Remuneration System for Professionals with Requirements for Efficiency and Sustainable Quality. 1. Performance Indicators and Priority Distribution Method

Jonas Žaptorius [1,2 a]
[1] Department of Business Management,
Vilnius Gediminas Technical University, Saulėtekio avenue 11, LT-10223 Vilnius, Lithuania
[2] Vilnius Business College, Kalvariju str. 125, Vilnius, Lithuania

Received 20 November 2015, accepted 10 December 2015

Abstract. In the age of raising healthcare expenditure, the efficiency of healthcare services has evidently become a top issue. This paper deals with the creation of a performance related remuneration system for medical professionals which would meet requirements for the efficiency and sustainable quality. In real world scenarios it is difficult to create an objective and transparent employee performance evaluation model having dealt with both qualitative and quantitative criteria. To achieve these goals, the usage of decision support methods is suggested and analyzed.

Citations: Jonas Žaptorius. Remuneration system for professionals with requirements for efficiency and sustainable quality. 1. Performance Indicators and Priority Distribution Method – *Innovative Infotechnologies for Science, Business and Education,* ISSN 2029-1035 – **2(19)** 2015 – Pp. 3-10.

Keywords: remuneration scheme; performance related pay; pairwise comparison method; healthcare provider organizations; decision support methods; data mining application; Priority Distribution Method (PDM).
Short title: Remuneration System. 1. Performance Indicators and PDM.

Introduction

In this article we will address the question how a financial employee motivation model based on measured performance and individual added value can be applied in the healthcare sector.

In the scope of this article we cover planning, execution and monitoring steps, excluding the HR related activities associated with communication, legislation and financing. In the second section we analyze the current situation in the healthcare sector and the latest trends in remuneration models used. Having analyzed that, a multi-criteria decision support method is proposed for HPOs performance related remuneration model creation.

1. Formulation of general task

An overview of early and contemporary theories of motivation factors show that motivation, taking into account the way in which it is applied, is a force that influences employees' internal features and external behaviors, and affects their performance [1, 2]. It should be noted that many forms of motivation exist and do not in all cases lead to the same results. The choice of motivation instruments depends on industry, company policies, an employee's job profile characteristics, as well as other factors. The payment system in each organization forms a foundation for a multi-layer motivational system and must be fair, equitable, consistent and transparent. In addition, personnel performance related pay must be based on an individual's activities and, when that is not measurable, on the overall team's work results.

Performance or work output based employee motivation systems are used in many domains. The prerequisite for performance related remuneration is the ability to define regularly measurable work results and their qualitative parameters. By linking employee pay to individual and team work results, managers can use the remuneration system to promote high performance culture, teamwork and foster other organizational objectives.

The creation of a financial employee motivation model is a complex multi-level endeavor, which may influence an organization's business results. By implementing a financial motivation system, organizations harness two competing interests face twofold interest. On one hand, the employee is concerned to maximize his/her pay and shall be interested to improve his/her work results and, on the other, the employer is interested in cost savings. Since ancient times various payment systems have been created to ensure cost-effectiveness, employee motivation and social balance.

The main remuneration system types are time-based (basic pay for standard hours) and unit-based, also called piece rate reward systems. Additionally, bonus systems such as additional hours' reward, sales commission, and profit related pay may be applied. There are many variations and combina-

[a] email: jonas@outlook4team.com

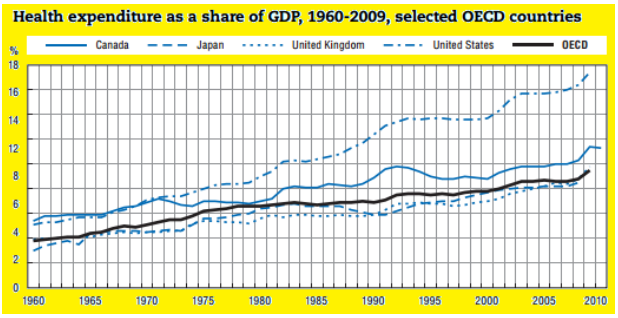

Fig. 1. Healthcare expenditure growth. Adapted according to Ref. [3].

tions of these forms, which are used in different industries for various job profiles.

