The impact of environmental technologies on employee motivation

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Abstract. The article examines how the implementation of ESG standards and environmental technologies in an industrial enterprise can influence the motivational profile of employees. To do this, the authors built and studied the motivational profile of 30 employees of production departments, as a result of which 4 groups of motivational profiles were identified: socially oriented, individualists, creative and independent, and piecework wages. As a result of the environmental technologies implementation, wages at the enterprise increased, and all respondents also participated in the implementation of lean production tools in their departments. Hypothetically, this should have reduced the importance of the salary factor among those who placed it in leading positions and increased the need for creative work among all participants. The first hypothesis was not confirmed: the wage factor remained at the same level among the same respondents, which indicates its stability. Overall, this group makes up less than 10% of all respondents. The second hypothesis was confirmed: in the remaining groups the need for interesting and creative work increased. Thus, the implementation of ESG standards and environmental technologies has a positive effect on the creative potential of employees.

1 Introduction

The problem of increasing labor productivity has been relevant at all times. However, to achieve this goal, different approaches and tools were used.

The 19th century was a unique market where the seller dominated, and new products that emerged were absorbed into the market in millions of quantities. The need to increase production volumes was satisfied through the division of labor, expressed in the conveyor flow, as well as the construction of new factories, the purchase of additional equipment, and
the hiring of more workers [1]. An example is the classic assembly line of H. Ford, which produced the Ford T model in multi-million copies [2]. At the same time, this approach fully met the challenges of that period of time: large migration waves from Europe, not always a qualified workforce, even language difficulties among migrants made it possible to use an exploitative approach towards employees. One of the obvious disadvantages of this approach is monotonous work, which creates alienation, dullness and motivation problems among employees. The conveyor does not allow workers to communicate with each other, which provokes social problems in the team. The routine nature of work does not allow employees to show creative potential, and this shifts the solution to labor optimization issues to management, who spends up to 80% of their working time managing operational issues rather than strategic planning of activities.

However, by the 20-30s of the 20th century, the market was saturated, and the need for large-scale mass production disappeared. Great Depression in the US clearly demonstrated this process. The increased level of competition between manufacturers has forced them to think about pricing issues in general and factors affecting product costs in particular. Enlarged, any production consists of 3 global elements:

- Raw, materials or information from which the product is manufactured;
- Equipment and tools with which the product is produced;
- A person who produces a product from raw or materials using equipment or tools.

Moreover, the first two factors are quite stable elements: if we took 10 metal blanks and processed them on one machine, without changing the settings, we get 10 identical parts. However, by influencing 10 different people in the same way, we may well get 10 completely different reactions. Moreover, by influencing one person in the same way, but at different times and in different circumstances, we can also get different reactions. This is due to the presence of a large number of variable factors in a person that influence his activity: physiological state, psycho-emotional background and motivation to work. At the same time, the person has a decisive influence on the result.

In this regard, studies of the first half of the 20th century were devoted to the human factor in production, since: a) people do not work stably and b) the natural efficiency of workers without motivation is, according to various estimates, from 20 to 44 percent [3]. Chronologically, this period includes the emergence of scientific schools of management that studied people in production: the behaviorist school [4], the school of human relations [5] and a number of theories of motivation, such as the hierarchical model of A. Maslow [6], two-factor F. Herzberg's model [7], V. Vroom's expectancy theory [8], J. S. Adams' theory of justice [9-10] and others. These studies, one way or another, revealed and scientifically confirmed the existence of a direct relationship between employee motivation and the effectiveness of his work.

It is traditionally accepted that material (financial) motivation is decisive for lower-level workers, since they are most often at the lower levels of the hierarchy of needs (according to Maslow) or in the zone of hygiene factors (according to Herzberg). At the same time, an increase in wages for such workers should provoke a proportional increase in productivity. In this regard, enterprises often apply piecework wages to such workers. This approach almost completely ignores the other needs that such workers have.

Later studies proved that:

- the order in which needs arise may change;
- needs of different orders can be active at the same time;
- once satisfied, individual needs can still remain good motivators [11].

The purpose of this study was to identify and understand the motivation of workers of an industrial enterprise by building a motivational profile with a simultaneous analysis of its changes under the influence of the introduction of “green” management into the practice of the enterprise, aimed at transitioning the enterprise to the ESG system [12-15].
2 Methods and Materials

30 workers of various production departments of an industrial enterprise aged from 24 to 65 years were selected as a test sample for analysis. The gender and age characteristics of the respondents are shown in the Table 1.

**Table 1. Gender and age characteristics of respondents**

<table>
<thead>
<tr>
<th>Age</th>
<th>under 30</th>
<th>31-40</th>
<th>41-50</th>
<th>51-60</th>
<th>over 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

The primary hypothesis also took into account the period of work of the worker at the enterprise: the longer he works in monotonous routine work, the lower his creative needs and the higher his material needs. This is due to the high adaptive ability of the human body. In other words, not feeling the need for creative manifestation of personality, it ceases to generate these abilities. The threshold for the adaptation period for the purposes of the study was 1 year. That is, it was accepted that within 1 year any employee fully adapts to the environment, and his needs take on the appropriate structure. The structure of respondents in terms of duration of work at the enterprise is presented in Fig.1.

![Fig.1. Duration of work of respondents at the enterprise](image)

Sh.’s method was taken as the basic methodology for constructing a motivational profile. Ritchie and P. Martin [16]. The methodology involves respondents’ self-assessment of 12 factors of their own motivation:

- need for high wage;
- need for good working conditions;
- need for clear work structuring;
- need for social contacts;
- need to establish and maintain social relationship;
- need for recognition;
- need to set ambitious, complex achievements;
- need for influence and power;
- need for diversity and changes;
- need for creativity;
- need for self-employment;
- need for interesting socially useful work.

