HUMAN RESOURCES MANAGEMENT PROCESSES IN THE SYSTEM SUPPORTING MANAGEMENT IN THE AREA OF KNOWLEDGE MANAGEMENT IN MECHANICAL ENGINEERING INDUSTRY ENTERPRISES

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The article presents the analysis of functionalities implementing in human resource management processes in the system supporting management in the area of knowledge management in mechanical engineering industry enterprises. The authors pointed out the importance of the analyzed functionalities supporting knowledge processes in the area of human resources management to improve management efficiency in mechanical engineering industry enterprises. Additionally, the authors present the algorithmization of selected methods supporting human resource management processes used in the system supporting management in the area of knowledge management in mechanical engineering industry enterprises.

Keywords: human resources management, mechanical engineering enterprise, information system supporting knowledge management

1. Introduction

Enterprises are forced to increasingly intensive use of IT tools supporting business processes. The main objective of IT tools implementation is to improve the economic efficiency of current activity and to improve the level of competitiveness in the domestic and foreign markets [4, 9, 10, 11]. This fact seems to be indisputable, but in practice, expected economic effects are not too often. Unfortunately, it derives from the simple fact that not all decisions relating to the modern

IT solutions implementation can be regarded as reasonable. Unprepared technical infrastructure or unresponsive level of personnel's competence can be key factors, which lead directly to the opposite effect [2, 3]. Improperly implemented IT solution can be the barrier for further development of an enterprise because of the involvement of deficient human resources and capital. It is also connected with the misuse of information, which, if it is incomplete, outdated or inaccurate can lead to bad (and sometimes disastrous) consequences of managerial decisions. Human resources management is one of the key areas in an enterprise. People with their skills and knowledge are the most valuable asset of many companies [3, 12]. And this is why it is particularly important to manage them effectively, often with the support of IT tools [6, 7].

In the article the proposal of implementation selected functionalities of the information system supporting knowledge management in the area of human resources management, dedicated to mechanical engineering industry enterprises, was given. The presented proposal is the fragment of the larger concept of IT system, which is working out as a R&D project "The computer system supporting management in the range of knowledge management in mechanical engineering industry enterprises". This project is being carried out in the Institute of Management and Administration of Silesian University of Technology. System Supporting Knowledge Management (the acronym SSKM) is being programmed.

2. The role of functionalities supporting human resources management in the conception of the system supporting knowledge management in mechanical engineering industry enterprises

In the year 2011 the questionnaire investigations were undertaken in selected mechanical engineering industry enterprises to analyse the level of IT support in key areas of analysed enterprises activity. These investigations indicated a limited use of IT tools in the area of human resources [2, 6]. In the analyzed mechanical engineering industry enterprises human resources and payroll can be identified as the functional area of human resource management, which is supported by IT solutions [7]. Unfortunately, this support is inadequate and should be revised, mainly according to the criterion of the improvement of the contract's preparation and execution processes. The activities of the analyzed mechanical engineering industry enterprises relies heavily on contracts in response to specific customer's requirements, as the unitary production for the order, mainly big machines. Therefore, the most important context of the system SSKM, which is being developed, should concentrate on the strengthening business processes related to preparation, implementation and monitoring of contracts [5].

On the basis of the undertaken analyses the functionalities were given to play the important role in supporting human resources management processes, mainly to

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strengthen the effectiveness of the contracts' implementation. Mechanical engineering industry enterprises, due to the specific circumstances of their activity [2, 8] need to ensure the coordination of all preparation and execution processes of contracts. The system, worked out within the R&D project, named System Supporting Knowledge Management comprises 5 main units:

- „SUPPLY",
- „PRODUCTION",
- „DISTRIBUTION",
- „SUPPORTING PROCESSES",
- „SYSTEM CONFIGURATION".

Functionalities supporting human resources management processes will be included in the unit „SUPPORTING PROCESSES" and its structure is presented in Figure 1, which includes the following options:

