation. Many young skilled workers go abroad to get additional income using his or her experience gained in Ukraine. Therefore, it's not unprestigious job in Ukraine, it's a place where an experienced worker does not get a good salary.
3. Investment into the operational process. Many companies have modern plant with outdated equipment. It should be essential to automatize manufacturing process and cut manual labor.
4. Research of an external market. Companies do not have any database of potential customers abroad. Moreover, they do not know needs of final customers (farmers or plants of food processing products).
5. Entering to external market as one brand. It will help to take part in International Expos, make completed orders and develop multinational market.

3. PARTNERS

3.1 Key Stakeholders

Organisation Name	Comments
Association and Units	
Cluster Agroboom	It is a good practice of the joint communication of local companies. The cluster began in 2009. It was closed in 2014.
a new industrial park in Mariupol	Mariupol authority is planning to construct and maintain an industrial park. Some of the enterprises will be engaged in the packaging of resources and raw materials. The existing port will service further distribution on external markets.
Industrial park in Melitopol Isatex Industry	Local entrepreneur Aleksey Focardi (Melitopol) and Izatex industry are creating an industrial park on the area of ex-factory Refma (Melitopol). This park will offer services to rent offices, trade, storage, and transportation. The Izatex Group has implied new approaches of the value chain in food processing.
Chamber of Commerce and Industry	Melitopol, Berdyansk, Mariupol. The chambers provide consultations on the questions of customs services and business consulting. They have deep relations with local companies, but they do not use the one uniform list of all companies in the Azov Sea.
Berdyansk Unit of industrialists and entrepreneurs	The Unit has a database of Berdyansk companies but usually uses it for the organization of conferences and meetings. The Unit does not provide consulting and training services.
Education	

Academies	
TVET See Annex	According to the peer-reviewed and phone interviews with executives, such mechanical professions do not popular among youth. The most reason why they attend TVET is an opportunity to work in Eastern Europe countries after education. TVETs in the region have a partnership with local companies frequently.
Colleges See Annex	All agrarian colleges have a dual-type of education. They have deep relations with manufacturing companies in the region. Moreover, the technical colleges (two in Mariupol, two in Berdyansk, and one in Melitopol) propose the workplace after graduation. The main threat of the value chain is the absence of a link between teachers and companies. As a result, teachers cannot explain new approaches, which an owner is planning to implement in a factory.
Universities See Annex	
National University "Zaporizhzhya Polytechnic University"	There are various departments where teachers and researches imply modern digital technologies. The department of informatics and radio electronics has created an incubator for youth about augmented reality in manufacture. Probably, any department does not have deep relations with machinery companies to retrain workers. The University just looks for young students from the school, passing real stakeholders of their educational services.
Zaporizhzhya National University	University has long-term deep relationship with leader companies in machinery.
Tavria State Agrotechnological University	The University boasts of numerous contracts with local machinery enterprises for dual education. According to the peer-review with the rector, most students take such type of education not less than half of year.It might be used for further development of the link between companies' unit and educational process.
R&D	
Private design Department "P.R.I.Z"	It is located in Melitopol,
Center of adult education "Pershiy".	The center offers courses of project management, time management and psychological management.
Incubators	There are a few business incubators in both oblasts which offer educational business training for youth to create start-ups. One of the purposes of the incubators is to perform progressed start-ups on the local competition. Anyway, courses typically are devoted to questions of a business plan or new ideas for start-uppers. It should be meaningful to broad themes by such directions as a business in the Internet, software programs in business for design and management, intellectual machinery, ways to enhance product value on a market
Agencies and Local Authority	
Rayon Council	
Department of	Such stakeholders usually provide an affordable platform for

Entrepreneurship and Industry	meetings and seminars. A department is developing a part of the Strategy of a city development until 2024. The staff analyses and works up strategical directions according to machinery companies' opinions. A strategy includes issues of further development of infrastructure in machinery.
Local agency of City Development	The stakeholders give informational support for companies and assist companies to get applications for grants and investments. Moreover, staff initializes supplementary services to support a local business. Melitopol Agency, for instance, creates digital room for each local company on the Internet platform as a part of the program Smart city.
Chamber of Commerce and Industry in Zaporizhska oblast	CCI organizes numerous expo in Kazakh Palace in Zaporizhya. It might be used to organize the International Expo of Machinery and Light Industry to invite foreign customers. The main aim of the expo should be to create a dialogue between companies and to present innovative digital ideas for further development of companies

3.2 Key Competitors

Based on the survey, competition results in loss of market share partially. Only eleven respondents answer about absolutely influencing forces, and the same quantity of respondents note that existing competition is the significant factor of the market. The last 19 interviewed persons do not see a problem in competition on the machinery market and point out that this issue.

We divided all limitations on three groups:

Global level

There are numerous competitors on external developed market (Canada, US, the European Union), but nowadays that result in distribution of local companies directly there some but not limited competitors, which were revealed in focus group: Badestnost (Bulgaria); Walvoil, Galtech (Italy); Bosch, Rexroth (Germany); OMFB (Italy). The major quantity of companies of the Azov Sea Region directs their products to the former Soviet Union Countries. From the very start, many customers from these countries buy used score parts to make the market declines demand new commodities. Moreover, a government, from the Russian Federation, for instance, offers various grants to buy new domestic equipment. Therefore, such companies as SALEO (Belarus) and Saratovdiesel apparatus (Russian Federation) have a competitive priority on a regional market.

National Level

Historically, some plant of score parts should be located in each oblast of Ukraine in the Soviet Union period. These days, such companies have renovated their principle of production and management. Each of them has its direction and database of clients. The most influences factories which could be evaluated as competitors to companies from the Azov Sea region are Lvivavtozapchasti (Lviv), Tractorspare (Kharkiv), and Auto spare parts (Zhitomir). According to the focus group, such companies do not make competition for them because most of Melitopol plants work and desire to work on the external market. Orihiv companies emphasize that such companies make competition in the supply of raw materials because this market is limited in the number of suppliers.

VC Azov level

Local large companies (MetInvest (Mariupol), AzovMach (Mariupol), Motor Sich (Zaporizhzhya) are huge competitors in the labor market because of great commercial sources. They attract workers with higher prices. It makes the results of R&D more resourceful these days.

The other type of competitors is a group of companies that work in the shadow economy. Such companies are usually located in garages or registered in apartments. Firstly, their unsatisfactory quality products spoil their reputation. Secondly, they dump the price because they do not return any tax and payments.

3.3 Logistics

Positive moments:

1. The local logistics network is significantly developed. The companies from the Azov sea region use various services from transport companies such as Nova Poshta, Delivery, Intime, Autoluks, etc. They must have contacts not only with the one transport company and select it according to price, opportunities to deliver the goods. Based on peer-review and the focus group, companies use their transport to deliver abroad. Furthermore, local owners usually join transportation abroad if companies have a small order to form a wholesale lot or their transport is out of the firm. It is a good practice that should be used in the future.
2. Hegelmann's logistics center is located in Melitopol. It has crucial experience in organizational deliveries in Europe. Personnel speaks Ukrainian, Russian, Polish, Germany, and English. Today the affiliate is looking for skilled translators of French, Czech, and German. The company offers transport services in Poland, Germany, and French mostly.

