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Assessment of the competitiveness of enterprises

Abstract

Introduction. Competition is a unique phenomenon which reveals specific competencies of business entities and allows them to realise their potential. However, businesses need a method for assessing the level of their competitiveness, which would use an integral index calculated on the basis of their financial statements and allow identifying «bottlenecks» of their economic activities and relate enterprises to specific economic sectors. *The purpose* of the article is to formulate a method for assessing the competitiveness of enterprises by using an integral index.

Results. The study proves that the competitiveness of a company takes into account the three major types of economic activity: supply, production and sales. Each of the abovementioned types can be further assessed by using independent indicators, which characterises the whole economic activity of the enterprise. An integral index of enterprise competitiveness should include indicators that directly describe the production process, the financial status, the use of staff, the level of innovations, etc. The proposed approach involves determining the growth indices which are then used as the basis for calculating the average weighted competitiveness of each type.

The testing of the proposed method has been demonstrated by using the performance results of four big enterprises of metallurgical and machine building industry of Ukraine. The enterprises are contractors with established long-term relations. For example, PJSC «Dniprovsky Metallurgical Plant» is a manufacturer of cast iron, steel and ferroalloys, further used by PJSC «Interpipe NTZ» for the production of pipes, wheels, etc. A separate group includes machine-building enterprises, which are PJSC «Dnipropetrovsk Aggregate Plant» specialising in the manufacture of air and space aircraft, electric motors, generators and transformers, hydraulic and pneumatic equipment and the enterprise PJSC «Dniprovazhmash» which produces railway locomotives, machinery and equipment for extractive industry and construction. However, these manufacturers are connected not only by the raw material chain and integrated sales channels, but also by the joint processes of using and introducing innovative developments and the modern expertise of specialists. The enterprises under consideration differ in the scope of economic activity: the average number of employees varies from 1,500 to 4,500 people, while the sales proceeds vary over the range of 13 to 500 million Euros.

When investigating supply, we can see that the competitiveness of this process in all the enterprises is more than one, with the exception of PJSC «Dniprovazhmash», which is explained by a significant improvement in the turnover of production stocks and positively characterises the procurement of raw materials. The analysis of the production shows that the least value of this process competitiveness is demonstrated by PJSC «Dniprovsky Metallurgical Plant» (0.883) and PJSC «Dniprovazhmash» (0.854), though PJSC «Dniprovsky Metallurgical Plant» shows a gradual recovery from the crisis situation, an increase in sales proceeds and increase in net profit. As for PJSC «Dniprovazhmash», the analysis revealed a deterioration of most indicators of financial and economic activity, which requires an immediate correction of the production program.

Conclusion. The proposed method for assessing enterprise competitiveness allows adjustments of the quantity and quality of indicators, use of public statistics, development of measures to improve a particular process; it also provides clear and convincing comparison results. The advantages of the proposed method prove its universal nature and ease of use.

Practical testing of the proposed method has revealed that all the selected enterprises had an integral competitiveness index of more than one. The best results in all the processes were shown by the metallurgical enterprise PJSC «Interpipe NTZ». The findings may indicate a gradual recovery of the enterprises from a system crisis and positively characterise their development, which, in turn, increases the investment attractiveness of not only specific entities, but also of the metallurgical and machine-building industries in general.

Keywords: Competitiveness; Production; Supply; Sales; Integral Competitiveness Index; Enterprise; Investment; Financial Statement; Raw Materials; Metal; Machine-Building; Dniprovsky Metallurgical Plant; Interpipe NTZ; Dnipropetrovsk Aggregate Plant; Dniprovazhmash

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Оцінка конкурентоспроможності підприємств

Анотація. У статті досліджено особливості оцінювання конкурентоспроможності підприємства з використанням інтегрованого показника. Доведено, що конкурентоспроможність підприємства враховує конкурентоспроможність трьох основних процесів господарської діяльності – постачання, виробництва і збуту. Обґрунтовано, що інтегрований показник конкурентоспроможності підприємства повинен враховувати показники, що характеризують виготовлення продукції, фінансовий стан, використання персоналу, інноваційність тощо. Запропоновано методику оцінки конкурентоспроможності підприємства, перевагами якої є універсальний характер і простота використання.

Ключові слова: конкурентоспроможність; виробництво; постачання; збут; інтегрований показник конкурентоспроможності.

