ANALYSIS OF INTENSIVE USE
OF THE HUMAN RESOURCES

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Abstract: The human resource represents an element essential to each work process, together with the other financial, material and technical resources. The term human resource is derived from the fact that it has a limited character and is consumed by its use in the work process. The problem of human resources use is considered from two points of view:

- *the extensive use presupposes the analysis of the use degree of the company's potential in what work resources are concerned, expressed by the staff number or working time.*
- *the intensive use which implies the evaluation of the efficiency of the use of human resources.*

Through the analysis of the intensive use of human resources it is evaluated the efficiency of the use of the human resources, the measurement of this efficiency being done with the help of the indicators: work productivity and profit level on employee.

Key words: human resources, work productivity, factors of influence, effects.

Analysis of work productivity level and dynamics

Work productivity (W) can be determined in many ways and it also has very many definitions. No matter its definition, we will have a ratio between the effect of the operating process and the effort with the necessary work.

$$W = \frac{\text{physical Q; value Q; exercise Q; Q destined to sales; CA; VA,}}{\text{Np, Nm, Nh, Nz.}}$$

The inverse ratio also represents W but more used is the ratio $\frac{effect}{effort}$

W analysis tends to determine the level registered by it and the evolution compared to other bases of comparison used, having as a goal to identify the factors and causes that influence W and to formulate the measures to increase W.

There are different measures that designate this productivity:

a) Annual W: $W = \dfrac{Q}{Ns}$,

where:
    Q – production, (as numerator can be used the turnover or the added value)
    Ns – average number of employees;
    W – average production on an employee for a management period.

b) Daily W: $Wz = \dfrac{Q}{Nz}$,

where:
    Nz – working time expressed in man-days;
    Wz – daily average production on an employee for a management period.

c) Hourly W: $Wh = \dfrac{Q}{Nh}$,

where:
    Nh – working time expressed in man-hours;
    Wh - hourly average production on an employee for a management period.

Comparing these three indicators **in dynamics** the normal correlations will be:
- $I_{Wz} > I_W$ – the index of daily productivity is higher than the index of annual productivity, because daily productivity is determined by eliminating time losses in whole days.
- $I_{Wh} > I_{Wz}$ – the index of hourly productivity is higher than the index of daily productivity, because hourly productivity is determined for the time effectively used, by eliminating time losses in whole days and hours.

In order to develop effectively an activity, any company will have as a goal to increase continuously its productivity, that is to register permanently a productivity index, calculated by repporting to the previous period, higher than 100% or supraunitary: $I_W = \dfrac{W_1}{W_0} \times 100$, $I_W > 100\%$, because the continuous growth of productivity is the situation which makes possible the desired development.

Factorial analysis of work productivity

In order to conduct the factorial analysis of work productivity, many factorial models of the explicative ratio type can be developed, starting from one of the formulas of work productivity:

$$W = \frac{Q}{Ns}$$

a) Determine the factorial model:

$$W = \frac{Nh}{Ns} \times \frac{Q}{Nh} = nh \times Wh$$

or

$$W = \frac{Nh}{Nz} \times \frac{Nz}{Ns} \times \frac{Q}{Nh} = \bar{\bar{dz}} \times nz \times Wh$$

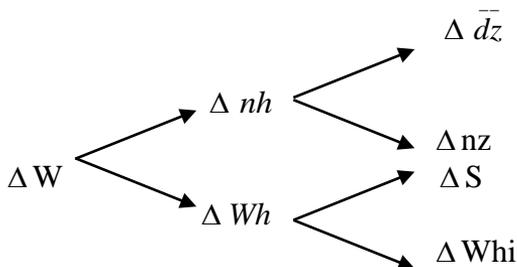**b) Identify the influence factors:**

W deviation is followed in absolute and relative values. Thus, in absolute values, the total change of the indicator is:

$$\Delta W = W_1 - W_0 = \frac{Nh_1}{Nz_1} \times \frac{Nz_1}{Ns_1} \times \frac{Q_1}{Nh_1} - \frac{Nh_0}{Nz_0} \times \frac{Nz_0}{Ns_0} \times \frac{Q_0}{Nh_0}$$

In relative values, the change of the indicator is:

$$I_w = \frac{W_1}{W_0} \times 100; \qquad \Delta I_W = \frac{W_1}{W_0} \times 100 - 100$$

The main factors of influence are:

$$
\begin{array}{ccc}
 & & \Delta\, \bar{\bar{dz}} \\
 & \nearrow \Delta\, nh \nearrow \\
 & & \searrow \Delta\, nz \\
\Delta W & & \Delta S \\
 & \searrow \Delta\, Wh \nearrow \\
 & & \searrow \Delta\, Whi
\end{array}
$$

We can observe that we have two factors of influence of first degree, depending on two factors of second degree:

1) $\Delta\, nh$ - number of hours worked on average by an employee which is influenced by the change of:

      1.1. $\Delta\, \bar{\bar{dz}}$ - average duration of the working day;
      1.2. Δnz – number of days worked on average by an employee.