At the initial stage in August 2022, respondents were selected and a basic motivational profile was built:

- Distribution of 11 points between various provisions characterizing individual motivational factors;
- Summation of scores for each factor;
- Building a histogram to visualize motivation factors.

During 2022 and 2023, the company actively implemented ESG standards and underwent the corresponding voluntary certification. Additionally, all 30 respondents completed advanced training courses on lean manufacturing programs during the year and were included in working groups to implement its tools in the work of their departments. It should also be additionally noted that the respondents do not know each other and do not intersect in daily production activities.

3 Results

The primary results made it possible to group all respondents into 4 groups.

Group 1 with leading needs for socialization – “Socially oriented”. This group included 14 people, which is 46.6% of the total population of respondents. In general, this result was expected, but the authors assumed that this category would be mainly represented by women, but 8 out of 14 people were men. An important characteristic of this category is that it is represented by employees who have recently joined the enterprise and those who are close to retirement age. The aggregated motivational profile is presented in Fig.2.

![Fig.2. Aggregated motivational profile of Group 1 "Socially oriented"](image)

Group 2 demonstrated high needs for recognition, high achievement and power - “Individualists”. This group is represented by 5 respondents (16.6%), 4 of them are men, all respondents in this group have been working at the enterprise for more than 2 years. The aggregated motivational profile of this group is presented in Fig.3.
Fig. 3. Aggregated motivational profile of Group 2 "Individualists"

Group 3 consists of 8 respondents (26.6%) and is focused on creativity and change, and is also able to form new tasks and carry them out independently - “Creative and Independent”. This group is quite mixed; in the small sample there are no correlations between gender, age or length of work at the enterprise. The aggregated motivational profile of this group is presented in Fig. 4.
Fig. 4. Aggregated motivational profile of Group 3 "Creative and Independent"

And finally, the last 4th group is focused on clearly structured work and high wages - “Piecework wage”. This group is the smallest and includes only 3 respondents (2 men and 1 woman). All respondents in this group have been working at the enterprise for a long time. The aggregated motivational profile is presented in Fig. 5.

![Aggregated motivational profile of Group 3](image)

Fig. 5. Aggregated motivational profile of Group 4 "Piecework wage"

During the year, the following changes occurred that could have an impact on the motivation of respondents:

- The period of presence at the enterprise increased (none of the respondents quit);
- All respondents were trained in the Lean Manufacturing advanced training program;
- All respondents participated in the implementation of lean manufacturing tools in their production units;
- The company is actively implementing ESG standards;
- Salaries of all employees increased by an average of 1.5 times.

Repeated measurement of the motivational profile redistributed the grouping of respondents (Fig. 6).
As can be seen from Fig. 6, the pool of Group 1 has increased. This increase was due to the transfer of 2 respondents from Group 2 to it. Another movement occurred from Group 4 to Group 3.

4 Discussion

Already the initial analysis has shown that the position about the prevailing need for material (financial) motivation is erroneous. Only 10% of respondents showed a clear need for this motivator.

Interestingly, both Group 1 (“Socially oriented”) and Group 2 (“Individualists”), along with factors characteristic of their group, also rated working conditions factors highly. This may likely be due to the lack of specific descriptions of what factors are being referred to. Respondents of the first group could mean by these factors those that allow informal communication and expanded communications of staff, and the second group, for example, factors of equipment provision or physical factors, such as lighting, air temperature, etc.

Also important is the fact that the second group of high wage factors indicates a high value. Subsequently, with repeated measurements, this correlation also remained, which probably indicates the need to confirm success with material symbols.

The third group demonstrated, along with creativity factors, an interest in factors of achieving ambitious goals, which indicates the ability and desire to set high goals in their activities. This group also showed the lowest interest in high wage factors among all other groups.
The latter group, along with the leading factor of high wages, also showed an interest in well-structured work. This essentially means that people want to clearly understand what to do and what they will get for it. Also, this group attaches relatively high importance compared to other factors to the need for recognition factor, which simultaneously indicates a desire to demonstrate the results of their work to the rest of the team.

During the year of observation, the authors did not conduct additional measurements. The reason was the hypothesis that respondents would simply remember their answers and would automatically copy them with each new measurement.

Repeated measurements did not significantly redistribute the groups, although a slight movement is still observed: 2 people moved from group 2 to group 1 and 1 person from group 4 to group 3. However, against the backdrop of the ESG policy pursued by the company's management, working conditions were improved and wages increased fee and implemented creative projects to implement lean manufacturing tools [17-19]. These factors, according to A. Maslow’s theory, should have reduced the need for high wages and creativity in work, but this did not happen. The need for salary remained at the same level among the remaining respondents of group 4 and the need for creativity among group 3. At the same time, the need for creativity also increased among groups 1 and 2, which allows us to conclude that the examples of creative projects were of interest to all their participants. The need for social contacts and building social relationships practically did not change in any group, which indicates the stability of the factor.

5 Conclusion

To summarize, the ESG policy of an industrial enterprise increased the need for employees to be creative at work, but did not affect the need for social contacts and building social relationships. According to the motivational profile, a very small number of employees of the enterprise as a whole have a clearly expressed need for high wages, but it is very stable. An increase in wages does not reduce the importance of this factor. There is no direct relationship between gender and age characteristics and the motivational profile, however, the greatest need for socialization is observed among workers who have recently gotten a job, as well as among those who are close to retirement age.

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