

# Process-cost analysis of productivity and wages in agro-industrial processing organizations

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**Abstract.** Process-cost analysis involves the implementation of appraisal procedures at each stage of adding value, which is considered as the main source of achieving the interests of personnel, owners and the state. The main goal of this study is to verify the existing methodological approaches to assessing the labor productivity of personnel in processing organizations of the agro-industrial complex, to assess the dynamic ratio of productivity and wages, based on methodologically justified assessment procedures that ensure the implementation of the advantages of process-cost analysis and eliminate the disadvantages of traditional methods. In order to improve the analytical suitability of the results of the process-cost analysis of labor results, three areas of key stakeholders' interest are identified, for each of which corrective operations are provided that provide not only the possibility of a retrospective analysis, but also predicting the possibility of parity of interests. Based on the results obtained, it was concluded that the share of value added in total revenues is low, the level of wages is unreasonable and, consequently, significant disparities in the distribution of value added. The inconsistency of the criterial assessment of the dynamic ratio of labor productivity and its payment in modern conditions has been proved.

## 1 Introduction

The development of the economy in general and the processing organizations of the agro-industrial complex, in particular, is associated with the need to increase labor productivity. This position is not in doubt and is confirmed in many domestic and foreign studies carried out at the macro and micro levels with an emphasis on various essential characteristics of this aspect, including the factors that determine its level and dynamics [1]. At the same time, our content analysis allowed us to identify certain positional disagreements, which are

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due to the postulation of the requirement for outstripping growth of labor productivity in comparison with wages [2]. As a rule, the principle support of this ratio is expressed under the assumption that the amount of remuneration is at a sufficient level to ensure the necessary motivation of personnel for highly productive work and the development of the labor component.

Considering labor productivity as a synthetic resulting parameter of the development of economic entities and having ascending opportunities for managerial influences and reducing the cost and time of their implementation, without begging the resulting significance of each, three main aspects can be distinguished that determine the level of productivity of the organization as a whole as a system. First, when assessing the productivity of agro-industrial complex processing organizations per unit of time, the limiting factor is the production capacity, which determines the maximum possible volume of finished goods production. Secondly, the organization of production processes is important when comparing two enterprises with a comparable level of production capacity and using the same technologies. The suboptimal organization of production and the effectiveness of supporting processes leads to underutilization of production capacity. Thirdly, the level of qualifications of personnel must correspond to the level of equipment and technologies used in production activities. Labor productivity of personnel in physical terms (output) is calculated as the ratio of the volume of products produced to the number of personnel, or labor costs (time). For the purposes of assessing the vector of the dynamic ratio, both options are acceptable, since both the volume of production and wages in both cases are taken for the same period of time, which ensures the unity of the results obtained. In our opinion, the objectivity of this approach does not raise doubts and any difficulties in performing assessment procedures and interpreting the results obtained.

A certain discrepancy at the methodological level, requiring additional clarification and elimination, arises when using cost indicators in the process of assessing both productivity and wages in space and time [3]. As the cost results of labor received by one employee or per unit of time, when calculating productivity, the following are traditionally used: revenue (income minus VAT) [3], profit (gross, from sales, net) [3] or value added [3]. A common disadvantage of the cost approach is the use of the implementation results of the reporting (current) period, and not production. In this case, the results of production, including past periods, are taken into account, but the balances of finished goods produced in the current period are not considered. It should be noted that the discrepancy between the period of production and sales of products requires certain methodological adjustments when calculating indicators, the information base for which is the "Report on financial results" and information on production costs (production results). We believe that the absolute indicators of the Statement of Financial Results should be adjusted taking into account the structure of shipped products (the share of last year's residues and the share of products in the reporting period). Ignoring this condition can lead to incorrect assessment results and the development of incorrect management decisions as a result.

The use of proceeds, despite the simplicity of calculations and recommendations of individual authors, is the most incorrect from an economic point of view. First, revenue is structurally the result of the labor of personnel not only of the manufacturing organization, but also of the supplier organizations, expressed in the cost of raw materials, materials, works and services. In material-intensive industries, which include the production of beet sugar, the share of purchased resources in the production cost may exceed 80%. Secondly, revenue characterizes the result of only the main (ordinary) activities. Underreporting income from other activities when assessing labor productivity throughout the organization can have a significant impact on the level of the results obtained and their analytical suitability.

The use of the profit indicator in calculating labor productivity should also be recognized as incorrect for many reasons, including the receipt of negative financial results.

The most reasonable, in our opinion, is the calculation of labor productivity based on the value added indicator. This approach has been used in many scientific practical works [4]. In international practice, gross value added (GVA) and net value added (NVA) are distinguished. When calculating NVA, total revenues are reduced by the amount of accrued depreciation; when calculating GVA, such an adjustment is not made.