- „CONTRACTS' DATABASES",
- „RISK MANAGEMENT OF CONTRACTS PORTFOLIO",
- „ANALYSIS TOOLS SUPPORTING KNOWLEDGE MANAGEMENT",
- „HUMAN RESOURCES MANAGEMENT".
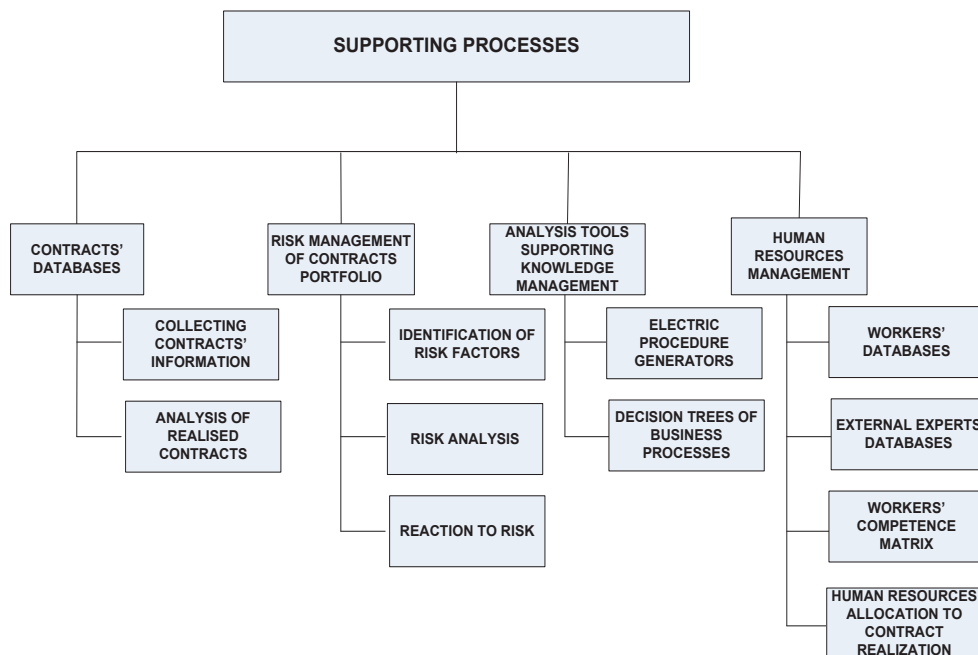
Figure 1. The structure of the unit "SUPPORTING PROCESSES" of System Supporting Knowledge Management SSKM

3. The description of functionalities supporting human resources management processes in the system supporting knowledge management in mechanical engineering industry enterprises

The proposed solutions in the SSKM system, which are the support of human resources management processes, are aimed mainly to improve the efficiency of the preparation and execution of contracts for individual orders of recipient of mechanical engineering industry enterprises [1]. The "Human Resources Management" in the SSKM system includes 4 main options:
- workers' databases,
- external experts databases,
- workers' competence matrix,
- human resources allocation to contract realization.

3.1. Workers' databases

The essential objective of the option „Workers' databases" is to provide contextual information about employees, their knowledge, skills and previous experience in the contracts execution.
The record of employee database will include the following information (as a record's field):
- employee's name,
- employee's surname,
- employee's contact data,
- the range of employee's education including technical and economic skills,
- the competence level of employee's including realized range of tasks/processes in an enterprises (strictly connected with the option „Workers' competence matrix"),
- employee's professional experience (professional career, participation in projects and contracts without taking into account the current employment),
- employee's involvement in the previously executed contracts,
- employee's present involvement in contracts in progress,
- employee's work time data (absenteeism, availability, performance)
- employee's evaluation.

In the range of the option „Workers' databases" the following functions will be realized:
- the creation of a new employee,
- the removal of an employee,
- the modification of employee's information,
- the search for contracts / tasks performed by the selected employee,

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- the search of employees with the required competence level in specified range of tasks / processes,
- the search of employees with specific experience in the execution of contracts.

The access to view the selected record field will be limited to selected users with certain privileges (mainly fields containing information about employee's assessment and control). The execution „Workers' databases" indirectly provide the access to information about contracts both previously completed and in progress, in which edited employee is/was involved.

The option „Workers' databases" will enable the following effects:
- improving the efficiency of human resources management, especially the employee's knowledge, skills and experience to realize tasks of the contract,
- providing comprehensive knowledge of the employees for planning, organizing, controlling and motivating employees,
- enabling ongoing analysis of company's personnel and equipment needs in ongoing contracts,
- enabling the analysis of the balance sheet in terms of quality of employment in ongoing task of contracts,
- analysis and control of labour productivity in contracts,
- strengthening the level of employee's motivation through increasing self-awareness of the scope of the tasks carried out in the contracts and the level of competence,
- improving the monitoring and evaluation of employees involved in contracts' realization.

3.2. External experts databases

The essential objective of the option „External experts' databases" is to gather the contextual information about external experts with particular emphasis on their previous experience in contracts and their cooperation with the mechanical engineering industry enterprise. The record of external experts' database will include the following information (as a record's field):
- expert's name,
- expert's surname,
- expert's contact data,
- the range and the level of expert's competence,
- expert's experiences in the area of contracts' realization in external enterprises,

- expert's collaboration with the enterprise with particular emphasis on their previous experience in realized contracts,
- the range of ongoing collaboration with the enterprise (involvement in contracts),
- expert's evaluation.

