

ЕКОНОМІКА ТА УПРАВЛІННЯ ПІДПРИЄМСТВАМИ (за видами економічної діяльності)

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PROBLEMS AND PROSPECTS OF THE DEVELOPMENT OF THE PARTICULAR FIELDS OF UKRAINIAN MACHINE-BUILDING UNDER CONDITIONS OF INCREASING INTERNATIONAL COMPETITION AND GLOBALIZATION OF ECONOMICS

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The problem statement. Ukrainian economics is becoming more and more open. Foreign manufactures in any field enter domestic market without any problems, pay minimal customs duty and freely sell own produce. This situation causes huge competitive pressure on the domestic manufacturer as foreign produce has significant competitive advantages over the domestic one. In strategic management the complex of advantages which win the benevolence of the consumers is called competitive strategy [1, 2]. There are 5 competitive strategies, according to the classification (Strickland), which based on the work of the guru of strategic management, the professor of Harvard Business School Michael Porter. [1].

We will characterize each of these strategies very briefly.

A wide differentiation strategy – high quality product is offered at the appropriate price.

A cost leadership strategy – the standard quality product is offered at a minimal price.

A best cost strategy – the product is offered with the best correlation of quality and price.

A focus strategy includes two strategies: cost leadership focus strategy and differentiation focus strategy. In the first case, specific product is offered at a minimal price to a certain, clearly defined segment of consumers. In the second case, high quality product is offered to a defined segment of consumers. [1, 2]

Each of the listed general competitive strategies has interrelated advantages and risks.

Ukrainian consumer doesn't understand competitive strategies. Nevertheless, in most cases Ukrainian consumer chooses foreign products. Why is it happening? It's very simple. No matter what strategy was used to design and manufacture products, they fully meet the preferences of the Ukrainian consumers. We will focus our attention on the industrial produce – construction, road building and agricultural machines. It is also manufactured while focusing on a specific consumer and, respectively, has own competitive advantages.

And this foreign produce, unfortunately, also wins in the competition with the Ukrainian manufacturer, even though, that Ukrainian produce is often considerably cheaper and simpler in maintenance.

The choice of a consumer against the Ukrainian manufacturers' produce results in decline of Ukrainian industries, loss of employment, industrial potential, and finally, country's economy. Why is it happening? How to overcome the mentioned problems? This article is dedicated to the search of the answer to this question.

The analysis of the latest researches and publications. This problem is discussed in a lot of publications. Thus, O. Karpets states that “active displacement of a domestic manufacturer from the market is taking place” [3]. The title of the article is also eloquent: “Corruption for lease. How Ukraine’s agricultural machine-building is slaughtered.” The author complains that state leasing company which could promote the development of agricultural machine-building has stuck in corruption. The author makes an interesting conclusion: “As a result of increasing financial difficulties, the agrarians seek to buy the cheapest machines possible. That is why in the harvesting complexes segment the demand shifted to the used machines, while among the coupling attachments suppliers the share of the domestic manufacturers increased. All this is the result of sharp national exchange devaluation”. And further: “At the same time, while in some segments of coupling attachments domestic manufacturers are developing successfully, producing competitive products and even exporting them to many countries, the manufacturers of self-propelled machines, mainly tractors and combines, are hopelessly lagging behind and won’t be able to produce competitive agricultural machines independently”. [3]. All these claims are illustrative and in future we will refer to them.

K. S. Taraban researches the state and prospects of the development of machine-building in Ukraine and remarks that industries manufacture plenty of modernized (more than 50% nomenclature) and new produce (about 13 %), however lose in competition with foreign produce because of insufficient modernization of production. The number of innovatively active enterprises is decreasing. He also defines the major problems of domestic machine-building complex, among them are the following:

- «... – lack of state schemes aimed at financing industry at the expense of the government orders;
- obsolescence and technical level of basic funds of industry ...» [4].

A. Sotnikov also analyzes the state of Ukrainian machine-building. He adduces data about the amounts of the increased products sold by the Ukrainian industries from 2007 to 2012 yrs. in accordance with the State Statistics Committee data. Then he adduces data about the part of the total amount of the industrial production output of the machine-building enterprises in the developed countries – Germany – 53,6%, Japan – 51,5%, England – 39,6%, Italy – 36,4%, China – 35,2%. At that, the part of the machine-building produce in GDP of the EU countries makes up 36-45%, the USA – 40%, in Russia machine-building provides 18% of GDP [5, p. 138-150]. The conclusion is made that the part of the machine-building sphere of Ukraine in the general structure of the products sold is rather small and needs increasing.

Amosha O. I., Vyshnevskiy V. P., Zbarzaska L. O. researched the state of industry and industrial policy in Ukraine and compared major tendencies with the world ones [6]. They notice that the development of production industry has become an essential factor of the world leadership, and the loss of enterprises by the USA and Europe through transferring them to the East can lead to the loss of leadership. They refer to the report of the National Intelligence Council of the USA on the analysis of the global trends of the world development by 2030: “By 2030 Asia will be well on its way to returning to being the world’s powerhouse & just as it was before 1500” [7, p. 23].