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Оценка конкурентоспособности предприятий

Аннотация. В статье исследованы особенности оценки конкурентоспособности предприятия с использованием интегрального показателя. Доказано, что конкурентоспособность предприятия учитывает конкурентоспособность трех основных процессов хозяйственной деятельности – снабжения, производства и сбыта. Обосновано, что интегральный показатель конкурентоспособности предприятия должен учитывать показатели, характеризующие непосредственно изготовление продукции, финансовое состояние, использование персонала, инновационность. Предложено методику оценки конкурентоспособности предприятия, преимуществами которой являются универсальный характер и простота использования.

Ключевые слова: конкурентоспособность; производство; поставки; сбыт; интегральный показатель конкурентоспособности.

1. Introduction

Competition is a unique phenomenon of the present day, which reveals specific competencies of business entities and allows them to realize their potential. However, businesses need a methodology for assessing the level of their competitiveness, which would use an integral index calculated on the basis of their financial statements, and would allow identifying «bottlenecks» of their economic activities and relate enterprises to specific economic sectors.

2. Brief Literature Review

As a rule, competitive advantages are studied through various methods of analysis such as SWOT, PEST, LOTS, PIMS and McKinsey. These tools are used to classify the external factors and rank them depending on their impact on a company. In addition, they reveal internal factors that need either to be improved or eliminated in order to achieve the company's objectives. It is essential to mention T. V. Shved (2017) [1], I. M. Dashko (2017) [2], A. M. Tkachenko and O. I. Pozhueva (2014) [3] among the scholars who investigated the factors affecting competitiveness and highlighted the financial and innovative components. Methods of qualitative analysis of competitive items, based on the concept of effective competition, have been proposed by R. S. Gayrbekova and F. A. Abitaeva (2016) [4]. A dynamic method of assessment based on quantitative parameters and the production model of knowledge representation has been substantiated by E. A. Razumovskaya, et al. (2017) [5], N. A. Semenov and A. K. Morozov (2017) [6]. T. F. Melnikova, V. S. Kupriyanova and S. Ya. Denisyuk (2017) [7] studied the level of aggregate indicators of the enterprise performance, which would determine

the success of the enterprise in the market for a certain period of time. M. I. Abuzyarova (2017) [8] focused on the impact of globalisation processes on the efforts of enterprises to improve the factors of competitiveness. R. Nowacki (2015) [9] and D. Grodzka (2017) [10] dedicated their studies to the assessment of the competitiveness of Polish enterprises, as well to the measurements of regional competitiveness. Issues of competitiveness in industry sectors are considered in the works by foreign scientists, such as Chong Wu, et al. (2013) [11], Ch. Fischer and S. Schornberg (2007) [12], P. L. Kennedy, et al. (1997) [13], Chi-K. Lau, et al. (2009) [14], G. Coffin, B. Larue, M. Banik and R. Westgren (1993) [15], along with K. Drescher and O. Maurer (1999) [16]. The influence of factors on competitiveness is investigated by J. A. Bernal-Conesa, A. J. Briones-Peñalver and C. de Nieves-Nieto (2017) [17; 18], C. Jansik and X. Irz (2015) [19], D. Lipovatz, M. Mandaraka and A. Mourelatos (2000) [20] and others.

The analysis of modern research has shown that the main factors that complicate the practical use of these techniques are the difficulty in obtaining information, the cumbersome mathematical apparatus and ambiguous interpretations of the results.

3. The purpose of the article is to formulate a method for assessing the competitiveness of enterprises by using an integral index.

4. Results

We consider supply, production and sales to be the major components of the company's competitiveness, since these processes ensure the continuity of production and maintain high performance.

The proposed method for assessing the competitiveness can be applied as described below. The integral index of enterprise competitiveness (IC) will take into account the competitiveness of the three major processes relating to economic activity, i.e. supply, production and sales. It is calculated according to (1):

$$I_C = \sqrt[3]{I_C^S * I_C^P * I_C^{SI}}, \quad (1)$$

where:

I_C^S is the competitiveness of the supply process, unit fractions;
 I_C^P is the competitiveness of the production process, unit fractions;

I_C^{SI} is the competitiveness of the sales process, unit fractions.

