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Automation of Human Resources Development Planning

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Abstract

Planning of human resources' development traditionally is a manual process as it is assumed that selection of an appropriate solution for development is influenced by too many subjective factors. During the research a model was developed that allows to automatize the process. The key stage of the planning process is decision-making in regards to the selection of a development solution. This article describes the application of the Analytic Hierarchy Process in decision-making for the planning process of employee development. The Analytic Hierarchy Process allows to manipulate the factors influencing the decision dynamically. If necessary or in specific situations, the list of factors, which are or are not considered in the decision-making situation, can be supplemented. This feature of the method can be applied when modelling business situations.

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1. Introduction

One of the widest and at the same time most complex spheres in Human Resources (HR) management is planning of the employee development. Compared to other types of resources (financial resources, technologies), HR management requires an explicitly complex approach and long-term planning. Acquisition of knowledge and creation of skills is a time-consuming process in which companies invest large amount of financial resources to ensure that employees obtain the necessary competences. Inability to assess the employees' competences necessary to implement strategy and to ensure acquisition or development thereof at the necessary level and due time may

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significantly threaten the company's ability to achieve its goals. Considering that organisations are subjected to rapid changes in the business environment, including internal changes in the organisation, it is important to seek an approach that helps to react to changes flexibly and quickly and adjust, attract and develop employee competences to ensure continuity of the organisation's operations, growth and competitiveness. To manage these processes effectively, an integrated system has to be established. The system shall include all matters related to HR capacity and HR development planning. Unlike the simple functionalities of information systems (IS) for HR management (for example, staff register database, working hours and salary processing systems) that are currently implemented in many company resources management systems, models supporting staff development management are more complex. They require multi-dimensional analysis opportunities that consider processes and trends existing in the organisation, as well as detection of complex causations and display of information necessary to make the related decisions in a simple and comprehensible manner. It is usually difficult to formalise the HR development planning process or it cannot be formalised at all as it is influenced by many factors that are related to "subjective human factors" and it interacts with other HR management processes, therefore no approaches exist currently that would allow to formalise this interaction. Therefore, during the research, new alternatives were sought – how to create a HR development planning model that can be configured and scaled and that can be adjusted to the specific needs of organisations and is able to ensure efficient process management using a competence-based HR management approach¹. Such a model opens new perspectives in automated HR development planning by serving as a base for new functionality in HR management IS. The key to achieving the research goal was the formalization of decision making about the best development plan. Two tasks were set – to identify factors that influence selection of development solutions and to find an approach to the formalization of decision making.

2. HR development management model

The HR development management model (HRDMM) developed during the research ensures development planning for employees – creation of employees' development plans². An employee development plan is a complex of advised development solutions that foster the reduction of the competence gap. In an ideal case, when implementing the development plan, the employee gains the necessary competences and achieves full compliance with the desired profile of competences³. However, the results of the development process as to what extent the employee would reduce the competence gap and comply with the desired profile of competences depend upon many factors and the development plan is only one of them.

The goal of HRDMM is to create a plan that would reduce the competence gap as much as possible, at the same time complying with the set conditions, restrictions and peculiarities of the company and employees. In order to achieve this, during the research, 12 factors⁴ were identified influencing selection of development solutions and creation of development plans. These factors are as follows: competences to be developed, the efficiency of the development solution, time, training intensity, development methods, cognitive style, venue, planned price, collateral cost, indirect costs, priorities of positions to be developed, priorities of competences to be developed. For HRDMM to be able to consider the factors, they have to be supported by data. The created model can adjust to existing data, namely, consider only those factors that are supported by data or the model can include additional factors. Planning of employee development is a process that ensures defining employee development goals and tasks and creating a plan to achieve them including selection of learning solutions if they are necessary to achieve the defined goals. On a high level the process consists of 4 stages (Fig. 1). This article is focused on Stage 4 that is the decision-making stage.

3. Decision-Making in HR development planning

Decision-making is the process of rational or irrational selection of alternatives, the goal of which is to achieve an informed result⁵. The process of creating an individual employee development plan basically is a process within the framework in which several decisions are made on use of development solutions. During the research it will be analysed what decisions are necessary to create employee development plans and what methods have to be applied to make the necessary decisions and how automation of the decision-making process can be achieved.

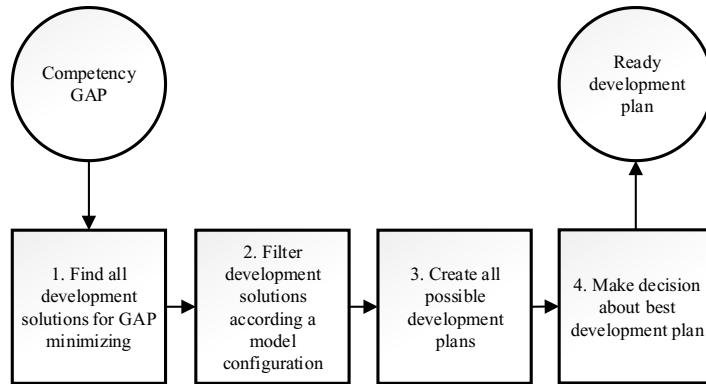


Fig. 1. Employees' development planning process.

