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## Two Types of Correlations between Labor Productivity and Job Satisfaction\*

Labor activity is usually regarded, first of all, from the standpoint of its socioeconomic usefulness as manifested in productivity indices and, secondly, from the standpoint of its significance for the individual as measured by indices of job satisfaction. What is the correlation between these two valuations? Is an increase in productivity accompanied by greater satisfaction of individual needs? Is high output a condition of an individual's psychological "comfort," or is the relationship between these two factors more complex?

These questions first became the subject of wide discussion in connection with the theory of "human relations in industry." The adherents of this theory expressed the view that a worker's job satisfaction is positively correlated with his productivity. However, results of empirical studies published in the 1950s and 60s cast doubt on such notions, and to this day the question has not as been completely resolved. [1]

Despite the ambiguity of the data obtained, they nevertheless

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give some basis for asserting that the positive correlation between productivity and satisfaction is dominant. For example, in a study of young workers (Leningrad, 1962), the correlation between the index of responsibility and initiative in work, on the one hand, and job satisfaction, on the other, was 0.14 ( $N = 2665$ ,  $p < 0.001$ ) [2, p. 137-39]. Similarly, almost all values for correlations between qualities of industriousness among engineers and their satisfaction with various aspects of their work were positive [3, 154]. Unidirectional changes in productivity and job satisfaction were registered among agricultural workers [4]. Foreign scholars have found similar correlations. Thus, for example, in fourteen out of twenty-six studies analyzed by F. Herzberg and his colleagues, greater satisfaction was accompanied by greater productivity, in nine studies these parameters were not correlated, and in only three of them was a negative correlation observed [5]. V. Vroom analyzed twenty studies in which productivity was compared with satisfaction [6]. Although the correlation coefficients changed from +0.86 to -0.31, the median coefficient was +0.14. In numerous studies of the 1970s, most correlations were also positive [7].

However, there is some basis for assuming that negative correlations also exist between productivity and job satisfaction. In fact, the absolute values for positive correlation coefficients are not high, rarely exceeding a value of 0.30. This permits the assumption that the direct correlation apparent in these coefficients is dominant but not the only one. Quite possibly, there may also be an opposite, negative, tendency which is hidden by the more powerful positive correlation. Factor analysis is an effective means for distinguishing contradictory tendencies [8; 3, pp. 44-53]. This method has not yet been used to study correlations between productivity and satisfaction.

We will examine the correlation between these two parameters, using data from a study carried out in Leningrad titled "Worker-1976."

Table 1

Correlation Coefficients between Indices of Productivity and of Satisfaction ( $N = 4003$ )

Parameters of productivity	Satisfaction with										
	Condition of equipment	Regular pace of production	Health and safety conditions	Output rates	Wages	Opportunities for self-realization	Process of work itself	Relations with foreman	Opportunities for improving skill level	Opportunities for participating in management of production	Job as a whole
Fulfilling output norms	0.06	0.00	-0.03*	-0.03*	0.21	0.08	0.08	0.08	0.04	0.07	0.14
Quality of work	0.04	0.04	-0.01*	-0.01*	0.13	0.11	0.11	0.10	0.07	0.08	0.12
Discipline	0.06	0.05	0.02*	0.04	0.16	0.10	0.11	0.13	0.12	0.09	0.14
Initiative in job	0.00*	0.02'	-0.02*	-0.02*	0.11	0.11	0.15	0.12	0.08	0.09	0.16
"Front-rank worker"— "Laggard"	0.05	0.03*	-0.01	0.03*	0.17	0.15	0.15	0.15	0.12	0.11	0.17

Note: Correlation coefficients beginning with 0.06 are statistically significant when  $p < 0.001$ . Coefficients not significant when  $p < 0.05$  are marked with an asterisk.

Table 2

## Weights of Various Combinations of Indices of Productivity and of Satisfaction

Types of combinations	Satisfaction with										
	Condition of equipment	Regular pace of production	Health and safety conditions	Output rates	Wages	Opportunities for self-realization	Process of work itself	Relations with foreman	Opportunities for improving skill level	Opportunities for participating in management of production	Job as a whole
<i>Homogeneous</i>											
Low productivity and low satisfaction	18	13	20	13	16	7	12	4	10	9	6
High productivity and high satisfaction	26	34	22	27	34	30	34	54	34	24	45
<i>Heterogeneous</i>											
Low productivity and high satisfaction	16	22	15	17	18	18	19	33	20	13	26
High productivity and low satisfaction	24	17	30	18	16	7	13	2	11	10	5

Note: The figures for each line vary depending on which parameter of satisfaction is being correlated with productivity. Since the table includes only data on respondents with high and low levels of satisfaction, the sum of the columns is less than 100%.

