

Methodology and analysis of employee structure and remuneration

Metodika analýzy struktury a odměňování zaměstnanců

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Abstract: The paper deals with forming of methodology overview, which could be used for an analysis of employee structure linked to differentiation of remuneration in an enterprise. It suggests an age structure, a structure according to education and qualification, number of employees, permanent state, fiscal state, paid state. The wage differentiation analysis comes from the calculation of month wage and series of quantiles indicators.

Key words: company, human resources, remuneration, wage, differentiation, quantiles

Abstrakt: Příspěvek se zabývá vytvořením přehledu metodiky, kterou je možné použít při analýze struktury zaměstnanců ve vztahu k analýze diferenciaci odměňování zaměstnanců v podniku. Doporučuje strukturu věkovou, podle vzdělání a kvalifikace, počtu zaměstnanců, trvalý stav, fiskální stav, placený stav. Pro analýzu diferenciaci mezd vychází příspěvek z výpočtu měsíční mzdy a škály kvantilových ukazatelů.

Klíčová slova: podnik, lidské zdroje, odměňování, mzda, diferenciaci, kvantily

Human resources delimit the possibilities of any organisation by their work, and agricultural and processing businesses are no exception, because they influence the level of exploitation of material resources. They are also a costly resource, because they demand high costs on wages, insurance, education and training, social security. This supports the hypothesis, that human resources are costly for a business, but this perspective cannot be the only one. Another hypothesis postulates that the most valuable asset of the 21st century business will be its employees commanding knowledge and their productivity supported by systems of remuneration.

The goal of this paper is to create an overview of methods, which authors suggest to be used in the analysis of employee structure, linked to differentiation of remuneration, in order to achieve a survey of efficiency of invested funds. As far as these issues are very extensive, the overview is not going to be exhaustive, but only some of the methods will be mentioned.

MATERIAL AND METHODS

Creating a brief overview of the methods, the authors come from those described and referred to in their publications Tomšík, Bartošová (2003a, b), Tomšík, Bartošová (2004), which can serve as a supplement to the

results of this paper. Methodology of our work is based on including description of used methods together with examples and demonstrations of their use in practice. For processing the groundwork in use of the methodologies, Microsoft Word and Microsoft Excel can be used as appropriate software tools.

RESULTS AND DISCUSSION

Employee structure analysis

Employee structure is a topic examined in order to identify employee or population characteristics, which are the basis for job planning and remuneration. Usually there is constructed an AGE STRUCTURE, which can differ in its pointed ness. Numerical data can be used for construction of a picture of an age pyramid and personnel managers use its analysis, because the age significantly influences the labour behaviour, and enables to signalise retirements. Age pyramid models should be the first ones used by personnel departments. It is a simple tool enabling to acquire interesting information. There does not exist any absolutely ideal age pyramid, but on the other hand, there exists an ideal pyramid for every organisation or an employee group within it. According to Peretti (1997), we can offer some characteristic types of pyramids (Figure 1).

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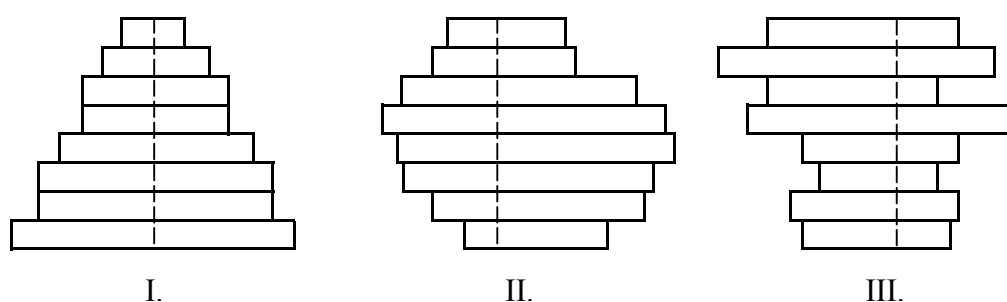


Figure 1. Age pyramids (Peretti 1997)

- I. Many employees younger than 40 years. Adverse in case of a conjuncture, risk of lay-offs – small offer of carrier benefits. Significant training costs. (Form of a pear.)
- II. Suitably balanced age pyramid with suitable allocation of employees' recruitment and retrials.
- III. Many older employees. Advantage: high flexibility in case of a demanding conjuncture. Disadvantages: limited counter change, high wage-costs. (Form of a mushroom.)

Except pyramids, the age structure of employees can be structured also into a table according to groups of a variable age-range – just as the following table (Table 1), which includes numbers of employees according to the levels of age-range related to sex and gross wages in these groups in 2001 according to the CZSO (2002). These are the data from a sample survey of employees in the CR.