Order of the Ministry of Economic Development of Russia dated December 28, 2018 No. 748 approved the Methodology for calculating labor productivity indicators of enterprises, industry and constituent entities of the Russian Federation. In accordance with this methodology, for organizations that do not prepare consolidated financial statements in accordance with the requirements of international financial reporting standards, value added is defined as "the sum of profit, labor costs, insurance payments, taxes and fees (excluding income tax) and depreciation fixed assets and intangible assets ". A similar approach to calculating value added (GVA) at the state level is used in determining GDP. However, its application on the scale of an economic entity in determining labor productivity, in our opinion, is highly controversial. First, depreciation charges represent a part of the initial cost of objects written off in a given period to the cost of production (that is, they are the organization's payment for the use of fixed assets and intangible assets). The cost of the acquired objects (in full) should be taken into account only by the organizations that produced them; otherwise, the previously created added value is re-recorded. Even if the objects were created by the organization on its own, then the costs of labor, insurance payments, taxes and fees were taken into account as part of the added value in the periods in which they were created. Secondly, if an organization does not buy a fixed asset and, as a result, does not charge depreciation (in the amount of 100,000 rubles), but rents an object (for 100,000 rubles), then, in accordance with the recommended methodology, the added value and productivity, all other things being equal, in this case will be lower. From the point of view of assessing labor productivity, the way non-current assets enter the organization is not fundamental and does not have a different-sized effect on labor results.

In these conditions, the importance of methodological aspects that determine the content and procedure for the implementation of assessment procedures, and the need for their development and adaptation to specific management tasks, primarily at the level of economic entities, increases.

## 2 Materials and methods

To neutralize the influence of the time factor in calculating the mass of value added for the purpose of assessing labor productivity, we propose the following algorithm [5]:

- 1) establish a balance of production of finished products, determine the share of finished products of the reporting and previous periods in the sales volume of the reporting period;
- 2) determine the amount of income for the main and other types of activities for the reporting period (according to the "Statement of financial results");
- 3) determine the amount of material costs attributable to products sold in the reporting period;
- 4) determine the amount of depreciation charges attributable to products sold in the reporting period;
- 5) deduct from the total income of the reporting period (cl.1):
  - the total amount of other expenses (according to the "Statement of financial results");
  - the adjusted amount of material costs (cl.3);
  - the adjusted amount of depreciation deductions (cl.4).

Analytical calculations in accordance with the proposed algorithm were performed according to data from eight sugar production organizations in the Voronezh region for 2014-2018 (tables 1-2). All selected organizations are part of the Prodimex group of companies, which ensures the unity of the accounting and analytical tools used and the comparability of data.

**Table 1.** Balance of finished and shipped products in organizations C1 - C8 of the Voronezh region (2014 - 2018) abor component.

Organization	Year	Balance of finished products at the beginning of the year, t	Finished goods produced, t	Finished products shipped, t	Balance of finished products at the end of the year, t	Share of manufactured and sold products in the reporting year,%
C1	2014	0	122411	67379	55032	55,04
	2015	55032	148493	113287	90238	39,23
	2016	90238	162387	122406	130219	19,81
	2017	130219	165874	183311	112782	32,01
	2018	112782	178083	165611	125254	29,67
C2	2014	3660	44688	21435	26913	39,78
	2015	26913	53682	48015	32580	39,31
	2016	32580	63830	59081	37329	41,52
	2017	37329	72508	74307	35530	51,00
	2018	35530	45873	54702	26700	41,80
C3	2014	0	64167	37862	26305	59,01
	2015	26305	57827	47629	36503	36,88
	2016	36503	88159	61135	63527	27,94
	2017	63527	95579	100478	58628	38,66
	2018	58628	93671	69587	82712	11,70
C4	2014	8682	124123	91299	41506	66,56
	2015	41506	157846	124787	74565	52,76
	2016	74565	190624	168763	96426	49,42
	2017	96426	206566	221602	81389	60,60
	2018	81389	193303	192498	82195	57,48
C5	2014	27713	52406	45290	34829	33,54
	2015	34829	52123	46019	40933	21,47
	2016	40933	53532	49450	45015	15,91
	2017	45015	74704	59688	60031	19,64
	2018	60031	90163	52114	98080	-8,78
C6	2014	0	18742	6440	12302	34,36
	2015	12302	27008	25525	13785	48,96
	2016	13785	31081	30065	14801	52,38
	2017	14801	32476	32970	14307	55,95
	2018	14307	23729	21407	16629	29,92
C7	2014	0	45132	37509	7623	83,11
	2015	7623	49776	27716	29683	40,37
	2016	29683	58332	58039	29976	48,61
	2017	29976	72948	66151	36773	49,59
	2018	36773	78486	46127	69132	11,92
C8	2014	0	40927	30562	10365	74,67
	2015	10365	49697	34959	25103	49,49
	2016	25103	49672	48760	26015	47,63
	2017	26015	54657	35649	45023	17,63
	2018	45023	41930	24367	62587	-49,26
By group of organizations	2014	40055	448429	299914	188570	57,95
	2015	188570	538625	420308	306887	43,02
	2016	306887	609458	536564	379781	37,69
	2017	379781	679733	673679	385835	43,24
	2018	385835	651567	556826	480576	26,24