Negative moments:

1. There are some quotes in both European and Middle Asia markets. Europe has quotes on extra machinery goods from Ukraine. The Russian Federation set quotes for transportation goods to countries of Middle Asia through its territory.
2. The subjective factors of corruption and bureaucracy do not endorse companies to use local custom services, particularly in Mariupol and Berdyansk ports. Peer-reviewed meeting has shown that it takes 3-4 days to clear custom in Lviv and 2 days to deliver goods to Berdyansk. If a company uses services from a local customs office in Berdyansk, it will take about three weeks. There is the same state in Mariupol, where SME prefers to use the services of the Odesa port.

3.4 Limitations

Corruption:

- There is a usual corruption process in local offices of police, fire departments, departments of occupational safety and health, etc. Based on peer-review, these stakeholders do not influence significantly.
- Corruption influences mostly on the production when some enterprise decides to share business and rent additional land. However, most of the study enterprises claim that it is a rare case in their business.

Bureaucracy:

- Based on the focus group, there is no bureaucracy. It is much more crucial to get information support from a local authority. For example, the first focus group notes that local authority tells a lot about the development of a machinery cluster, but it has not done any step for the last years. Moreover, three of the forty-one interviewers answered that they do not have information about existing grants and funds.
- The one case of bureaucracy, claimed during the focus group, is an issue with tax payments and documentation of company opening. One of the interviewed people asks to stop audit and control.
- According to survey, the major issues are connected with problems of national economics. The interviewed managers (9 from 41) writes that the most question is unstable economic in Ukraine which leads to risks if financing. The second focus group in Melitopol empathises that many companies will stop manufacture if the rate of dollar will be lower than 22 UAN. They explain that they might lose incomes in an external market and manufacture will not be profitable.

Lobbying:

- There is grey (not pronounced situation) lobbying in regions. For example, the affiliated owner of Berdyanski znivarky is directly connected with deputy of the city council which influences on the development of machinery in the city indirectly. The most skilled workers prefer to work here, for instance.
- Moreover there is aconflict of interests in the Local council but does not still influence significantly. However, regardless of political preferences all companies are willing to work together for the one aim.
- Large companies such as Metinvest attract suppliers to make contract with them beneficially. Because of monopoly on quality metals in the region, local companies have deficit in raw materials.

Economy and government:

- All participants of focus group note about unstable situation on financial market in the country which result in increasing of financial risks and exchange rate. Evaluating as most crucial force, the owners and managers focus on guaranties and subventions from the government.

- There isimperfect legislative framework in developing of contracts with intermediaries. Based on focus group, it is common to have deferral of payments.
    - According to peer-reviews, owners complain on the imperfection of the refund of value added tax

Education:

- There are numerous education centres (Universities, colleges and TVETs), which educate workers and specialists. However, bureaucracy in educational process in Ukraine does not allow implement a new educational program rapidly. Moreover, the educational process is not flexible for today to change tasks and learning approaches quickly.
- Because the Ukrainian government has not supported renovation of educational facility financially for the last decades, departments need to educate students on outdated equipment.
- There is no direct link between TVET and companies. Actually, Universities have a practice of dual education in the region, so companies do not emphasises problems with managers and engineers. Nonetheless, such companies demand skilled workers from TVET. From this side, some entrepreneur from Berdyansk outlines that he does not understand the feedback from direct stipendium andgrants for TVET students. From the other side, training and financial support will help students to understand the preferences in working at a plant.

Logistics:

- The main problem is quotes and embargo on Ukrainians good and transport services in Russian Federation and the European Union. It makes shrink the volume of export and find the other external markets. Moreover, such issue is a problem of fulfilment of contracts in a timely and complete manner.
- The other factor is linked with local bureaucracy with customs clearance in port in Mariupol and Berdyansk.there is internal border between Mariupol and other cities among the Azov Sea, which might extra bureaucracy in transportation of commodity.
- There is a limited railwayelectrical connection between Zaporizhya, Orihiv, Tokmak and Berdyansk which limit transportation of goods by this way. Moreover, the road between Melitopol and Zaporizhya is congested in summer. According to focus group, it takes few days more to deliver commodities to customer in season. The bad road surface and police bribes on Ukrainian roads complicate the transportation system. Based on peer-review, the bad quality road might increase transport cost till20% from total amount.

Infrastructure and broader details:

- Lack of quality hotels, which are necessary requirements for organization of international forums, visiting and even Expo.
- Monopoly on energy resourceslead to increasing of costs. The companies are limited in selection of suppliers of energy. Nonetheless, Zaporizhska oblast

provide more energy than consume in five times. In 2018, energetic enterprises have produced 44.2 billion of kWt of electric energy and 5.5 mln geco Cal of thermal power. All users from Zaporizhska oblast have supplied 9.0 billion of kWt of electric energy and 4.9 mln geco Cal of thermal power. Furthermore, producing all electric machinery industrial enterprises have supplied 0.3 billion of kWt of electric energy and 4.9 mln geco Cal of thermal power. Therefore, Zaporizhska oblast has enormous potential to develop the industrial sector, providing local energetic resources(щорічник Запоріжжя, 2018 ст 182-183).

- There is no any industrial association or cooperation which presents interests of companies from the Azov Sea region

3.5 Overview

1. Most existing units in the region have the aim to get income from study companies as rent of offices, leasing or consulting services. Companies need more real support in promotion their business. From this side, cooperation with the Chamber of Commerce and Industry in Zaporizhska oblast might be crucial in organization Forum, Expo and training of managers. To sum it up, it is crucially to initiate some unit of companies in order to present their interest and promote results abroad. Abundance of companies in the region, who produce some small score part in farm or automotive machinery might really be the ground of the competitive industrial cluster or hub.
2. There is no direct link between educational centers and companies. It would useful to create a platform where students will get novel skills and knowledge. Again, the dual system of education is a good practice for further development. In order to motivate students. It might be important to finance scholarship of a TVET student to organize a competition “WorkerSkills” in a plant. Involving youth into modern manufacturing process and motivating them in the same time might stop workflow to the European Unit.
3. All companies, producing Farm, Automotive or Food processing machinery have their R&D offices. Such offices boast of excellent skilled constructors rather in engineering then in electronical design. Existing of incubators propose business courses, not popular among owners of machinery industry, because they proposes theme how to create start-up or media literacy mostly. We revealed a potential of digital and electronic innovations in departments of informatics and automatization in National University “Zaporizhzhya Polytechnic University”.
4. Local authority and departments give various consulting support to machinery enterprises. Some managers or owners note in the survey that they get ongoing information about grants and funds not full r not in time. Moreover, there is some political lobby of interests in Melitopol and Berdyansk, not influenced on the development of machinery significant.
5. Each company form the VC Azov has found its own niche, which allow cooperating with others in organization of joint transportation or complex order.

6. Logistics has its cons and pros. Firstly, there is poor road surface in some rayons in Zaporizhska oblast, which lead to increasing of transport costs and delivery time. Secondly, there is internal border between Mariupol and other cities among the Azov Sea, which might extra bureaucracy in transportation of commodity.

4. PERCEPTIONS, PROBES & POSITIONS

4.1 Companies Identified

In October, we revealed about 110 enterprises in Agricultural and Automotive Machinery. During a month later, we validated the existing list and added 20 enterprises more. Large or closing enterprises were rejected. We divided new list on two parts: Farm and Automotive machinery (106 enterprises) and Food Processing Machinery (6 enterprises). All list of companies were checked in the unified state register of legal entities. We collected phones, sites and e-mails for further contact and evaluation of the main activities.