Table 1 shows the correlation coefficients between assessments by experts of qualities of industriousness and indices of satisfaction. As we can see, a majority of the correlations are positive and statistically significant, and, moreover, in 62% of cases when  $p = 0.001$ . This indicates that as productivity rises, satisfaction usually also rises. The value of the coefficients depends above all on what aspect of work activity is being assessed. Satisfaction with wages as well as opportunities for self-realization display rather close positive correlation with all "industriousness" parameters, as do satisfaction with the process of carrying out the work, with relations with the foreman, with opportunities for improving skills and for participating in running the work, and with the job as a whole. The link between productivity and satisfaction with condition of equipment, health and safety conditions, output rates, and the pace of production is much weaker—essentially statistically insignificant.

The essence of the correlation coefficients will be more apparent if we distinguish groups of respondents according to differing combinations of productivity and satisfaction (see Table 2). There are 10% more homogeneous combinations (high satisfaction with high productivity or low satisfaction with low productivity)<sup>2</sup> than heterogeneous—44% to 34%. Moreover, satisfaction with wages, with opportunities for self-realization, participation in running the work, improving skills, with the process of the work itself, and with relations with one's foreman are combined more "harmoniously" with productivity than satisfaction with equipment, health and safety conditions, output rates, and the pace of production. In the first instance, homogeneous combinations outweigh heterogeneous by 16% on average (46% as against 30%), while in the second instance by only 3% (43% as against 40%).

We should note that it is the aspects of the production situation for which a worker bears no responsibility which display weak correlation between satisfaction and productivity and the

Table 3

**Factors of Direct (I) and Inverse (II) Correlation between Productivity and Satisfaction (extractions from factor matrix before rotation; main component method;  $N = 4003$ )**

Indices	I factor	II factor
<i>Productivity</i>		
Fulfilling output norms	0.40	-0.55
Quality of work	0.48	-0.64
Discipline	0.50	-0.56
Initiative in work	0.48	-0.66
"Front-rank worker"—"Laggard"	0.54	-0.65
<i>Satisfaction with</i>		
Condition of equipment	0.50	0.37
Regular pace of production	0.48	0.37
Health and safety conditions	0.47	0.45
Output rates	0.50	0.43
Wages	0.55	0.14
Opportunities for self-realization	0.52	0.18
Process of work itself	0.50	0.14
Relations with foreman	0.44	0.12
Opportunities for improving skill level	0.46	0.17
Opportunities for participating in management of production	0.45	0.17
<i>Number of attractive aspects of job</i>	0.42	0.13
<i>Number of unattractive aspects of job</i>	0.47	-0.39

greatest number of heterogeneous combinations. These factors are regulated by various officials of the enterprise, branch, or other body in question. On the other hand, aspects of the work which are more closely correlated with productivity are such that, as a rule, a worker has some control over them.

Using factor analysis, ten factors describing 80% dispersion were distinguished from an intercorrelation matrix of seventeen indices. The combination of parameters of productivity and satisfaction is apparent in only two factors (Table 3). As we can see, the *first factor* (23% informativity) reproduces a ten

gency apparent in the coefficients of paired correlations: differences in satisfaction among individuals are directly proportional in this case to variations in productivity. In other words, the better a person works, the better satisfied are his needs. This refers to all indices of productivity and satisfaction.

But as we expected, the general tendency manifested in the first factor is not the sole tendency. In the *second factor* (17% informativity), satisfaction and productivity have opposite weights. That is, the lower the latter, the higher the former. Four indices of satisfaction are almost as closely correlated with the factor as the indices of productivity (the factor weights range from 0.37 to 0.45), while the others are more weakly correlated (0.12 to 0.18). As a worker's productivity rises, his satisfaction diminishes for the most part with such factors as output rates, health and safety conditions, condition of equipment, and the pace of production—in other words with aspects of the job for which participants in the work process other than the worker himself are responsible. Let us recall that it was precisely the indices of satisfaction just mentioned that did not display significant paired correlations with productivity.