The data in Table 1 indicate a co-directional (for each organization in most cases), but different-sized impact (for the compared organizations) of the factors of the external, coupled and internal environment on the results of economic activities of organizations C1-C8. A tendency towards an increase in the balances of finished goods at the end of the year is characteristic of all surveyed organizations (Table 1). On the one hand, this is due to the specifics of seasonal production, an increase in production volume, on the other, creative decisions of the Management Company (Prodimex-Sugar Management Company), aimed, among other things, at ensuring the highest sales volume while setting maximum wholesale selling prices for sugar. For example, at the end of 2018, only 11.92% of the finished products produced in the reporting period were sold for the group of organizations as a whole. Interesting, in our opinion, are the negative structural ratios obtained in 2018 by organizations C5 and C8, which indicate that these organizations during the year were unable to sell fully the remnants of finished products of previous years.

The data in Table 2 for the purposes of assessing labor productivity are intermediate, but already at this stage, they allow us to conclude that the results from other activities are significant and the need to consider them to achieve the set goals.

Since the ratio of labor productivity growth and its payment affects the interests of various stakeholders, there is a need to apply analytical procedures that assess value added, as well as to assess the possibilities of positive changes in the level of its structural elements and ensure a positive vector of their dynamics (parametric analysis).

The solution to this management problem provides the use of tools for process-value business analysis. Methodological support of business analysis of economic activity development of agro-industrial complex processing organizations, including sugar production, focused on the processes of adding business value, includes an assessment of indicators, indicators and parameters that take into account the interests of the state, organizations and personnel. In other words, adding value to a business not only increases its synergistic efficiency [6], but can also increase the tax burden on VAT. Therefore, taking the deductive approach as the basis of the process-cost business analysis, it is advisable to identify the causes and consequences of the formation of the added value mass and its change in the course of the development of the organization economic activity, not only as an economic entity that increases the value of the business, but also as a taxpayer burdened with obligations before the state, and the employer who motivates staff.

The cost of sales of products (works, services, etc.) can be aggregately represented as a set of: the cost of consumed material resources, value added (including profit), and value added tax (Figure 1).

The acquisition of material resources, as a rule, is associated with the payment of "input VAT", and their consumption - with the write-off of the amount of "input VAT". Thus, the cost of purchased raw materials and materials, fixed assets, works and services does not increase the amount of benefit created by the organization. At the same time, the presence of a certain type of resources (even if they are not used in business processes) is associated with the obligation of the organization to calculate and pay: property tax, land tax, tax, transport tax, the amounts of which increase the costs of organizations and, as a result, benefit.

The valuation of the use of human resources is characterized by the accrued income of the personnel, the sum of compulsory insurance premiums and premiums for insurance against industrial accidents and occupational diseases. In addition, considering the system of relations between the state, organization and hired personnel, one can make an educated assumption that the employer is interested in high-quality labor results, and the personnel - in their adequate payment [7].

**Table 2.** Indicators determining the level of added value, organizations C1 - C8 of the Voronezh region (2014 - 2018).