- Number (segment if required): 106 in Farm and Automotive machinery and 6 in Food Processing Machinery

4.2 Companies Touched

- Number of companies, contacted by phone: 2 in Mariupol, 12 in Berdyansk, 36 in Melitopol, 6 in Orihiv.
- Number of companies, sent email: 89 from the list (27 companies do not present their e-mail in the Internet.
- Number of companies worked in focus group: 28 in Melitopol, 4 in Orihiv, 3 in Berdyansk.
- Number of owners, contacted outside the focus group and field visiting: 1 from Mariupol and 1 from Berdyansk.

4.3 Field Visits

There were organized five focus groups (3 in Melitopol, 1 in Berdyansk and 1 in Orihiv):

- Number of the focus group 1: 2 owners and 4 managers in Melitopol;
- Number of the focus group 2: 17 managers and 4 owners in Melitopol;
- Number of the focus group 3: 6 managers and 1 owner in Melitopol;
- Number in focus group: 2 owners and 2 managers in Orihiv;
- Number in focus group: 3 owners in Berdyansk.

  Field visits of stakeholders:
- Visiting Zaporizhya National Polytechnic University;
- Visiting Tavria State Agrotechnological University;
- Agency of Melitopol Development;

- The Department of Entrepreneurship and Industry at Rayon Council in Melitopol and Mariupol, at oblast Council in Zaporizhya;
- Rayon Council in Orihiv;
- Chamber of Commerce and Industry;
- Izatex Industry group.

Visiting companies:

- Silmash Servise (Melitopol)
- Swag (Melitopol)
- Turbokom (Melitopol)
- Ecopromlit (Melitopol)
- Kompressor (Melitopol)
- Rosta (Melitopol)

Visiting education institutions:

- Melitopol high professional school
- Berdyansk college of Tavria State Agrotechnological University
- Orihiv college of Tavria State Agrotechnological University
- National University “Zaporizhzhya Polytechnic University”

4.4 Surveys & Questionnaires (see the List in the Annex)

- Number Sent: 89
- Number Received: 41 (received 52 but 12 was rejected (do not work in the sector, they are only traders, or answers were not)
- Response Rate: 46%

4.5 The Good!

- Skilled engineers and designers, which can “design any part just give me an order”;
- “If I cannot produce some part of appliance just give me time and I will invent”;
- “We are unique because we are together”;
- “We can produce even a tractor together if we cooperate”;
- Companies try to solve their issues, using diversification;
- “If we have quality raw materials, you have high quality order”;
- “Show us innovative process abroad and we will do better”;
- “Our product is unique because we can produce it not even for a tractor but also for boat, train and even plan”;
- The region historically have a good potential of skilled workers because knowledge and experience pass from generation to generation;
- Melitopol companies have an experience to participate in Expo as one group;
- Some companies coordinate with TVETs and Colleges to train young workers during education process;

- Companies in Melitopol and Orihiv organizes excursion for youth at their factories: “We dispel the myth that plant is dirty and non-image place”;
- Most companies are satisfied by skills of newcomer workers from Universities, colleges, and TVET. “If a worker do not have some skills, we train him or her for two-tree months”;
- “You propose me to use robotics, don’t you?”. It is a challenge, so I will do”.

4.6 The Bad!

- A lot of companies compete by price: “We have lower prices comparing with external market”;
- Give me the money and I will invest in production (a person do not want to implement in innovations);
- “It’s affordable to use three-shift working day than to pay more a worker because they (workers) will not produce more”;
- Companies from one city actually do not prefer to study companies from the other cities in the region: “I do not know anything about Foundry Company in Melitopol because it might produce not quality goods”. After that, this owner order resources in Turkish;
- “Why I need to study local market of farmers if I sell abroad”;
- There is a politician lobby of some representors from Local Authority, which make monopoly on resources or final products;
- “the worst we have is politician and economic in our country which we cannot influence”;
- Company use to develop some engineering ideas (tools) but they do not imagine how to imply digital and electronic parts;
- There are small number of suppliers of metals which limited opportunities of the study companies;
- I do not understand why I need site and SMM manager if we use face-to-face contact”. Only a few companies use linkedin;
- Some companies are not so flexible to redirect their production into manufacture of anther products;
- Many companies use primitive supply management systems. Furthermore, some of them use “paper list” of customers;
- All companies use outdated software programs to design a manufacturing process and a product;
- Limitation of workers quantity because of unprestigious professions.

4.7 The Ugly!

- “I do not know how to contact with abroad suppliers. Where can I get information”;
- “We use turning lathe produced in 50th years of the last century”;
- “Why I should support the TVET and grant students? It is an issue of the government”;

- “We train a young worker, he get a necessary experience and go abroad”;

5. PURPOSE

5.1 Improving Market Orientation

Manufacturing principles

Based on the survey, more than 56% of interviewed owners and managers boast of lower prices compared with other international companies, and 42% of them propose deferred payments to their customers. Nonetheless, such approached to make business should be changed. Only 11 from 41 interviewed persons answer about a unique product in their companies, and 25 from 41 could deliver in a short time. Furthermore, work in the focus group has revealed, that management prefers decreasing prices to offering extra options for goods and services. From this side market, orientation standards will be directed on manufacture unique products, just-in-time ordering, short delivery time, and benefits in usage (low energy costs, for instance). The affordable standards for market orientation are to promote the benefit of product usage and provide postoperative services.

Digital promotion

The main issue of losing a market of the local machinery companies is their inwardly focused on parts and tools for outdated machinery. The work in the focus group has shown that managers do not consider the Internet as a potential promotion of their products. Only four companies use LinkedIn to promote their business. Furthermore, during survey preparation, it was revealed that more than half of the interviewed companies do not have their site, and half of them do not present their contact e-mail on the Internet. We needed to have a face-to-face interview or use mobile communication to make contact. Mostly, companies use their site to present a variety of products or even to explain their main purpose. Based on the focus group, the owners do not prefer to develop web stores and feedback from customers on their site. Usually, customer reviews are uploaded by management and are used as a part of a promotion.

Marketing analytics

Producing fine goods of excellent quality, most of them are isolated from the real demand in the world. Their operational process does not market-orientated. For example, a focus group in Melitopol has revealed, that nobody has examined the demands of local farmers and existing equipment these farmers use for today. Moreover, it used to hear that an owner might produce an individual order but does not a marketing channel and a client on the European market. Companies have does not examine their potential customers in Europe and consider the potential of participation in the Expo. Nowadays, local companies still dominate the Russian market, but they might run out of their business if they do not renovate it, according to the new wave of

Industry 4.0. From the very start, it should be evaluated what tools and score parts are crucially needed for intelligent machinery. The creation of a land market in Ukraine will stimulate the usage of land more efficiently. Furthermore, it will result in the utilization of soil tillage required high-precision machinery and equipment.

Customer-oriented markets

All companies have deep relations with their customers not only in Ukraine. A management system used in companies collects data about time, quantity, and value of sales. However, they do not collect information about the specification of their orders, even giving postoperative services. From this site, if companies continue the practice of face-to-face communications with clients, they would lose potential clients who demand distinguished products. According to accumulated knowledge, a company can enhance manufacture improving quality and preventing failure. Monitoring of customers, evaluation of complaints help to find new ideas to produce new products and services. Moreover, feedback from customers will allow inventing product more quickly, compared with competitors. The modern customer relationship management will provide change product and manufacturing orientation according to comers' wants and needs. Probably, survey and focus groups have shown that companies still use 1C trade and storage to collect information. Based on the focus group, only one company in Orihiv (Orihivsilmash) has implemented a CRM system, and one more in Melitopol (Melitopol Mechanical Plant) is planning to do it in the nearest future. The desires of others run into a problem of investments, and a company that can implement it.