Within these unit-based forms of remuneration schemes employees have an incentive to increase labor productivity which, in turn, leads to a higher pay. In the healthcare domain this type of payment is directly linked to the most popular reimbursement model, Pay-for-Service. It is heavily used by healthcare provider organizations (HPO) worldwide in private medicine, particularly in the USA.

Indirect unit-based remuneration is characterized by indirect employees' work results. For example, in order to support personnel, the performance related pay is linked to overall team achievements. E.g., the variable salary portion of an operational theatre nurse may depend on overall team performance.

However, in most public, as well as in some private HPOs, the financial organization's operation model is usually not transferred to the remuneration scheme where time-based remuneration is typically used. In Europe there is a higher public share of HPOs, therefore, the most common payment form in the European healthcare sector is a time-based salary system, where the amount paid is based on working hours and employee qualifications. The simplest time-based form of payment is called unified payment for work time system, which is a fixed basic pay for standard hours.

Employee qualification requirements and job profile complexity is understood differently in different countries, industries and even competing companies. A set of defining criteria should include all the factors affecting job characteristics and conditions. The criteria set may include the required level of education, cooperation, concentration, universality and working conditions.

This paper provides an overview of labor relations regulation through performance related payment schemes, which aims to ensure cost-effectiveness, employee motivation and social balance. This significantly increases the importance of human factor, with focused attention on personal responsibility, operational efficiency and continuous improvement processes.

The practical implementation of performance related payment models in an organization has three steps: planning, implementation and monitoring of the new remuneration model. A planning step consists of three parts.

1. Determination of performance indicators to be used in the model.
2. Creation of a calculation model for performance related pay.
3. Discussion and communication with personnel.

The implementation step consists of the actual implementation of new accountancy policies, performance measurements and changes to Human Resources (HR) policies.

The monitoring step is a routine activity aiming to monitor and analyze the changes in an organization caused by an implemented personnel remuneration model.

2. Remuneration scheme for medical professionals

There are substantially different financial healthcare models coexisting worldwide. Each proposes a different business model for healthcare providers. The following major healthcare services reimbursement methods and their combinations are prevalent:

i) Payment-per-Service;
ii) Patient Subscription;
iii) Performance-related Payment.

Regardless of the financial model, a public or private insurance entity reimburses all legally approved medical services provided for a patient covered by the insurance. In some cases, healthcare organizations will get fixed payments for each subscribed patient. This model is typically used for primary care and is used in the UK, USA, post-Soviet Union countries and others. Performance related payment is usually paid by insurance agencies as a bonus, i.e. if healthcare facility meets the quality and performance requirements set.

In the era of steady healthcare expenditure growth [3], which is illustrated in Fig. 1, society demands better efficiency from healthcare providers. Thus, healthcare policy makers are asking themselves what systematic changes would result in better quality of service, more efficient health provider work and less money spent for a healthier population. There are a few answers to address this issue, however, some recent examples of different initiatives for tackling the chronic problems of healthcare systems do exist. The USA recently introduced a new financial model for healthcare providers called ACO, or Accountable Care Organizations, which aims to financially motivate providers by setting metrics for qualitative factors and overall performance. This model complements the fee-for-service model with a performance bonus based on quality and cost savings. Some European countries have introduced special programmes in order to encourage early diagnoses and prevention of diseases like diabetes, tuberculosis, HIS and breast, prostate and lung cancers. Different financial incentive systems have been applied to encourage healthcare providers to participate in these programs.

Getting better results from doctors and nurses requires active performance monitoring and management. Different contract types and bonus packages have been used to improve the quality of the services provided by medical professionals. Paying clinicians based on a "Fee-for-Service" method has caused justified concerns that the balance of medically necessary services being delivered is distorted and has also led to unjustified admissions and other activities [4]. In contrast, time-based salary does not lead to efficient work and encourages lower output. The most innovative healthcare providers have introduced payment mechanisms that combine incentivized output and quality outcomes [5]. There are known examples where up to 20 per cent of doctors' salaries are performance related with nearly half being linked to team performance and quality improvement measurable values[6]. At top class HPO Kaiser Permanente doctors are monitored and ranked in real time on a wide variety of clinical outcomes [6]. The monitoring data is immediately available for the doctors to compare their personal results with peers in their group or even across the region.

