

A NOVEL GENERALIZED NET MODEL OF THE EXECUTIVE COMPENSATION DESIGN

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Abstract:

In the paper we are concerned with a structured approach to the process of design of an executive compensation system in a company which is one of most relevant issues in corporate economics that can have a huge impact on a company, with respect to finances, competitiveness, etc. More specifically, we present a novel application of Atanassov's concept of a Generalized Net (GN) which is a powerful tool for the representation and handling of dynamic discrete event problems and systems. First, to present the problem specifics, a broader Total Reward system is discussed together with the importance of proper structuring of the compensation system for executives to support company's goals, allowing attracting, motivating and retaining managers. The proposed compensation design model starts from incorporating a broad spectrum of benchmarks, expectations and constraints to those already incorporated in the early phase of the design of the executive compensation. In the design and testing phase a significant emphasis is placed on the flexibility and adjustability of the executive compensation package to external factors by testing, dynamically adjusting and stress testing the proposed compensation package already in the design phase. Then, we apply some elements of the theory of Generalized Nets (GNs) to construct the model of executive compensation design using the proposed approach.

Keywords: *rewards systems, compensation design, banking activities, corporate activities, Generalized Net, modelling, Discrete Event System Modeling*

1. Introduction

The present paper is a continuation of our previous investigations on the use of some elements of the theory of Generalized Nets (GNs) proposed by Atanassov [2, 3] for the mathematical modeling of banking activities [8, 11], executive compensation [9], as well some technological and business activities of a petrochemical company (cf. [5]).

In this paper, by extending the ideas of [9], we focus on the development of a system for compensation design for bank executives. We start by discussing the role of compensation in the reward systems to identify the key objectives placed on the executive compensation as well as key requirements of the compensation design process. Later we discuss the importance

of updating procedures in the compensation design, which includes continuous cycle of developing, implementing, using, evaluating and adjusting of executive compensation. Based on those principles and objectives we propose a comprehensive approach to executive compensation design.

We continue show the application of some elements of Atanassov's theory of Generalized Nets to construct the model of executive compensation design which incorporates the process for executive compensation design to be proposed. Finally we identify some promising areas for future research.

2. Reward Systems and Their Role in Attaining Company Goals

The primary goal of a reward system in a company, firm, corporation, etc. is commonly described in the literature as the supporting of business goals, and attracting, motivating and retaining competent employees (cf. [13]). It is also referred to as a system that aligns the rewards to executives with is critical for the company to succeed in both a short-term and long-term perspective, and to accomplish its strategic plan (cf. [12]). Yet another approach is presented by Ellig (2007) who defines the Reward Management as the one concerned with the formulation and implementation of strategies and policies that aim at rewarding people fairly, equitably and consistently in accordance with their value to the organization (cf. [7]).

Rewards strategy is a significantly complex issue which ties the business strategy with medium and short term tactics and with day to day tasks and decision, and therefore a proper rewards strategy requires the incorporation of large number of elements a list of which is listed below as proposed by Armstrong [1] and WorldatWork [13]:

- Rewards strategy philosophy – statement about how rewards strategy will support business strategy and needs of the company's stakeholders,
- Goals of Rewards Strategy – their prioritization and success criteria for evaluation,
- Types of Rewards – list of reward types including their description and relative importance,
- Relative importance of various rewards -setting the importance of rewards relative to other tools applied in influencing employees behaviors,
- Selection of measures – selection of measures that should be used in the design of rewards includ-

ing decision about the level in the organization at which the criteria will be measured (organization-wide, SBU, team, individual) and decision about which elements of total rewards will be associated with those measures,

- Selection of competitive market reference points – selection of peers and competitors that should form the benchmarks and to which employees will benchmark their compensation in terms of its competitiveness,
- Competitiveness of rewards strategy – decision on desired competitive position versus selected competitive market reference points, company's level of rewards to be below, on par or above the market,
- Updating of Rewards Strategy – defining criteria and process for updating of Rewards Strategy or decision of which elements can be updated individually,
- Data and information management – selection of information sources, approach and methods of data processing, tools used in decision support as well as reporting,
- Guidelines for solving conflicts – methods for approaching to conflict and processes for resolving conflicts,
- Communication Strategy – decision about the intensity of communication of rewards strategy with key stakeholders as well as content of such communication.

The Total Rewards approach targets very closely the issues faced today by majority of banks operating in fast changing environment with increased scrutiny of shareholders, regulators and public on their performance and in particular on compensation of their executives. While banks are expected to be more modest in their compensation they also operate in a highly complex and fast changing environment where they need to attract, develop and retain top talent. Therefore the historical simplified approach to rewards management needs to be expanded into a total rewards system. The Total Rewards approach proposed by WorldatWork [13] promises to address key concerns of today's banks in managing their executive workforce with:

1. Increased flexibility
2. Improved Recruitment and Retention
3. Reduced Labor Costs/Cost of Turnover
4. Heightened Visibility in a Tight Labor Market
5. Enhanced Profitability

Given our task of structuring and codifying the bank process that we started in our previous paper, as well as with the current significant visibility and public scrutiny of compensation of executives in banks, we commence our analysis with compensation processes and systems.

3. Role of Compensation Systems in Motivating Executives

While executives are motivated by diverse elements, compensation program, when properly structured and controlled, remains the most potent

weapon for CEO and HR department in their arsenal of reward and punishment devices. Compensation is highly effective at motivating individual executives to higher levels of performance as described by Bruce R. Ellig [6]. This approach is consistent with agency theory that suggests performance pay as a substitute to monitoring [7]. Compensation is by any mean the largest component of rewards system and a major cost for the organization [13]. At the same time, while Total Rewards Strategy as presented earlier is highly complex to design and implement, the well-designed compensation system can benefit even smallest organizations and can become a centerpiece of human resource strategy when it comes to attracting and retaining top talent and good performers.

The challenge of proper structuring and implementation of compensation system is further complicated in the professional organization, such as bank, where there is a significant number of professionals, which not only have various targets set but they also tend to work with different lines of responsibility and reporting to multiple superiors or operating in cross functional teams. In addition to this, given the various ownership changes and mergers divestments the typical career in "siloses" or within certain departments or parts of organization is no longer the rule. Today's professionals tend to change assignments or specialties, levels of responsibility regularly; they also take advantage of horizontal promotions. In those cases what seems natural from the organizational point of view, that certain position has attached to it compensation package is not accepted by employees that are to relocated from the department or position with more attractive or just differently structured compensation package. Those challenges of today's banks call for a highly dynamic and flexible compensation design process.