5.2 Investment & CAPEX

The value chain of machinery in Zaporizhska and Donetska oblasts is still the most invested region in Ukraine. Only 20% of interviewed enterprises point out, that financial issue is not the main direction to enhance a value chain. Such companies emphasize that they play much more influence on the stable economy in the country. By the opinion of those companies, it should be crucial to renovate a technological process. The deep analysis shows that they distribute more than 70% of their products abroad.Nonetheless, 59% of companies need to improve their financial positions. They emphasize that the availability of financial resources is a crucial question. Based on focus groups, oranges zone is supposed to be the vital reason why machinery companies do not have access to cheap loans and investments. The rate of a loan has not been less than 20% for the last five years. Base on the focus group, it is difficult to get some state investments and funds for modernization. During 2013-2018, capital investments have gradually decreased (table 5.3.1).

Table 5.3.1

Capital investments into machinery(mln Euro)

	2013	2014	2015	2016	2017	2018
Zaporizhska oblast*						
manufacture of machinery and equipment, not elsewhere classified	5.28	4.01	3.34	6.17	7.95	7.76
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	91.52	66.10	56.81	42.93	55.42	60.84
Donetska oblast**						
manufacture of machinery and equipment, not elsewhere classified	62.51	37.27	16.40	9.81	15.37	22.74
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	21.64	2.95	0.30	to	0.08	0.16
Ukraine***						
manufacture of machinery and equipment, not elsewhere classified	152.78	138.36	80.27	81.94	109.70	126.23
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	162.49	203.69	108.46	117.78	112.93	148.76
VC Azov in Ukraine, %						
manufacture of machinery and equipment, not elsewhere classified	44.37	29.84	24.60	19.51	21.25	24.17
manufacture of motor vehicles, trailers and semi-trailers and other vehicles	69.64	33.90	52.65	to	49.14	41.00

Щорічник, 2018, стор 236, 2013 (стор123)
***Shorichnik Donetsk 2018 (p 258), 2015 (284)*
Щорічник України, 2018, стор 350

The value of capital investments decreases continuously during 2013-2018 and results in decreasing productivity. In 2018 the break in the manufacture of machinery and equipment is +2.5 mln Euro in Zaporizhska oblast and -39.8 mln Euro in Donetska oblast compared with 2013. The gap in the manufacture of vehicles is -30.7 mln Euro in Zaporizhska oblast and -21.48 mln Euro in Donetska oblast. There is a tendency of contrast between the output of production and direct capital investments. For instance, the production value of the manufacture of machinery and equipment in Zaporizhska oblast is 143.1 mln Euro, and the investments in this subsector are 7.76 mln euro. In the manufacture of vehicles, the production value is 366.4 mln euro, and investments are 60.84 mln Euro. So, the ratio between output and input is 18.4 in the manufacture of machinery and 6.0 in the manufacture of vehicles. There is an identical circumstance in Donetska oblast, where the ratio between output and input is 2.1 in the manufacture of machinery and more than 1000 in the manufacture of vehicles.

It is crucial to know what percentage of Zaporizhska and Donetska oblasts in total capital investments of Ukraine is 24%. Furthermore, the percentage of these oblasts in the manufacture of vehicles is 41% of the total investment value of Ukraine. To sum it up, most subsided regions do not increase their value in production due to investments. It should be taken into account the fact that enterprises do not invest mostly in environment protection. (table. 5.3.2)

Table 5.3.2

Costs for environmental protection, 2018 (mln Euro*)*

	Total	Capital investment	Investment on overhaul	Current costs
Zaporizhska oblast				
Total	110.8	33.1	5.6	77.7
Manufacture of machinery and equipment	0.039	0.004	0.001	0.034
Donetska oblast				
Total	113.9	47.1	5.4	66.8
Manufacture of machinery and equipment	4.030	2.658	0.462	1.371

ЗапорізькаЩорічник, 2018, стор 160
Донецька Щорічник 2018, стор 163

The potential in the utilization of energy is very low in both oblasts. Enterprises spend no more than 34 thousand Euro in Zaporizhska oblast and about 1.4 mln Euro on Donetska oblast. This reason leads to environmental degradation of the region and population migration to other regions. Further investments should be directed to equipment installation with modern technologies of energetic utilization and environment conservation.

5.3 Setting Benchmarks & Standards & Solutions to Improve the Value Output of the VC.

We divided the value chain improvement on four systems such as process, product, people and place. Each system includes various standards and solutions, which might enhance the value chain.

Process

Firstly, the process includes all operational processes from suppliers to the packaging department. Probably, the system Process has more treatments comparing with others. Based on the focus group, while some of the foundry enterprises boast of quality resources, the others buy casting abroad, complaining about the lack of suppliers in the region. Moreover, an owner claims that he cannot find a client abroad because most enterprises do not believe in high-quality production. From this side practice of CE marking would guaranty the quality and ecological benefits of the products. Moreover, CE marking will allow enterprises from the Azov Sea region to move and sell their products in the European Economic Area. So, some investments might be directed to the conformity assessment procedure or implementation of a production management system.

Secondly, most enterprises produce score parts or tools for farming, which has been evolved to Agriculture 4.0. It includes big data processing and the Internet of things. So, if the company wants to compete on the market, it would be not enough to have some extra options in the product. Manufacturing should update radically their operational process to offer modern goods such as the implementation of digital parts and electronic devices. Fertilizing machines, for instance, will compete when it has a load cell and control the exact fertilizer application. Meeting with owners has revealed that most of them try to invent some engineering tools to make farming production efficiency. Mostly, they changed some parts of the design and construction of existing equipment. From this side, business excursion for R&D workers on leading enterprises will give some new ideas to innovate the products in the region.

Finally, to improve all elements of value chain ERP is a crucial system of control. When we ask in the survey what electronic system for auditing and controlling you use, the middle enterprises write 1 C accounting. Micro and small enterprises prefer to work with an accountant on outsourcing. For these days, the implementation of an ERP system is said by members of the focus group to be necessary but expensive.

Product

Based on the focus group and peer-review, the numerous executives do not know their final customers. Moreover, they do not collect information about customers' opinions and feedbacks. If management does not know the customer's wants and needs, the company might lose even regular customers. From this side, the implementation of a CRM assists to collect extra information about preferences and complains. It makes a company react more quickly to customer requests. The best benefit of such a system is the opportunity to examine customers through multiple sources. Based on the survey, 40% of interviewed companies have more than 100 SKU. If such companies have more than 10 clients, and their managers collect opinions about a purchase on paper, they have big risks to lose perception of a product defect.

The modern approach in the industry is the usage of mixed and augmented reality. Welding, mapping of seed planting, and PH audit are supposed to be the most demanded products on farming nowadays. Moreover, augmented reality devices help to control lightning, ventilation, and irrigation system. Actually, the more quickly farming is changing, the more quickly industrial companies should be ready to present affordable products.

Urbanization in Ukraine will lead to the growth of dubbed vertical farming and green wall construction. Based on the focus group, management does not ready to perform machinery and equipment for the before-mentioned farming. It should be examined the potential of generating new products for smart farming. A combination of R&D, a plant, and a farm could create a new market of smart farming.