Within any given factor, the assessment of satisfaction varies in general between neutral and negative value; the factorial weight of an index characterizing the number of unattractive aspects of the job is 0.39, while for attractive aspects it is only 0.13. This means that the more productive workers feel negatively about working conditions (that is, they are dissatisfied with them), while the less productive workers have no feelings whatsoever about working conditions. As far as the first factor is concerned, here the assessments of satisfaction vary across the entire range of the emotional scale: the factorial loads of the attractive and unattractive aspects of work are almost the same in terms of absolute value and are equal respectively to 0.42 and -0.47. Both poles of the first factor are emotionally saturated to an equal extent: less productive workers tend to

have negative feelings about their work, and more productive workers, positive.

Thus, we may conclude that there are two types of correlations between the productivity of a worker and his satisfaction with various aspects of his work. The dominant ones (as was also apparent in data from earlier studies) are indeed *direct correlations*, where satisfaction increases as productivity rises. However, there is also a significant proportion of *inverse correlations* in which as one of the parameters under study rises, the other diminishes.

The presence of such correlations shows that there are four types of workers in our sample: those who are productive and satisfied with all aspects of their jobs, those who are unproductive and dissatisfied with all aspects of their jobs, those who are productive but dissatisfied with those aspects of their jobs for which others bear responsibility, and those who are unproductive but satisfied with those aspects of their jobs for which others bear responsibility. The first and second types represent the poles of the first factor; the third and fourth represent the poles of the second.

The reader may doubt that inverse correlations actually exist between productivity and satisfaction, since the final result of the factor analysis is absent in the initial matrix of paired correlations and, moreover, is "lost" after rotation. As proof of the validity of not only the positive but also the negative correlations we must obtain both correlations in a clearer form, as paired correlations. Moreover, it is natural to expect that among persons displaying polar individual values with regard to the first factor, the paired correlations between productivity and satisfaction will be positive. Among those with solar individual values with regard to the second factor, the correlations will be inverse.

In order to find the unknown paired correlations, we created two subsamples. The first included respondents with individual

**Table 4**

**Correlation Coefficients between Assessments of Productivity and Indices of Satisfaction**

Satisfaction	Correlations for entire sample N =4003 (1)	Correlations for group of persons with polar significances for first factor N= 597 (2)	Significance of differences between (1)and(2)	Correlations for group with polar significances for second factor N - 570 (3)	Significance of differences between (1)and(3)	Significance of differences between (1) and (3)
a) condition of equipment	0.05**	0.56***	0.001	-0.21***	0.001	0.001
b) regular pace of production	0.03	0.52***	0.001	-0.13**	0.001	0.001
c) health and safety conditions	-0.01	0.48***	0.001	-0.35***	0.001	0.001
d) output rates	0.03	0.53	0.001	-0.27***	0.001	0.001
e) wages	0.17***	0.61***	0.001	0.01	0.001	0.001
f) opportunities for self-realization	0.15***	0.63***	0.001	0.01	0.001	0.001
g) process of work itself	0.15***	0.60***	0.001	0.04	0.05	0.001
h) relations with foreman	0.15***	0.51***	0.001	0.10*	n.a.	0.001
i) opportunities for improving skill level	0.12***	0.51***	0.001	0.00	0.01	0.001
j) opportunities for participating in management of production	0.11***	0.53***	0.001	0.01	0.05	0.001
Sum of features a-d	0.03	0.60***	0.001	-0.33***	0.001	0.001
Sum of features e, f, h, i	0.22***	0.68***	0.001	0.03	0.001	0.001

\*Correlations are significant when  $p < 0.05$ . \*\*Correlations are significant when  $p < 0.01$ . \*\*\*Correlations are significant when  $p < 0.001$



values for the first factor from 1 to 7 (low) and from 15 to 17 (high); the second included those with values from 1 to 4 and from 12 to 17, but for the second factor.<sup>3</sup> Each subsample was thus composed of persons with polar values for the same factor.<sup>4</sup> Correlation coefficients were calculated for these groups between the resulting indices of productivity ("front-rank worker" vs. "laggard") and the various indices of satisfaction (Table 4).