To determine the competitiveness, we presented the production process as a set of indicators that characterise the direct production of products, the financial status, the use of personnel and innovation. Each of the above processes can be further assessed by independent indicators, according to the processes that characterise the whole economic activity of the enterprise (Table 1).

To calculate the above coefficients (Table 1), we will use the indicators obtained on the basis of financial and economic activities of a business entity. The characteristic feature of the above approach is that the specialists of an enterprise can complement the assessment of the process competitiveness by indicators that they consider appropriate to determine their competitiveness. In the proposed method, the coefficients of the competitiveness of supply, production and sales processes are determined by averaging 5, 10 and 5 indicators, respectively.

The proposed approach involves determining the growth indices for the coefficients as a ratio of the value obtained within the analysed period to the same coefficient in the base period. These will serve as the basis for the calculation of the weighted average competitiveness of each process.

At the same time, coefficients that need to be taken into account include net profit, sales revenue and equity costs (autonomy coefficient, economic growth rate, return on assets, return on equity, innovation ratio, profitability and sales profitability). In the conditions of a structural crisis, unfortunately, the percentage of loss-making enterprises is rather high. Therefore, the following points should be taken into account:

- 1) if the coefficients in the base and analysed periods have a positive value $K_b > 0$ and $K_a > 0$, the growth index will be obtained according to the equation (2):

$$I_{1r} = \frac{K_a}{K_b}; \quad (2)$$

- 2) if the coefficients of the base and analysed periods had a negative value $K_b < 0$ and $K_a < 0$, the growth index will be obtained according to the equation (3):

$$I_{2r} = \frac{K_b}{K_a}; \quad (3)$$

- 3) if the coefficients had a negative value in the base period and a positive value in the analysed period: $K_b < 0$ and $K_a > 0$ (the indicator has increased), the growth index will be calculated by (4):

$$I_{3r} = \left| \frac{K_a - K_b}{K_a} \right|; \quad (4)$$

- 4) if the coefficients had a positive value in the base period and a negative value in the analysed period: $K_b > 0$ and $K_a < 0$ (the indicator has decreased), the growth index will be obtained according to (5):

$$I_{4r} = \left| \frac{K_b}{K_a - K_b} \right|. \quad (5)$$

It is also necessary to consider the coefficients, whose reduction is favourable for the company's competitiveness. In the above pattern, it is a coefficient of finished products overstock, which is obtained from the equation (3).

The competitiveness of the supply, production and sales processes is calculated by the equations (6-8); it should be noted, that the index of the radical depends on the number of coefficients recommended for use:

$$I_C^S = \sqrt[n]{I_{C^{IT}}^S * I_{C^{APT}}^S * I_{C^Q}^S * I_{C^{CE}}^S * I_{C^{SE}}^S}, \quad (6)$$

$$I_C^P = \sqrt[n]{I_{C^{CT}}^P * I_{C^M}^P * I_{C^{UF}}^P * I_{C^A}^P * I_{C^{EG}}^P * I_{C^{RA}}^P * I_{C^{RE}}^P * I_{C^{LP}}^P * I_{C^{SL}}^P * I_{C^I}^P}, \quad (7)$$

$$I_C^{SI} = \sqrt[n]{I_{C^{RT}}^{SI} * I_{C^{FPO}}^{SI} * I_{C^{PSI}}^{SI} * I_{C^{PP}}^{SI} * I_{C^{SIE}}^{SI}}. \quad (8)$$

The testing of the proposed method will be demonstrated by using the performance results of four enterprises of metallurgical and machine building industry, whose brief economic characteristics is given in Table 2.

The above enterprises of the metallurgical and machine-building industry are contractors with established long-term relations. For example, PJSC «Dniprovsky Metallurgical Plant» is a manufacturer of cast iron, steel and ferroalloys, further used by PJSC «Interpipe NTZ» for the production of pipes, wheels, etc. A separate group includes machine-building enterprises, which are PJSC «Dnipropetrovsk Aggregate Plant» specialising in the manufacture of air and space aircraft, electric motors, generators and transformers, hydraulic and pneumatic equipment and the enterprise PJSC «Dniprovazhmash» which produces railway locomotives, machinery and equipment for extractive industry and construction. However, these manufacturers are connected not only by the raw material chain and integrated sales channels, but also by the joint processes of using and introducing innovative developments and the modern expertise of specialists. The enterprises under consideration differ in the scope of economic activity: the average number of employees varies from 1,500 to 4,500 people, while the sales proceeds vary over the range of 13 to 500 million Euros; PJSC «Dniprovazhmash» is unprofitable due to the loss of the major market.

