LEARNING AND COMPETENCE MANAGEMENT SOLUTION

Janis Judrups, Uldis Zandbergs, Maksims Kazakovs
Baltic Computer Academy Ltd.
janis@bda.lv

Abstract. The goal of the study was to develop a solution that would allow a training centre to be efficient in ensuring the development of employees to accomplish the objectives of the organization and complete work tasks in business environment. The developed learning and competence management (LCoM) solution is based on three approaches: (1) Competences as unified evaluation criteria; (2) Automated development planning based on the lack of individual competences of employees; (3) Knowledge management and e-learning integration for human resource development. LCoM solution uses two methodological frameworks to provide detailed description of competency usage and learning design and implementation. For those methodological frameworks a support information system was designed and the working prototype was created. The proposed solution provides four aspects of use – learning, competency, e-learning and knowledge management. Validation of LCoM solution in the business environment proved its compliance with the research objectives.

Keywords: human resources development, competences, planning, e-learning, knowledge management.

Introduction

Large organizations often face challenges in human resource development and effective management: (1) lack of criteria for common employee assessment, (2) difficulty to perform knowledge assessment for many employees and provideindividual training, (3) limited and narrow use of knowledge management and e-Learning. By finding a solution to the mentioned problems anorganization will be able to better develop its human resources and achieve better business results.

In this study a specific solving approach was chosen for each of those problems [1].

- Competencesare used as a unified criterion for employee description and evaluation.
- Support for automated individual development planning and realization.
- Use of integratedknowledge managementand e-Learning solutions.

Theoretical methodology (framework) that provides guidelines for implementation needed to be developed for each of these approaches. To ensure practical application of these approaches supporting information systems and tools needed to be developed.

Although the above mentioned problems are related to human resources development in organizations, the solution approaches are not clearly and closely interrelated and their implementation may take different paths. Therefore, it is necessary to answer the following questions.

- What is more appropriate – to develop a single solution or solve every problem separately?
- If the unified solution is chosen, how to combine the separate research approaches?

This article aims to show and analyze the conceptual decisions that allowed the creation of a uniform solution for human resources development in organization. As research methods testing of hypotheses, modeling and prototyping were used.

Unified management solution

The first conceptual decision was made concerning the use of integrated solution for LCoM. Use of competences for description and evaluation of employees of organizations could be done separately from planning and implementation of development of the employees. The idea of unified management solution is based on alignment of inputs and outputs of all the process stages of employee development to streamline the competence management process and avoid extra work in translating the outcomes of earlier stages to inputs for the later stages [1]. As a result the effectiveness of the competence management may be improved.

The proposed solution should be flexible enough to allow for only parts of it being used by managers and human resource management experts. Hence, the decision of separate but integrated modules for the competence management system and learning management system, which was further supported by the expected division of competence and learning management assignments to various organizations working together during the process. This allows the organizations to outsource the

assessment of competences and training and development of employees to specialized service suppliers. In these scenarios the organizations themselves may be concerned only about using individual modules or parts of them for management of competences but at the same time communication with the outsourced service provider would be made easier.

The creation of unified solution based on the proposed frameworks is therefore beneficial with a further added benefit of the possibility to create an information system supporting the use of the proposed principles of competence and learning management. The proposed information system (IS LCoM) not only answers the doubts of linking the competence evaluation results with the possible learning options for improvement of competences but it also increases the convenience of use of the framework in the environment of several organizations working on separate stages of the process.

The second decision was made about supporting the need for integration of all parts of the proposed IS LCoM. Competence-based approach is centered about the idea of competences as building blocks that describe the employees' ability to manage their assignments. In the proposed framework a universal list of competences divided in separate skills is used as the main input for building competence profiles, evaluation of competence gaps, description of development solutions, generation of development plans, and assessment of the effectiveness of competence development [2].

Both of the decisions attributed to the approach of later development of creation of IS LCoM.

Competence management

Using competences as a basic principle for the assessment of the ability of the employees to complete their assignments and linking of competence management to the strategic goal of the organization has lately gained some popularity in Latvia [1]. There are several attempts to use a competence-based human resource management approach in order to establish the best practice for the task [3-5]. However, using competences as a building block for HR management in an environment where separate tasks can be assigned to different involved parties may prove not sufficiently detailed and objective.

In order to gain additional precision in competence management and develop the opportunity for automation of competence management by using an information system a decision was made to divide competences into separate skills that decrease the subjectivity of assessment and align the results of competence evaluation with their development [1; 2; 6]. This approach led to the definition of the competence-based human resource development framework (CoDeF) (see Figure 2.)

In accordance with CoDeF, the supporting IS LCoM is responsible for several user and administrator functions, which include the following [1; 2; 6].

- Detailed description of competences in universal and structured competence catalogue;
- Descriptions of the existing required and future required competence lists for the employees of the organization in form of competence profiles;
- Storage and analysis of the results of competence evaluation received from various sources that are used for calculation of the competence gap, which, in turn, is used later on for development of employees and making of management decisions.

