

## THE POSSIBILITY OF QUALITATIVELY AND QUANTITATIVELY ADAPTATION HUMAN RESOURCES ON THE EXAMPLE OF CHOSEN UNIT OF METALLURGICAL ENTERPRISE

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One of basic tasks of human resource management in a metallurgical enterprise is assurance of workers with correct - from organization point of view - competences. These activities are possible only when competences needed in the enterprise are recognized and the influence of particular competences on correct course of manufacturing process is described. This enables the enterprise to have an access to exact qualification of workers' profiles which should be applied on stage of selection. In this paper, on the example of chosen unit of metallurgical enterprise, methods possible to use in human resource management are presented.

**Key words:** *organizational structure, human resource management, metallurgy*

**Mogućnosti kvalitativne i kvantitativne prilagodbe ljudskih resursa na primjeru odabranog pogona metalurškog poduzeća.** Jedan od osnovnih zadataka upravljanja ljudskim resursima u nekom metalurškom poduzeću je osiguravanje dovoljnog broja radnika s odgovarajućim odgovornostima - gledajući s točke gledišta organizacije. Takve aktivnosti su moguće samo onda ako organizacija zna prepoznati koje odgovornosti su joj potrebne i ako je (unaprijed) opisan njihov utjecaj na ispravan tijek proizvodnog procesa. To omogućuje poduzeću da ima pristup točnim kvalifikacijama profila radnika koje će se primijeniti u fazi odabira. U ovom radu su prikazane na primjeru jednog pogona nekog metalurškog poduzeća metode koje se mogu primijeniti u upravljanju ljudskim resursima.

**Ključne riječi:** *organizacijska struktura, upravljanje ljudskim resursima, metalurgija*

### INTRODUCTION

One of the main activities of an enterprise, which assures its functioning on the market, is planning. The planning process is associated above all with an enterprise's conducted manufacturing processes and possessed technological resources.

Less often, the notion of employment planning, or more generally - personnel planning can be met. This issue, however, should be of high priority for all enterprises implementing restructuring objectives.

For without competent employees, it is impossible to properly carry out most of changes in the spheres of engineering, technology or organization [1].

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### DETERMINATION OF OCCUPATIONS EXISTING IN THE ORGANIZATION UNDER STUDY

Two methods of creating the list of occupations for the organization were considered in the studies. The first method is through the identification of occupations based on actual jobs posts, and the second one is through the identification of main objectives, and then the families and sub-families of occupations. The choice of a method was determined primarily by:

- number of occupations identified within the analyzed organization,
- degree of diversity of the organization's business activity,
- diversity of the product offer,
- number and scatter of particular units being part of the organization, and
- quality and accuracy of available information sources.

For the purpose of the conducted studies, the identification of occupations was done based on the analysis of

individual job posts. These posts were grouped and assigned to a single occupation, if they:

- had similar work contents, or if the work content of one post is part of the work content of the other,
- had similar or identical competition requirements,
- were characterized by a high similarity in the methods of carrying out planned work objectives,
- because of the specificity of conducted activities, required the mutual rotation of employees, whereby the employees had to possess qualifications, skills and personal features enabling them working on the both job posts.

In the organization under analysis, 56 job posts were identified.

**EVALUATION OF CHANGES IN THE NUMBER OF EMPLOYEES IN PARTICULAR OCCUPATIONS**

The determination of changes in the number of employees in particular occupations, particularly when considering a broader organizational aspect (reference made

- dancies in respective units and undertaking actions aimed at the intensification of employee flow in directions desirable from the organization’s point of view,
- establish an economically justified relationship between employment of the internal and external labour market.

In the studies carried out, Markov’s [2] method was used for the analysis of employee flow within the organization. According to the principles of this method, the state of the system at the time  $t_1$  is dependent on its state at the moment  $t_0$ , whereas the majority of employee displacements within the organization must be internal in character.