To identify the necessary method, the experience of decision-making has to be summarised, which would make it possible to set several requirements for peculiarities of the method⁶. The method has to comply with the natural course of human decision-making. It has to be taken into account that math based on method cannot substitute the human mind and experience interpreting the real world. The method has to serve as a universal systematic basis for decision-making, which would decision-making to be a flow. The method has to consider the fact that usually many opinions and decision-making styles are present. Quite often, especially for large scale tasks, there are several possible solutions or several alternative actions to implement the tasks. As a result a non-systematic decision-making process is full of uncertainties that influence the quality of decision. Moreover, to select the best decision, it is not always possible to build the logical chain of thinking when only one option can be selected out of two and no compromises are acceptable in the selection of the solution. Therefore, to be clear, a decision-making mechanism is necessary that would allow arranging priorities for the possible decisions.

3.1. The Analytical Hierarchy Process in automation of HRDP

The Analytical Hierarchy Process (AHP) to a great extent complies with the decision-making within the process of HR development planning. The Analytical Hierarchy Process⁷ is a structured technique to organise and analyse complex decisions that is based on maths and psychology. The method was developed by Thomas L. Saaty in the 1970s and since then it has been intensively studied and adjusted⁸. The description of the Analytical Hierarchy Process does not include general requirements for creating the structure of the decision-making model. The description reflects the real decision-making situation as there are always many opinions on one issue. The process allows considering creating an additional model to coordinate different opinions and set own priorities. Consequently the process allows considering the “human factor” when preparing the decision. It is one of the main advantages of the Analytical Hierarchy Process over other methods used in decision-making⁹. Creating the structure of the decision-making model within the Analytical Hierarchy Process is a time-consuming process. However, as a result it is possible to obtain a detailed understanding of how factors influencing priorities of alternative solutions and solutions themselves interact. Collection of data to support decision-making is mainly carried out by applying the paired comparison procedure. The results of paired comparisons may be conflicting. In these cases, data has to be reviewed to minimise conflicts. The process of paired comparison and review of comparison results often is quite time-consuming. But the decision-maker gains confidence that the used data is reasonable. Use of the method is completely independent from the sphere in which decisions are made. Therefore the method is universal and allows organising a support system for decision-making.

Preparatory work for decision-making often is too time-consuming for one person could complete it. Use of the method allows to divide a larger task into several smaller independent tasks. Therefore several independent experts can be attracted to the preparation of decision-making and would work with smaller local tasks or the IS could

perform such tasks automatically. Experts might not know anything about the decisions to be made, which consequently favours the security of the process – information on decision preparation can be kept secret.

3.2. Use of the Analytical Hierarchy Process in selection of development solutions

To describe use of AHP, an example of the selection of DS is modelled – let's assume that the employee assessment process revealed that an employee has to develop the competence “Personal efficiency”. DS catalogue provides three solutions with the help of which the competence can be developed to the necessary extent. When planning the development of employees, a decision has to be made which DS out of the three should be used.

For practical reasons we will use the decision-making support system MPRIORITY 1.0¹⁰. The system has certain restrictions, but will not hinder validation of AHP, if playing a real use case. The main restriction is that no more than 9 elements can be defined on each level. In the research 12 influencing factors were identified. Therefore, to use the MPRIORITY system, in this case three factors have to be excluded. Theoretically, there is no difference as to which factor is excluded, however, it can impact the final result. For example, if the price factor would be excluded from analysis, the result would be different as in this case the price was very significant. However, to make the case as realistic as possible, the DS efficiency factor was excluded from further analysis as it is a usual situation when information on DS efficiency is not yet available or has not been accumulated yet. In these cases the DS efficiency factor is not considered.

Table 1. Summary of alternative development solutions.