Table 3 shows the calculation of the competitiveness of the above metallurgical and machine-building enterprises.

The proposed method for the assessment of their competitiveness has a number of significant advantages, proving its universal nature and ease of use in terms of:

- the possibility of adjusting the quantity and the quality of indicators used in the three types of economic activity (supply, production and sales);
- the use of statistical data which are in common use;
- evident and clear comparison results;
- identification of the so called bottlenecks in each type of economic activity and development of measures to improve a particular process.

The interpretation of the model: competitiveness can be evaluated both as a whole, and for each of the types. If the integral index of competitiveness is greater than one, the competitiveness increases during the period under consideration; if the competitiveness is equal to one, it retains the previous value; if the competitiveness is less than one, then it decreases.

Figure 1 shows the calculated competitiveness indicators. The results obtained lead to the following conclusions. Firstly, when investigating supply, we can see that the competitiveness of this process in all the enterprises is more than one, with the exception of PJSC «Dniprovazhmash»,

Tab. 1: Integral indices of enterprise competitiveness, unit fractions

No.	Description	Designation	Calculation formula	No.	Description	Designation	Calculation formula
Integral Competitiveness Index $I_C = \sqrt[3]{I_C^S * I_C^P * I_C^{SI}}$							
1	Competitiveness of supply process	I_C^S	$I_C^S = \sqrt[3]{I_{CT}^S * I_{CMT}^S * I_{CQ}^S * I_{CCE}^S * I_{CSE}^S}$	2.6	Growth index of return on assets	I_{CRA}^P	$C_{RA}^P = NP / A$
1.1	Growth index of the inventory turnover ratio	I_{CT}^S	$C_{IT}^S = P_S / S$	2.7	Growth index of return on equity	I_{CRE}^P	$C_{RE}^P = NP / E$
1.2	Growth index of the accounts payable turnover	I_{CMT}^S	$C_{APT}^S = P_S / AP$	2.8	Growth index of coefficient of the staff labor productivity	I_{CLP}^P	$C_{LP}^P = P_S / q$
1.3	Growth index of the supply quality coefficient	I_{CQ}^S	$C_Q^S = Q_Q / Q$	2.9	Growth index of staffing level ratio	I_{CSL}^P	$C_{SL}^P = q / q_n$
1.4	Growth index of the contracts execution ratio	I_{CCE}^S	$C_{CE}^S = Q / Q_C$	2.10	Growth index of innovation coefficient	I_{CI}^P	$C_I^P = I / NP$
1.5	Growth index of the coefficient of steady execution of contracts	I_{CSE}^S	$C_{SE}^S = (Q_p - Q_{UC}) / Q_p$	3	Competitiveness of sales process	I_C^{SI}	$I_C^{SI} = \sqrt[3]{I_{CRT}^{SI} * I_{CFPO}^{SI} * I_{CPSI}^{SI} * I_{CPSI}^{SI} * I_{CPSI}^{SI} * I_{CSIE}^{SI}}$
2	Competitiveness of the production process	I_C^P	$I_C^P = \sqrt[10]{I_{CT}^P * I_{CM}^P * I_{CUF}^P * I_{CA}^P * I_{CEG}^P * I_{CRA}^P * I_{CRE}^P * I_{CLP}^P * I_{CSL}^P * I_{CI}^P}$				
2.1	Growth index of the capital transfer of non-current assets	I_{CT}^P	$C_T^P = P_S / FA$	3.1	Growth index of receivables turnover coefficient	I_{CRT}^{SI}	$C_{RT}^{SI} = P_S / R$
2.2	Growth index of the material return coefficient	I_{CM}^P	$C_M^P = P_S / MC$	3.2	Growth index of coefficient of finished products overstock	I_{CFPO}^{SI}	$C_{FPO}^{SI} = (FP + G) / P_S$
2.3	Growth index of the capacity utilisation factor	I_{CUF}^P	$C_{UF}^P = P_S / P_S^{max}$	3.3	Growth index of profitability of sales	I_{CPSI}^{SI}	$C_{PSI}^{SI} = PS / P_S = (GP - E_A - E_S) / P_S$
2.4	Growth index of the coefficient of autonomy	I_{CA}^P	$C_A^P = E / A$	3.4	Growth index of profitability of production	I_{CPSI}^{SI}	$C_{PP}^{SI} = PS / C = (GP - E_A - E_S) / C$
2.5	Growth index of the economic growth coefficient	I_{CEG}^P	$C_{EG}^P = (NP - D) / E$	3.5	Growth index of sales effectiveness coefficient	I_{CSIE}^{SI}	$C_{SIE}^{SI} = P_S / E_S$