Another important external factor faced by banks in the US and in Western Europe, in particular banks that required state bailout or struggling with lack of growth is an increased public scrutiny of compensation in banks. At the same time banks in the emerging economies face different sets of challenges related to reduced access to liquidity, increased regulatory oversight, foreign ownership and need for operational excellence [9]. The famous year-end bonuses enjoyed by many bank professionals for reaching sales or profit targets are questioned as they promote taking sizeable risk that only later are realized and that do not impact the executives that took those risks.

One more characteristic of banks today is the need to quickly react to changes in the marketplace and to changing bank objectives that put an additional pressure on compensation systems as recent research from Towers Perrin [12] points out that compensation and benefits can be easily copied by competitors vs. other types of rewards, in particular intangible, that maybe more difficult to imitate.

Therefore the compensation systems while remains the most important element of reward systems at banks require a support in the design process performed by HR professionals. We believe

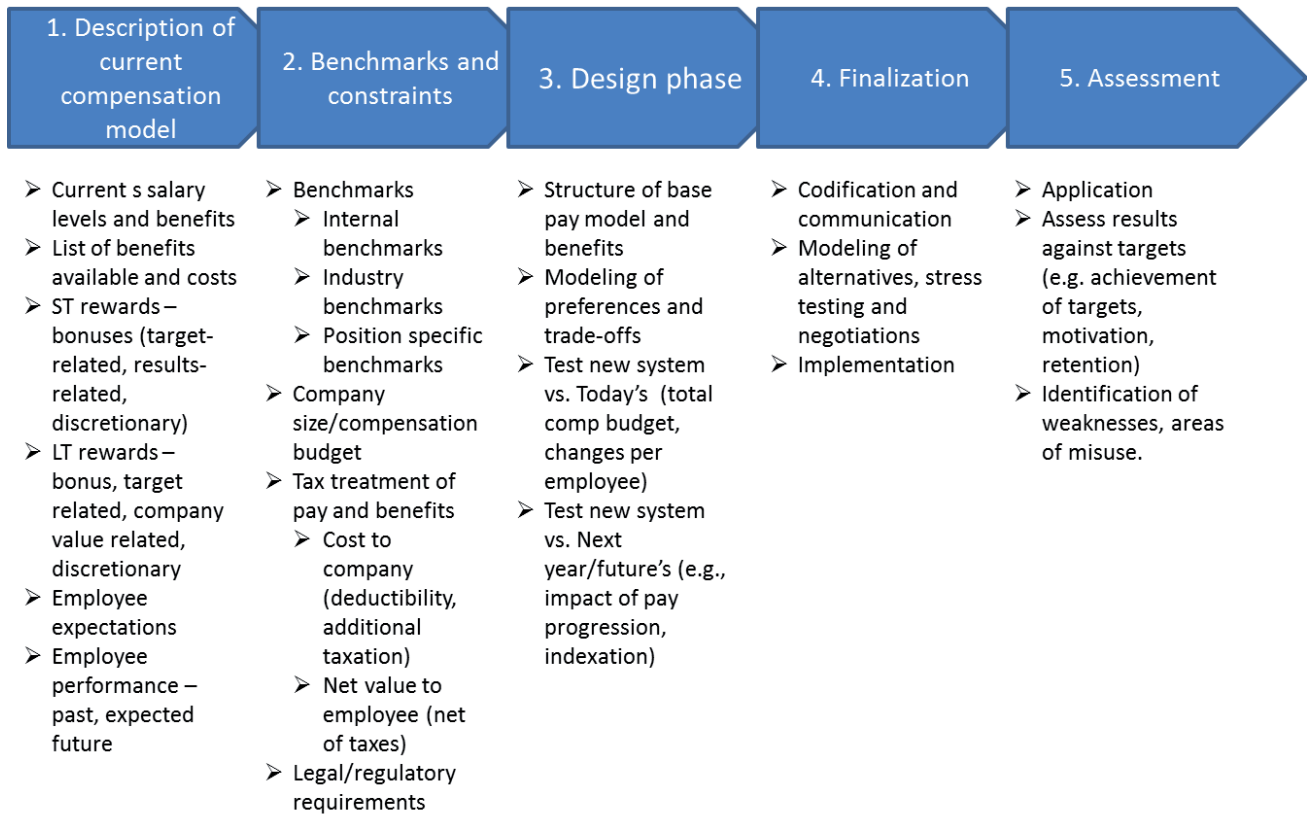


Fig. 1. Compensation design process steps and tasks

that well-structured compensation design process that incorporates broad information sourcing with high level of flexibility and adjustability that can be implemented in a decision support system would be of significant help and would improve decision making and help banks in increasing their results and efficiency while providing well balanced motivation to bank executives.

4. Proposed Approach to the Structuring Process of the Executive Compensation Design

In our approach to the structuring of the process of executive compensation design we have decided to first focus on internal company goals and initially set aside external constituencies and considerations which we will analyze in our future works.

While setting the goals for structuring and codifying the executive compensation design process, based on the available literature and research results reported (in particular: [13], [6], and [10]) we have identified and set three goals for the process and model considered:

1. To optimize executive compensation to maximize the value to a company (to fit its goals) and to an executive (to be able to attract and retain the best people).
2. To dynamically calculate the cost of executive compensation to the company and benefits to an executive to respond to a fast changing and highly competitive environment.

3. To provide a tool for a compensation committee/ CEO/HR department to evaluate alternatives and conditions of the executive pay package and their impact on the company in static and highly dynamic scenarios.

With the three goals for the structuring and codifying of executive compensation design process presented above, we wish to propose an approach that focuses on the incorporation of a diverse sets of source data but also that puts a significant effort into dynamic analyses of the incorporation of those sets of sources, evaluation and readjustments that can be performed throughout the compensation design process.

The proposed process, presented in Fig. 1 below, is composed of five action steps:

1. **Description of the current compensation model** – an important goal of this step is to understand the current drivers, variables and constraints of the existing compensation model as well as employee expectations and past performance.
2. **Benchmarks and constraints** – this step allows for the introduction of various benchmarks, survey data as well as external and internal constraints.
3. **Design phase** – the most important element that reshapes the standard blue print for the compensation model with data inputs from the existing compensation system and external benchmarks, with internal and external rules and constraints in an iterative and dynamic process of designing, analyzing and testing.