Organization	Year	Total income, thousand rubles	Material costs, thousand rubles	Depreciation, thousand rubles	Other expenses, thousand rubles	Added value, thousand rubles
C1	2014	3131670	1260430	67546	1535208	268486
	2015	6779431	2229452	132850	2908169	1508960
	2016	10049532	3182534	189466	4162060	2515472
	2017	9310664	4154571	236129	3696109	1223855
	2018	7622516	3684271	188570	2194444	1555230
C2	2014	586073	258697	40343	80100	206933
	2015	1617894	607625	62265	134162	813842
	2016	2216619	987126	54508	201915	973070
	2017	1864400	1050612	45373	429038	339377
	2018	1693230	926123	38746	169709	558653
C3	2014	3035636	2165849	43009	600049	226730
	2015	3367084	2208867	41700	693339	423178
	2016	2871342	1449179	30636	297228	1094300
	2017	3005655	2054743	50386	143246	757281
	2018	2100807	1335954	34384	208544	521925
C4	2014	3944032	2332741	190921	1094936	325434
	2015	5988517	2480814	290143	1889219	1328341
	2016	7518566	3720391	389412	785677	2623086
	2017	8800104	4671917	341400	2885935	900852
	2018	8026296	4118555	211340	2583717	1112683
C5	2014	1253837	624558	39592	168872	420815
	2015	2674746	957613	57972	748983	910178
	2016	3921818	1031060	49200	1742912	1098646
	2017	3688854	1476514	102351	1699253	410736
	2018	2086873	910413	115568	645606	415286
C6	2014	461124	214569	5923	54906	185726
	2015	719600	360048	4691	102842	252019
	2016	1460109	708839	4389	398436	348445
	2017	1128149	660073	4441	336858	126776
	2018	590471	410494	3515	39155	137306
C7	2014	861259	564780	14642	118144	163693
	2015	1799371	791315	17053	293855	697147
	2016	3161154	1285776	22573	944794	908011
	2017	2078000	1344315	18189	219353	496143
	2018	1604644	855551	24201	263722	461170
C8	2014	856503	410482	11826	142694	291501
	2015	1905633	631549	7947	786806	479332
	2016	3546958	1023490	12714	1593416	917338
	2017	2519906	873820	14231	1238852	393002
	2018	1057212	402462	7067	298040	349643
By group of organizations	2014	14130135	7832107	413802	3794909	2089317
	2015	24852276	10267284	614620	7557375	6412997
	2016	34746098	13388395	752895	10126438	10478369
	2017	32395732	16286565	812501	10648645	4648022
	2018	24782049	12643824	623391	6402936	5111897

In conditions when organizations receive a positive financial result, which is typical for C1 – C8 organizations throughout the entire study period, business analysis of the structure of the cost of sales is of particular interest, the intrastructural proportions of which in a certain way characterize the effectiveness of economic activity. In addition, the economic activity of sugar factories is associated with the need to take into account the influence of factors of external, associated, internal business environment [8]. Integration of these parties is one of the features of the business analysis methodology, the key reference point of which, comprehensively characterizing the effectiveness of sugar beet processing, is

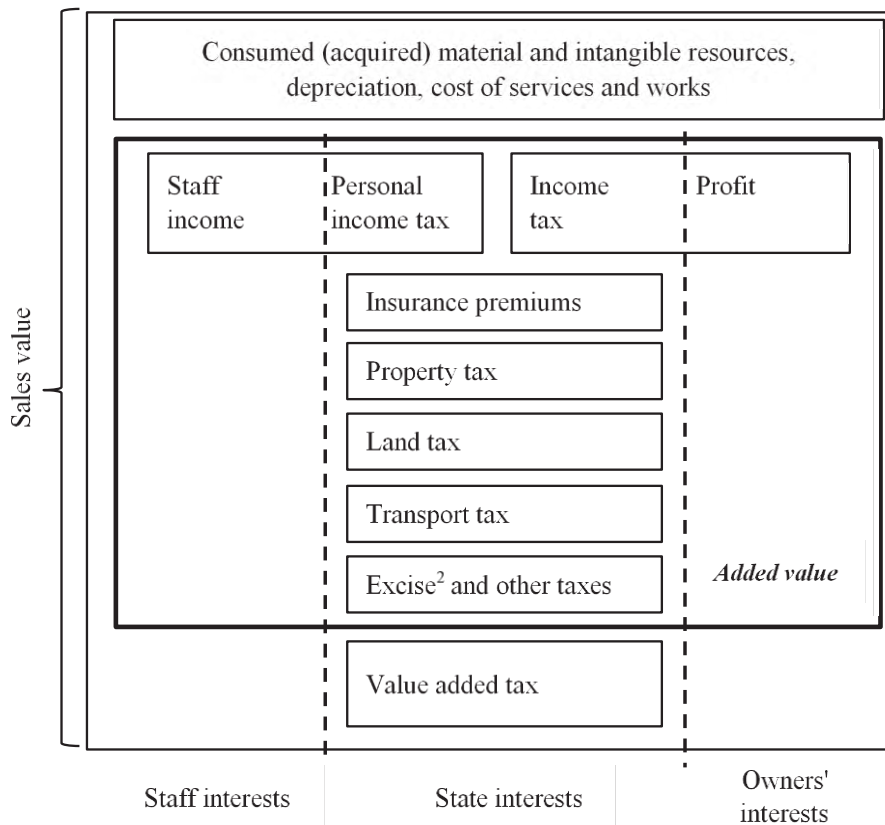
value added business analysis. This indicator links the results of such components of business activities as [9]:

supply (takes into account the effectiveness of the raw material supply of the production process: external factor - the state and level of development of the system of business relations, characterized by quality characteristics and average market prices for beet raw materials);

production (takes into account the effectiveness of the use of beet raw materials, technological equipment and human resources: internal factor - the state and level of development of production potential, characterized by the yield of sugar);

sales (takes into account the mass of sales income: external factor - the state and level of pricing, characterized by average market prices for sugar and by-products).