Notes: P_S - proceeds from sales, monetary units; S - stores, monetary units; AP - accounts payable, monetary units; Q_Q - number of contracts that fully provide the specified quality of raw materials, pcs; Q - total number of completed contracts for delivery, pcs; Q_C - number of concluded contracts for delivery, pcs; Q_p - number of contracts planned for the specified period of time, pcs; Q_{UC} - number of under-executed contracts within the specified period of time, pcs; FA - fixed assets, monetary units; MC - material costs, monetary units; P_S^{max} - sales proceeds at max use of production capacities, monetary units; E - equity, monetary units; A - asset (balance sheet currency), monetary units; NP - net profit, monetary units; D - dividends paid to shareholders, monetary units; q - average number of staff, person; q_n - total need for staff, person; I - amount of investment and innovation, monetary units; R - receivables, monetary units; FP - finished products, monetary units; G - goods, monetary units; PS - profit on sales, monetary units; GP - gross profit, monetary units; E_A - administration expenses, monetary units; E_S - expenses on selling, monetary units; C - cost of products sold, monetary units.

Source: Compiled by the authors

Tab. 2: Performance characteristics of metallurgy and machine building enterprises in 2017 (with a recalculation in euro as of 01 October 2018)

Enterprise	Economic activity according to NACE (Classification of Economic Activities)	Major products, commodity item according to FEACN (Foreign Economic Activity Commodity Nomenclature)	Average number of employee, persons	Balance sheet assets (total assets), in 1000 euro	Net income from sales, in 1000 euro	Cost of products sold, in 1000 euro	Net financial result, in 1000 euro	Operating expenses, in 1000 euro	Total income of company owners, in 1000 euro
PJSC «Interpipe NTZ»	production of pipes, hollow profiles and fittings made of steel, 24.20	solid wheels (8608), steel seamless hot-dip shaped pipes (7304), casing pipes (7304) and couplings to them (8505)	4,966	506,649	324,602	251,406	9,759	364,921	5,667
PJSC «Dniprovsky Metallurgical Plant»	production of pig iron, steel and ferroalloys, 24.10	conversion pig iron (7201), semi-finished square sections (7207), channels (7216)	4,472	134,947	491,265	462,346	74,170	496,419	70,618
PJSC «Dnipropetrovsk Aggregate Plant»	production of air and space aircraft, associated equipment, 30.30	air and space aircraft (8802), associated equipment (8805), electric motors (8501), generators (8502) and transformers (8504), hydraulic and pneumatic equipment (8412, 8477, 8481)	2,581	14,646	13,136	8,336	711	13697	711
PJSC «Dniprovazhmash»	manufacture of machinery and equipment for metallurgy, 28.91	railway locomotives (8601), machinery and equipment for extractive industry and construction (8428), ovens and stern burners (7321), hoisting, loading and unloading machinery (8427)	1,518	15,864	19,029	17,598	-2,253	20,882	-2,244

Source: Compiled by the authors based on <https://smida.gov.ua>

which is explained by a significant improvement in the turnover of production stocks and positively characterises the procurement of raw materials.

Secondly, an analysis of the production shows that the least value of this process competitiveness is demonstrated by PJSC «Dniprovsky Metallurgical Plant» (0.883) and PJSC «Dniprovazhmash» (0.854), though PJSC «Dniprovsky Metallurgical Plant» shows a gradual recovery from the crisis situation, an increase in sales proceeds and increase in net profit. As for PJSC «Dniprovazhmash», the analysis revealed a deterioration of most indicators of financial and economic

activity, which requires an immediate correction of the production program.