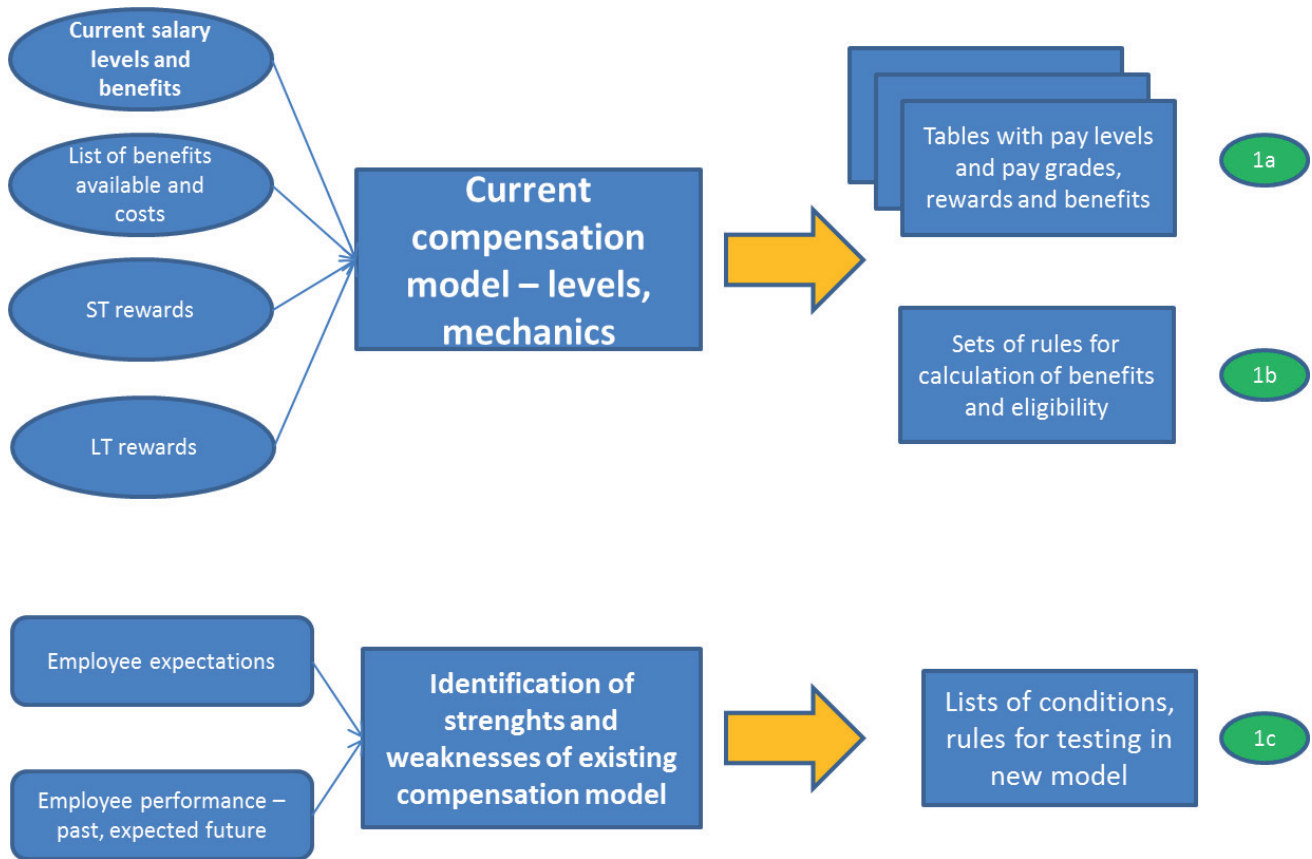


Fig. 2. Description of current compensation model

4. **Finalization** – in this phase the proposed new compensation model is codified as well as alternatives are modeled and it is stress tested for extreme cases. This phase ends with the implementation.
5. **Assessment** – in this step the new compensation model is used, its effectiveness is monitored and potential weaknesses are spotted, documented and evaluated.

4.1. Description of the Current Compensation Model

The first step in the proposed process, depicted in Fig. 2, focuses on the compilation of source information about the current salary levels for different positions and grades of the executives together with benefits as well as short term (ST) and long term (LT) rewards such as target and result oriented bonuses.

By compiling those sets of information, first, trends or inconsistencies of the existing model can be spotted and properly marked for future analyses. This data set also allows for performing the verification of the existing compensation model to targets and budgets of the company in question, as well as its fit with company goals and strategy.

The second element of this step is the compilation of employee expectations, both monetary and non-monetary ones, as well as related to the structure of their compensation or mechanics of pay for their performance together with information of the employee performance related to targets of the company. Based

on this data the first partial analysis can be performed to identify if the current compensation model is acting properly to stimulate the performance of the individual executive, its efficiency and effectiveness.

The key outputs of this step are tables with pay levels and pay grades together with rewards and benefits (primarily monetary), sets of rules for the calculation of benefits and their eligibility, and a list of condition rules for testing in the new model.

4.2. Benchmarks and Constraints

The second step, presented in Fig. 3, is focused on the assembling of sets of benchmarks as well as rules and constraints that describe the competitive environment and allow for a dynamic modeling of the new compensation model. The comparable universe of benchmarks is to include data from internal benchmarking (between bank subsidiaries or countries of operation), industry benchmarking (primary in the same country or a similar financial center) and position specific benchmarking as well as information about company/bank sizes and compensation budgets for similar sized competitors. This set of data will allow the determination of sets of ranges, medians and distributions to be later used in the modeling process.