Activities at this stage of studies were divided into three stages that included:

- a) estimation of the number of employee displacements, respectively, within the organization and between the organization and the external market;
- b) determination of the probability of employees passing to other organizational units within a division examined (Table 1.); and

Table 1. **Probability of employees passing to other units within the examined organization (the number of employees transferred to a particular division in relation to the total number of displacements for that division)**

Tablica 1. **Vjerojatnost prelaska djelatnika u drugi pogon ispitivane organizacije (broj djelatnika prebačenih u neki drugi konkretni pogon u odnosu na ukupni broj razmještaja za taj pogon)**

No	Division	1	2	3	4	5	6	7	8	9	10	11	O
1	Furnace Division	24/32	1/32					1/32				2/32	4/32
Rolling Mill Division													
2	Rolling Train		34/48	1/48					1/48				12/48
3	Reconstruction Section		4/32	25/32	1/32								2/32
4	Saw and Cold Store Division				23/24								1/24
5	Fixtures Section				1/20	8/20							11/20
6	Bearings Section				1/18		12/18						5/18
Shape Finishing Division													
7	Technological Sequence							64/77					13/77
8	Dispatch							1/35	30/35		1/35		3/35
9	Reconstruction Section							3/9		5/9			1/9
Train Finishing Division													
10	Rail Finishing Division Train										24/27		3/27
11	Mining Linings Train											1/2	1/2

to sections or divisions rather than to individual occupations), creates bases for defining the organization’s future demands for workers.

This action is a basis for the proper personnel planning in both quantitative and qualitative aspects. The main purpose for which it was carried out, was to:

- determine an optimal employment level that would allow cost reduction by avoiding excessive employment,
- maintain the stability and continuity of functioning of the organization by reducing the phenomenon of voluntary staff fluctuation (by defining shortages and redun-

- c) determination of the predicted demand for workers based on the estimated internal displacements and departures from the organization (Table 2.).

The predicted state in column B of Table 2. has been determined according to the following algorithms:

Furnace Division:

$$48 \times 0,8 = 38$$

Rolling Train:

$$48 \times 0 + 86 \times 0,7 + 44 \times 0,1 = 65$$

Reconstruction Section:

$$44 \times 0,8 = 35$$

Table 2. Prediction of the company's demand for workers resulting from internal displacements and departures from the organization  
 Tablica 2. Predviđanja potreba kompanija za radnicima koji proizlaze iz unutrašnjeg razmještaja i odlazaka iz organizacije

No	Division	A <sup>1</sup>	1	2	3	4	5	6	7	8	9	10	11	B <sup>2</sup>	C <sup>3</sup>	D <sup>4</sup>
1	Furnace Division	48	0,8	0,0					0,0				0,1	38	44	6
Rolling Mill Division																
2	Rolling Train	86		0,7	0,0					0,0				65	74	9
3	Reconstruction Section	44		0,1	0,8	0,0								35	42	7
4	Saw and Cold Store Division	43				1,0								48	42	-6
5	Fixtures Section	29				0,1	0,4							12	18	6
6	Bearings Section	23				0,1		0,7						16	18	2
Shape Finishing Division																
7	Technological Sequence	117							0,8					99	104	5
8	Dispatch	35							0,0	0,9		0,0		32	32	1
9	Reconstruction Section	19							0,3		0,6			11	18	7
Train Finishing Division																
10	Rail Finishing Division Train	77										0,9		69	74	5
11	Mining Linings Train	47											0,5	28	46	18

<sup>1</sup>A - employment level at the beginning of the study period (January, 2001)  
<sup>2</sup>B - predicted employment level  
<sup>3</sup>C - employment level desirable from the point of view of the business strategy carried out by the company  
<sup>4</sup>D - predicted level of redundancy/shortage, while considering the information provided (D = C - B)

Saw and Cold Store Division:  
 $44 \times 0 + 43 \times 1 + 29 \times 0,1 + 23 \times 0,1 = 48$

Fixtures Section:  
 $29 \times 0,4 = 12$

Bearings Section:  
 $23 \times 0,7 = 16$

Technological Sequence - Shape Finishing Division:  
 $117 \times 0,8 + 35 \times 0 + 19 \times 0,3 = 99$

Dispatch:  
 $86 \times 0 + 19 \times 0,6 = 32$

Reconstruction Section - Shape Finishing Division:  
 $77 \times 0,9 = 69$

Rail Finishing Division Train:  
 $48 \times 0,9 + 47 \times 0,5 = 28$

Mining Linings Train:  
 $19 \times 0,6 = 11$

It can be found from the data given in Table 2. that the majority of the divisions and sections studies show slight redundancy of employment compared to the economically justified level. Maintaining a slight excess of employment in this case is dictated by the management's wish to have some employment buffer enabling it to reasonably flexibly respond to negative trends within human resources (such as sick leaves, sudden departures, etc.).