If an organisation constructs a similar table, the numeric data can be successively used to form an age pyramid, and thus serves the personnel manager in further analysis. The age has namely a significant

influence on labour behaviour and as was already mentioned, it can also signalise retirements.

STRUCTURE OF EMPLOYEES ACCORDING TO THEIR QUALIFICATION (EDUCATION) is of the same importance. This structure and the information it provides is bound on the age structure, length of employment, sex, etc. It is specifically useful as the information related to remuneration. The significance of analysis of the existing human resources is mentioned also by Armstrong (1999). According to this author, the analysis should classify employees according to the functional perspectives, departments, occupation, employment, level of

Table 1. Numbers of employees and their average monthly gross wages and salaries in 2001 in total classified by age and sex of employees in the CR (CZO 2002)

Age of employees	Number of employees			Average monthly gross pay of employee		
	total	in this		total	in this	
		males	females		males	females
TOTAL	511 288	267 858	243 430	13 969	16 170	11 548
in this employees in age:						
up to 19 years	3 727	1 789	1 938	3 325	3 541	3 125
from 20 to 24 years	41 044	21 400	19 644	9 706	10 320	9 038
from 25 to 29 years	60 694	35 500	25 194	13 167	14 719	10 981
from 30 to 34 years	53 702	29 352	24 350	14 352	17 225	10 889
from 35 to 39 years	61 367	30 154	31 213	14 876	18 075	11 785
from 40 to 44 years	63 120	29 614	33 506	14 761	17 606	12 245
from 45 to 49 years	78 459	36 583	41 876	14 645	17 311	12 317
from 50 to 54 years	84 677	40 586	44 091	14 460	16 789	12 316
from 55 to 59 years	46 570	31 261	15 309	15 739	16 952	13 262
from 60 to 64 years	10 990	7 308	3 682	14 008	16 877	8 314
from 65 years and more	6 938	4 311	2 627	8 167	9 635	5 757
in age 55 years and more						
– old-age pensioners	16 398	6 027	10 371	8 048	8 488	7 792
Average age of employees	41.37	41.52	41.21			

Table 2. Structure of employees and their average gross monthly salaries and wages in 2001 in total divided by education and sex of employees in the CR (CZSO 2002)

Education of employees	Number of employees			Average monthly gross pay of employee		
	total	in this		total	in this	
		males	females		males	females
TOTAL	511 288	267 858	243 430	13 969	16 170	11 548
employee with education:						
primary education, non-complete	58 188	22 067	36 121	8 977	10 777	7 877
secondary education without GCE	196 891	131 308	65 583	11 437	12 871	8 566
complete secondary education	152 913	60 594	92 319	14 777	17 677	12 873
higher vocational and bachelor ed.	5 861	1 994	3 867	14 885	18 704	12 916
university education	58 419	33 927	24 492	24 857	29 156	18 902
<i>not identified ed.</i>	39 016	17 968	21 048	14 590	17 019	12 517

qualification and status. In fact he supports Peretti (1997) and accents also a comparison among the particular employee-categories. Monitoring of employee-structure was done in practice also by Martory, Crozet (1998). They remind of the practice of European countries, use almost the same segmentation of the above-mentioned authors, and suggest one more group of employees – the part-time employees. The total number of these employees corresponds with the sum of weights, which are a part of working time stated by an organisation. For example, it means that we have a theoretical number of 2 employees, one of which has a load of 0.40, and the second 0.30. The result is 0.70 of the weighted number of employees. Quantitative issues are discussed also by Mahé de B. (1998). He states that for the operative management, it will not suffice to know just numbers of employees. But for the current situation, it is important to pay attention to qualitative attributes of positions, which will become necessary, and it will be needed to analyse positions regarding also their qualitative development.

Structure of employees by qualification related to the wages and salaries is given in Table 2 regarding the numbers of employees and their gross monthly wages and salaries in 2001 in the CR, also divided by sex. Generally the division of employees in total, including employees with primary education, secondary education without GCE, complete secondary education, higher vocational and bachelor, university education, and not identified education.