Another group of data to be elicited and included is the external constraints that need to be considered in the design of compensation model. In particular this should include the local legal and tax considerations as well as industry specific requirements. Those sets

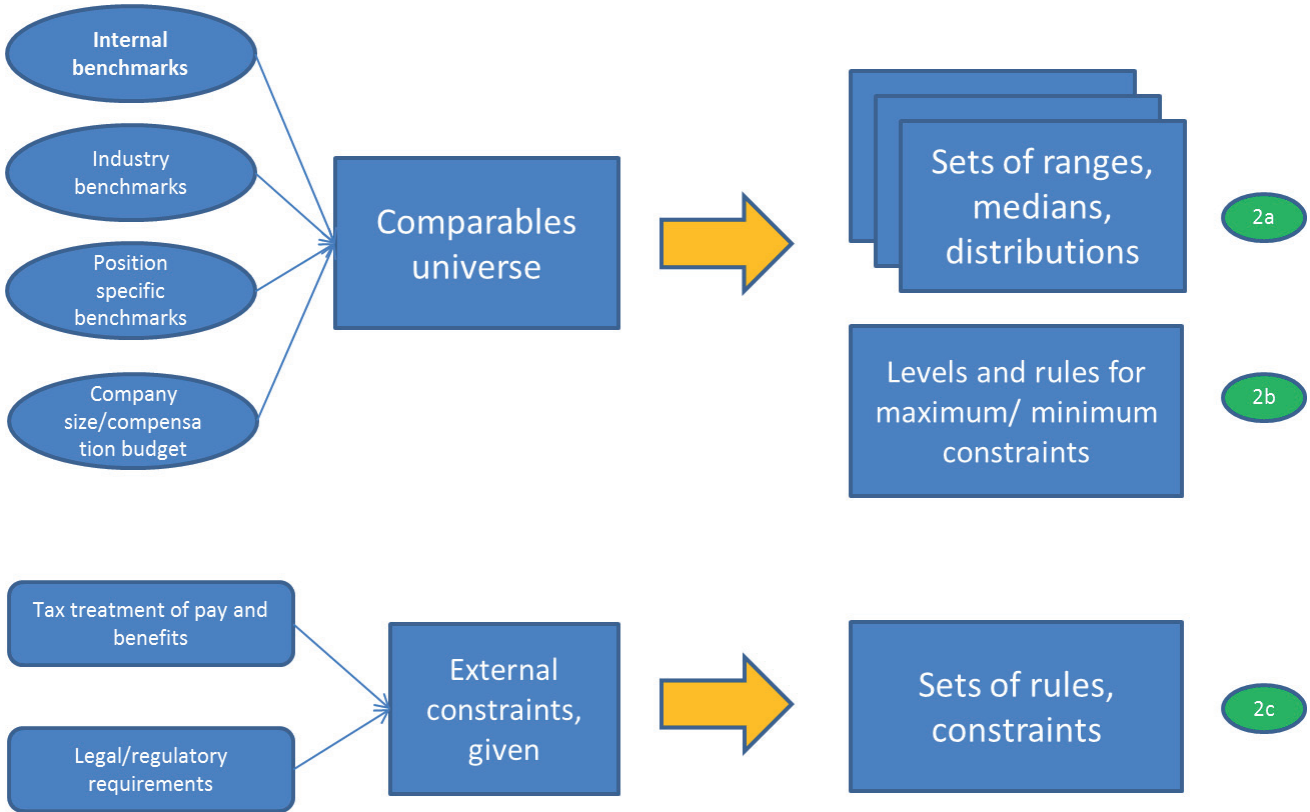


Fig. 3. Benchmarks and constraints

of rules and constraints will be used in the following step to adjust and test the proposed compensation model for compliance and efficiency.

4.3 Design Phase

The design phase, shown in Fig. 4, is the most important and the most complex element of the proposed approach as it is the process in which the data inputs together with rules and constraints are used to

develop the compensation model blueprint which is transformed into a proposal of a new compensation model and finally into the new compensation model. The proposed approach starts with a compensation model template which includes all elements of the compensation system such as a base pay, base pay modifiers (such as pay grades or bands), target-related and results related rewards, etc. but without any numerical data.