“Increasing attention to the development of industry and industrial policy is one of the dominant trends of the transformation of the modern world economy. Global financial and economic crisis of 2007-2008 and further recession demonstrated that the countries with developed modern industry are capable of successfully overcoming ordeals and coming out of them being stronger. Such course of actions stipulated for the wide recognition of the important role of industry in resolving pressing problems of the present time [6, p. 4].

The USA set the task to ensure their leadership in the sphere of advanced manufacturing. Ensuring American Leadership in Advanced Manufacturing:

“1. Manufacturing, based on new technologies including high-precision tools and advanced materials, provides the opportunity for high-quality, good-paying jobs for American workers;

2. A strong manufacturing sector that adapts to and develops new technologies is vital to ensure ongoing U.S. leadership in innovation, because of the synergies created by locating production processes and design processes near to each other;

3. Domestic manufacturing capabilities using advanced technologies and techniques are vital to national security” [8, p. 10].

The EU is also making efforts in this direction. “With the renewed industrial strategy outlined in this Communication, the Commission seeks to reverse the declining role of industry in Europe from its current level of around 16%¹ of GDP to as much as 20% by 2020. This should be driven by substantial recovery in investment levels (gross capital formation and investment in equipment), an expansion of the trade in goods in the Internal Market (to reach 25% of GDP in 2020) and a significant increase in the number of SMEs

exporting to third countries " [9, p. 4]. They also cite the words by J. Cameron at the economic forum in Davos (January 2014), "There is no doubt that when it comes to re-shoring in the US, one of the most important factors has been the development of shale gas, which is flooring US energy prices with billions of dollars of energy cost savings predicted over the next decade. Taken together, I believe these trends have the ability to be a fresh driver of growth in Europe too. I want Britain to seize these opportunities. I think there is a chance for Britain to become the "Re-Shore Nation. For years we have had UKTI out there helping our businesses to export and encouraging inward investment. Now I want to give that same dedicated specific support to helping businesses re-shore. Much as Britain can be the "Re-shore nation", so Europe can benefit from this too. But only if we act now to make re-shoring as attractive as possible" [9, p. 3].

"Re-industrialization and re-shoring are the leading directions of neo-industrialization of the national economies and the world economics in general on the basis of the newest machines and technologies. Firstly, modern industry is the generator of the scientific and technical progress and innovation in economics. Thus, in the EU the part of industry that produces ≈15% GDP requires 65% of expenses on science research and designing works and almost 50% of the expenses on innovations. The term "industry" "is associated with the science intensive activity and advanced ecologically clean production". It acts as a driver of the economic growth. Industry is an essential factor of the global competitiveness of the national economies. In the EU it ensures more than 2/3 of the products export and almost 60% of the total amounts of the export (including export of services)."

"Overcoming the crisis phenomena and ensuring the sustainable development of the Ukrainian industry demands the development and realization of the matrix industrial policy of the European type. Such policy is based on the fact that successes of the industry depend, first of all, on the actions of the business, which is responsible for the development of products, processes and workmanship of the workers, necessary for the preservation of the available and the opening of the new markets in the globalized world, the search for new opportunities for growth subject to the requirements of the corporate social responsibility and sustainable development" [6, p. 62].

The given work was written in 2013; however, the problems highlighted in it still remain actual nowadays. As a consequence of the known war actions and the loss of Russian market as one of the major ones for the domestic machine-building, the situation at the industrial enterprises has only grown worse.

Separation of the parts of the general problem which were unsolved before. It is obvious that both foreign and certain nomenclatures of the domestic machines or the machines manufactured in CIS are in demand in the domestic market. The question why in certain cases the domestic consumer prefers certain samples of machines has not been answered. The criteria of the consumer's choice are not always clear. By researching this issue, we need to answer the following: in what direction should the Ukrainian manufacturers improve? What is the role of the Ukrainian scientists and the Ukrainian business that owns these enterprises? Can Ukrainian industry hope that modern technologies will come along with foreign investments and will help to bring the country to the cutting edge of science and technology?

Main outcomes of the research. By analyzing the supplies of the foreign machines to Ukraine and Russia, whose technological level is very close to Ukrainian, we will see that the markets of these countries in most branches are filled with foreign produce and the amounts of its realization is growing extremely fast. We have analyzed the production and consumption, first of all, of the agricultural and road-building machines.

Chart 1

Supply of foreign grain-harvesting combines to the Russian Federation in 2016 [11]

Types of machines	2017		2016		Changes., %	
	Number	Cost, USD	Number	Cost, USD	Number	Cost
Total	2 193	144 431 177	1 681	82 553 171	30	75
Grain-harvesting combines	374	55 461 387	91	17 503 715	41 0.	32 p.
New	350	54 646 667	86	17 181 036	41 0	3,2 p.
Used	24	814 719	5	322 679	48 0	152

Chart 2

Supply of ploughs to the RF, pieces [11]

Type/year	2017	2016	Changes., %
Ploughs	2 103	1 905	10,4

Chart 3

Supply of foreign tractors to the RF in 2016 [11]

Types of the machines	2017		2016		Change, %	
	Pcs	Cost, USD	Pcs	Cost, USD	Number.	Cost measurement
Total	7 406	164 046 675	4 515	81 143 401	-39	-51
New tractors	5 386	141 711 305	3 093	73 144 553	-43	-48
Capacity less than 25 horsepower	2 373	2 997 813	1 657	2 566 640	-30	-14
Capacity from 25 to 50 horsepower	83	780 669	52	298 228	-37	-62
Capacity from 50 to 80 horsepower	236	4 262 316	241	4 449 144	-2	-4
Capacity from 80 to 102 horsepower						
Capacity from 102 to 122 horsepower.	193	8 345 547	46	1 216 635	4,2p.	y 6,9p.
Capacity more than 122 horsepower	2 501	125 324 961	1 097	64 613 906	128	94
Used tractors	1 922	5 223 694	1 374	3 239 617	40	61
Caterpillars	98	17 111 676	48	4 759 231	104	y 3,6p.