Not only are the doctors subject to the anticipated financial incentives change. Nursing personnel are typically the most populous group of professionals in healthcare and their contribution is an essential component in achieving the improved productivity, better quality of care and higher effectiveness in the health sector [7].

In terms of medical personnel payment, the reimbursement methods, used by HPOs influence remuneration schemes, are different. Firstly, there are different financial motivators driven by these methods. Payment-per-Service financially encourages high output of the services provided to the patient, patient subscription financially rewards minimization of services provided while only performance related payment results in long - term patient health quality. Due to the complexity of coexisting financial models there are different medical personnel remuneration models. However, in practice the two most popular payment forms are: time based fixed salary in public HPOs and performance related salaries in private healthcare facilities. The performance related salary scheme is typically calculated considering quantitative results, e.g. number of patient visits, examinations, surgeries, etc.

In private HPOs, employee salaries are determined by these main factors:

i) amount of services provided;
ii) price level in the market;
iii) employee's personal contribution.

Different countries undergo continuous reform of their healthcare systems and the determination of medical personnel remuneration scheme in public HPOs has become one of the central issues. In public HPOs, salaries of medical professionals are usually time-based and formally defined by the governing body. Obviously, this payment method alone does not provide adequate motivation for higher quality or performance. However, usually there are some possibilities to introduce bonuses or performance related payment based on individual or team work results, which can be used as financial motivation instruments.

When an employee's contribution cannot be expressed by its monetary equivalent or percentage of revenue, it is considered to be a subjective decision of the employer. In the public sector, the remuneration scheme is determined by a job evaluation system. The International Labor Organization has suggested a job evaluation system based on the evaluation within four general factors. Each factor has a certain maximum number of points with a total amount of four factors equal to 1000 points. The maximum value of 450 points is assigned to the work complexity factor. Work complexity is seen as an aggregative factor of required professional education and experience, decision magnitude and managerial level.

A social value of work is evaluated with a maximum of 220 points, and is determined by these two criteria: appointment procedures and social significance of the work. A professional responsibility is evaluated by a maximum of 180 points and described by three criteria: impact on the safety of other people, material and moral responsibility and cooperation with external organizations. The last factor is work complexity and work environment which is evaluated by maximum of 150 points. It is characterized by two criteria: mental and physical stress, caused by the level of nervous strain at work and working conditions. According to this system each job profile is rated within the listed four factors by assigning points accordingly. Finally, total sums are calculated and normalized and the resulting coefficient is applied to the official minimum of monthly salary.

Regardless of the ownership form of HPO and the reimbursement model of the healthcare institution, the introduction of a balanced medical personnel performance related payment scheme, which considers both qualitative and quantitative factors may provide the answer to the current efficiency problems faced by the healthcare sector. Implementation of such a balanced performance related remuneration scheme requires determination of measurable indicators. There are a number of healthcare quality and performance indicators which are part of the best practice of business metrics or governmental programs and legislation. However, there is a lack of methods to select, rank and weigh these indicators, gathering them in one system suitable for financial employee performance evaluation. For this purpose, we propose to use the Priority Distribution Method, described by Žaptorius in earlier publication [8].

3. Selecting performance indicators

The first step of an organization's personnel remuneration system change is determination of performance indicators to be used in a new model. Typically, the initial area to look

at is a list of key performance indicators defined by the organization itself. However, in healthcare there are external sources, such as governmental bodies or insurance companies, which set financial incentives for meeting certain criteria. Therefore, depending on the healthcare facility profile and region, one can select from different sources. To name a few, the "Meaningful Use" program [9] established by the U.S. Department of Health and Human Services has a set of criteria for organizations meaningfully using electronic health record systems. Another initiative from the U.S. is called Accountable Care Organizations (ACOs), which proposes that participating healthcare facilities receive additional payments based upon specified quality and savings criteria. Another example is the law setting healthcare providers performance indicators, approved by the Ministry of Health of the Republic of Lithuania.

One can conclude that there is no lack of performance indicators for the healthcare industry, however there is a lack of methodologies for the selection of optimal sets of indicators for a specific healthcare provider. There are a high magnitude of HPOs, with different clinical domains and different financial schemes. Below, we propose a generic method which allows an organization to analyze and choose performance evaluation indicators for a performance related remuneration model.