As the table shows, the value of the paired correlations confirms the results contained in the factor matrix. In the subsample created on the basis of the first factor, correlations between productivity and satisfaction display high positive values ( $r_{cc} = 0.56$ ). They substantially exceed (when  $p < 0.001$ ) both the coefficients obtained for the entire sample and those for the subsample created on the basis of the second factor. In the latter, the coefficients for the correlation of productivity and satisfaction with job aspects over which the worker has no control are negative and quite high in terms of absolute value, while the correlations for satisfaction with otherjob aspects are zero (only one of them is 0.10). The values of all correlations in the subsample for the second factor are much lower than in the subsample for the first factor, and lower than for the entire sample; moreover, the differences are statistically significant (in most cases,  $p = 0.001$ ). For example, the correlation coefficient between a worker's reputation in his shop (his productivity) and his total satisfaction with working conditions for which he is not responsible in the subsample of the second factor is equal to  $-0.03$ , and for the subsample of the first is  $+0.60$ .

Thus, thanks to factor analysis, we were able to "split" the initial zero correlations between worker productivity and satisfaction with work conditions for which they were not responsible. It turned out that each such coefficient calculated for the entire sample contained two opposite tendencies which were characteristic of different (and almost nonintersecting)

subsamples. The tendencies actually noted are already represented in the initial bivariate distributions for productivity and satisfaction (see Table 2). If we move from a group with low values to one with high values for the variables referred to, the latter change in one direction only, and this gives a positive correlation. On the other hand, if the changes are bilateral—that is, if we move from a group with high productivity and low satisfaction to a group with low productivity and high satisfaction—the coefficient should have a negative value. The intra-factorial correlations described can be consistently reproduced using various subsamples according to age, age-sex combinations, various parameters for job conditions, and so on, for a total of eighteen groups altogether.

The information contained in the initial factor matrix is extremely vague in terms of possibilities for cause-and-effect interpretation. In order to overcome this difficulty to some extent, we "broadened" our factor matrix, adding new indices to the initial set. These indices were used as "keys" to explaining the correlations which were of interest to us.

On the basis of these supplementary indices we may conclude that the direct correlations between productivity and satisfaction which predominate are the result of the fact that within the first factor greater productivity is accompanied by greater "gains" and fewer "losses" by workers (less fatigue, illness, etc.). Inverse correlations, on the other hand (the second factor), are partly engendered by the fact that the negative effect of work (fatigue, bad health) is greater on productive workers. Workers regard working conditions as the source of such negative phenomena, and this is what arouses their dissatisfaction with them.

But the main determinant of inverse correlation between productivity and satisfaction has to do with motivational differences among workers within the second factor. Higher productivity is associated with a desire for higher wages (this

correlation is absent in the first factor). Such desires bring about dissatisfaction not so much with the wages themselves as with working conditions, since defects in the system for planning work and output rates (unwarranted revisions of these rates, for example), inadequate equipment, and an irregular pace of production are considered by respondents concerned with wages to be the reason their pay does not rise. Thus, dissatisfaction with job conditions arises within the factor indicated for two reasons. First, workers who are more productive and are concerned with wages consider that these conditions hinder to a certain degree the rise of their wages, and second, they would like to achieve their goal with less fatigue, which in their opinion requires improved working conditions.

## Notes

1. Our study comprised 4003 workers, of whom 2233 were men and 1770 were women. Productivity was measured as follows. A foreman evaluated a respondent's fulfillment of the norms for output, quality of work done, level of discipline, and initiative. In addition, he answered a question as to how others would characterize the worker in question according to the following categories: "consider him a front-rank worker" (4), "a well-regarded worker" (3), "an average worker" (2), "a laggard" (1). The higher the score, the higher a worker's productivity. Respondents assessed their own satisfaction with various aspects of their jobs according to the following scale: "fully satisfied" (5), "more satisfied than not" (4), "not sure if satisfied or not" (3), "more dissatisfied than not" (2), "completely dissatisfied" (1). In addition, in answering the question "What do you like and what do you dislike in your present job?" the respondents were to name the attractive and unattractive aspects of their jobs. It was possible to check any number of positions on a list of seventeen points [2, pp. 325-26].

2. Low productivity corresponds to gradations 1 and 2 on the continuum "front-rank worker"—"laggard," and high productivity to gradations 3 and 4; low satisfaction corresponds to gradations 1 and 2, and high satisfaction to gradations 4 and 5 (see note 1, above).

3. The entire scale comprised seventeen possible scores.

4. There were approximately six hundred persons in each of the subsamples. The groups intersected, but not to a significant degree: only eighty-four persons (14-15% of the subsample) were found in both the first and second.

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