Chart 4

Grain-harvesting combines made in Russia [11]

Type/Year	2017	2016	Changes, %
Grain-harvesting combines made in Russia	611	711	85,9%

Chart 5

Import of grain-harvesting combines to Ukraine according to trademarks 4 quarter 2016 [12]

Trademark	Used, pcs	Customs value \$	New, pcs	Customs value \$	PTotal, pcs	Customs value \$
Claas	27	1 363 423	27	4 850 044	54	6 213 466
New Holland			37	6 028 104	37	6 028 104
John Deere	41	2 011 777	15	3 620 793	56	5 632 570
Case	19	834 876	26	4 308 464	45	5 143 340
Challenger			1	179 939	1	179 939
Massey Ferguson	6	131 278			6	131 278
Bizon	4	65 600			4	65 600
Volvo	2	10 479			2	10 479
Deutz Fahr	1	8 160			1	8 160
Fortschritt	1	4 085			1	4 085
Total	101	4 429 677	106	18 987 344	207	23 417 021

Chart 6

Supply of new and used combines to Ukraine 4 quarter 2016 [12]

Type of machine	Number	Customs value \$
New combines	106	18 987 344
Used combines	101	4 429 677
Total	207	23 417 021

Manufacturing of certain types of machines in Ukraine [15]

Types of machines	2013	2014	2015	2016	2017
Grain-harvesting combines	68	0	100	0	0
Precision planters	3589	3023	3511	4352	3365
Tractors for agriculture and forestry with engine capacity up to 37 kW, pcs 50 horsepower	51	0	0	0	No data in report
Tractors for agriculture and forestry with engine capacity up to 59 kW, pcs 80 horsepower	428	0	0	0	No data in report
Tractors for agriculture and forestry with engine capacity not more than 75 kW, pcs 120 horsepower	1588	1334	1905	2769	No data in report
Tractors for agriculture and forestry with engine capacity more than 90 kW, pcs 122 horsepower	1127	1402	914	543	No data in report
Ploughs, pcs	6203	4446	3672	3572	No data in report
Looseners and cultivators, pcs	4358	3739	3672	3798	No data in report
Disc harrows, pcs	1975	2044	2252	2859	2390
Excavators	0	0	0	0	0

Chart 8

Import of tractors to Ukraine according to trademarks 4 quarter 2012 [12]

Trademark	Number	80-100 horsepower	100-200 horsepower	200-300 horsepower	> 300 horsepower	Customs value, \$
Belarus	1 414	1 305	102	7		23 729 055
John Deere	155	1	37	57	60	14 514 587
New Holland	61		2	10	49	7 284 628
Case	50		10	7	33	5 787 200
Deutz Fahr	45	17	6	22		3 674 435
Challenger	17			2	15	2 839 299
Claas	17			8	9	2 509 538
Fendt	7		1	1	5	783 233
Lamborghini	8		5	3		559 235
Others	11	1	9	1	0	399 689
Total	1 785	1 324	172	118	171	62 080 899

Chart 9

Supply of new and used tractors to Ukraine 4 quarter 2016 [12]

Correlation	Number	Customs value, \$
Used tractors >80 horsepower	128	4 404 322
New tractors	1 657	57 676 578
Total:	1 785	62 080 899

Chart 10

Supply of new and used cultivating planters to Ukraine in 4 quarter 2016 [12]

Correlation	Number	Customs value, \$
New cultivating planters	49	771 796
Used cultivating planters	267	11 691 517
Total	316	12 463 313

Chart 11

Import of seed planters to Ukraine according to trademarks 4 quarter 2016 [12]

Trademark	Used, pcs	Customs value, \$	New, pcs	Customs value, \$	Total, pcs	Customs value, \$
Gaspardo			139	1 882 999	139	1 882 999
John Deere	3	58 101	20	1 279 726	23	1 337 827
Vaderstad	4	44 285	10	570 952	14	615 237
Great Plains			5	364 652	5	364 652
Terranova			1	147 034	1	147 034
Kuhn	1	19 336	4	125 396	5	144 731
Lemken	1	16 346	3	126 725	4	143 072
Amazone			2	116 729	2	116 729
Kverneland			3	105 426	3	105 426
Challenger			1	83 341	1	83 341
Others	8	192 260	3	71 586	11	263 845
	17	330 328	191	4 874 565	208	5 204 893

Chart 12

Supply of new and used seed planters 4 quarter 2016 [12]

Correlation	Number	Customs value, \$
New seed planters	17	330 328
Used seed planters	191	4 874 565
Total	208	5 204 893

Chart 13

Import of cultivating planters to Ukraine according to trademarks in 4 quarter 2016 [12]