To more completely estimate the organization's future demand for workers, an analysis of the population of employees in terms of age was additionally carried out - see Figure 1. The obtained results show a very unfavorable pattern in age structure. Over 70 % of the employees are more than 40 years old, whereas individuals below 30 years

of age account for a mere 5 %. These data indicate the existence of a generation gap in the organization, constituting a serious risk for the organization's future functioning, as it considerably shortens the period during which older employees can pass their skills and experience on to new starters, which may lead to a situation of incomplete passing of information.

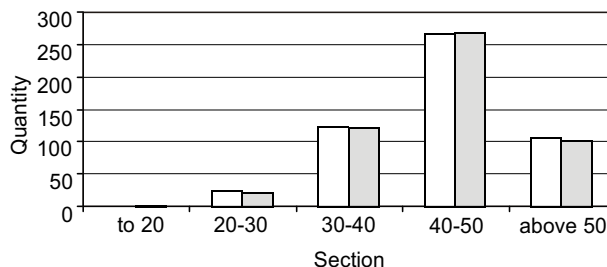


Figure 1. Division of employees according to the age  
 Slika 1. Raspoređivanje djelatnika prema starosti

### DETERMINATION OF PREFERENTIAL OCCUPATIONS

All occupations in an organization undergo constant evolution, depending on technological and organizational changes. The duration of transformation of an occupation's content depends on its specificity and conditions prevailing in the organization. For this reason, all occupations do not require the management's enhanced attention at the same time. Within these studies, those occupations were regarded as preferential, which met one or more of the following conditions:

1. Fast transformation of the occupation content under the effect of technological factors and organizational changes.
2. Close connection with the implementation of the organization's strategy, its competitiveness and performance.
3. High or complete reduction of employment, being the consequence of introducing new manufacturing techniques, organizational forms or management methods.
4. High monotony of work, great physical arduousness.
5. Newly forming occupations.

These occupations are called preferential ones due to particular consideration which is to be given them by the

Table 3. **Summary of the preferential occupations of the organization examined**  
 Tablica 3. **Sažeti prikaz preferiranih zanimanja u ispitivanoj organizaciji**

No.	Category/Job Post
1	Fast transformation of the occupation content under the effect of technological factors and organizational changes
2	Close connection with the implementation of the organization's strategy, its competitiveness and performance
2.1	Trade Manager - the Stepped Furnace Division
2.2	Manager of the Rolling Mill Division
2.3	Trade Foreman - the Rolling Mill Division
2.4	Shift Foreman of the Rolling Mill Division
2.5	Trade Foreman - the Reconstruction Division
2.6	Manager of the Shape Finishing Division
2.7	Trade Foreman - the Furnace Division
2.8	Shift Foreman of the Shape Finishing Division
2.9	Trade Foreman - the Dispatch Division
2.10	Manager of the Rail Finishing Division
2.11	Shift Foreman of the Rail Finishing Division
2.12	Trade Foreman - the Rail Finishing Division
2.13	Trade Foreman - the Mining Linings Division
3	High or complete reduction of employment, being the consequence of introducing new manufacturing techniques, organizational forms or management methods
4	High monotony of work, great physical arduousness
4.1	Operator - the Furnace Division
4.2	Furnaceman - the Furnace Division
4.3	Bridge Operator - the Rolling Mill Division
4.4	Cycloping Operator - the Shape Finishing Division
4.5	Bridge Operator - the Shape Finishing Division
4.6	Craneman
5	Newly forming occupations

management and actions that are to be undertaken, if required.

Table 3. summarizes preferential occupations for the organization under study together with the division into groups according to the above-mentioned criteria.