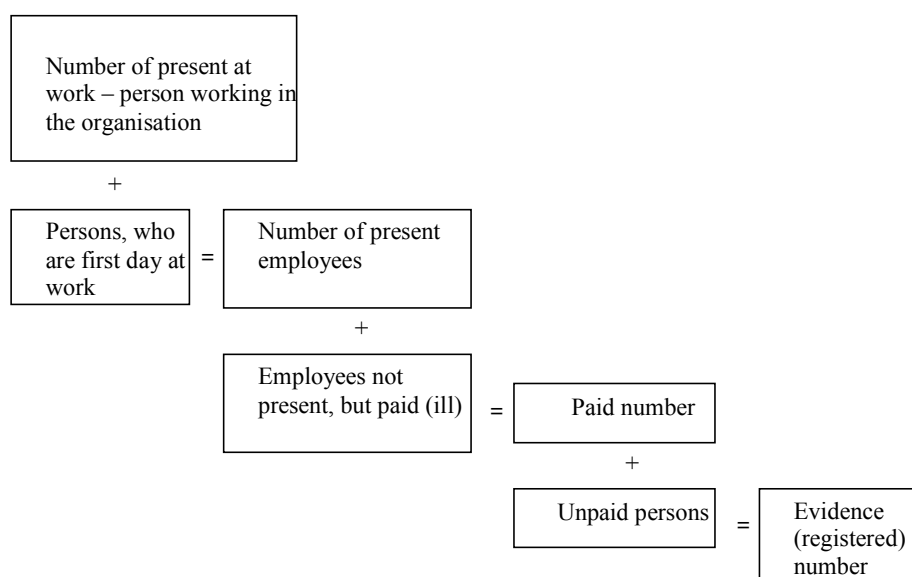
The table includes five levels of education, as they are used by CZSO and MLSA in their surveys. Knowledge of this structure enables an organisation to elaborate a plan of the need of employee training, which increases their qualification, whether to plan single or cyclical trainings, what kind of forms of training to use – internal, external – and how much money it is necessary to detach. Determining and monitoring of education leads also to advisements and plans of awarding employees and their motivation towards training, and certainly influences the volume of personnel costs.

For the needs of human resources remuneration and planning, it is suitable to know the NUMBER OF EMPLOYEES in an organisation, because this knowledge influences the general policy of employment. It is suitable to start with the definition of what is the status (number) of employees, because there exists a number of terms, which should be distinguished. E.g. Peretti (1997) states, that this term is connected with others, which have to be considered. Those are especially the common number of employees, registered (evidence) number of employees, stable number, budget, instant and average number, and the number of paid employees. The common number of employees is important for applying the legislature in an organisation, e.g. because of electing the deputies of employees for negotiating with the employer. The definition of this common number is important in application of social laws. The registered (evidenced) number of employees includes employees into the employee register. This register then includes documents related to recruitment, acceptance and leave of employees, to contracts, lay-offs, demises, expiration of non-tenure contracts. It includes the basic data about an employee – name, surname, nationality, date of birth, sex, employment and qualification, date of acceptance and leave. The evidence number of employees can be monitored for different times, e.g. current or to a certain date, or average number to a certain date. The stable number of employees is based on those employees, who currently have a tenure contract for the period from 1st January to 31st December.

The stable number of employees (Martory, Crozet, 1998, Peretti, 1997) can be calculated in the following way:

$$\text{Stable number} = \text{number to 1}^{\text{st}} \text{ January} - \text{leaves} - \text{non-tenure contracts} - \text{part-time contracts}$$

The budget (fiscal) number includes all, who have been included in the register not regarding the time, and were paid by the organisation within the accounting year. This number serves for taxation and social security purposes.



Calculation scheme 1.

Fiscal number = opening number + acceptations within the year

The paid number of employees is created by the persons present and persons, whose contract was temporarily interrupted, i.e. are not paid, but belong to the evidenced (registered) or stable number. Employees draw for example the sick-leave allowances.

Paid number of employees, e.g. to 31st December = evidenced (registered) number – number of not paid

The number of present employees is the number of employees, who were really present at work. This term is important because it influences the length of paid holiday.

Calculation scheme, which pictures the relations among different momentary numbers of employees is given by Scheme 1.

Besides monitoring the number of employees in an organisation, it is important for personnel managers to monitor the numbers of employees on the labour market in appropriate industry and compare for example their

decrease with the decreases within the organisation. Therefore we include Table 3. Average number of workers in civil sector of the national economy, agriculture and hunting, forestry, and education (CZSO 2002). Monitoring internal and external labour market is a characteristic of human resource management.

Analysis of employee rewarding differentiation

For evaluation of rewarding employees, we use the data from organisations preferably for a certain time-period. For evaluation of rewards differentiation, data from the evidenced number of employees are used – men and women separately, employees in total, and by workers and administrators including their distribution by sex, age, education (primary, secondary without GCE, complete secondary, vocational, bachelor, university).