Trademark	Used, pcs	Customs value, \$	New pcs	Customs value, \$	Total, pcs	Customs value, \$
Kinze	1	74 000	92	6 705 802	93	6 779 802
Great Plains			59	2 021 879	59	2 021 879
Ribouleau/Monosem			33	875 612	33	875 612
Vaderstad			13	747 682	13	747 682
John Deere	30	505 261			30	505 261
Challenger			7	479 775	7	479 775
Kuhn	2	26 188	9	327 891	11	354 079
Молдагротехника			35	212 717	35	212 717
Quivogne			4	108 154	4	108 154
Gaspardo			10	100 296	10	100 296
Others	16	166 347	5	111 709	21	278 056
Total	49	771 796	267	11 691 517	316	12 463 313

Chart 14

Supply of new and used cultivating planters to Ukraine in 4 quarter 2016 [12]

Type of machine	Number	Customs value, \$
New cultivating planters	9	771 796
Used cultivating planters	67	11 691 517
Total	16	12 463 313

Import of ploughs to Ukraine according to trademarks 2016 [12]

Trademark	Used, pcs	Customs value, \$	New, pcs	Customs value, \$	Total, pcs	Customs value, \$
Lemken	14	142 622	38	1 474 697	52	1 617 319
Kverneland	3	44 646	25	664 195	28	708 842
Kuhn	2	26 482	9	208 303	11	234 785
Gregoire Besson	4	22 201	4	183 321	8	205 522
Pottinger/Servo			5	184 036	5	184 036
Молдагротехніка			40	182 814	40	182 814
Opall-Agri			5	152 969	5	152 969
Almeks			16	141 280	16	141 280
Rabe	3	44122	2	84 466	5	128 588
Sukov/Arco Agro			4	88 390	4	88 390
Others	35	136 568	31	313 519	66	450 088
Total	61	416 641	179	3 677 991	240	4 094 632

Chart 16

Supply of new and used ploughs to Ukraine in 4 quarter 2016 [12]

Correlation	Number	Customs value, \$
New ploughs	179	3 677 991
Used ploughs	61	416 641
Разом	240	4 094 632

As we can see from the given charts, Ukraine is filled with foreign machines. And all this in spite of the fact that they cost much more than the domestic machines or those made in CIS countries. Thus, tractor XTA-300-03 with the engine D262 with the capacity of 250 horsepower costs \$93000 (a new one), similar tractor John Deere 7930 made in 2010 – €194 000, wheeled tractor John Deere 6920-2009 with the capacity 150 horsepower and 6500 motor-hours service costs \$56 000 (made in 2009), similar new T-150 – \$20 500[11,12]. Why is it happening? What are the motives of the Ukrainian agrarians? It's logical to assume that the main estimations are economic. But they can object that it's uneconomic to use expensive foreign machines, it's better to use much cheaper domestic machines. Then why do Ukrainian and Russian agrarians use more expensive and often not new foreign machines, ignoring new, much cheaper domestic machines? Let us consider this question in detail. It's clear that everyone chooses the most profitable option. Then in what way do foreign machines prevail over domestic machines? It's known from theory that new machines should be more economically efficient than old machines. The criterion of the economic efficiency of the machines and technology is reduced costs per unit, which are reduced costs calculated per unit of produce. Reduced costs are current (operating) costs plus share of the capital costs which should be recouped in a year, that is, capital costs multiplied by normative coefficient of economic efficiency (1).

$$Z_p = I + K \cdot E_n, \quad (1)$$

If we divide these costs by yearly operating productivity of the machines $Q_{e.p}$, then we will receive reduced costs per unit (2)

$$Z_{yp} = \frac{Z_p}{Q_{e.p}}; \quad (2)$$

Current costs and technological process performance costs consist of the costs of the salary for the machine operators; costs of the technical service and maintenance; energy costs; costs of lubricants; relocation costs; hydro system oil costs; replacement items costs.

Here, K – is capital investments into the purchase of the machines, $E_H = 0,16$ – is normative coefficient of economic efficiency, which shows the share of capital investments that should be recouped in a year.

Let's find out the ideas of the Ukrainian agrarians. From the Internet resources – discussion about which engine is better – D245 or Cummins: “I was using D245 with 30 000 kW, crankshaft (author) broke, frankly speaking, I didn't expect this as D240 on MTZ normally use more than 4000 motor-hours”. Further: “Though Cummins is more expensive, it's more reliable and less fussy”. And more: “after reading the

reviews I have decided to buy Cummins, I got a used one, however I have been using it for a year already and haven't had any problems yet!" [13]

We also carried out the survey of the farmers, who work in Kirovohrad region, namely, Seredenko Mykola Borysovych (private agricultural enterprise "Dimitrovo"), Kravchuk Dmytro Vasyliovych (agrofirma "Rosj"), Rovenskyi Yurii Vasyliovych (firm "Tsvitna Agro"). Their opinions are similar – foreign machines are of much higher quality and more reliable. Thus, farmer Seredenko M. B. first had 15 tractors T-150 in operation, which he later replaced with 5 John Deere tractors. Here is his explanation: "In the morning 15 tractors start working, but by the evening only one remains in operation. All the rest go out of order for certain reasons. It seems like it's not the machines, but sabotage". Further: "If John Deere tractor works for 500 hours, it just needs motor oil changed, but T-150 will need the whole hydraulics replaced after the same time." It can be reproached, that this is not a representative selection, which demands scientific correctness. But these are the opinions of experienced users who have been dealing with the machines for 25-30 years and who weren't objected to in the forum, besides, the farmers' opinions were the same, so they generalize long-time experience of many of their colleagues. We can claim with certainty that there is a particular marketing research among the experienced users of the domestic machines and the machines made in CIS countries.