The study of the European market shows that there is a practice to offer used score parts, tools, and equipment. Researching sites of the companies in the region, we revealed that only a few companies propose used repairing tools. Other do not disregard such opportunity and lose their potential customers.

Place

Digital marketing literacy plays an important role in conquering an external market. According to the survey, 78% of enterprises use their site to promote the products. However, typing such keywords as turbines, seeders, score parts, machinery in Google, we have not found any company from the Azov Sea region even on the fifth page. The most reason – is the lack of an English version of the site. Moreover, spending a lot of money on creative on web sites, owners do not pay attention to SEO. Management opens a site in social nets and does not use it effectively. All members in the focus group claim that social networking is not useful because they have not sold any product through the Internet social nets. To sum it up, it would be very practical to organize training for managers in issues of the main principles in SEO and SMM.

People

The other crucial problem after the process is people. The education system has a huge development lag in practical approaches to teach. Educational centres (Universities, colleges, and TVETs) are outdated. It is difficult to fund in one centre for various reasons. Having good welding equipment, a vocational school does not have many students or teachers who can meet all the necessary standards. Moreover, geographical distance from Berdyansk, for instance, does not allow juveniles to study in TVETs Melitopol. It would be more useful to find partially according to the specialization of the educational centre and popular professions among companies in the region.

To increase the number of potential employees, it would be successful to motivate women working in a factory. There are two essential motivators except for salary. Firstly, the association of manufactories should provide social infrastructure for children rising, such as kinder gardens, camps, pediatric cliniques, etc). Moreover, to meet all wants, it would be effective to implement some discounts on fashion salons, cinemas, and theatres. It will give beliefs about social security.All propositions and solutions will work more effectively in a team not separately.

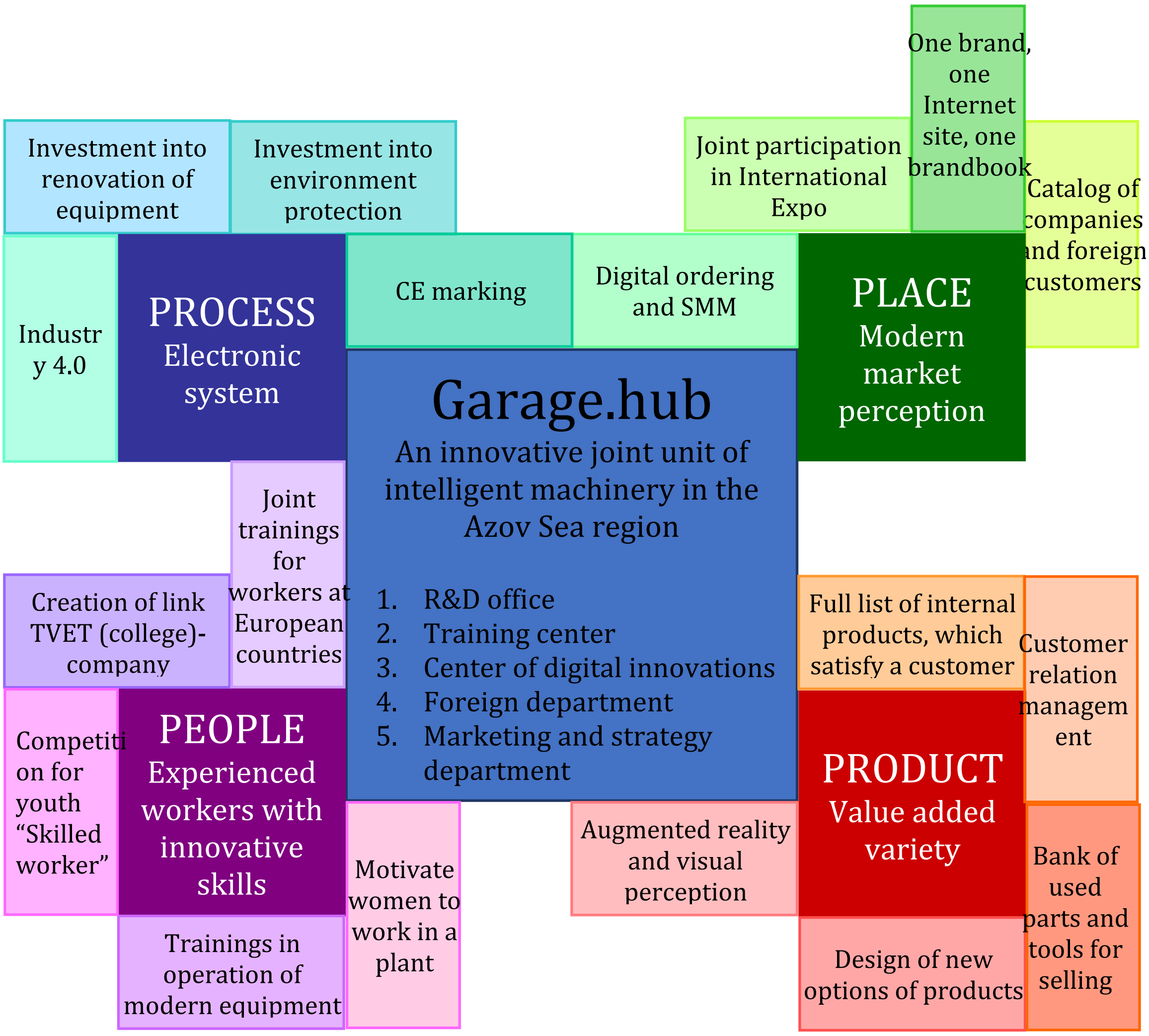


Fig 5.3.1. – Benchmark of a cluster in the Azov Sea region

5.4 Skills and Education Needs for SME Development

Further developing in the machinery require changings in the education of workers and managers. Based on the survey, the more companies direct their marketing efforts to an external market, the more skilled workers they need.
Modernization of the value chain should parallel with improving worker skills and knowledge. However, existing facilities in colleges and TVET do not allow getting such practice. Moreover, many youths visit TVET to get primary skills for working abroad. Therefore, there are a diversified set of propositions:

- Investment to facility renovation in TVETs and colleges (Berdyansk, Mariupol, Melitopol);
- Dual education in Universities (Tavria State Agrotechnological University (Melitopol), National University "Zaporizhzhya Polytechnic University" (Zaporizhya));
- Organization separate department in a plant where youth can train and earn pocket money;
- Organization of local award "Skilled worker" among the Azov Sea region;
- Retraining for new skills in professional training centers and local universities (National University "Zaporizhzhya Polytechnic University" (Zaporizhya) as a joint group (few workers from each company);
- Scholarship for talented students from vocational schools;
- A material incentive of an employee to get extra necessary skills and knowledge (for example to pay managers certification of Google Adwords);
- Contribution 5 from 40 hours per week on training and self-realization.