Step 1. Generate a comprehensive list of clinical, financial and management indicators, derived from the following sources: a) KPIs used internally; b) HPO performance related indicators applied by insurance agents; c) HPO performance related indicators applied by government authorities.

Step 2. Filter indicators which are practically measurable and applicable for financial incentives calculation and assign them to job profiles. It will be useful afterwards to define the indicators' value scale, evaluation period and method.

Step 3. Transform interrelated indicators by combining them. For example, indicators such as overtime hours per month and number of night shifts per month can be combined to the composite indicator - *higher compensated work hours per month*.

Step 4. Preliminarily prioritize the indicators (final ranking of indicators will be done using PDM method). The rule of thumb is to give higher priority to indicators linked to the organization's strategy and to raise priority of indicators which have low performance values.

Step 5. Identify potentially dependable indicators, i.e. indicators which are definitely dependable from other measurable indicators, which were not selected for the financial incentives model. This can be achieved manually or by applying statistical regression analyses tools. A wide range of clinical, statistical and financial data available in organization's IT systems should be used. The data collected in hospital information systems (HIS) has significant potential for these types of analyses.

Step 6. Identify any specific factors leading to unsatisfactory values of selected indicators. We propose to perform this kind of analysis applying data mining methods, such as association rules analysis upon the data prepared in step 5.

Let us consider the following example; an association rules discovery algorithm was used on data collected from a provider's HIS. One of the rules showed with high confidence a longer average length of stay for patients diagnosed with hospital acquired pneumonia, which was developed after using extra corporeal lung support systems.

Out of this rule the management decided to introduce a specific performance indicator related to a careful following of the defined algorithm and used it for the responsible medical personnel in appropriate wards.

Step 7. Update each job profiles performance criteria list per organizational unit based on the results of step 6.

Step 8. Use the PDM method to rank quantitative and qualitative criteria and calculate performance related pay. Data mining methods can be helpful to determine other important indicators which influence initially defined (primary) indicators.

The benefit of this type of analysis is automated intelligent analysis of the aggregated data from different domains:

i) patient demographics, clinical patient data;
ii) illness scripts, including epidemiology and average prognosis;
iii) computerized physician order entry systems (CPOE) data;
iv) data collected from nursing charts;
v) surgery and minor interventions protocols;
vi) medical personnel HR data.

For example, using classification trees [10,11] we can determine what factors influence longer LOS, higher mortality rate for specific nosology, or readmission rate. This approach is suitable for HPOs that have already implemented HIS and or EMR. This approach is considered to be not lower than STAGE 4 according to HIMMS electronic medical record adoption model [12]. Modern HIS, EMR and medical decision support systems are able to provide vast amounts of data and allow us to apply data mining techniques to discover hidden patterns and dependencies, and to facilitate route-cause analysis.

4. Priority distribution method

The *Priority Distribution Method* (PDM) belongs to the family of multi criteria decision support methods, based on expert pair wise comparison of criteria.

In 1977 T. L. Saaty proposed a multi-criteria decision support methodology Analytic Hierarchy Process (AHP) to rank alternatives by pair wise comparison [13]. This method, called the analytic hierarchy process, requires evaluation by how many times one alternative (criterion) is better than the other.

There are other applicable methods for this task as well: Simple Additive Weighting, TOPSIS (Technique for Order

Preference by Similarity to an Ideal Solution), to name but a few. Each has its pros and cons, however, the strongest feature of the proposed PDM, and the reason it was selected, is its high practical applicability.

The weakest part of most pair wise comparison methods is the difficulty of normalizing the experts' opinions. For instance, defining how many times mortality rate in a ward is more important than patient acquired post-surgery complication is very doubtful even for a domain expert. Therefore, the following reduction of a comparison result range just to three categorical values, as proposed in PDM, is very helpful: <less important>, <equal> or <more important>.

The downside of PDM is that the method is not mathematically precise. For a mathematically proven method we recommend a modified AHP version, which addresses the rank reversal problem.

According to J. Žaptorius [8], the application of the *Priority Distribution Method* (PDM) to the financial portion of an employee remuneration package is possible under the following conditions:

a) the employees are working in teams or shifts and have similar job profiles;
b) a variable salary part or performance bonus is applicable;
c) it is impossible to directly and precisely evaluate the productivity of the employees.