For CALCULATION OF MONTHLY WAGES we can use the data about the number of hours at work of particular employees and the reached yearly wages and salaries. We recount them to the weighted average by the value

Table 3. Average number of workers in civil sector of the national economy, agriculture and hunting, forestry, and education

Year	Civil sector of the national economy (in total)		Agriculture and hunting, forestry		Education	
	thousand persons	index	thousand persons	index	thousand persons	index
1997	3,463	98.3	214	90.3	298	96.0
1998	3,353	96.3	194	90.7	293	98.1
1999	3,205	95.3	176	90.9	287	98.1
2000	3,157	97.3	160	90.7	283	98.6
2001	3,118	100.0	150	93.8	281	99.6

Source: CZSO 2002

of 2 016 working hours and subsequently we adjust this data about the yearly wages on the average gross monthly wages of an employee.

Calculation of the average gross monthly wage of an employee was constructed this way:

1. $\frac{\text{Total yearly gross wages (CZK)}}{\text{Number of hours at work (h)}} = \text{Average gross hourly salary (CZK)}$
2. $\text{Average gross hourly wages} * 2\,016 \text{ h} = \text{Converted gross yearly wages (CZK)}$
3. $\frac{\text{Converted gross yearly wages (CZK)}}{12} = \text{Converted gross monthly wages (CZK)}$

Example:

Employee Petr Kozílek has worked 1 824 hours in the year 2003 and his taxable yearly wages were 150 438 CZK.

$$\frac{150\,438}{1\,824} = 82.477 \quad \text{CZK/h} \quad \text{average gross hourly wages}$$

$$82.477 \times 2\,016 = 166\,273.632 \quad \text{CZK/year} \quad \text{converted gross yearly wages}$$

$$\frac{166\,273.632}{12} = 13\,856 \quad \text{CZK/month} \quad \text{converted gross average monthly wages.}$$

Average converted gross monthly wage of this employee is 13 856 CZK.

FOR CALCULATION OF WAGE DIFFERENTIATION, a scale of quantile indicators can be used, which is generally used for evaluation of wages. These are especially quartiles and deciles.

Quantiles – orderly variation series is divided in a certain ratio of frequencies. In general we talk about the p -percent quantile x_p , which divides 100. p % of values from the orderly series, for which is valid, that $x_{(i)} \leq x_{(p)}$ and 100 – 100. p % of values, for which is valid, that $x_{(p)} \leq x_{(i)}$ (Minařík 1995).

$$100.p \leq \sum_{x_{(i)} \leq x_p} 100.p(x_i) \quad \text{and} \quad (100 - 100.p) \leq \sum_{x_p \leq x_{(i)}} 100.p(x_i)$$

Quartiles – are the quantiles, which divide the orderly series into four parts with the same frequency

$$x_{0.25} \quad \text{lower quartile,}$$

$$x_{0.50} = \bar{x} \quad \text{medium quartile (equals to median),}$$

$x_{0.75}$ upper quartile.

Some of the basic indicators of significant values of variation series will be more specified in connection with the evaluation of wages:

- D_1 – first decile
wages within the first tenth of variation series of accedent values (some authors name the first decile as low level),
- Q_1 – first quartile
wages within the first quarter of variation series (lower limit of medium level),
- \bar{x} – median
wages in the mid-level of variation series of accedent values, i.e. the value dividing the orderly series into two halves of the same frequency (medium level),
- \bar{x} – average
arithmetic average of examined characteristics,
- Q_3 – 3rd quartile
wages on the level of the third quarter of variation series (upper limit of medium level),
- D_9 – 9th decile
wages on the level of ninth tenth of variation series of accedent values (high level),
- R – extent of dispersion
dispersion of the data series, $R = x_{\max} - x_{\min}$

Example:

The accedent values series of average gross monthly wages was formed of the data about 345 employees of Koruna, a. s., divided separately for workers and administrators. Then we allocated the median, upper and lower quartile and first and ninth decile. The results are included in the table (see Table 4).

The evaluation of wages differentiation in the whole file of employees – workers and administration – the quantiles distribution is different than in evaluation of individual organisation units (departments, sections, centres, etc.). Both views, i.e. the view of centres and also the view of accedent series of all average monthly wages, are possible and provide data for evaluation of wages differentiation and can be a possible gauge for use of wages in motivation of all employees – in centres and in the whole organisation. We can say that the analysis by the selected quantile-characteristics enables to evaluate wage-differentiation in a much better way than just a survey of numbers.