Table 5.5.1

Necessary skills to enhance the VC Azov

Hard skills	Soft skills
R&D worker	
• Operate of large database • Use analytical software program (ecoGenesis, Python, C++, Solid Edge, CATIA, etc) • Ability to discover a new options of products • Technical visibility	• Analytical problem solving • Team working • Leadership
Operational worker	
• Computer vision skills (TurboCad, AutoDesk , etc) • Use of perception algorithms • Use of robot operational system • Use knowledge and skills in engineering, electronic and informatics technologies • Skills of machine adjustment and repairing	• Team working in multifunctional community • Creative problem solving • Learning quickly
Manager	
• Speaking of various languages • Multi knowledge in law, international economic, digital business and operational process • Analytical and discovery skills • Use various management programs (ERP, Lean	• Developing new ideas • Leader skills • Good oral and presentation ability • Quickly solving problem

production, DRP, CRM, etc)	
Leader of the Hub	
• Perfect knowledge of management and manufacturing systems • Work with huge database • Multi knowledge in law, international economic, digital business and operational process	• Helicopter view • Recognition by companies from the VC Azov • Credibility • Leader skills • Fine oral and communicationalskills • Team building and team leading

There is a vital issue in the region to find a professional worker. The competition on the labor market results in a lack of a caster, a locksmith, milling machine operator, and a turner. Moreover, the most demanded profession is an operator of numerically controlled machine tools. About 29% of interviewed owners and managers point out that it is a vital necessity to find a skilled operator. The lack of skilled workers is increasing due to three issues such as migrant workers to the EU, a low level of salary and unprestigious job.

Way of education improvement and prestige increase:

- Organization business visiting of owners to leading plants to the EU to get experience and make a contact;
- Organization training for a group of designers operator of numerically controlled machine tools on progressive plants;
- Involving workers in problem-solving (hazards identification and eliminating) to increase the importance of their role in a plant);
- Opening a new incubator of professional skills in the Hub according to the experience in National University “Zaporizhzhya Polytechnic University” (Zaporizhya);
- Implementation of the one contemporary software program (Solid Edge, for instance) in all VC companies and train designers to use it. It will help to set complex order in various plants just-in-time;
- Permanent training for managers on course, Edex to get skills of digital marketing, logistics and supply chain management;
- Investment into the renovation of the facility in the departments of automatization process in Universities to educate newcomers;
- Financial support (travel and accommodation) of students to participate in “European best engineering competition”;
- Development of a new program of the motivation of employees (awards, payment for training, premiums for high-quality products);
- Development of social infrastructure to attract women as a skilled worker (children gardens, camps, pediatrician);
- To provide discounts for women workers in hairdressing and manicure salons, gynecologist, etc.

5.5 Existing Development Short-Comings

Issue Noted	Alternative Solution Suggested by VC Expert
There are some funds for the development of companies from foreign partners, but enterprises do not know about it	To make a list of contacts or group in a social net to promote deadlines and requirements timely
There are a few incubators in the Zaporizhska oblast: IT incubator (Zaporizhya); business incubator (Melitopol), vocational incubator (Tokmak), but they direct on the education of start-up mostly. Furthermore, the leader of the first incubator (Galina Shilo) has not had the experience to work with enterprises and does not have contacts.	To create an incubator to educate professional workers who might work with digital programs and equipment To develop education course for R&D engineers in IT incubator in Zaporizhya
The cluster Agroboom has good experience in 2009-2014, but it closed because of changes in Ukrainian economics. The most aim of the cluster was to organize the International Expo of Machinery industry in Melitopol. The customers were from the Post-Soviet Union countries.	It would be perfect to initiate a new cluster of enterprises. The aim of the cluster should be joint participation an value chain enhancing
Some enterprises with sufficient financial assets (Turbokom (Melitopol), SWAG (Melitopol), MPI Agro (Melitopol), Silmash (Orihiv)) have the experience to invite various consulting centers for business training. They are said to be effective but expensive, especially for small businesses.	It would be essential to organize a specialized course for the joint group. For example, one-course id should join sales managers of companies to get skills in digital marketing or CRM system. The owners should initiate the theme of a course. In such a way, they can share their payments and all managers get extra skills.
Many enterprises in the region offer quality resources, but enterprises from other regions do not know about their existing. Furthermore, each city has a catalog of enterprises.	For better cooperation, it would be more useful to publish a modern catalog of all companies in VC divided by subsectors or operation process with information: contacts, e-mails, main product, opportunities of unique orders, QR-codes of web sites. Moreover, to share this information abroad the digital search list might be located on each council of the Azov Sea region. It will help a foreign customer to find a necessary product or service.
There is an affiliate of Hegellman transport firm	It might be used for further delivering of good and resources from and to the European Union

5.6 Improving Digital Capability

Manufacturing

- Permanent training of workers how to use existing digital technologies;
- Mastering skills of novel technologies in R&D;
- Training of operators and other workers how to use software programs in the manufacturing process;
- Creation of a joint online database of a variety of products to make complex order;
- Implementation of ERP on enterprises in all enterprises among the Azov Sea regions.

Sales

- Implementation of CRM system;
- Education of Google AdWords;
- Web-site design (we needed to have a face-to-face contact to fill survey). Many enterprises do not present their email and even the number of mobile phones to contact them.
- It should be "web literacy" to promote products, activate SMM and SEO

Deliver

- Installation of the program for controlling of delivering (risk reduction and guarantee to clients);
- Creation of joint.

6. PROGRESS

6.1 Roadmap& Reccomendations;

Value Chain Economic Opportunities	Value Chain Challenges	Value Chain Initial Roadmap Guidelines
1. The growth of the sector because of strengthen food processing production and farming in Ukraine 2. Creation of land market 3. Production of high quality modern equipment 4. Development HUB	1. Big financial investment into renovating and modernization of the sector 2. Novel software programs for designs and precise production 3. Inconsistency of standards and requirements from	1. Development of National unified Brand of machinery companies in the Azov Sea as a HUB (entire rules of business, construction, design and delivery) 2. Creation of Exhibition platform in the Region 3.

(R&D, marketing, export, Law, contracts) 5. Attracting customers from abroad 6. The growth of labor market	export customers 4. Increasing of price on raw materials and natural resources 5. Lack of skilled workers	4. Development of new approaches in education 5. Diversification of production on order to increase income 6. Creating new products for smart farming and intelligent machinery

7. Other

Zaporizhska oblast is specialized in the manufacture of machinery and equipment, where GVA is 12.9 Euro per hour. Selling on 452.3 mln Euro in 2017, GVA was only 11.8 Euros per worker in an hour. The most productive subsector is the manufacture of vehicles in Donetska oblast, where GVA is 77.6 Euro per hour.

The local logistics network is significantly developed. The companies from the Azov sea region use a variety of services from transport companies. The main problem is quotes and embargo on Ukrainians good and transport services in the Russian Federation and the European Union. It makes shrink the volume of export and finds the other external markets.

The value investments decrease continuously during 2013-2018 and result in decreasing productivity. In 2018 the break in the manufacture of machinery and equipment is +2.5 mln Euro in Zaporizhska oblast and -39.8 mln Euro in Donetska oblast compared with 2013. The break in the manufacture of vehicles is -30.7 mln Euro in Zaporizhska oblast and -21.48 mln Euro in Donetska oblast.

Manufacture of machinery and equipment in Zaporizhska oblast has a stable trend during 2013-2018 and ranges from 5.1 to 6.8 thousand people. In Donetska oblast the number of full-time employees in this sector has dropped in twice from 31.6 to 17.9 thousand people.The amount of salary grows more slightly compared with the growth of total sales volume. During the last six years, the quantity of TVETs in Zaporizhska oblast decreases from 47 to 38 schools. The first reason is un-prestigious undergraduate professional education among youth.Because of the military conflict, the quantity of TVETs in Donetska oblast dramatically fell in three times.