Let us consider, using a conventional example, the procedure for the formation of added value in the area of interest of the selected stakeholders (owner, staff, state).



**Fig. 1.** Structural characteristics of the cost of product sales.

The results obtained indicate that 41.14% of value added tax is charged on the amounts ultimately paid to the budget in the form of taxes and fees. It should be noted that if the transport tax, land tax, personal income tax, insurance premiums and environmental payments are included in the cost price and, thereby, reduce the taxable base for income tax, then the VAT calculated on these amounts leads to an increase in product prices, not reducing profits.

Thus, the added value and the payments to the budget generated by it act as the main source of satisfaction of the interests of the personnel, owners and the state. In this context, the establishment of parity proportions of the distribution of value added is of priority

importance. When establishing the specified proportions, it is important to recognize the use of staff salaries, adjusted by the amount of withholding tax on personal income, which makes it possible to judge the real possibilities of meeting the needs of staff. Only after this condition is met, it is possible to assess the dynamic ratio of productivity and wages.

**Table 3.** Distribution of the added value of C1-C8 sugar production organizations in the Voronezh region by areas of interest of the main stakeholders.

Organization	Year	Personnel interest area		Owners' interests zone		State interests zone	
		Labor costs		Net profit		Value added taxes and fees	
		thousand rubles	%	thousand rubles	%	thousand rubles	%
C1	2014	75724	28,20	101110	37,66	91652	34,14
	2015	101125	6,70	1057751	70,10	350084	23,20
	2016	123425	4,91	1716760	68,25	675287	26,85
	2017	172541	14,10	590113	48,22	461201	37,68
C2	2018	205868	13,24	848852	54,58	500510	32,18
	2014	62449	30,18	93458	45,16	51026	24,66
	2015	105372	12,95	483699	59,43	224771	27,62
	2016	102539	10,54	525036	53,96	345495	35,51
C3	2017	96296	28,37	83500	24,60	159581	47,02
	2018	94615	16,94	296050	52,99	167988	30,07
	2014	103865	45,81	52273	23,06	70592	31,13
	2015	106213	25,10	176050	41,60	140915	33,30
C4	2016	85000	7,77	703094	64,25	306206	27,98
	2017	150615	19,89	328504	43,38	278162	36,73
	2018	104761	20,07	370151	70,92	47013	9,01
	2014	123627	37,99	106754	32,80	95053	29,21
C5	2015	109273	8,23	895056	67,38	324012	24,39
	2016	136961	5,22	1785559	68,07	700566	26,71
	2017	190857	21,19	303300	33,67	406695	45,15
	2018	185828	16,70	513549	46,15	413306	37,14
C6	2014	56664	13,47	75304	17,89	288847	68,64
	2015	77114	8,47	388861	42,72	444203	48,80
	2016	58730	5,35	567233	51,63	472683	43,02
	2017	85805	20,89	8656	2,11	316275	77,00
C7	2018	56777	13,67	6786	1,63	351723	84,69
	2014	45308	24,40	46339	24,95	94079	50,65
	2015	42634	16,92	90309	35,83	119076	47,25
	2016	50859	14,60	190586	54,70	107000	30,71
C8	2017	55416	43,71	1895	1,49	69465	54,79
	2018	43933	32,00	47553	34,63	45820	33,37
	2014	70004	42,77	49173	30,04	44516	27,19
	2015	70327	10,09	429350	61,59	197470	28,33
By group of organizations	2016	87170	9,60	602403	66,34	218438	24,06
	2017	78470	15,82	241164	48,61	176509	35,58
	2018	62201	13,49	301407	65,36	97562	21,16
	2014	40852	14,01	53214	18,26	197435	67,73
By group of organizations	2015	36948	7,71	278541	58,11	163843	34,18
	2016	56084	6,11	487290	53,12	373964	40,77
	2017	59930	15,25	75397	19,18	257675	65,57
	2018	32211	9,21	127673	36,52	189759	54,27
By group of organizations	2014	578492	27,69	577625	27,65	933200	44,67
	2015	649006	10,12	3799617	59,25	1964374	30,63
	2016	700769	6,69	6577961	62,78	3199639	30,54
	2017	889930	19,15	1632529	35,12	2125563	45,73
By group of organizations	2018	786195	15,38	2512021	49,14	1813681	35,48



The actual data indicate the absence of any proportions in the distribution of the value added of the surveyed organizations (Table 3). The smallest share of value added is distributed in the form of wages (87.5% of all observations), an increase in the level of this indicator was observed only in cases where the organization received a relatively small amount of profit (for most organizations in 2014). The results obtained indicate that, despite a certain increase in average annual wages, its level does not depend on the mass of value added.