Thus, we have come to the conclusion, that the farmers are only attracted by the high economic efficiency of the machines. It happens, as it was mentioned earlier, that while choosing agricultural machines they sometimes prefer domestic or CIS-made machines (Belarus tractors – MTZ-80 and their modifications are imported – chart 8, planters "Moldagrotekhnika" – chart 13; Ukrainian planters, ploughs, cultivators – chart 7), but while choosing combines, most powerful tractors and most types of planters the verdict is unequivocal – foreign machines are much better, thus, more efficient. This is proved by the figures of foreign machines export, both new and used – see charts 5-15. Chart 4 shows the number of the combines made in Ukraine in recent years, which speaks for itself. The farmers don't know the nuances of the methodology of calculating economic efficiency, but they feel it very well in their pocket. At much higher price these machines have much higher productivity, reliability, motor-resource, and minimal harvest loss. The above-mentioned methodology of calculating economic efficiency can prove it with figures.

While writing this article the authors became familiar with numerous internet-offers of used foreign agricultural machines. Among scores of offers no less than 10% of tractors have 10000 motor-hours in operation, and only insignificant part had capital maintenance of the engine. Machines with the resource from 2000 to 9000 motor-hours make up 70% among the used machines offered, and only the machines made by 2005 had capital maintenance with preserving performance figures at a primary level.

It is known, that motor-resource of the majority of domestic machines in theory makes up 5760, sometimes 7680 motor-hours. But it's theoretically. As practice shows, real situation is much worse. A vital problem of the domestic machines is their unreliability and small resource of component parts. Thus, Public Joint Stock Company "Hidrosyla" advertises their best gear-type pumps of "Master" series which have 2000000 cycles resource. [14]. At the medium rate of turnover of the gear-type pump of 2400-2500 turnover per minute it amounts to only 13,9 motor-hours. The motor-resource of foreign hydraulics exceeds these performance figures by several times. This strongly influences the performance figures of the whole machine. Meanwhile, we should remember that PJC "Hidrosyla" is a leader in manufacturing hydraulic machines on CIS territories.

Thus we can see that real motor-resource of the most engines in domestic or CIS-made machines is less, often significantly less, than the resource of the similar foreign machines, and often much less than the claimed 5760 motor-hours. Very little resource of other systems and mechanisms – hydraulics, pneumatics and other systems, makes normal work impossible even during the period of sowing, reaping and other agricultural works. Another important factor which characterizes the reliability of the machines' work is mean time between failures. Foreign machines have mean time between failures in several times, if not in scores, higher than the domestic ones. It is especially important during sowing campaign or harvesting, when it's difficult and expensive to arrange and carry out the maintenance of the machines in the field conditions; besides, this leads to obvious harvest losses as a result of the loss of the most favorable time for carrying out agricultural works.

In order to prove the economic efficiency of the machines' use it is necessary to calculate precisely current and capital costs of domestic and foreign machines. The data for every mark of machines differ significantly. Comparing the data of operating costs for foreign tractors of various manufacturers, we can see significant differences – see charts 16-17.

Comparative data on the Co LTD “Harvest Holding” tractors test

Parameter	Claas Xerion 3800	Fendt 9836 Vario	New Holland 390	Challenger MT6850	John Deere 8335 R	T-150	XT3-240
Capacity, horsepower	385	356	340	345	335	150	240
Fuel expenses per 1 hectare	21,5	22	27,5	27,7	33,3	20	18
Productivity, hectare/year	2,76	2,1	2,35	2,22	1,79		
Cost	1144000 €	122000€	90000€	111000€	122500€	20500\$	32000\$

*Report on the results of the competition in the group of “Rostok Holding” companies of 22 April 3013 near village Ulanove, Hlukhivskiyi district Sumy region. Information provided by the agricultural produce manufacturers in the regions of central Ukraine.

Comparative data while operating tractors according to the data of agricultural produce manufacturers in the regions of central Ukraine

	Tractor specifications	Engine capacity, hp	Coverage of working machine, m	Machined depth, cm	Fuel expenses, l/he
1	John Deere 7530	180	3,5	35	14 - 16
2	KhTZ-2021 (XT3)	130	2,3	40	18 - 20
3	KhTZ-240 (XT3)	240	2,5	55	18
4	K-700	300	3,5	40	19
5	MTZ (MT3)	105	1,5	55	15
6	K-700 (engine Renault)	400	3,5	35	17 - 20
7	New Holland	350	4,5	45	16 - 18
8	T-150 (engine MAZ)	238	2,5	35	20
9	K-700	300	3,5	35	19 - 20
10	John Deere 8400	270	3,5	30-35	18-22

*deep cultivator Gaspardo Artiglio was used. Information provided by the agricultural produce manufacturers in the regions of central Ukraine.