	DS1	DS2	DS3
Competences to be developed	100%	100%	100%
Method	Full-time course	Book	E-course
Duration (h)	16	40	24
Intensity (h/per day)	8	1	2
DS efficiency	No	No	No
Cognitive style	0 : 0	+0.7 : 0	-0.2 : +0.5
Venue	Riga	-	On-line
Price (EUR per 1 person)	300	0	10
Collateral cost	0	0	0
Indirect costs	100	0	50

The factors Priorities of positions to be developed and Priorities of competences to be developed are not used in decision-making under AHP. Filters are used instead that select employees and competences to be developed during the pre-planning stage. These factors will not influence selection of a better alternative for development of one competence, however, they are present only in the situation when implementation of all selected DS cannot be ensured with the available budget resources. Table 1 summarizes information on 3 alternative DS that should be considered when making a decision. Several personal parameters have to be defined for the employee for whom the DS selection is made:

- Development method priorities – the employee in the example values on-site learning most highly (rating 10), the employee views e-learning as a good and efficient method (rating 8) and does not consider book reading efficient (rating 3);
- Cognitive style of the employee – after the test a result was obtained -0,1 : -0,2;
- Location of the employee – Riga. And it will be assumed that moving around the city does not require additional expenses.

At first, a scheme of hierarchies will be developed to take the best DS selection (Fig. 2). After DS selection, in line with the competences to be developed, several DS can be selected. Let's assume that n solutions have been selected. On the next level DS selection is influenced by 9 factors - competences to be developed, time, training intensity, development methods, cognitive style, venue, planned price, collateral cost, and indirect costs. A paired comparison matrix of factors influencing the decision is developed in light of the most suitable development solution. This is the most important stage in the expert's work. DS selection will depend on these assessments. However, the assessment process can be performed iteratively and change previously assigned values.

The software MPPRIORITY offers a convenient interface to document paired assessments. The expert has to choose an assessment from the provided list. The selected assessment is registered with the paired comparison matrix. On the next level of alternative DS, priorities for alternative development solutions have to be assessed regarding each influencing factor. In the example, 3 solutions were selected and paired assessments have to be grouped in 3×3 matrices. After completion of all paired assessments the MPPRIORITY system calculates eigenvector, eigenvalue λ , consistency index CI, consistency relations CR and finally proposes priorities and ratings of priorities.

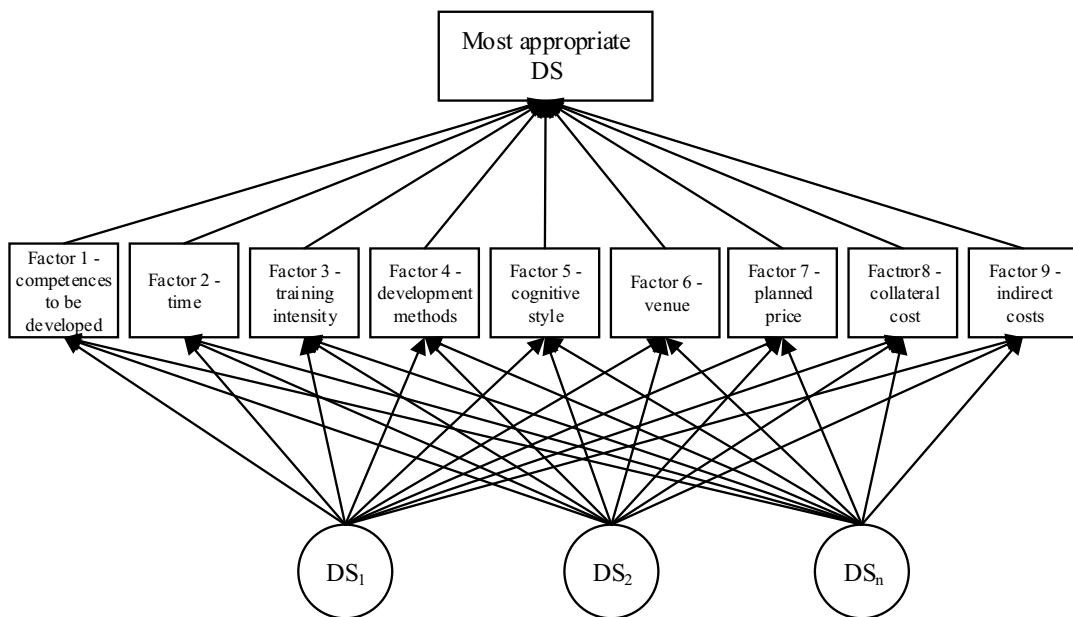


Fig. 2. Scheme of hierarchies to make the most suitable DS selection decision.

In the case under review, the first rating and the highest priority was assigned to DS-2, the second – to DS-3 and the third – to DS-1. Based on the information of the DS, and the desires and priorities of the employee, a justified decision was made and the most suitable development solution selected.

4. Conclusions

Formalizing the DS selection, decision-making corresponds completely to the opportunities provided by the Analytical Hierarchy Process. Using this method, it is possible to formalise the decision-making process and create a support system for decision-making that can become the basis for an automatic system for HR development planning. The Analytic Hierarchy Process allows manipulating factors, dynamically influencing the decision. If necessary or in specific situations the list of decision-making factors can be supplemented. This feature of the method can be applied when modelling business situations.

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