PDM is based on the expert evaluation of qualitative and quantitative features of the object, i.e. job profile, in comparison with each other. The method allows to evaluate objects which have incomplete or only qualitative differentiation parameters. In practical settings, a panel of experts shall be formed, who will analyze initial data and define comparison criterion for the investigated objects.

The method prioritizes a group of objects in ascending or descending order, depending on the magnitude of their characteristics manifestation, thus, calculating their ranks. Using pair wise comparisons, the relative importance of one criterion over another can be calculated.

Accordingly, for each object PDM defines relative weighting, which expresses the rank of each object's characteristics and helps to select and prioritize the criteria.

PDM is flexible in adjustment of precision and degree of justification required for management tasks and optimal decision support.

Typically, when indicators with different origin and measurement units exist, we face the problem of normalization and conversion to a unified measurement unit or non-dimensional unit. To tackle this problem, the method proposes the conversion of indicators' values to their relational values (ratios), which will be expressed in uniform, quantitative and therefore arithmetically comparable units. The initial step is to define the most important differentiating criteria, which will be used to calculate performance related payments. There are a number of possibilities for the selection of criteria, e.g. contracting external HR consultants, surveying employees and defining by number of votes, or basing definition on an individually generated added value aligned with the company's business goals and key performance indicators.

Table 1. Comparison of all possible criterion pairs

Criteria pair	Experts					Average priority value P*
	1	2	3	4	5	
w_1 & w_2	>	>	>	>	>	>
w_1 & w_3	>	>	=	>	>	>
w_1 & w_4	>	=	>	<	>	>
w_1 & w_5	>	>	>	>	>	>
w_2 & w_3	<	<	>	=	<	<
w_2 & w_4	=	=	=	>	<	=
w_2 & w_5	<	>	<	<	<	<
w_3 & w_4	>	>	>	>	=	>
w_3 & w_5	>	=	=	=	=	=
w_4 & w_5	>	=	>	>	=	>

As indicated in section "Selecting performance indicators", there is a set of typical indicators used in healthcare; some of which can be successfully projected to personal employee job evaluation indicators.

There are two potential classes of employee productive input evaluation criteria: quantitative and qualitative. We will assume criteria as quantitative if they are measurable, numerical and their measurement or evaluation is not dependent on subject matter expert opinion, e.g. number of patient visits, hospitalization length of stay, percentage of postoperative complications and percentage of patient readmissions. In contrast, a qualitative criterion usually has categorical values which are indirectly evaluated by subject matter experts, e.g. teamwork, discipline, loyalty, creativity, or proactivity. Such a qualitative criterion can be valued, compared to the etalon value if it exists, or compared to the respective criterion of other employees in the group or region.

According to the pair wise decision rule formulated by Terstown [14], if a pair wise comparison is performed by a group more or equal to 25 independent experts then their evaluation values have a normal distribution with variance equal to 1. In a practical setting the typical number of experts is less than 25 and so distribution is close to normal.

Let us define the most important criteria set as

$$K\{k_1, k_2, k_3, k_4, k_5\}. \quad (1)$$

Each criterion k_n shall have a defined value range, source, and calculation method.

To rank the criteria we need to define each criterion's weight w_n. In the frame of PDM it is achieved by comparing criteria in pairs. In order to mutually compare k_n we will use the Table 1 of all possible pair wise comparisons.

All possible criteria pairs' comparison ratios are defined by the experts. In this example, we analyze simplified and more practical comparisons, where the only ratio values the

experts can assign are: greater than ">", equal to "=", or less than "<", assuming that the same degree of criteria pairs' relative difference applies. Then, the comparison matrix

$$A = \| a_{i,j} \| \tag{2}$$

is derived by using average priority values $P*$, criteria conditional priorities P^s_{ij} are incrementally calculated. ‖A‖ is a square matrix with size equal to the number of criteria l. As in many multi-criteria decision making methods using pair wise comparison [13,15,16], the matrix $\| A \|$ is naturally reciprocal, where

$$a_{i,j} = a^{-1}_{j,i}. \tag{3}$$

Therefore only the upper or lower part of it shall be calculated and another is easily derived. PDM uses formula for data when $a_{i,j} \in [0; 2]$:

$$a_{i,j} + a_{j,i} = 2 \tag{4}$$

According to PDM, the following heuristic is used to derive the comparison matrix.

$$\text{a(x)} = \begin{cases} 1+z, & \text{when } x_i > x_j \\ 1, & \text{when } x_i = x_j \\ 1-z, & \text{when } x_i < x_j \end{cases}$$

where z is defined as:

$$z = \frac{K_r - 1}{K_r + 1} + \sqrt[2]{\frac{0.05}{l}} \tag{5}$$

and l represents the number of criteria.