The CoDeF also provided us with the information for the definition of possible functionality modules for the IS LCoM, which included managing competences and their respective skills in the competence catalogue, storing the information of employee competences in competence profiles, managing competence gaps by combining the data from competence profiles and competence evaluation solutions, and adding experience data to competence evaluation results.

Automated development planning

Planning of human resource development traditionally is a manual process as it is assumed that selection of an appropriate solution for development could not be formalized due to free interpretation of development needs and different approaches to describe the outcomes of development solutions and it is influenced by too many subjective factors.The HR development management model (HRDMM) developed during the research offers solutions for the mentioned problems that open a possibility to formalize the HR development planning process and to create an automated IT support system.

A conceptual decision was made concerning the use of competences as a common language for definition of development needs and development solution (DS) outcomes. An employee development need would be represented by a competence gap [1] and DS description contains references to the competences, which could be developed by thisdevelopment solution [7].

HRDMM ensures creation of employee development plans (DP) – a set of advised development solutions that foster reducing the competence gap of the employee.The goal of HRDMM is to create a plan that would reduce the competence gap as much as possible, at the same time it would comply with the set conditions, restrictions and peculiarities of the company and employee. In order to achieve this, during the research, 12 factors [8] were identified influencing selection of development solutions and creation of development plans.

On a high level, planning of employee development is a process that consists of four stages [9].

1. Finding all development solutions for minimization of the competence gap – information about all available development solutions (courses, lectures, books, e-learning, etc.) must be gathered in a database – a development solution catalogue [7]. Each DS description includes a list of competencies that a particular DS develops.
2. Filtering of pre-selected DS according to a model configuration – an organization's HR development policy is formalized through parameters of 12 factors of HRDMM.
3. Combination of all possible development plans – each DP has the same parameters, as a standalone DS and they should be calculated according to the developed approach [10].
4. Making a decision about the best DP – formalizing DP selection; decision-making corresponds completely with the opportunities provided by the Analytical Hierarchy Process [11]. Using this method, it is possible to formalize the decision-making process and create a support system for decision-making that can become the basis for the automatic system of HR development planning.

Information system functionality based on HRDMM could provide different levels of automation. In low-end solution IS could cover the first stage of the planning process described above. The further planning would be done manually. In high-end solutions IS could operate in fully automatic mode, as soon as it is configured. However, HRDMM verification [11] revealed that the model's configuration is rather a time-consuming process and adequateness of the model's implication should be evaluated first.

HRDMM functionality is implemented in the IS LCoM learning management module. The necessary input data provide a catalogue of competence, employee competence profiles with the competence gap and the development solutions catalogue. Development planning results are passed to other study management module components to support the employee development process.

Knowledge management and e-Learning integration

The third approach of this study proposes to use integrated knowledge management (KM) and e-Learning (EL) solutions. Knowledge management and e-Learning are traditionally seen as two close but separate disciplines, which facilitate learning and competence development in organizations. KM is related to an organizational perspective to addresses the lack of sharing knowledge among employees while EL emphasizes an individual perspective and focuses on individual acquisition of new knowledge [12]. Joint studies of both domains point out the opportunity for increased quality, convenience, diversity and effectiveness within an organization. Jointly applied, they are a catalyst for organizational learning, which improves the performance and results of the team members [13].

The KM and EL integration models described in literature propose several integration approaches. Special interest is in additional integration component like organizational context, knowledge maturity or learning outcomes [14]. In this study a conceptual decision was to base knowledge management and e-Learning integration on learning as a common ground of both disciplines. Learning is the mean that allows connect KM an EL with employee automated development planning. In such a way learning and competence management become two central aspects of LCoM solution.

Models described in literature lack of the necessary detail for practical implementation [14] and they did not fit with the approach context of this study. For this reason a new knowledge management and e-Learning integration (KMELI) model was developedKMELI [15].

To support practical implementation of the model methodological guidelines and procedure step descriptions were prepared in KMELI framework, which explains the preparation and delivery of learning in the organization (see Figure 2). KMELI framework is based on instructional design ADDIE approach supplemented by the initial analysis process to separate the organization's training needs from other performance problems, which cannot be resolved through training [16].

Information System LCoM

The initial decision to create an integrated competence based human resource management solution naturally leads to the development of a unified support information system LCoM. For the system a modular and open architecture was chosen, which provided customers with the option for integration of the functionality of the existing custom-made business management systems with IS LCoM (see Figure 1). Modularity helps to provide a way for flexibility requirements of the organization – the customer can implement and use only actually required system components and functionality [2].
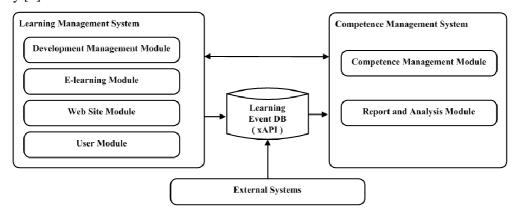

Fig. 1. **Information system LCoM**

The conceptual decision to apply xAPI standard was of particular importance as it ensures IS LCoM openness. xAPI is used for learning events data exchange between system modules and to receive data from external business systems. Learning events database accumulates extensive and detailed learning process information about the employees' activities and results [2]. Reporting and analysis module allows analysis of data from different points of view and provides the organization with the necessary business intelligence.