### FORMULATING NEEDS IN EDUCATION AND THE PREPARATION OF EDUCATION

One of the most important factors decisive to the proper functioning of an organization is labour potential. For enterprises, it is not only the current potential which can be used immediately, that is important. Of equal importance is the future potential understood as the features and qualities of particular employees, which can be developed as a result of appropriate decisions made and actions undertaken in the field of human resources management (in particular, in the sphere of employee education and training).

Figure 2. gives a graphical presentation of changes within the structure of education for the organization under analysis. It can be seen from the presented data that the largest group of employees is made up of individuals with technical vocational education. About 64% are employees with basic trade education or incomplete primary education. Only 2,5 % of employees have higher education. Employees with secondary technical education, who, because of their tasks carried out in the organization should be a basic group of the organization's focus, account for a mere 25 % of the whole population.

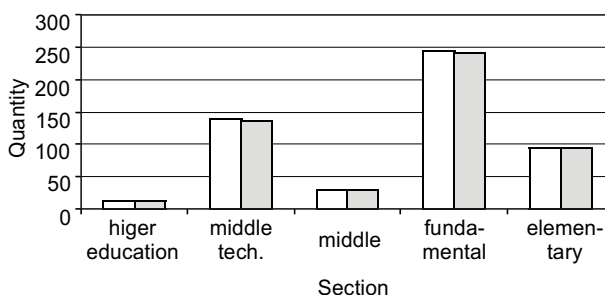


Figure 2. **Division of the employees of the organization studied according to the education structure**  
 Slika 2. **Raspoređivanje djelatnika unutar organizacije prema stupnju obrazovanja**

The index, whereby the level of education of the organization's employees to be very clearly determined, is the average education potential. It allows the determination of the number of years of education per one employee, thus enabling the estimation of the average education level.

To make the performed analysis more detailed, the index of general education potential has additionally been calculated:

$$P_{ow} = \sum P_{pw} \times L_p \tag{1}$$

where:

$P_{ow}$  - index of general employment potential,  
 $P_{pw}$  - number of employees at a given education level,  
 $L_p$  - number of years for a given education level, according to the following rule: primary e. - 8 years, basic vocational e. - 11 years, general secondary e. - 12 years, technical secondary e. - 13 years, higher e. - 18 years.

Furthermore, the average education potential has been determined, which represents the number of years of learning per one employee:

$$P_{sw} = \frac{P_{ow}}{Z_k} \quad (2)$$

where:

$P_{sw}$  - index of average education potential,  
 $P_{ow}$  - index of general education potential,  
 $Z_k$  - state of employment at the end of the period studied.

The determination of training needs for the organization has been made based on:

- the analysis of the organization (the environment, the degree of fulfillment of the set targets, available human resources, the organization's culture),
- the analysis of the post,
- the analysis of the unit.

Carrying out these analyses has enabled the detailed determination of specific training courses that are required in the organization for the adequate fulfillment of the work tasks and for the organization's development. Additionally, the quantitative determination of training courses is possible through the identification of the scope of competencies required of employees at respective job stands.

## SUMMARY

The analysis of the obtained data indicate that the steelworks' department discussed does not show an economi-

cally unjustified over-employment. A slight excess of human resources above the optimal level is justifiable and is dictated by the necessity of providing reserves permitting the efficient and effective functioning of the organization independently of some unexpected events, such as the illnesses, leaves or sudden departures of employees. At the same time, the examined population of employees has a very unfavourable age structure and an improper educational pattern. Phenomena, such as the generation gap or too low education level, constitute a serious risk to the future functioning of any enterprise.

Therefore, the management of the analyzed enterprise should, in a continuous and planned manner, make necessary changes to the structure of human resources so that the human factor not be a force hampering the organization's development.

At the same time, the performed studies have shown very great possibilities of using Markov's analysis for the purposes of determining the organization's future demand for workers. The condition of its application, however, is maintaining a reasonably employment level for a prolonged period of time. The knowledge of future demand for workers enables the organization to define, in a programmed and timely manner, a schedule of substitutions, which forms bases for developing a programme of training aimed at supplementing deficiencies in competences.

The identification of preferential occupations has allowed, in turn, the optimal adaptation of motivation actions to workers employed at specific job stands, which is particularly important for strategic posts and those, where the workers are exposed to monotony or adverse factors in the working environment.

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