2) $\Delta\, Wh$ - hourly productivity of work is influenced by the change of:
      2.1. ΔS – production structure;
      2.2. ΔWhi – hourly productivity on product.

c) Measure the action intensity of factors:
1) The influence of the change of the number of hours worked on average by an employee:

$$\Delta W_{(nh)} = (nh_1 - nh_0) \times Wh_0$$

    1.1. Influence of the change of average duration of the working hour

$$\Delta W_{(dz)} = (\bar{\bar{dz}}_1 - \bar{\bar{dz}}_0) \times nz_0 \times Wh_0$$

    1.2. Influence of the change in the number of days worked on average by an employee

$$\Delta W_{(nz)} = \bar{\bar{dz}}_1 \times (nz_1 - nz_0) \times Wh_0$$

2) Influence of the change in hourly worked productivity

$$\Delta W_{(Wh)} = nh_1 \times (Wh_1 - Wh_0)$$

    2.1. Influence of the change in production structure

        but:
$$\Delta W_{(S)} = nh_1 \times (Wh_{(S)} - Wh_o)$$
$$Wh_{(S)} = \Sigma gs_1 \times Wh_{io}$$

where:
  $Wh_{(S)}$ - hourly work productivity recalculated in function of production structure;
  gs - specific weights;
  Wh_i - hourly productivity on product;
  i - products.

    2.2. Influence of the change of hourly productivity on product:

$$\Delta W_{(Wh_i)} = nh_1 \times (Wh_1 - Wh_{(S)})$$

d) Determine total deviation:

$$\Delta W = \Delta W_{(nh)} + \Delta W_{(Wh)}$$

$$\Delta W_{(nh)} = \Delta W_{(dz)} + \Delta W_{(nz)}$$

$$\Delta W_{(Wh)} = \Delta W_{(S)} + \Delta W_{(Wh_i)}$$

Explanation of the transmission mechanism of factors actions on work productivity

1) The variation of the **number of hours worked on average by an employee** will influence directly the level of work productivity, in the same direction and proportionally to the level of work hourly productivity in the basis period.

 1.1. The variation of the **working day average duration** will influence the work productivity through the influence on the change in the number of hours worked on average by an employee, in the same direction and proportionally to the level of days worked on average by an employee and the hourly work productivity in the basis period.

 1.2. The variation of the **number of days worked on average by an employee** will influence the work productivity through the influence on the change in the number of hours worked on average by an employee, in the same direction and proportionally to the level of hourly work productivity in the basis period and the level of average duration of working day in the current period.

2) The variation of **hourly work productivity** will influence directly the work productivity level, in the same direction and proportionally to the number of hours worked on average by an employee in the current period.

 2.1. The variation of **productivity structure** will influence the work productivity through the influence on the hourly work productivity, in the same direction and proportionally to the number of hours worked on average by an employee in the current period.

 2.2. The variation of the **hourly productivity on product** will influence the work productivity through the influence on the hourly work productivity, in the same direction and proportionally to the number of hours worked on average by an employee in the current period.

Effects of the change in work productivity

The change of the work productivity influences the level of realised physical production, the level of value production indicators, the level of company's expenses, profit and profitability. The effects of the change in work hourly productivity are:

1. on the value production

$$\Delta Q_{(Wh)} = T_1 \times (Wh_1 - Wh_0)$$

2. on the turnover

$$\Delta CA_{(Wh)} = T_1 \times (Wh_1 - Wh_0) \times \frac{CA_0}{Q_0}$$

where:

$\dfrac{CA_0}{Q_0}$ - capitalization degree of production in the basis period

3. on the added value

$$\Delta VA_{(Wh)} = T_1 \times (Wh_1 - Wh_0) \times \frac{CA_0}{Q_0} \times \overline{Va_0}$$

where:

Va_0 - average added value for 1 leu turnover for the basis period

4. on the fixed expenses for 1000 lei CA

$$\Delta Cf_{/1000(Wh)} = \frac{Cf_0}{T_1 \times Wh_1} \times 1000 - \frac{Cf_0}{T_1 \times Wh_0} \times 1000$$

5. on the rotation speed of circulating assets

$$\Delta nr_{AC(Wh)} = \frac{\Delta CA_{(Wh)}}{AC_1}$$

6. on the gross profit

$$\Delta Pb_{(Wh)} = T_1 \times (Wh_1 - Wh_0) \times \frac{CA_0}{Q_0} \times r_{Pb_0}$$

where:

$r_{Pb_0} = \dfrac{Pb_0}{CA_0}$ - gross profit ratio in the basis period

7. on the capitals rentability

$$r_{(Wh)} = \frac{\Delta Pb_{(Wh)}}{C_{permanent_1} \, sau \, C_{propriu_1}} \times 100$$

CONCLUSIONS

The factors which influence the evolution of work productivity, no matter the used factorial model, are:

- the company's technical and technological level;
- the organisation of the operating process;
- the quality of the human factor.

The analysis of the way in which human resources are managed at the company's level aims at the following aspects:

- analysis of the way human resources is provided for;
- analysis of the (extensive and intensive) use of the company's human resources;
- effects of providing and using the human resource.

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