K_r represents the preliminary estimated maximum and minimum criterion weight ratio:

$$K_r = \frac{X^{max}_i}{X^{min}_j} \tag{6}$$

where X^{max}_i and X^{min}_j - compared i and j indicators with a maximum and minimum value.

By ranking expert ratios values (see Table 1), let us estimate K_r=4. Given the above estimated K_r:

$$z = \frac{4-1}{4+1} + \sqrt[2]{\frac{0.05}{5}} = 0.7 \tag{7}$$

and

$$\text{a(x)} = \begin{cases} 1.7, & \text{when } x_i > x_j \\ 1, & \text{when } x_i = x_j \\ 0.3, & \text{when } x_i < x_j \end{cases}$$

This derives a comparison priority matrix ‖A‖ as presented in Table 2.

Considering the matrix above, the criteria priorities P_i and then subsequently normalizing P_i , $P^{'}_i$ has been derived.

5. Calculation routine

The calculation is provided using following routine.

1. Calculate priority sums for each row:

$$\sum_{j=1}^{i} a_{i,j} = b_i \tag{8}$$

Table 2. Criteria weight comparison matrix.
Indexes: i (vertical), j (horizontal)

i j	w_1	w_2	w_3	w_4	w_5	$\Sigma a_{i,j}$=b_i	P_i	$P^{'}_i$
w_1	1	1.7	1.7	1.7	1.7	7.8	37.04	0.348
w_2	0.3	1	1.7	1	1.7	5.7	23.60	0.222
w_3	0.3	0.3	1	0.3	1.7	3.6	13.10	0.123
w_4	0.3	1	1.7	1	1.7	5.7	23.60	0.222
w_5	0.3	0.3	0.3	0.3	1	2.2	9.04	0.085
Sum							106.38	1.000

Table 3.Recalculated criteria weight comparison matrix.
Indexes: i (vertical), j (horizontal)

i j	w_1	w_2	w_3	w_4	w_5	$\Sigma a_{i,j}$=b_i	P_i	$P^{'}_i$
w_1	1	1.69	1.69	1.69	1.69	7.8	36.90	0.345
w_2	0.31	1	1.69	1	1.69	5.7	23.69	0.222
w_3	0.31	0.31	1	0.31	1.69	3.6	13.34	0.125
w_4	0.31	1	1.69	1	1.69	5.7	23.69	0.222
w_5	0.31	0.31	0.31	0.31	1	2.2	9.30	0.087
Sum							106.91	1.000

2. Calculate P_i by summing the product of row priority $a_{i,k}$ and b_k:

$$P_i = \sum_{k=1}^{i} a_{i,k} \times b_k \tag{9}$$

3. Normalize conditional priorities $P^{'}_i$ values:

$$P^{'}_i = \frac{P_i}{\sum\limits_{k=1}^{i} P_i} \tag{10}$$

With calculated $P^{'}_i$ values, actual K^f_r ratio is being calculated and compared to preliminary estimated ratio K_r:

$$K^f_r = \frac{P^{'max}_i}{P^{'min}_i} = \frac{0.348}{0.085} = 4.094 \tag{11}$$

Thus, $K^f_r \neq K_r$, and we have to align the initially calculated z value. The calculation of correction coefficient α will be provided.

$$\alpha = \frac{K_r}{K^f_r} = \frac{4.000}{4.094} = 0.98 \tag{12}$$

The aligned z value will be calculated using initial $z_p$value:

$$z = z_p \times \alpha \tag{13}$$

Thus result:

$$z = 0.7 \times 0.98 = 0.69 \tag{14}$$

Considering the new z value, a new a_{ij} value has been derived:

$$\text{a(x)} = \begin{cases} 1.69, & \text{when } x_i > x_j \\ 1, & \text{when } x_i = x_j \\ 0.31, & \text{when } x_i < x_j \end{cases}$$

A recalculated comparison priority matrix ‖A‖ is presented in Table 3. Weighted criteria ranks are expressed as normalized numeric weights $P^{'}_i$.