As we can see, modern foreign tractors have very different performance figures on fuel expenses and productivity. In order to calculate the economic effect precisely, we need to have accurate data about the annual operating costs of the tractors under comparison. We haven't found these data. Thus we will use the data on the structure of operating costs of domestic machines.

Calculation of the annual current costs, UAH

Item of expenses	Symbolic notation	Performance figures values	% in the structure of current costs
1	2	3	4
Machine operators' salary	Z ₃	162400	16,2
Replacement parts costs	Z _{3M.O}	1830	2
Maintenance control and repairs costs	Z _{TO}	37640	4
Energy costs	Z _c	711200	71
Lubricants costs	Z _c	135100	13,5
Relocation costs	Z _{нб}	800	0,9
Hydraulic system oil costs	Z _г	5012	3,6
Total amount of annual current costs	I	1054000	100

Undoubtedly, to assume that the structure of foreign machines costs will be the same is simplification, but we will use this assumption. Obviously, the main item of current costs is fuel costs. In a particular case they made up 71% of the current costs value. If we take this figure as a check point and carry out relevant calculations, we can determine that the most efficient machines among the given ones, in consideration of

productivity, are foreign machines. Similar situation is with grain-harvesting combines. It is absolutely supported by the opinions of the interviewed Kropyvnytskyi (Kirovohrad) farmers. Despite the higher price, Ukrainian farmers prefer new and used foreign machines. According to the State Statistics data, in the last two years Ukraine hasn't manufactures a single combine (chart 7) [15], though at the Agro-2017 exhibition (Kropyvnytskyi, 20-23 September, 2017) we could see the sample of the Ukrainian combine "Khersonets". Advantages of foreign combines are the same as of other machines – extremely high quality of performing all operation, lack or minimal losses, high reliability (big motor-resource, big mean time between failures of the engine and other systems), high productivity, efficiency, convenient service, availability of parameter range of machines with different productivity, which allows the choice of machines subject to the working conditions. According to any parameters CIS-countries combines can't even catch up with the foreign competitors. From the charts 1.3, 5.8.10, 12 given above we can see that consumption of the used foreign machines is growing. We link this to the decline of the economic situation in the country and the fall of the hryvnya rate as well as the fact that technical performance of the used foreign machines remains on the high level.

Here we should make some remarks about the choice of the machines. The choice of the machines is not always made with the consideration of the efficiency criterion. It appears that in specific conditions there are other important considerations which influence the choice. For instance, productivity. In real production conditions it is sometimes extremely important to till the land quickly, while the weather is favorable. High productivity of machines is needed for this. In the given case the calculations can prove that the usage of more productive, and thus, more expensive foreign machines will lead to higher expenses than the usage of less productive domestic machines. But this on the assumption of time availability. If weather conditions do not provide such an opportunity, then further non-performance of the work in the field (undelayed moisture etc) will lead to much bigger losses. Accordingly usual calculations of economic efficiency won't be correct in the sense of receiving maximal possible benefit by the farmer. We can foresee similar situation with the mean time between failures. If pre-calculated more efficient machines get out of order in the field and the maintenance and arrival of the maintenance team takes a lot of time, and waiting for the maintenance will lead to harvest loss, than, from the point of view of the final outcome, more reliable but more expensive in maintenance machines will be more efficient according to the generally-accepted criterion of economic efficiency. This idea is supported by the data from charts 16 and 17. On the assumption of the data from chapter 1, it's obvious that foreign machines are more efficient. However, more efficient machines are not always sold more – chart 8.

What conclusion can we make from this? We should handle the choice of new machines not from the local but from the general, systematic efficiency. Correspondingly, this demands reconsideration of the approach to determination and choice of the more efficient variant of new machines. In our view, while determining economic efficiency of the new machines we should consider the following questions:

1. What machine specifications allow receiving maximal systematic economic effect?
2. What weather, market or other conditions can require changes (or variations) in technical performance of the machines and to what extent (what productivity, capacity, mean time between failures, motor-resource, period between maintenances etc)?
3. What possible problems in the machine work can lead to the unplanned expenses?

At this we believe that the criterion of the minimum of the reduced costs per unit is important and actual for the determination of more efficient machines. On the grounds of the Kropyvnytskyi (Kirovohrad) farmers' survey we believe that the most experience and the most successful of them use exactly this approach. It should be used while designing new machines for the determination of their rational technical specifications.

More about the farmers' choice of the machines. As we have already mentioned, rational considerations are important during the choice. At the same time, quite often farmers follow not only rational considerations, but also general considerations, such as the known trademark, availability of technical service and spare parts; and sometimes even quite irrational considerations, such as the colour of the tractor etc. It is obvious from the fact that they don't always buy the most economically profitable foreign tractors or other machines. It's reasonable to mention Richard Thaler, the Nobel prize laureate in Economics in 2017 and his works about behavioral economics. Let us remind his main ideas which, in our view, can refer to this issue.

1. "The Theory of Limited Rationality". We can't assume that people consider all possible alternatives and all probable long-term effects before every economic decision. This is just insurmountable task, thus the decisions are often taken with the narrow focus. Such approach in economics got a name "The Concept of Limited Rationality".

2. Lack of self-control. We give in to short-term temptations which threaten our long-term welfare. Experience, closer in time, attracts us more than the remote one. A thousand dollars next year is perceived as fewer sums than a thousand dollars today, no matter whether it is profits or expenses [16, 17].