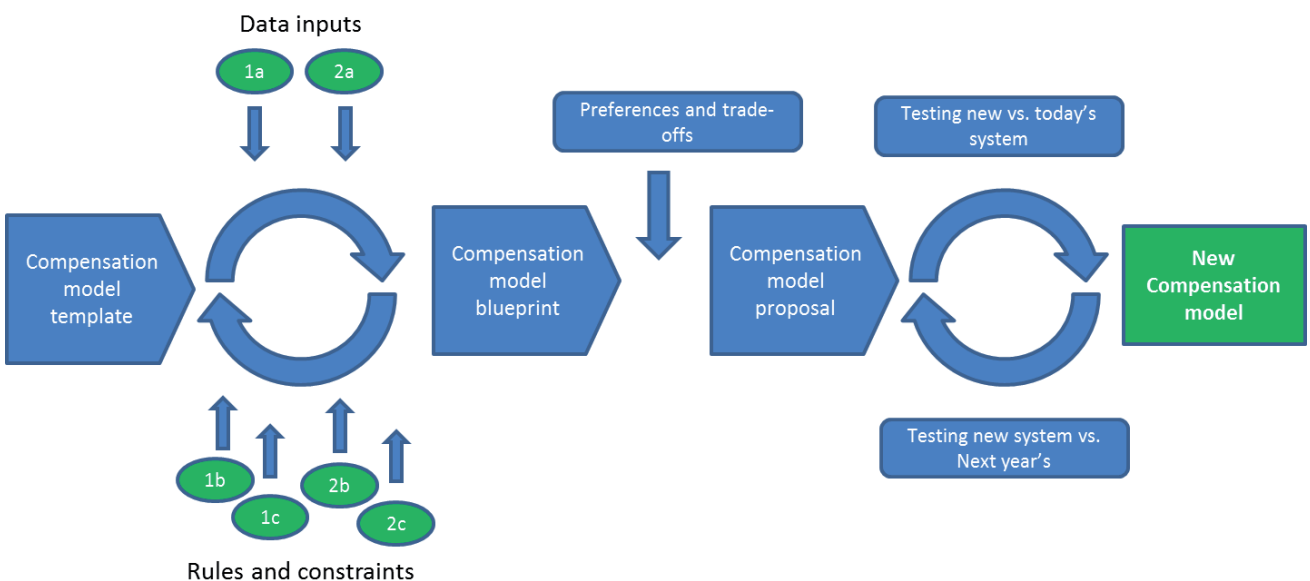


Fig. 4. Design Phase

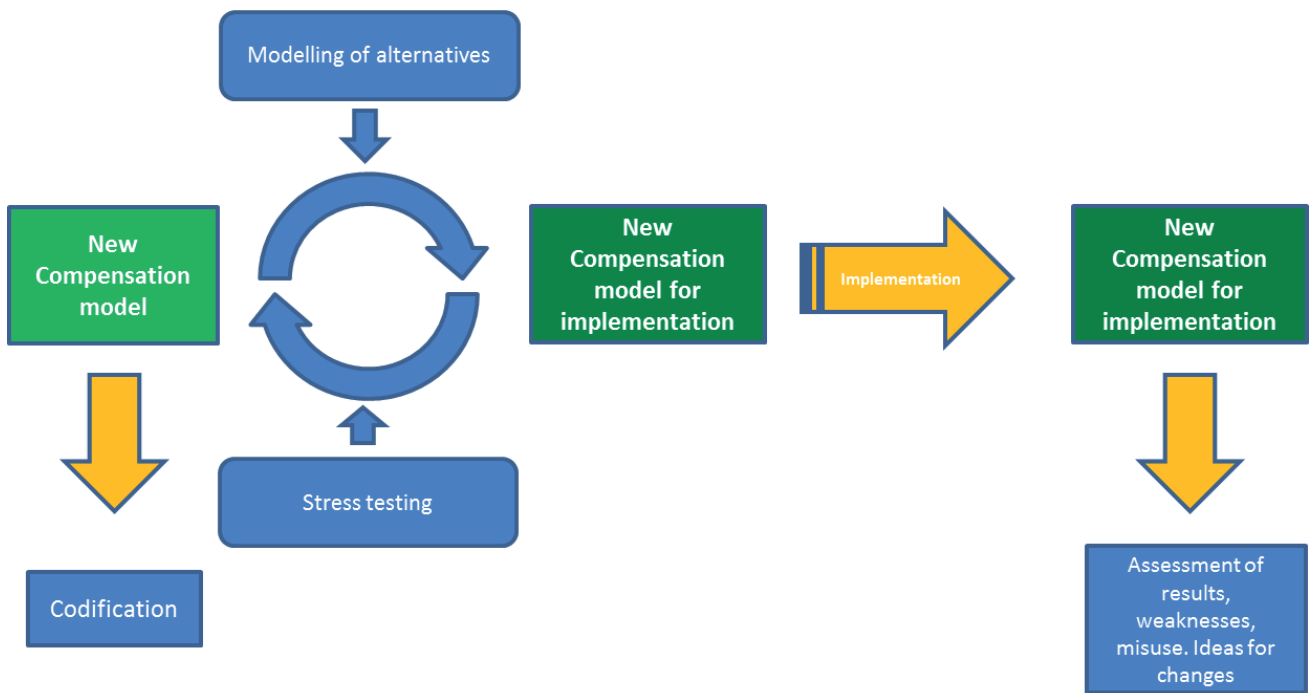


Fig. 5. Finalization and Assessment

The first phase of the design process is an iterative inclusion of the data inputs and rules/constraints that forms a blue print of the new compensation model, highlighting the elements consistently meeting the criteria and elements that are contradictory or outside of the constraints placed.

The second phase includes an evaluation of preferences and trade-offs to eliminate the criteria that cannot be met and to finalize core elements of the compensation model. This phase of the process involves an iterative testing of the proposed model versus present goals and a present system and new targets and goals to verify its applicability and efficiency (in particular a cost – effect type analysis). The final product of this action step is a proposal of a new compensation model which consists of a core model and sets of variable elements together with performance criteria and rules/constraints.

4.3. Finalization and Assessment

The final action steps in the design and implementation of the new compensation model, shown in Fig. 5, start with the finalization phase in which the proposed model is stress tested to verify its flexibility and to possibly correct any improper performance for outliers and various compensation alternatives. At the same time the compensation model is codified into procedures and manuals, and at the same time its practicality and cohesiveness is verified and corrected.

The final step includes the implementation and assessment which includes an implementation in the company or organization, starting with a pilot implementation and a later staged rollout. At this action step the new compensation model is constantly monitored and fine-tuned by verifying the executive performance versus the company targets and individual targets set as well as versus the past performance and also the simulated performance of the old model.

5. Application of Theory of Generalized Nets to the Proposed Approach to Executive Compensation Design

The Generalized Nets (GNs) have been introduced by Atanassov [2], [3] as a powerful, general and comprehensive tool to conceptualize, model, analyze and design of all kinds of discrete event type processes and systems that evolve over time. They can effectively and efficiently model various aspects of processes whose behavior over time is triggered and influenced by some external and internal events.

These characteristic features of the GNs do clearly suggest that they can be a powerful, effective and efficient model for the executive compensation problem considered in this paper. We will show this in detail in the next subsection.

However, let us first start with a brief description of basic elements of the theory of GNs that will be of use for our next considerations. Some GNs may not have some of the components, thus giving rise to special classes of GNs called *reduced GNs*. For the needs of the present research we shall use (and describe) one of the reduced types of GNs.

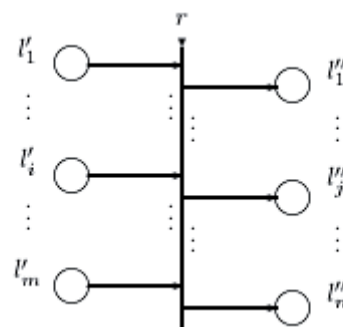


Fig. 6. GN-transition

Formally, each transition of this reduced class of GNs is described by (cf. Fig. 6):

$$Z = (L', L'', r, \square), \quad (1)$$

where:

(a) L' and L'' are finite, non-empty sets of places (the transition's input and output places, respectively). For the transition in Fig. 1 these are $L' = \{l'_1, l'_2, \dots, l'_m\}$ and $L'' = \{l''_1, l''_2, \dots, l''_n\}$;

(b) r is the transition's condition determining which tokens will pass (or transfer) from the transition's inputs to its outputs; it has the form of an Index Matrix (IM); cf. Atanassov ([2], [4]):

$$r = \begin{array}{c|ccc} & l''_1 & \dots & l''_j & \dots & l''_n \\ \hline l'_1 & & & & & \\ \vdots & & & & & \\ l'_i & & & r_{i,j} & & \\ \vdots & & & & & \\ l'_m & & & & & \end{array} ;$$

($r_{i,j}$ - predicate)

($1 \leq i \leq m, 1 \leq j \leq n$)

where $r_{i,j}$ is the predicate which corresponds to the i -th input and j -th output places. When its truth value is "true", a token from the i -th input place can be transferred to the j -th output place; otherwise, this is not possible;

(c) \square is a Boolean expression. It contains as variables the symbols which serve as labels for transition's input places, and it is an expression built up from variables and the Boolean connectives "conjunction" and "disjunction". When the value of a type (calculated as a Boolean expression) is "true", the transition can become active, otherwise it cannot.