Table 4. Allocation of quantiles in variation series of average wages of Koruna, a. s. employees

Category	D_1	Q_1	\bar{x}	Q_3	D_9	Average	Extent of dispersion
Workers	7 494	9 022	10 766	12 587	14 575	11 039	44 529
Administration	12 809	14 923	18 260	22 843	29 245	19 707	39 314

In case of the need to ANALYSE THE TARIFF SYSTEM of an organisation and to identify wages differentiation of employees, it is good to start with the analysis of wage-categories and wage-tariffs. Based on the data provided by a company, we need to find out not only how many employees are placed in which category, but also how the individual categories follow one another, or how they overlap.

Calculation of the wage-tariffs overlap can be done in the following way:

$$Wt_a \text{ upper level} - Wt_b \text{ lower level} = \text{Overlap} (Wt_a - Wt_b) \text{ (CZK)}$$

Table 5. Scale of hourly wage tariffs

Wage category	Hour tariff	Bonus max.	Total CZK/h
1	34	0	34
2	34	4	38
3	34	11	45
4	34	19	53
5	40	20	60
6	45	23	68

Table 6. Overlap of the monthly wage-tariffs

Category		Wt_a	Wt_b	Overlaps ($Wt_a - Wt_b$)	Span	Overlaps
a	b	(upper limit)	(lower limit)	in CZK	Wt_b	%
1	: 2	34	34	0	4	0.00
2	: 3	38	34	4	11	36.36
2	: 4	38	34	4	19	21.05
3	: 4	45	34	11	19	57.89
3	: 5	45	40	5	20	25.00
4	: 5	53	40	13	20	65.00
4	: 6	53	40	13	23	56.52
5	: 6	60	45	15	23	65.22

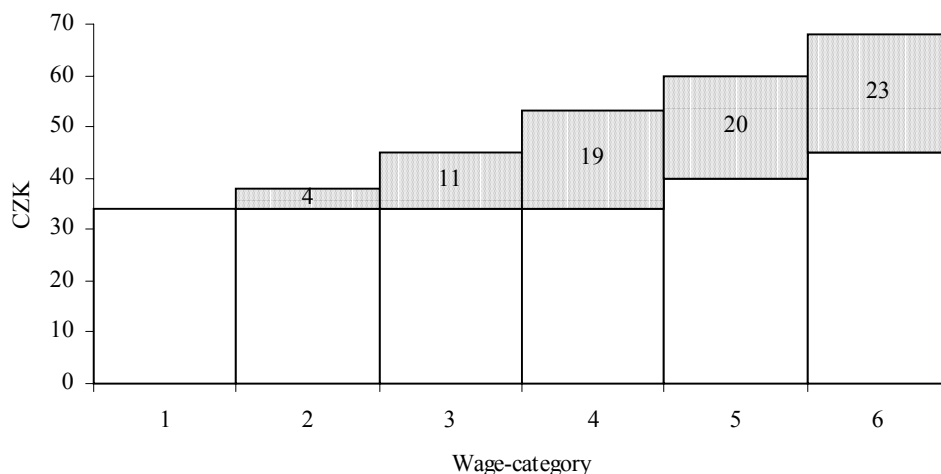


Figure 2. Scale of hourly wage-categories

$$\text{Range } Wt_b = \text{Upper level } Wt_b - \text{Lower level } Wt_b \quad (\text{CZK})$$

$$\text{Overlap} (\%) = \frac{\text{Overlap} (Wt_a - Wt_b)}{\text{Range } Wt_b} \quad Wt... \text{ wage tariff}$$

Example:

As an example, we can use the scale of hourly wage tariffs and do an analysis of overlaps of the particular wage-categories according to the above-mentioned methodology (Table 5).

The hourly tariff scale used in this case has six wage-categories, where the first to the fourth have the same bases, but differ in the additional premiums: 0 to 19 CZK. The remaining two categories already have a differentiated bases and premiums (Table 6).

For a better exhibit of wage tariffs, it is suitable to construct a graph (Figure 2), which is included below. The particular columns showing 6 wage-categories with hourly tariffs which are in a range out of the first one, which represents the basis. Starting with the second wage-category, these are hourly tariffs with overlap. At the same time, these hourly wage-tariffs overlap into other than neighbouring categories. The tariff range is included inside the columns from 4 CZK to 23 CZK.

CONCLUSION

Owing to the extent of the issues, we appoint that these methods of analysis can be amended by structural analysis of the wage costs, analysis of wages and labour productivity, analysis of rewards differentiation by the range of monthly wages, analysis of an average wages by sex, age or education.

As a conclusion we can state, that the paper creates a methodology apparatus for evaluation of evaluation of some aspects of analysis of employee structure in relation to rewarding, and indicates possibilities of further specifications.

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