Certain imbalances were caused by changes, primarily in the area of interests of the owners of the organization:

- significant amounts of "input VAT" accepted for offset;

- participation of factories (in terms of modernization programs) in particularly significant regional projects. As a result, the initial cost of fixed assets in each of their organizations C1, C4 and C5 increased by more than 1.5 billion rubles in five years. In accordance with the legislation of the Voronezh region, organizations were provided with benefits for income tax;

- receiving significant net profit in 2015-2016. In 2016, the organizations produced the maximum volume of beet sugar 590.82 thousand tons, which, against the background of the high price level for white granulated sugar, provided the formation of a significant amount of profit from sales - 6.5 billion rubles and net profit - 6.6 billion rubles. In 2015 and 2016, five and seven sugar factories, respectively, were included in the top 25 organizations of the Voronezh region in terms of net profit. The net profit received by the sugar factories was 6.15% (2015) and 11.35% (2016) across the region.

For processing organizations, net profit is the main source of replenishment of equity capital and the satisfaction of the target financial interests of their owners. Sugar factories of the Voronezh region do not practice the annual calculation and payment of dividends. According to the financial statements of organizations in 2012-2013, dividends, despite positive financial results, were not accrued. In addition, the situation that developed in the organization C3 in 2015 is interesting: dividends were paid by 181.237 million rubles more than accrued. At the same time, there were no accounts payable to the founders for previous periods in the C3 organization, and the total amount of paid dividends was 2.74 times higher than the organization's net profit at the end of 2015. In general, for the period 2015-2016, the group of the studied sugar production organizations in the Voronezh region paid dividends for 3.2 billion rubles. (31.67% of net profit for 2015-2016).

The use of the cost approach in assessing labor productivity has a number of limitations, some of which were discussed by us above. One of the possible options for the valuation of labor productivity is to determine the hypothetical mass of income from the sale of all manufactured products for the reporting year at average prices for this period. However, when using this approach, there will be no relationship with the actually generated mass of value added. Therefore, to reveal the structural links and assess the proportions of the actual distribution of value added, the following indicators were adjusted: material costs, depreciation, and subsequently personal income tax when calculating dynamic ratios. In addition, in accordance with the position we justified above, for the purposes of conducting a process-cost business analysis, the mass of value added for calculating labor productivity was increased by the amount of VAT payable to the budget (Table 4).

The best in terms of labor productivity for all surveyed organizations without exception was 2016, the worst (in most cases) - 2014. The data obtained also indicate the presence of a linear dependence of the production results on the provision of high-quality beet raw materials. Thus, this aspect should be recognized as another limitation of labor productivity for organizations of sugar production, which, as a rule, is due to the influence of natural and climatic conditions and is characteristic of organizations that process raw materials of agricultural origin. In such conditions of the negative manifestation of the impact of

external and associated environment factors, the choice of a shorter assessment period, for example, 9 months, can be considered correct. At the same time, the analytical results obtained in a similar way, in our opinion, cannot be used for comparison with the average annual values of the indicators of the same name.