This way, while choosing the machines there is a certain “dualism” – the combination of the rational considerations and taking objective factors into account as well as certain “limitation of the rationality” and lack of self-control. We believe that these points work while choosing the machines. In order to give more grounded answer what particular factors the farmers use while choosing the machines, economists, engineers and marketing specialists should carry out further detailed research.

How do domestic manufacturers react on the competitive pressure? To their honor, they work and try to compete with the foreign manufacturers. This is proved, for instance, by the work of Kharkiv tractor plant and its new models of tractors, which are produced with foreign component parts, especially engines as the most complicated and responsible aggregates. Similar situation exists in Russia and Belarus where the level of technics and technology is similar to Ukrainian. For example, Russian and Belorussian manufacturers are also trying to produce domestic tractors and combines which could compete with the foreign ones. However, the share of foreign tractors in recent years makes up from 76% to 61%, the number of Russian combines in their own market is also decreasing radically. We can see it in charts 1, 2, 3. They are being developed on the basis of foreign counterparts and with the use of foreign component parts, primarily engines. Nowadays, there are about 20 manufacturers of agricultural tractors in Russia, 8 of which assemble the machines under the foreign manufacturers’ license. The question arises is these steps are successful in response. Our opinion is that so far they are not successful. As we can see from the charts above, the production of Ukrainian combines is completely closed; the production of the tractors is decreasing sharply; there are significant problems with the realization of hydraulics in the foreign markets. Thus, PJC “Hidrosyla” claims that they realize their products in Germany, Austria, Switzerland, Holland, Belgium, Norway, Sweden, Finland and Great Britain [14]. However, the amount of these supplies is limited to several scores of aggregates to each country a year, which cannot be considered a success. It’s known, that the representatives of the Volvo firm tried to cooperate with PJC “Hidrosyla”, but they were not satisfied with the quality of this enterprise’s products. The enterprise also had to leave the Chinese market where they delivered their products. However, the supplies were going to the secondary market of spare components, not to the assembly conveyor of the enterprises.

The same situation is with the development of the market of the construction and road machines: auto-cranes and self-propelled cranes, bulldozers, excavators. Also the foreign machines cost much more expensive (however, there is a stable tendency to supply Chinese machines – excavators and cranes of low power and average power to the Ukrainian market in significant amounts at the acceptable prices), but they have much better performance and, thus, they win in the competition. Besides, there is insufficient motor-resource of separate units and systems – of engines, hydraulics etc.

So what is the way out of this situation? As academician Amosha said: “the successes of industry depend primarily on the actions of the business, which is responsible for the development of the products, processes and skillfulness of the workers, necessary for the preservation of the available and opening of the new markets in the globalized world, search for new opportunities with a glance to the requirements of the corporate social responsibility and sustainable development”. What are the specific objectives of the business? What conclusions can we make from everything mentioned above?

Conclusions. There is a tough competition ongoing, in which machines of higher quality are winning. The manufacturers from CIS countries are mainly followers. Their positions are mostly weak. The winner is determined by the market, in other words, a consumer. He relies on own considerations of profit and attraction of the machines. The consumer often prefers foreign machines, even if they are not new, in spite of significant difference in price, to the domestic machines. But sometimes domestic machines win in competition – in some cases they satisfy the Ukrainian consumers better. Ukrainian economists should study the problems mentioned, and Ukrainian scientists should improve the machines’ designs. The expectations for the foreign investors who will come and bring new technologies and technics as well as raise Ukrainian production are not well-grounded. After the crisis of 2008 the developed nations understood that the advanced economics which can survive periodic crises without significant losses is economically developed economics with working industrial enterprises, not only a financial center. British prime-minister D. Cameron spoke about this at the global economic forum in Davos in 2014. Since then this tendency is increasing. We should understand that the investors will not come to Ukraine to build powerful enterprises and create competitors to themselves. In the best case it will be manufacturing of not very complicated components and machines that are not very competitive. The main hope is for own business and own scientists and designers. This is shown by the experience of the enterprises of the Chinese People’s Republic

and foreign enterprises.

We mentioned unsuccessful experience of the cooperation of JSC “Hidrosyla” with the Volvo company. At the same time some manufacturers were able to sell their products for foreign machines kitting. We also know the history of the cooperation of this enterprise with the Chinese enterprises, which started optimistically, however, unfortunately, ended quite fast as a result of dissatisfaction of the Chinese consumers with the quality of the Ukrainian products. But this doesn't mean that it is impossible to work with the famous manufacturers. Thus, Czech firm Poclain supplies its hydraulic machines for one of the most world-recognized German combines Claas [18, 19]. That is, if products meet the requirements of quality and price-competitive, they can go on foreign markets. This is also proved by the purchase of some Ukrainian agricultural machines by the domestic farmers and road-building organizations. It's known that in some branches Chinese enterprises present a serious challenge to European and American manufacturers. Their advantage is not the cutting-edge technologies, they either copy, or buy them, but in the cheap, productive and disciplined workforce, which makes it possible to decrease the cost value and the price of the products dramatically. European and American manufacturers are forced to respond to this and find interesting action options, i.e. their conveyors work 24/7 with the aim of decreasing the cost value of their products. Taking into account the advantage of the European and American products in quality, such step in response brings its results. This should be an example for the Ukrainian business.