The ordered four-tuple $E = (A, K, X, F)$ is called the *simplest reduced GN* (briefly, we shall use again "GN") if:

- (a) A is a set of transitions;
- (b) K is the set of the GN's tokens.
- (c) X is the set of all initial characteristics the tokens can receive when they enter the net;
- (d) Φ is a characteristic function which assigns new characteristics to each token when it transfers from an input to an output place of a given transition.

Over the GNs a lot of types of operators are defined. One of these types is the set of hierarchical operators. One of them changes a given GN-place with a whole subnet, cf. Atanassov ([2], [3]). Below, having in mind this operator, we will use three places that will represent three separate GNs as shown in the authors earlier works (cf. [9]).

6. A GN-model of the Design of an Executive Compensation Scheme

Now we will present the use of elements of the theory of the GNS presented in Section 5, to develop a novel model of the executive compensation scheme. The essence and problems related to this design process have been extensively described in the preceding sections.

The GN model (Fig. 7) consists of nine transitions that represent, respectively:

- the process of Description of the current compensation model (transitions Z_1 and Z_2),
- the analysis of Benchmarks and Constraints (transitions Z_3 and Z_4),
- the Design phase (transitions Z_5, Z_6 and Z_7),
- the process of Finalization (transition Z_8),
- the process of Assessment (transition Z_9).

Initially, the tokens α and β stay in places l_4 and l_7 . They will be in their own places during the whole time during which the GN functions. All tokens that enter transitions Z_1 and Z_2 will unite with the corresponding original token (α and β , respectively). While the α and β tokens may split into two or more tokens, the original token will remain in its own place the whole time.

The original tokens have the following initial and current characteristics:

- token α in place l_4 with the characteristic:
 $x_{cu}^\alpha =$ "Current salary levels and benefits, List of benefits available and costs,
 ST rewards - bonuses (target related, results related, discretionary),
 LT rewards - bonuses (target related, company value related, discretionary)",
- token β in place l_7 with the characteristic:
 $x_{cu}^\beta =$ "Benchmarks: Internal benchmarks, Industry benchmarks, Position specific benchmarks;
 Company size/compensation budget".

Transition Z_1 has the form

$$Z_1 = \langle \{l_1, l_4\}, \{l_2, l_3, l_4\}, r_1, \vee(l_1, l_4) \rangle,$$

where

$$r_1 = \begin{array}{c|ccc} & l_2 & l_3 & l_4 \\ \hline l_1 & false & false & true \\ l_4 & W_{4,2} & W_{4,3} & W_{4,4} \end{array},$$

in which:

- $W_{4,2}$ - "Tables with pay levels and pay grades, rewards and benefits are prepared",
- $W_{4,3}$ - "Sets of rules for calculation of benefits and eligibility are prepared",
- $W_{4,4} = \neg W_{4,2} \ \& \ \neg W_{4,3}$.

The α_0 -token that enters place l_4 (from place l_1) does not obtain the new characteristic. It unites with the α -token in place l_4 with the above mentioned characteristic.

The α token can be split into tree tokens. As we mentioned above, the original α token continues to stay in place l_4 . The other tokens (α_1 and α_2) enter places l_2 and l_3 and obtain the following characteristics:

- Token α_1 enters place l_2 with the characteristic:
 $x_1^\alpha =$ "Tables with pay levels and pay grades, rewards and benefits";
- Token α_2 enters place l_3 with the characteristic:
 $x_2^\alpha =$ "Sets of rules for calculation of benefits and eligibility".