**Table 4.** Assessment of labor productivity in organizations C1 - C8 of the Voronezh region (2014 - 2018).

Organization	Year	Value added (VA), thousand rubles	VAT payable to the budget, thousand rubles	The amount of VA and VAT payable, thousand rubles.	Average annual number of personnel, people	Labor productivity, thousand rubles / person
		3	4	5=3+4	6	7=5/6
C1	2014	268486	-72965	268486	465	577
	2015	1508960	-54670	1508960	513	2941
	2016	2515472	146818	2662290	518	5140
	2017	1223855	147743	1371598	565	2428
	2018	1555230	148563	1703793	639	2666
C2	2014	206933	-4191	206933	339	610
	2015	813842	64810	878652	345	2547
	2016	973070	158444	1131514	370	3058
	2017	339377	66387	405764	358	1133
	2018	558653	62262	620915	329	1887
C3	2014	226730	-10843	226730	476	476
	2015	423178	5960	429138	476	902
	2016	1094300	65981	1160281	382	3037
	2017	757281	97689	854970	370	2311
	2018	521925	69083	591008	382	1547
C4	2014	325434	0	325434	526	619
	2015	1328341	0	1328341	558	2381
	2016	2623086	136302	2759388	590	4677
	2017	900852	147625	1048477	662	1584
	2018	1112683	70496	1183179	607	1949
C5	2014	420815	233240	654055	271	2413
	2015	910178	307268	1217446	270	4509
	2016	1098646	292070	1390716	276	5039
	2017	410736	240261	650997	281	2317
	2018	415286	252823	668109	296	2257
C6	2014	185726	61282	247008	221	1118
	2015	252019	79041	331060	238	1391
	2016	348445	28439	376884	249	1514
	2017	126776	33306	160082	236	678
	2018	137306	4766	142072	227	626
C7	2014	163693	-20156	163693	222	737
	2015	697147	64663	761810	228	3341
	2016	908011	22849	930860	244	3815
	2017	496143	77327	573470	250	2294
	2018	461170	-69832	461170	254	1816
C8	2014	291501	127669	419170	285	1471
	2015	479332	49996	529328	294	1800
	2016	917338	187592	1104930	285	3877
	2017	393002	163622	556624	283	1967
	2018	349643	165436	515079	264	1951
By group of organizations	2014	2089317	314036	2403353	2805	857
	2015	6412997	517068	6930065	2922	2372
	2016	10478369	1038495	11516864	2914	3952
	2017	4648022	973960	5621982	3005	1871
	2018	5111897	703597	5815494	2998	1940

**Table 5.** Dynamic ratio of productivity and wages in organizations C1 - C8 of the Voronezh region (2014 - 2018).

Organization	Year	The rate of dynamics of the average annual wage per employee, %	Labor productivity dynamics, %	Lead coefficient, units
1	2	3	4	5=4/3
C1	2015	121,05	509,44	4,21
	2016	120,87	174,73	1,45
	2017	128,17	47,23	0,37
	2018	105,50	109,83	1,04
C2	2015	165,80	417,22	2,52
	2016	90,74	120,08	1,32
	2017	97,06	37,06	0,38
	2018	106,91	166,51	1,56
C3	2015	102,26	189,27	1,85
	2016	99,72	336,91	3,38
	2017	182,94	76,08	0,42
	2018	67,37	66,95	0,99
C4	2015	83,32	384,77	4,62
	2016	118,54	196,47	1,66
	2017	124,20	33,86	0,27
	2018	106,19	123,07	1,16
C5	2015	136,59	186,83	1,37
	2016	74,50	111,75	1,50
	2017	143,50	45,98	0,32
	2018	62,82	97,43	1,55
C6	2015	87,38	124,45	1,42
	2016	114,02	108,81	0,95
	2017	114,96	44,81	0,39
	2018	82,42	92,27	1,12
C7	2015	97,82	453,14	4,63
	2016	115,82	114,18	0,99
	2017	87,86	60,13	0,68
	2018	78,02	79,15	1,01
C8	2015	87,67	122,41	1,40
	2016	156,59	215,33	1,38
	2017	107,61	50,73	0,47
	2018	57,62	99,20	1,72
By group of organizations	2015	107,70	276,80	2,57
	2016	108,27	166,64	1,54
	2017	123,15	47,34	0,38
	2018	88,55	103,68	1,17

The values of the advance coefficient characterizing the ratio of the rates of dynamics of labor productivity and rates of dynamics of wages were less than one in 11 out of 40 observations, which does not correspond to the generally accepted level (1.0 units), ensuring the development of the organization (Table 5). First, organizations annually received a sufficient amount of net profit, which made it possible to modernize production facilities, pay a significant amount of dividends, and significantly reduce borrowed sources of financing - all this indicates the development of the organization. Secondly, in the surveyed organizations, the increase in labor productivity was mainly due to three main factors for sugar production: an increase in production capacity, an increase in prices for finished products, high yields of beet raw materials and an increase in its quality characteristics, against which the impact of the quality of personnel labor on the volume of products produced is not significant. Thirdly, empirical data made it possible to identify a trend characteristic of all organizations - the cyclical growth of labor productivity due to the influence of raw materials and technical components. Thus, in the current situation, the use

of criterion values of the advance coefficient as a tool for assessing the possibilities and directions of development of sugar factories in the Voronezh region is not advisable.