7. Annexes

Annex 1

Trade balance in Ukraine, 2013-2018, Euro thnd

Group of products	2013	2014	2015	2016	2017	2018
8432 Agricultural, horticultural or forestry machinery for soil preparation or cultivation	-187995	-112088	-115169	-187795	-284058	-227545
8433 Harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers	-229626	-127929	-142384	-344694	-401082	-263354
8434 Milking machines and dairy machinery	-2186	-2738	-1276	-3248	-2280	-953
8435 Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices	-1477	-305	-299	-202	27	62
8436 Agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery	-25788	-16671	-21456	-29710	-23674	-25110
8437 Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables	2350	-4800	-466	-12863	-1041	375
8438 Machinery, not specified or included elsewhere in this chapter, for the industrial preparation	-65041	-26675	-30841	4837	-44024	-63742
842481 Agricultural or horticultural mechanical appliances, whether or not hand-operated	-21372	-17394	-11305	-29391	-34903	-36024
8701 Tractors	-375596	-164487	-182751	-466916	-598404	-533820
8708 Parts and accessories for tractors, motor vehicles for the transport of ten or more persons	-285015	-154863	-126822	-234945	-245378	-280762
Trade balance in sector	-1191746	-627950	-632769	-1304927	-1634817	-1430873

Annex 2

Imported products to Ukraine (2013-2018), EURO, thnd

Group of products	2013	2014	2015	2016	2017	2018
8432 Agricultural, horticultural or forestry machinery for soil preparation or cultivation	233582	149654	118281	220898	284447	262194
8433 Harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers	254383	144876	159162	368367	425241	283065
8434 Milking machines and dairy machinery	5563	4083	2685	4199	4854	2456
8435 Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices	1606	438	572	466	666	1176
8436 Agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery	53309	36199	30658	36615	24318	32018
8437 Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables	15638	14379	7862	21171	12488	12209
8438 Machinery, not specified or included elsewhere in this chapter, for the industrial preparation	79562	45322	40568	4595	56749	74415
842481 Agricultural or horticultural mechanical appliances, whether or not hand-operated	24248	19293	13057	29544	37752	39691
8701 Tractors	423721	205833	206554	467738	613549	541654
8708 Parts and accessories for tractors, motor vehicles for the transport of ten or more persons	372224	226324	179175	239727	305082	345306
8410 Hydraulic turbines, water wheels, and regulators therefor	6076	8548	2214	4464	1978	1092
total volume of sector	1463836	846401	758574	1393320	1765146	1594184
Total volume of import (Ukraine)	57960263	40911436	33798503	35464523	43763128	48423570
Share of machinery sector	2,53%	2,07%	2,24%	3,93%	4,03%	3,29%

Annex 3

Imported products to Ukraine (2013-2018), EURO, thnd

Export						
8432 Agricultural, horticultural or forestry machinery for soil preparation or cultivation	45587	37566	3112	33103	389	34649
8433 Harvesting or threshing machinery, incl. straw or fodder balers; grass or hay mowers	24757	16947	16778	23673	24159	19711
8434 Milking machines and dairy machinery	3377	1345	1409	951	2574	1503
8435 Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices	129	133	273	264	693	1238
8436 Agricultural, horticultural, forestry, poultry-keeping or bee-keeping machinery	27521	19528	9202	6905	644	6908
8437 Machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables	17988	9579	7396	8308	11447	12584
8438 Machinery, not specified or included elsewhere in this chapter, for the industrial preparation	14521	18647	9727	9432	12725	10673
842481 Agricultural or horticultural mechanical appliances, whether or not hand-operated	2876	1899	1752	153	2849	3667
8701 Tractors	48125	41346	23803	822	15145	7834
8708 Parts and accessories for tractors, motor vehicles for the transport of ten or more persons	87209	71461	52353	4782	59704	64544
8410 Hydraulic turbines, water wheels, and regulators therefor	10145	1859	7785	15605	4877	529
Total volume of sector	272090	218451	125805	88393	130329	163311
Total volume of export (Ukraine)	47671920	40559277	34348854	32854496	38442449	40080971
Share of machinery sector	0,57%	0,54%	0,37%	0,27%	0,34%	0,41%

Annex 4
SWOT Analysis of Farm, Automotive and Food Processing Machinery

Strengths	Weaknesses
1. Low Energy Costs	1. Owners do not know the International export transportation rules
2. Established relations with customers (FPM companies has distributor net)	2. There no any staff who speaks more than two foreign languages (English and Germany)
3. Each company has find an individual niche (FPM companies)	3. Conflict of interests between owners (politics, share of orders, ex-top-managers)
4. Good and High quality of products	4. Low value-added output and Outdated Product Portfolio.
5. Certificated production (ISO)	5. National mentality of distribution: "Give me orders and I will do"
6. Companies have patents and copyright certificates on innovations (FPM mostly)	6. Some factories do not have marketing department, so they do not know the main principles of marketing
7. Experience in participation in Ukrainian expo	7. Poor marketing and customer understanding even if a factory has such department
8. Top managers and experienced workers from the factory teach youth and new comer workers	8. Failure to pursue partnerships and weak management capability
9. Experienced personnel	9. The personnel are educated in schools and colleges on manufacturing equipment which are out of production
10. Middle and big companies spend money for trainings of Top managers	10. Outdated production technology and product portfolio.
11. Some companies has full circle of production (foundry, welding, repairing) (Farm Machinery and Automotive)	11. Vocation Education Skills need to be developed
12. Some companies have an experience in pre & post-operational servicing	12. Supply dependency. Costs of resources and raw materials is about 65-70% of total production costs.
13. Actually, every second company has a constructor and design office	13. A problem to find a high quality raw materials
14. Track record of manufacturing and vocational skills in region	14. Do not have "official" software for technical service
15. Much of the Raw Material Base (steel) is produced in the region or nearby oblasts	15. Deferred payment of customers
16. Willingness and possibility for diversification	16. Some owners do not believe in grants and funds because many association had attempted to create a union and failed
17. Individual approach to customers (flexibility of ordering)	17. Do not know farmer needs in equipment (any connection). Companies have relations with other factories in value chain
18. "we can produces any type of part which you want from tiny to immense'	18. Mostly companies do not have the own transport logistics
Opportunities	**Threats**
1. Possibility to export	1. Lack of investments on machinery industry development
2. Possibility to scale the business	2. Monopoly of big size factories which have been constructed since Soviet Union
3. Existing areas to construct machinery industrial Hub	3. Lobbying of monopolist interest about metal supply and export
4. The gradual growth of production volume in SME	4. Conflict with Russia (destroyed connection with customers)

5. Opportunity to attract investment and add value 6. Possibility to decrease costs among Value chain if small companies with various resources will cooperate 7. A perfect potential in workers and engineers 8. Possibility and willingness of trainings for workers and management 9. A good potential in management personnel (marketing, managers, translators, designers, innovators, IT-specialists) 10. Low wage of workers and specialists 11. The possibility to hire students from technological departments as part time and seasonal workers. 12. Possibility to use railway system in transportation	5. Transportation export service are not developed in regions 6. Lack of innovation and modern production management and methodologies. 7. Lack of Modern Vocational skills (IT technology, management and supply systems) 8. Management Capability Development 9. Not modernizing at a fast enough pace.