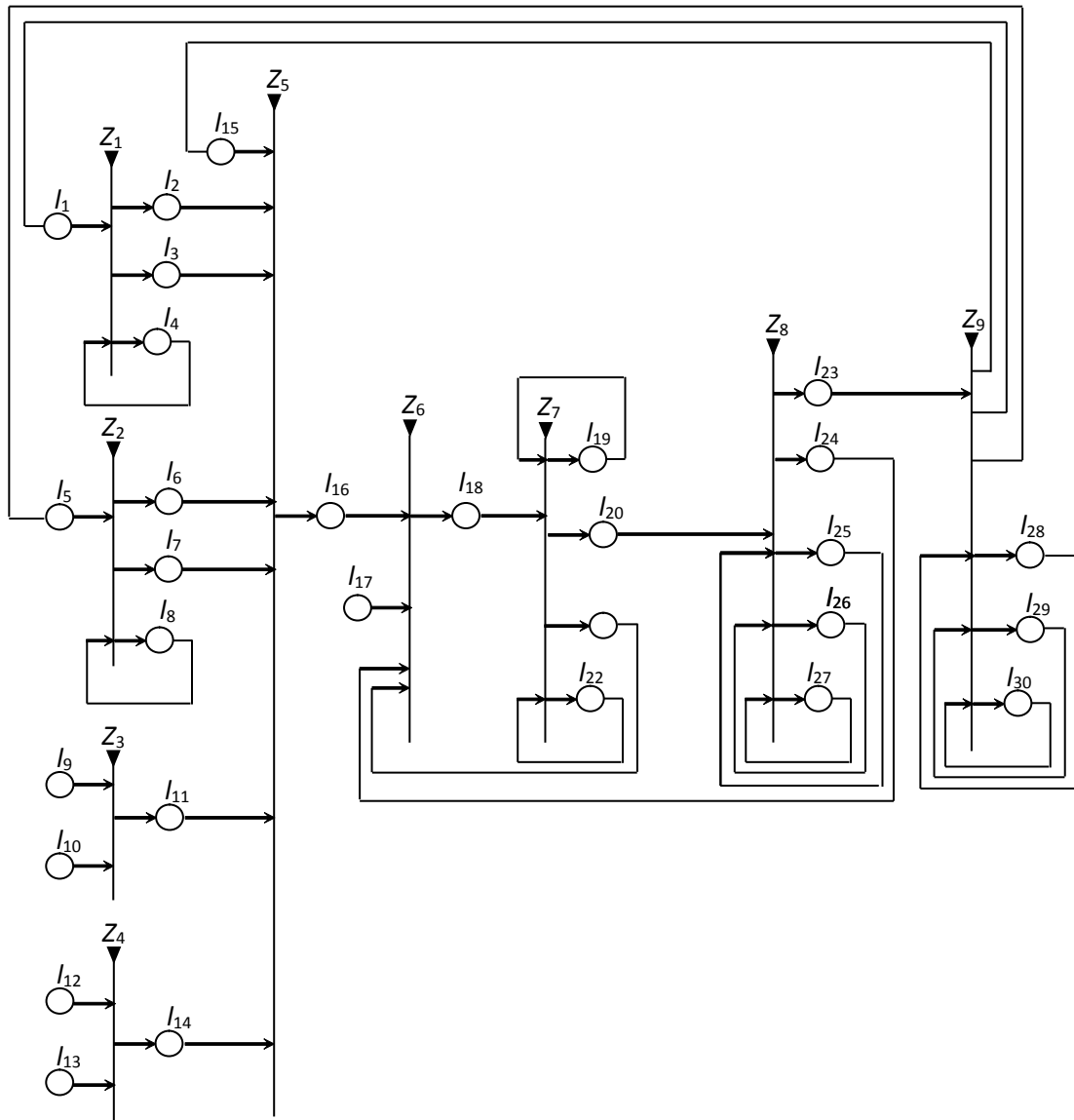


Fig. 7. A GN model of the design of the executive compensation design model

Transition Z_2 has the form:

$$Z_2 = \langle \{l_5, l_8\}, \{l_6, l_7, l_8\}, r_2, \vee(l_5, l_8) \rangle,$$

where:

$$r_2 = \begin{array}{c|ccc} & l_6 & l_7 & l_8 \\ \hline l_5 & false & false & true \\ \hline l_8 & W_{8,6} & W_{8,7} & W_{8,8} \end{array},$$

in which:

$W_{8,6}$ - "Sets of ranges, medians, distributions are determined",

$W_{8,7}$ - "Levels and rules for maximum/ minimum constraints are determined",

$W_{8,8}$ - $\neg W_{8,6} \ \& \ \neg W_{8,7}$.

The β_0 -token that enters place l_8 (from place l_5) does not obtain the new characteristic. It unites with the β -token in place l_8 with the above mentioned characteristic.

The β token can split to tree tokens. As we mentioned above, the original β token continues to stay in place l_8 while the other tokens (β_1 and β_2) enter places l_6 and l_7 and obtain the following characteristics:

- Token β_1 enters place l_6 with the characteristic: $x_1^\beta =$ "Sets of ranges, medians, distributions";
- Token α_2 enters place l_7 with the characteristic: $x_2^\beta =$ "Levels and rules for the maximum/ minimum constraints".

The γ_1 and γ_2 -tokens enter the GN net via places l_9 and l_{10} with the following characteristics, respectively:

- Token γ_1 in place l_9 with the characteristic: $x_1^\gamma =$ "Employee expectations";
- Token γ_2 in place l_{10} with the characteristic: $x_2^\gamma =$ "Employee performance - past, expected future".

Transition Z_3 has the form:

$$Z_3 = \langle \{l_9, l_{10}\}, \{l_{11}\}, r_3, \wedge(l_9, l_{10}) \rangle,$$

where:

$$r_3 = \frac{l_{11}}{\begin{array}{c|c} l_9 & W_{9,11} \\ l_{10} & W_{10,11} \end{array}}.$$

in which:

$W_{9,11} = W_{10,11} =$ "The identification of strengths and weaknesses of the existing compensation model is performed".

The γ_1 and γ_2 -tokens unite with token γ in place l_{11} with the characteristic:

$x^\gamma =$ "Lists of conditions, rules for testing in new model".

The δ_1 and δ_2 -tokens enter the GN net via places l_{12} and l_{13} with the following characteristics, respectively:

- Token δ_1 in place l_{12} with the characteristic:
 $x_1^\delta =$ "Tax treatment of pay and benefits";
- Token δ_2 in place l_{13} with the characteristic:
 $x_2^\delta =$ "Legal/regulatory requirements".

Transition Z_4 has the form:

$$Z_4 = \langle \{l_{12}, l_{13}\}, \{l_{14}\}, r_4, \wedge(l_{12}, l_{13}) \rangle,$$

where:

$$r_4 = \frac{l_{14}}{\begin{array}{c|c} l_{12} & W_{12,14} \\ l_{13} & W_{13,14} \end{array}}.$$

in which:

$W_{12,14} = W_{13,14} =$ "The external constraints are given".

The δ_1 and δ_2 -tokens unite with token δ in place l_{14} with the characteristic

$x^\delta =$ "Sets of rules, constraints".

Transition Z_5 has the form

$$Z_5 = \langle \{l_2, l_3, l_6, l_7, l_{11}, l_{14}, l_{15}\}, \{l_{16}\}, r_5, \wedge(l_2, l_3, l_6, l_7, l_{11}, l_{14}, l_{15}) \rangle,$$

$$r_5 = \frac{l_{16}}{\begin{array}{c|c} l_2 & true \\ l_3 & true \\ l_6 & true \\ l_7 & true \\ l_{11} & true \\ l_{14} & true \\ l_{15} & true \end{array}}.$$

where:

In place l_{15} there is one ζ_0 -token with the characteristic

$x_0^\zeta =$ "Compensation model template".

Tokens α_1 and α_2 (from places l_2 and l_3), β_1 and β_2 (from places l_6 and l_7), γ (from place l_{11}), δ (from place l_{14}) and ζ_0 (from place l_{15}) merge in a ζ -token that enter place l_{16} with the characteristic

$x^\zeta =$ "Compensation model blueprint".

Transition Z_6 has the form:

$$Z_6 = \langle \{l_{16}, l_{17}, l_{21}, l_{24}\}, \{l_{18}\}, r_6, \vee(\wedge(l_{16}, l_{17}), \wedge(l_{16}, l_{21}), \wedge(l_{16}, l_{24})) \rangle,$$

where:

$$r_6 = \frac{l_{18}}{\begin{array}{c|c} l_{16} & true \\ l_{17} & true \\ l_{21} & true \\ l_{24} & true \end{array}}.$$

From place l_{17} η -token enters the net with the characteristic

$x^\eta =$ "Preferences and trade-offs".

The θ -token that enters place l_{18} obtain the characteristic

$x^\theta =$ "Compensation model proposal".