### **3 Discussion**

The majority of agro-industrial complex processing organizations are characterized by the presence of factors and processes identified in the course of a survey of sugar production organizations in the Voronezh region. In particular, an unreasonably low level of assessment of the work of employees of Russian organizations is noted in the works of Kositsina, Nigmatulin, Bakhtizin, Sulakshina, Pirogovoy, Nuzhdina and others [10,11,12]. We share the position of the authors who consider it necessary to increase the size of wages in domestic processing organizations, regardless of the level of labor productivity. At the same time, a feature of traditional material-intensive industries, which include sugar beet processing, is the absence of a high correlation between wages and the volume of products produced, as well as the negative (in terms of assessing labor productivity and staff motivation) influence of the time factor. In this regard, the management of processing organizations use the increase in wages to retain the most valuable, as a rule, management personnel. In other cases, the increase in wages is a reaction to inflationary processes or other changes in the external, not internal environment. In addition, previous studies [13] indicate that, despite the high level of profitability of the economic activity of sugar factories in the Voronezh region, the average level of remuneration of their personnel in certain periods was lower than the average for the region.

The main parametric characteristics that need to be paid close attention are the following indicators: the share of value added in total income and the share of wages in value added [14]. As a rule, the economic activity of agribusiness entities does not generate high benefit. However, as the results showed, its share in the income of the surveyed organizations varied on average for the group in the range from 14% to 30%, with the determining factor being the level of prices for finished products.

The distribution of added value between staff, owners, and the state is carried out in the surveyed organizations without observing any proportions, which, given the insufficient level of remuneration, contributes to an increase in disparity in meeting the interests of stakeholders, primarily personnel. Drawing a certain analogy between the value added of an economic entity and GDP on a national scale, one can make an assumption about the need to ensure a comparable level of labor costs in their structure. The share of labor costs in GDP is approximately 25% [15], the share of value added on average for the group of surveyed organizations for 2014-2018 was 15.81%, which should be recognized as an unreasonably low value even in comparison with the structure of GDP. It is permissible to use the level of 50-55% [15] recommended by individual authors for GDP as a target for labor costs at the level of organizations, which, in our opinion, will significantly increase staff motivation, the welfare of the population and the competitiveness of the domestic economy.

The positive ratio of the dynamics of labor productivity and labor costs in the surveyed organizations is due not to an increase in the quality and results of labor, but to the influence of price factors, the development of the material and technical base and favorable weather conditions. The significant dependence of the results of the economic activity of sugar factories on the volume and quality of beet raw materials contributed to the development of Prodimex Group of its own raw material bases and the use of highly productive hybrids of foreign selection. Thus, there is a high efficiency of the management decisions taken aimed at achieving strategic goals and increasing the competitiveness of organizations, against the background of palliative measures for the development of production personnel.

## 4 Conclusion

Consideration of labor results in the context of process-cost business analysis made it possible to substantiate the need to analyze the level, dynamics and proportions of the distribution of value added between personnel, owners and the state. A certain scientific value and practical significance have been put forward and tested recommendations for calculating the mass of value added for assessing labor productivity:

1)take into account when calculating the mass of income and expenses from other types of activities. In the organizations of sugar production C1, C5 and C8 in 2016-2017, the masses of income for the main and other types of activities varied at a comparable level and, as a result, had an equal impact on the assessment results.;

2)stop using gross value added in valuation procedures. Use net value added, adjusted by the amount of accrued depreciation, which should be perceived as a result of the activities of partner organizations;

3)neutralize the influence of the time factor, which manifests itself in the mismatch of the periods of production and sale of finished products. For this, it is proposed to adjust the amount of material costs (and equivalent costs) and depreciation, taking into account balances, volumes of manufactured and shipped products. In the surveyed organizations, a trend was revealed for an increase in the shelf life of products, which is caused, on the one hand, by the overproduction of sugar in the country, and on the other hand, by the use of opportunities for obtaining a greater mass of income in the face of rising market prices.;

4)when assessing the parity of the distribution of value added between stakeholders, transfer the amounts of personal income tax withheld from the area of personnel interests to the area of interests of the state, and also take into account, in addition, in the area of responsibility of the state, the amounts of VAT payable to the budget. The priority from the standpoint of ensuring the parity of interests of the main stakeholders is, first, an increase in the share of expenses for personnel remuneration and the implementation of existing opportunities to increase the share of value added in the total revenues of the organization.

In the course of the study, it was concluded that it is inexpedient to use any numerical values as evaluative criteria when analyzing the dynamic ratio of productivity and wages, since at present the prevailing influence on the background of unjustified low remuneration of personnel on the results of their activities is: the development of the technical component of economic activity, provision of quality raw materials of agricultural origin, the level of prices for finished products. The considered methodological approach is an effective tool, the use of which in the process of business analysis and forecasting makes it possible to determine not only the possible level of added value and its individual elements, but also the level of labor productivity and achieving the interests of the main stakeholders.

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