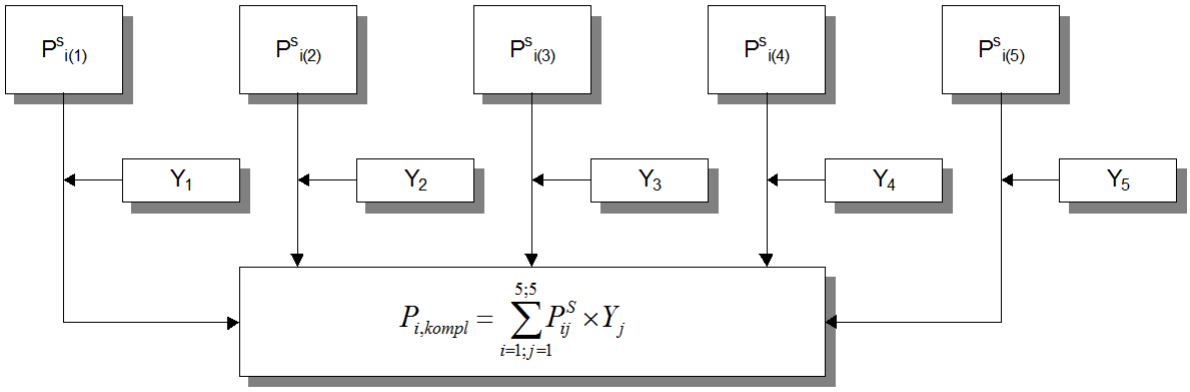

Fig. 2. Complex employee performance value indicator.

The next step is to evaluate employees individually. Quantitative criteria evaluation can be directly performed, applying normalized measurement ranges. Individual employee criteria ranking shall have the biggest weight value for the best performance value, accordingly, as the biggest weight value for the most important criterion was calculated in $\|\mathrm{A}\|$. Therefore, if a minimizing criterion exists, its value shall be converted as follows using $\min c$ as the smallest value of an object's criterion:

$$\overline{c} = \frac{\min c}{c_i} \tag{15}$$

This transformation of minimizing criteria values will convert the smallest value to the largest equal to 1.

For evaluation of individual employee's qualitative criteria we apply PDM. The external experts or the team of employees themselves evaluate each employee pair wise, according to the steps described above. The results of the evaluation are combined with the PDM results of criteria ranking. The complex employee performance value indicator $P_{i,compl.}$ is calculated using routine as presented in Fig. 2.

$P_{i,compl.}$ represents the i-th employee performance value indicator; $P^S_{i(j)}$ - i-th employee evaluation weight for j-th criterion; y_j - j-th criterion weight.

The employee performance related payment is calculated using a fixed salary part, called the Base. Typically, the variable salary part is formed as a specific percentage K% of the Base, as defined by company policies. Applying the calculated complex employee performance value indicator (see Fig. 2), the variable salary part equals to:

$$Salary_{var,i} = Salary_{fix,i} \times K \times PVI \tag{16}$$

where $Salary_{var,i}$ - i-th employee variable salary part (performance related pay); $Salary_{fix,i}$ - i-th employee fixed salary part.

According to [8], this method can also be used as a method for employee job profile evaluation. From a HR management point of view, this heuristic method expresses a comparative view of the market value of the job performed by certain employees.

The most practical outcome of the PDM is the definition of employee evaluation criteria weights, which can be universally used in the frame of the analyzed company/department/team.

Conclusions

Healthcare policy makers and Healthcare Provider Organizations are in a constant battle with rising healthcare expenditure; there is a high need for innovative financial schemes, promoting greater effectiveness of services provided. A method utilizing multi-criteria decision support for the creation of a performance related remuneration model in inpatient healthcare facilities was created.

The implementation of a well-balanced performance related remuneration model needs a systematic approach. Having analyzed the issues of practical implementation of performance related pay schemes in the healthcare domain, a methodology consisting of performance indicators selection, usage of the Priority Distribution Method and a method for monitoring its efficiency is proposed.