The main question is: who will finance this? The answer is the only one, it should be Ukrainian business. Thus, American corporation John Deere spends up to 3,5 billion dollars on scientific research and experimental project works in 5 years and does not expect money from the state. Other world-known manufacturers – German Lemken, Japanese Komatsu, Toyota and others act likewise. The question arises if there is someone to finance. The answer is yes, there is. It is known that among the numerous cohorts of scientists only 8% create new knowledge. And they are exactly who we should search for and finance. We can present the examples of the engineering designs, which create competitive products. These are the designs by Professors Chernovol M. I. and Kuleshkov Yu. V., who have developed new designs of the hydraulic machines – gear pumps with the improved performance. Unfortunately, this work hasn't found necessary support in business [20, 21].

Also there are known works by Professors Sysolin P. V., Salo V. M. and others on improvement of agricultural machines. They created unified running system for the family of planters and cultivators, the family of seeding-machines ZS-3,6; ZS-3,6-01; ZS-3,6-02, ZS-3,6-03 (2003), the family of ground looseners GRN-1,9, GRN-2,9, GRN-3,9 (1997-2003). Plant “Agromash” in Kyiv produced more than 600 ground looseners and the experimental sample of the mineral fertilizer. Within the frames of the regional scheme “Agrotekhnika” and the state program of introduction of technical complexes of the machines and equipment for the agro-industrial complex PC “Chervona Zirka” mastered the manufacturing of ground looseners [22].

The works of Professor Aulin V.V. on the issues of the evolution of the development of the technical state and reliability of the systems and aggregates of the mobile agricultural and motor transport machines, the methods of their improvement and design perfection, technical and economic efficiency of functioning, usage and maintenance, the development of tribotechnology of running-in and restoration of the machines systems and aggregates which determine the resources are also widely known [23]. It's impossible to list all the works of the Ukrainian scientists who deserve the attention of the business.

Thus, we see serious works by Ukrainian scientists who can give adequate results in increasing the quality, and in this way, competitiveness of the Ukrainian industrial products. We should also take into account that these works were done without any external funding. It's logical to assume that adequate financing of the scientists' work would give much better results.

There is another aspect to this problem. As we know, there are different methods of evaluating the business value – according to the value of creating, according to the depreciated cost and the generated profit amount. The last method is the most used. The authors are convinced that activation of innovative business activity will allow not only to improve its strategic and financial positions, but will also increase its capitalization, or value. Everybody – science, business, economics, and finally, the whole country will win from this step.

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Vladyslav Nastoiashchy, Professor, PhD (Technical Sciences), Professor at Department of Building and Road Construction Machines. **Volodymyr Yatsun**, Associate Professor, PhD (Technical Sciences), Dean of Faculty of Planning and Exploitation of Machines. **Ihor Kharchenko**, Associate Professor, PhD (Economic Sciences) at Department of Economy and Enterprise. Central Ukrainian National Technical University. **Problems and Prospects of the Development of the Particular Fields of Ukrainian Machine-Building under Conditions of Increasing International Competition and Globalization of Economics.** The article looks at the problems which agricultural and road building machine-building faces today. Our industry has the necessity of carrying out such works. Plants would use this situation. In fact, situation is different. Our manufactures has lower quality and lose in competition with foreign manufactures. Ukrainian consumer prefer foreign machines, though some kinds of domestic produce are still in demand. Our economists should study the problems mentioned, and scientists should improve the machines' designs. The expectations for the foreign investors who will come and bring new technologies and technics as well as raise Ukrainian production are not well-grounded. After the crisis of 2008 the developed nations understood that the advanced economics which can survive periodic crises without significant losses is economically developed economics with working industrial enterprises. Ukrainian business must finance research to increase our machine quality. We see serious works by Ukrainian scientists who can give adequate results. The authors are convinced that activation of innovative activity will allow to improve its positions.

Keywords: Ukrainian agricultural and road building machine-building, Ukrainian machine-building enterprises, competition, reliability, resource, economic efficiency, market, demand, selling.

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Настоящий Владислав Анатолійович, кандидат технічних наук, завідувач кафедрою, професор кафедри будівельних, дорожніх машин та будівництва. **Яцун Володимир Васильович**, кандидат технічних наук, доцент, декан факультету проектування і експлуатації машин. **Харченко Ігор Валерійович**, кандидат економічних наук, доцент кафедри економіки та підприємництва. Центральнoукраїнський національний технічний університет. **Проблеми та перспективи розвитку окремих галузей українського машинобудування в світлі посилення міжнародної конкуренції та глобалізації економіки.** Розглядається українське агро- та дорожнє машинобудування. Є попит на техніку. Підприємства мають шанс. Реально все інакше. Вища якість закордонної техніки – перемога в конкуренції, дещо з вітчизняної продукції користується попитом. Причина – мала наукомісткість вітчизняної продукції через неувагу бізнесу до НДДКР. Недофінансована українська наука має що запропонувати виробництву. Реалізація розробок покращить стан як підприємств і економіки.

Ключові слова: агро- і дорожнє машинобудування, конкуренція, якість, ринок, попит.

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Ключевые слова: агро- и дорожное машиностроение, конкуренция, качество, рынок, спрос.