Transition Z_7 has the form

$$Z_7 = \langle \{l_{18}, l_{19}, l_{22}\}, \{l_{19}, l_{20}, l_{21}, l_{22}\}, r_7, \vee(l_{18}, l_{19}, l_{22}) \rangle,$$

where

$$r_7 = \frac{\begin{array}{c|cccc} l_{19} & l_{20} & l_{21} & l_{22} \\ l_{18} & true & false & false & true \end{array}}{\begin{array}{c|cccc} l_{19} & W_{19,19} & W_{19,20} & W_{19,21} & false \\ l_{22} & false & W_{22,20} & W_{22,21} & W_{22,22} \end{array}},$$

in which:

$W_{19,19} =$ "The new system is tested vs. today's system (total compensation budget, changes per employee)",

$W_{19,20} =$ "The result from testing the new system vs. today's system is positive",

$W_{19,21} =$ "The result from testing the new system vs. today's system is negative",

$W_{22,20} =$ "The result from testing the new system vs. Next year/future's is positive",

$W_{22,21} =$ "The result from testing the new system vs. Next year/future's is negative",

$W_{22,22} =$ "The new system is tested vs. next year/future's (e.g., impact of pay progression, indexation)".

The θ_1 and θ_2 tokens that enter places l_{19} and l_{22} obtain the following characteristics, respectively:

$x_1^\theta =$ "Test new system vs. today's" in place l_{19} , and

$x_2^\theta =$ "Test new system vs. Test new system vs. Next year/future's" in place l_{22} .

The θ -token that enters place l_{21} (form places l_{19} or l_{22}) does not obtain the new characteristic.

With the truth values of the predicates $W_{19,20}$ and $W_{22,20}$, the ν -token enters place l_{20} with the characteristic $x^\nu = \text{"New compensation model"}$.

Transition Z_8 has the form:

$$Z_8 = \langle \{l_{20}, l_{25}, l_{26}, l_{27}\}, \{l_{23}, l_{24}, l_{25}, l_{26}, l_{27}\}, r_8, \vee(l_{20}, l_{25}, l_{26}, l_{27}), \rangle$$

where:

r_8	l_{23}	l_{24}	l_{25}	l_{26}	l_{27}
l_{20}	false	false	true	false	false
l_{25}	false	false	false	true	true
l_{26}	$W_{26,23}$	$W_{26,24}$	false	$W_{26,26}$	false
l_{27}	$W_{27,23}$	$W_{27,24}$	false	false	$W_{27,27}$

in which:

- $W_{26,23}$ - "The alternatives are modeled",
- $W_{26,24} - W_{27,24}$ = "New compensation model have to be corrected",
- $W_{26,26} - \neg W_{26,23}$
- $W_{27,23}$ - "The stress testing of the new compensation model is ready",
- $W_{27,27} - \neg W_{27,23}$.

The ν_1, ν_2 and ν_3 tokens that enter places l_{25}, l_{26} and l_{27} obtain the following characteristics, respectively:

$x_1^\nu = \text{"New compensation model, modeled alternatives"}$ in place l_{25} ,

$x_2^\nu = \text{"New compensation model, evaluated impact on executive compensation of unlikely but probable developments"}$ in place l_{26} ,

and

$x_3^\nu = \text{"New compensation model, written summary of compensation rules and levels as well as description of targets to be achieved"}$ in place l_{27} .

The ν -token that enters place l_{24} (form places l_{26} or l_{27}) does not obtain the new characteristic.

With the truth values of the predicates $W_{26,23}$ and $W_{27,23}$, the κ -token enters place l_{23} with the characteristic

$x^\kappa = \text{"New compensation model for implementation"}$.

Transition Z_9 has the form:

$$Z_9 = \langle \{l_{23}, l_{28}, l_{29}, l_{30}\}, \{l_1, l_5, l_{15}, l_{28}, l_{29}, l_{30}\}, r_9, \vee(l_{23}, l_{28}, l_{29}, l_{30}), \rangle$$

where:

r_9	l_1	l_5	l_{15}	l_{28}	l_{29}	l_{30}
l_{23}	false	false	false	true	false	false
l_{28}	false	false	false	true	true	true
l_{29}	true	true	true	false	false	false
l_{30}	true	true	true	false	false	false

The κ_1, κ_2 and κ_3 tokens that enter places l_{28}, l_{29} and l_{30} obtain the following characteristics, respectively:

$x_1^\kappa = \text{"Application of the new compensation model for implementation"}$ in place l_{28} ,

$x_2^\kappa = \text{"New compensation model for implementation, assess results against targets"}$ in place l_{29} ,

and

$x_3^\kappa = \text{"New compensation model for implementation, identification of weaknesses, areas of misuse"}$ in place l_{30} .

The α_0 and β_0 tokens that enter places l_1 and l_5 obtain the characteristic:

$x_0^\alpha = x_0^\beta = \text{"Current compensation model"}$.

The ϵ token that enters place l_{15} obtains the characteristic

$x^\epsilon = \text{"Compensation model template"}$.

7. Concluding Remarks

In this paper we have presented a novel approach to the structuring of the design of executive compensation in companies, corporations, firms, etc., and showed that it can be effectively and efficiently implemented by using a Generalized Net model. Our purpose has been to identify, organize and structure the key components required for the development, testing, implementation and assessment of the compensation model, and to show how they can be reflected using concepts, tools and techniques of the GNs. In particular, we have identified the type of the information input, the way of processing it and types of outputs to be used in the subsequent phases of the design process.

Due to the novelty of the presented approach, both in terms of the first use of the GNs for the class of problems considered as well as the first approach to the design of an executive compensation scheme by using not only GN based analyses but more generally a net analysis related models, we have concentrated on the representation of basic variables and relations. Other variables that are relevant for the problem considered, such as external stakeholders exemplified by shareholders, board of directors, international and local regulators or competition for talent, will be dealt with in subsequent papers, and included in a comprehensive model to be developed.

In our future research we plan first of all to focus on a deeper analysis and testing of each step of the proposed approach to the compensation design by incorporating some findings and conclusions obtained from earlier research performed as well as by testing the approach proposed on real data of various kinds and sizes of companies and organizations. We also

plan to compile and test the benchmark tables and constraints tables from the fragmented source data available and work on improving their reliability and applicability with the help of mathematical modeling.

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