A pair wise criteria comparison method called *Priority Distribution Method* (PDM) was used for weighed personnel performance criteria ranking. The defining of an HPO's personnel remuneration model is a complex and manifold task, which highly influences overall enterprise results. In order to determine individual work outputs healthcare providers have to use personnel work performance evaluation models. Recent global changes in the healthcare domain have resulted in a new understanding that a complex set of quantitative and qualitative criteria should be applied for the overall provider's activity evaluation. When projecting this perspective to the evaluation of individual performance, we face the issue of the qualitative criteria relative weight determination and its influence to overall employee performance, expressed in weighed

criterion rank. PDM was specifically created to address these issues and provide a practically usable method, in which not directly measurable qualitative criteria shall be subjectively evaluated by experts [8].

Additionally, the issues of performance criteria selection for PDM and evaluation of PDM application results were discussed.

A method for healthcare specific criteria selection consisting of 6 steps was provided. The method emphases the usage of well-defined criteria in healthcare legislation and healthcare sector best practices for setting the initial indicators. Enterprise specific indicators shall be derived from initial by applying intelligent data analysis techniques to the available provider's statistical, clinical and HR data. Usage of association rules learning and other data mining methods can reveal additional non-obvious indicators, which will/should be included in PDM calculations.

References

1. Abramson P. R., Inglehart, R. Value Change in Global Perspective. – Ana Arbor: University of Michigan Press, 1995.
2. Martinkus B., Savanevičienė A. Darbo ekonomika. – Kaunas: Technologija, 1996
3. Health at a Glance 2011. OECD INDICATORS. Organisation for Economic Co-operation and Development. – 2012. – ISBN 978-92-64-11153-0
4. Lee T., Mongan J. Chaos and Organisation in Health Care. – Cambridge: MIT Press, 2009.
5. Darves B. Physician Compensation Models: Big Changes Ahead. – *New England Journal of Medicine Career Centre* (2011). – <http://www.nejmcareercenter.org/article/92/physician-compensation-models-big-changes-ahead/>, accessed 20 04 2013.
6. Paulus R. et al. Continuous Innovation in Health Care: Implications of the Geisinger Experience. *Health Affairs* 27:5 (2008).
7. Buchan J., Black S. . The impact of pay increases on nurses' labour market: a review of evidence from four oecd countries. – *OECD Health Working Paper* 57(2011). – <http://search.oecd.org/officialdocuments/displaydocumentpdf/?cote=DELSA/HEA/WD/HWP(2011)4&docLanguage=En>, accessed 20 04 2013.
8. Žaptorius J. Darbo rinka: darbo užmokesčio tendencijų barometras. – *Filosofija. Sociologija.* 4 (2005) 53-61. – Vilnius: Lietuvos mokslų akademijos leidykla. – ISSN 0235-7186.
9. Meaningful use. [interactive] Centers for Medicare and Medicaid Services. USA. – <http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Meaningful_Use.html>, accessed 10 04 2013.
10. Bellazzi R., Zupan B. Predictive data mining in clinical medicine: Current issues and guidelines. – *International journal of medical informatics* 77 (2008) 81-97.
11. Berka P., Rauch J., Zighed D. A. . Data mining and Medical Knowledge Management - Cases and Applications. – Idea Group Inc (IGI), 2009.
12. Electronic Medical Record Adoption Model [interactive HIMMS]. Healthcare Information and Management Systems Society, USA – <http://www.himssanalytics.org/emram/>, accessed 10 04 2013.
13. Saaty T.L. A scaling Method for Priorities in Hierarchical Structures. – *J. Math. Psychology* 15 (1977) 234-281.
14. Beshelev S.D., Gurvish F.G. Mathematical and statistical methods of expert evaluation. – Moscow: Statistics, 1974 (in Russian).
15. Uppuluri, V.R.R. Prioritization Techniques based on stochastic paired conparisons. – In: B.Karpak and S.Zionts (Eds.) Multiple Criteria Decision Making and Risk Analysis Using Microcomputers – *NATO ASI Series* F56 (1989) 293-303.
16. Wilson A., Thabane L., Holbrook A. Application of DM techniques in pharmacovigilance. – *British Journal of Clinical Pharmacology* (57) 2 (2003) 127-134.