Results and discussion

By realizing three selected basic approaches of the study two methodological frameworks (CoDeF and KMELI) and the supporting information system LCoMwere created. These components together formed a learning and competence management solution LCoM that allows training centers to support the processes of employee development and management of training (see Figure 2).
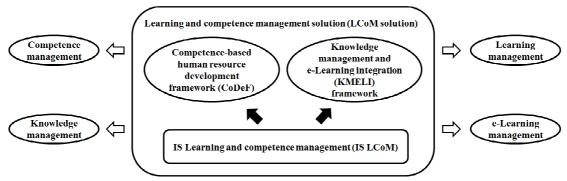

Fig. 2. **LCoM solution and the four aspects of application**

All three selected basic approaches of the study have been successfully implemented in the developed LCoM solution. The competence approach methodological part is provided by CoDeF

framework, technical support – IS LCoM competence management system, which consists of basic functionality including the competencecatalogue, user competence profiles, competenceassessments and gaps. Competences are also used in other parts of the IS LCoM to define the development solutions and create development plans.

Automated planning approach is implemented in the IS LCoM learning management module, which includes the development solution catalogue and realization of the planning algorithm. The system automatically generates plans in accordance with the selected criteria, as well as allows you to manually create plans for choosing development solutions from the catalogue.

The knowledge management and e-learning integration approach methodological part is provided by KMELI framework, technical support is primarily based on the IS LCoM e-learning module, xAPI learning events database and development solution catalogue usage. The knowledge management aspect is provided by means of the development solution catalogue and employee competence profiles to support learning through the common knowledge / learning objects, expert finding (informal learning), dynamic knowledge (providing learning objects based on the current assessment) and experience portfolio (expertise and lessons learned finding and reflection).

LCoM solution may indicate the four aspects of application (see Figure 2).

- Learning management supports common learning processes, including e-learning content and application aspects.
- Competence management supports development and use of the competences' dictionary,competences profile definition, competence assessment, current competence profile and competence gap acquisition.
- E-learning management supports the necessary technology and application preparation, implementation and usage tracking. Logically it is subject to common learning processes, but for the technology and learning specifics it is useful to isolate it.
- Knowledge management provides learning/knowledge object establishment and use, expert knowledge use in the organization and dynamic knowledge provision.

LCoM solution practical test was carried out in a number of projects. IS LCoM was implemented in the form of a prototype based on the training center's existing IS and specially designed additional modules [2]. Using the methodological framework of the guidelines the full process of human resources developmentwas verified- defining the competences, profile composition, competence assessment, development planning, preparation, implementation, and evaluation of the results. The test results showed that the LCoM solution fulfils its training and competence management functions.

Verification of LCoM solution showed the following benefits [2].

- Competences facilitate learning needs assessment during the initial analysis process. Defining the competence profile is linked with the employee task definition, so a shortage of competences is a good indication of the real need for training.
- Competence management functions provide additional benefits related to the increase of objectivity in competence assessment, higher precision in competence evaluation results, ability to comply to specific organization's needs and alignment of competence development with the strategic goals of the organization.
- Effective individual learning minimizes unnecessary already known material re-mastering. It is achieved with personal development plans, based on the employee's actual competence gap. Especially effective such training can be done by e-learning means.
- xAPI use for learning progress and results tracking makes it possible to improve the learning materials, adjust the learning process and dynamically offer other learning paths based on the existing learning outcomes.
- Easy find staff and specific experts for a specific task using the real competence assessments of competence profiles.

In the future, the full functionality of LCoM solution needs to be realized in a production environment. In addition, further research of the organization's strategic and tactical objectives cascading to competencies and development plans is necessary.

Conclusions

1. LCoM solution development adopted the following decisions: (1) A single integrated solution is used for all three research approaches; (2) The competence catalogue is the primary and central unifying element for solution; (3) Competences are divided in skills; (4) The competence gap is used for development planning; (5) The KM and EL are integrated on learning basis.
2. All three selected basic approaches of the study have been successfully realized in the developed LCoM solution that can be used in training centers formanagement of human resources development.
3. LCoM solution prototype validation was successful and showed that the LCoM solution fulfils its learning and competence management functions. This proves that the conceptual decisions were made correctly and properly.
4. In the future it is necessary to realize the full functionality of LCoM solution in the production environment.

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