Thirdly, considering the organisation of sales, it should be noted that all the enterprises, except for PJSC «Dnipropetrovsk Aggregate Plant», demonstrate the sales competitiveness of more than one, which positively characterises the distribution of the finished products.

Fourthly, the integrated competitiveness index has a value above one in all the investigated enterprises, which can testify to the gradual recovery of the enterprises from the system crisis.

Tab. 3: Assessment of competitiveness of metallurgical and machine-building enterprises

No.	Indicator	Designation	PJSC «Interpipe NTZ»			PJSC «Dniprovsky Metallurgical Plant»			PJSC «Dnipropetrovsk Aggregate Plant»			PJSC «Dniprovazhmash»		
			2016	2017	Coefficient	2016	2017	Coefficient	2016	2017	Coefficient	2016	2017	Coefficient
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Integral Competitiveness Index	I_C	2.104			1.243			1.015			0.988		
1	Competitiveness of supply process	I_C^S	1.186			1.150			1.050			0.953		
1.1	Inventory turnover, times	C_{IT}^S	17.682	21.192	1.198	25.299	27.376	1.082	5.358	6.257	1.168	11.799	12.075	1.023
1.2	Accounts payable turnover, times	C_{APT}^S	3.869	7.130	1.843	1.391	2.239	1.610	5.857	6.322	1.080	1.927	1.674	0.869
1.3	Supply quality coefficient, u. f.	C_Q^S	0.814	0.802	0.985	0.759	0.801	1.055	0.916	0.922	1.007	0.789	0.755	0.957
1.4	Contracts execution ratio, unit fractions	C_{CE}^S	0.908	0.936	1.031	0.889	0.903	1.016	0.994	0.996	1.002	0.864	0.837	0.969
1.5	Coefficient of steady execution of contracts, u. f.	C_{SE}^S	0.909	0.952	1.047	0.746	0.803	1.076	0.985	0.991	1.006	0.843	0.804	0.954
2	Competitiveness of production process	I_C^P	2.088			0.883			1.050			0.854		
2.1	Capital transfer of non-current assets, monetary unit / monetary unit	C_T^P	1.458	3.020	2.071	5.876	9.036	1.538	1.841	2.412	1.310	9.371	9.788	1.044
2.2	Material return, monetary unit / monetary unit	C_M^P	2.494	1.778	0.713	1.143	1.243	1.087	3.745	4.289	1.145	1.913	1.839	0.961
2.3	Capacity utilisation factor, unit fractions	C_{UF}^P	0.764	0.898	1.175	0.732	0.818	1.117	0.841	0.862	1.025	0.452	0.426	0.942
2.4	Coefficient of autonomy, u. f.	C_A^P	0.040	0.048	1.220	-1.139	-0.783	1.454	0.211	0.250	1.189	0.249	0.146	0.586
2.5	Coefficient of economic growth, unit fractions	C_{EG}^P	-2.400	0.399	7.009	0.057	-0.702	0.075	0.299	0.194	0.649	-0.488	-0.975	0.501
2.6	Return on assets, unit fractions	C_{RA}^P	-0.095	0.019	5.924	-0.065	0.550	1.118	0.063	0.049	0.772	-0.121	-0.142	0.854
2.7	Return on equity, u.f	C_{RE}^P	-2.400	0.399	7.009	0.057	-0.702	0.075	0.299	0.194	0.649	-0.488	-0.975	0.501
2.8	Labour productivity of employees, monetary units / person	C_{LP}^P	1136.9	2098.9	1.846	2145.6	3527.5	1.644	131.98	163.43	1.238	349.96	402.52	1.150
2.9	Staffing level ratio, unit fractions	C_{SL}^P	1.012	0.968	0.957	0.992	0.975	0.983	0.983	0.979	0.996	0.952	0.936	0.984
2.1	Innovation rate, monetary unit / monetary unit	C_I^P	-0.464	1.034	1.448	-0.253	0.027	10.353	0.239	0.532	2.224	-0.320	-0.220	1.453
3	Competitiveness of sale process	I_C^{SI}	3.770			1.892			0.947			1.186		
3.1	Receivables turnover, times	C_{RT}^{SI}	0.658	0.999	1.519	4.087	10.296	2.519	2.656	2.833	1.067	2.208	2.414	1.093
3.2	Coefficient of finished products overstock, u. f.	C_{FPO}^{SI}	0.038	0.027	1.408	0.018	0.011	1.648	0.108	0.072	1.506	0.015	0.002	8.701
3.3	Profitability of sales, unit fractions	C_{PSI}^{SI}	0.007	0.115	17.632	-0.019	0.013	2.472	0.152	0.127	0.833	-0.040	-0.091	0.442
3.4	Profitability of production, unit fractions	C_{PP}^{SI}	0.008	0.149	19.338	-0.019	0.014	2.417	0.237	0.200	0.841	-0.046	-0.098	0.471
3.5	Sales effectiveness, monetary unit / monetary unit	C_{SIE}^{SI}	12.189	12.736	1.045	29.029	28.360	0.977	24.021	16.299	0.679	13.618	17.447	1.281