Annex 5

Azov Sea RPP 2019 – Create First Impressions Business Model Canvas

<table>
<tr>
<td rowspan="2">7.Key Partners:

Educational Institutions (TVET, colleges, University)
Transport companies
R&D partners
Expo organizers
Distributors (sometimes)
Partners in repairing of equipment
Training center (spend about $2000 per training for managers)</td>
<td>5.Key Activities:

Production of farm equipment such as a seeder or reaper (not entire machinery)
Production of parts for automotive industry
Foundry
Welding
Repairing
Diagnostics
Design and Construction</td>
<td rowspan="2">1.Value Proposition

A strength concentration of SME with developed customer relations in Ukraine</td>
<td>3.Customer Relationship

Issues with supply of high quality recourse
Diversification of own production
Long-time relations with suppliers if raw materials have high quality</td>
<td rowspan="2">2.Customer Segments

Factories who produce agricultural machinery (tractors, combines) and well-known at the worlds market

Middle companies who produces parts and equipment for machinery

Agricultural farms

Heavy industry enterprises

Ports

Export (Germany, Turkey, Italy, Kazakhstan, Russian Federation)</td>
</tr>
<tr>
<td>6.Key Resources:

Metal (steel, cast iron, iron in tubes and slabs);
Technology equipment (founder, workbench, technological belts, melting furnace);
Software programs for design and diagnostic;
Qualified workers;
Innovative and ideas for technologies (professional designers and constructors);
Equity and loans</td>
<td>4.Channels

Direct contacts (Phone calling, meetings at a company, visiting customer offices)
Participation in expo
Sending Ad materials and visit cards
Own distributor centers abroad
Affiliate firm abroad
Internet site</td>
</tr>
<tr>
<td colspan="3">8.Cost Structures

Manufacturing costs:
Costs of materials and resources 65-70%
Operational costs 15-20%
Labor costs 5-8%
Other costs 10%
Marketing costs – usually not more than 5-10%</td>
<td colspan="2">9.Revenue Stream

Sale of goods
Additional services for neighbor companies such as foundry
Design of a part for individual ordering for other company</td>
</tr>
</table>

Annex 6

Education centres in Farm Machinery and Automotive among VC Azov

City, name of school	Specialty	Number of students, attended 2019	Professional stakeholders	Issues	The best practices
Mariupol					
Mariupol Professional Machinery school #4	1. machine operator 2. operator of machine tools with software 3. locksmith	1. 14 2. 18 3. 12	Metinvest AzovMash Magma	• Un-prestigious profession among young people • Educational equipment is outdated • Methodological plans does not meet market requirements • Migration of you to European Union	• Young team of teaches which has novel approach to teach • Administration organizes “day of Career” few time per educational year • Good practices in participation in Ukrainian contest of professional skills “WorldSkillsUkraine”
Mariupol high metallurgic professional school #99	1. cold and hot rolling machine operator 2. founders 3. locksmith 4. turbine specialist	1. 19 2. 14 3. 15 4. 10	Metinvest AzovMash Promservis	• Outdated technologies • Bureaucracy • Lack of investments to modernization • Lack of new software programs • Long period for education • Migration	• Good quality of education • Experienced teachers • Practical education in laboratories
Tokmak					
Tokmak professional lyceum	1. machine operator 2. operator of machine tools with software	1. 15 2. 18	Orihiv and local companies	• Un-prestigious among youth • Internal migration of students • Outdated educational facility • Bad location to have a practice • Lack of state support	• Professional teachers with experience more than 20 years • favorable environmentfor students • heritage of local generations (tradition to study at the lyceum)
Melitopol					
Melitopol professional agrarian lyceum	1.wheeled vehicle repairman 2.agricultural machinery repairman 3.turner and locksmiths	1. 25 2. 15 3. 0	Vidrodgennya Assa Business track And other local companies	• Issues to promote the specialties of locksmiths and turners • Outdated technologies • Teachers are professional in training, have the best engineering skills but they do not have modern skills with robotic and usage of novel technologies	• State granted education • Various of specialties • Guarantee of employment • Dual education • Opportunity to attend Agrarian University in Melitopol

Melitopol high professional school	1. Turner 2. Locksmith	1. 120 2. 22	Ruslan Komplect Tara Gidrosila+ Gudroteks	• A low level of teaching salary • Outdated facility • Complex education process in Ukraine which require long term of training	• The Authority organizes school contest “Skills and Excellence” • Good practices in participation in Ukrainian contest of professional skills “WorldSkillsUkraine” • Salaries for the best students during education • 100% guarantee of employment • The unique institution in Zaporizhzhya region because of variety of vocational specialties
Berdyansk					
Berdyansk professional lyceum	1. machine operator and wheeled vehicle repairman 2. locksmith 3. welder 4. electromechanic	1. 25 2. 25 3. 30 4. 25	Berdyanskie zhatki	• Soviet approach to education proses • Authority does not effort to look for new students • The low level of salary which might enhance the prestigiously of vocational specialties • Oldering of teachers (more than 45 years old)	• Dual education at “Berdyanskie zhatki” • Good practices in participation in Ukrainian contest of professional skills “WorldSkillsUkraine” and festival “Steel wave” • Teachers use their own developed program software in learning process • Facility in welding is upgraded partially
Berdyansk center of vocational education	1. truck crane 2. locksmith 3. gas welder	1. 25 2. 25 3. 25	Berdyansksil mash Voloshin Any SME which can guaranty salary for students	• A few number of students • Lack of state financing • Outdated facility • Lack of software • Oldering of teachers • lack of coordination with local authorities	• Students have advance to get driver license C during education • Methodical plan has updated structure (every year student get skills and knowledge of one profession)

Annex 7
Attending to colleges in Zaporizhska oblasts, quantity of students, 2019

Colleges	After 9 years at school	After 11 years at school
Applied mechanic		
Zaporizhzhya aviation college named after Ivchenko	24	-
Berdyansk college of engineering of Zaporizhzhya Polytechnic University	16	7
Zaporizhzhya hydraulic and energetic college of Zaporizhzhya National University	17	1
Branch engineering		
Zaporizhzhya aviation college named after Ivchenko	52	5
Zaporizhzhya hydraulic and energetic college of Zaporizhzhya National University	22	2
Zaporizhzhya metallurgic college of Zaporizhzhya National University	36	5
Zaporizhzhya Construction College	21	6
Zaporizhzhya Electro technical College of Zaporizhzhya Polytechnic University	40	6
Dniprorudne industrial College	30	2
Berdyansk college of Tavria State Agrotechnological University	12	1
BerdyanskConstruction College Zaporizhzhya Polytechnic University	15	6
Tokmak Mechanical College of Zaporizhzhya Polytechnic University	39	0
Melitopol industrial and economic college	22	
Agro engineering		
Melitopol College of Tavria State Agrotechnological University	43	1
Nogaisk College of Tavria State Agrotechnological University	30	2
Orihiv College of Tavria State Agrotechnological University	51	1

Attending to Universities

	Bachelor after 11 years at school	Bachelor after college	Master
Applied mechanic			
National University "Zaporizhzhya Polytechnic University"	18	112	72
Tavria State Agrotechnological University	7	-	
Branch engineering			
Zaporizhzhya National University	1	15	41
National University "Zaporizhzhya Polytechnic University"	17	118	118
Tavria State Agrotechnological University	11	36	57
Agro engineering			
Tavria State Agrotechnological University	60	132	130