Source: Calculated by the authors based on <https://smida.gov.ua>

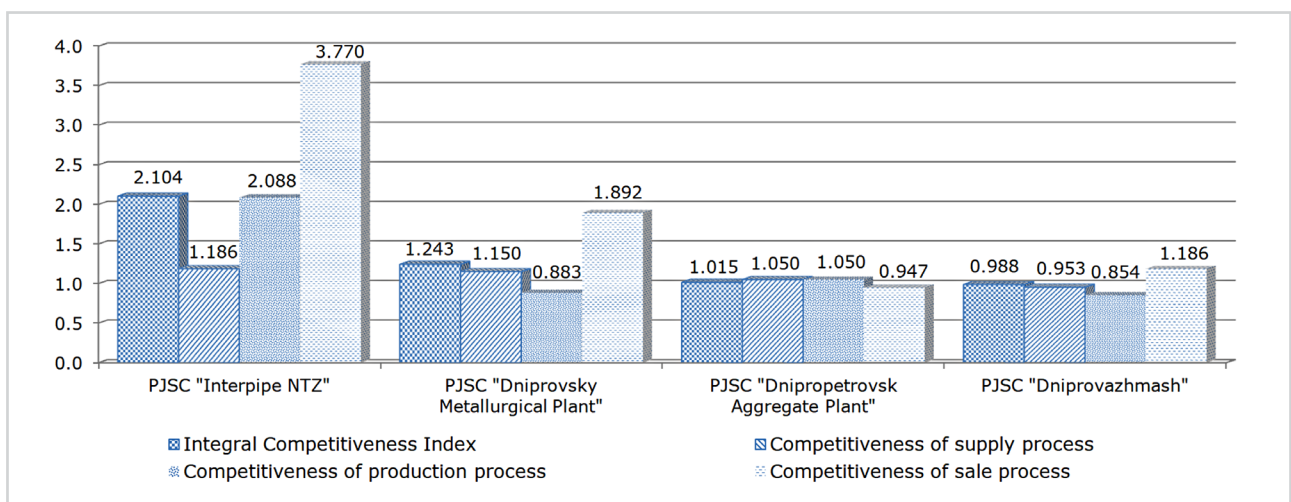


Fig. 1: Competitiveness indicators in metallurgical and machine-building enterprises

Source: Compiled by the authors based on data in Table 2

5. Conclusion

The study has formulated the method for assessing the competitiveness of a company with the use of an integral index, which takes into account the competitiveness of the three major types of economic activity: supply, production

and sales. Each of the above types can be further assessed using independent indicators, which in turn characterise the whole economic activity of the enterprise.

The proposed approach involves determining the growth indices for the coefficients as a ratio of the coefficient value

obtained in the analysed period, to the value of the same coefficient in the base period. The growth indices are then used as the basis for calculating the average weighted competitiveness of each process. The proposed method for assessing competitiveness allows adjustments of the quantity and the quality of indicators, the use of public statistics, the identification of «bottlenecks» in each economic process, the development of measures to improve a particular process; it also provides clear and convincing comparison results.

Practical testing of the proposed method has revealed that all the selected enterprises had an integral compe-

tiveness index of more than one. The best results in all the processes were shown by the metallurgical enterprise PJSC «Interpipe NTZ». The findings may indicate a gradual recovery of the enterprises from a system crisis and positively characterise their development, which, in turn, increases the investment attractiveness of not only specific entities, but also of the metallurgical and machine-building industries in general.

The prospects of further research imply the creation of ways to increase the competitiveness of industrial enterprises.

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