In the range of the option „ External experts' databases" the following functions will be realized:
- the creation of a new expert,
- the modification of expert's information,
- the search for contracts / tasks performed by the selected expert,
- the search of experts with the required competence level in specified range of tasks / processes,
- the search of experts with specific experience in the execution of contracts.

The option „ External experts' databases" will enable the following effects:
- assuring expert knowledge for the preparation of solutions and ideas for improving the efficiency of solving problems in the implementation of the specific tasks of the contract,
- improving the quality of knowledge in the enterprise,
- improving the effectiveness of the contracts' implementation,
- improving monitoring and evaluation of external experts collaborating in the execution of contracts.

3.3. Workers' competence matrix

The essential objective of the option „Workers' competence matrix" is to enable the analysis of competence needs of employees, especially taking into consideration the scale and range of tasks in realized contract.

Employees' skills matrix as a functionality in the SSKM system is to be the tool allowing the competence level assigned for each employee of a mechanical engineering industry enterprise for an individual business process (task, operation, or the type of skills). Employees' skills matrix as a functionality will enable to edit the competence level of employees in the form of matrix presented in Figure 2.

The value of the competence level ESM_{ii} reflects the assignment of a particular employee to a specific process (task, operation) according to the following rating scale:
- $ESM_{ij}=0$ if an employee is not connected with the process realization or no competences are required in the process realization,
- $ESM_{ij}=1$ if an employee is connected with the process realization and the increase of the competence level of an employee is required,

- $ESM_{ij} = 2$ if an employee is connected with the process realization and the competence level of an employee is being increased in the range of the process realization,
- $ESM_{ij} = 3\ 1$ if an employee is connected with the process realization and the employee's competence level in the range of the process realization is satisfactory,
- $ESM_{ij} = 4$ if an employee is connected with the process realization and the employee's competence level in the range of the process realization is good,
- $ESM_{ij} = 5$ if an employee is connected with the process realization and the employee's competence level in the range of the process realization is professional,
- $ESM_{ij} = 6$ if an employee is connected with the process realization and the employee's competence level in the range of the process realization is professional. Additionally, the employee is responsible for training new employees.

Business processes / Employees	Process 1	Process 2	…	Process m
Employee 1	ESM_{11}	ESM_{12}	…	ESM_{1m}
Employee 2	ESM_{21}	ESM_{22}	…	ESM_{2m}
…	…	…	…	…
Employee n	ESM_{n1}	ESM_{n2}	…	ESM_{nm}

Figure 2. The scheme of the "Employees skills matrix"

In the SSKM system the search of the contextual level of competence (and its modifications) for employees selected by the specified key will be possible. On the other hand, the scope of the presented "Workers' competence matrix" may be limited to certain categories of processes parameterized by the user of the system. This allows the user to focus on selected employees and processes / tasks, reflecting the executed contracts in the planning, implementation and control stages. The functionality „Workers' competence matrix" in the SSKM system will be linked to the functionality „Workers' databases" and the functionality "Human resources allocation to contract realization". The option to modify the competence level of employees will be limited to a group of users with certain rights.

The option „Workers' competence matrix" will enable the following effects:
- improving the efficiency of the use of knowledge resources, skills and experience to realize tasks of the contract by the employees and management staff, the ability to reach the problem directly to the most competent employees,
- enhancing skills and qualifications in the context of the needs of specific tasks and processes,
- ensuring the optimal selection of the range of internal and external training for employees due to the information of knowledge deficit in various processes,
- ensuring the efficient allocation of tasks between employees and strengthening the transfer of knowledge to increase the productivity of individual employees and the entire enterprise.

3.4. Human resources allocation to contract realization

The essential objective of the option „Human resources allocation to contract realization" is to ensure dynamic allocation of employees to contract's tasks and to create the communication platform for employees.

In the range of the option „Human resources allocation to contract realization" the following functions will be realized:
- the selection of the project team to perform the contract,
- the control of the tasks progress in the contract in the area of human resources,
- the changes in the cast of the tasks of the contract,
- the analysis of the time involved in the contract employees,
- the evaluation of employees in ongoing contracts,
- providing the platform of cooperation between employees in the execution of the contract.

The option „Human resources allocation to contract realization" will enable the following effects:
- improving the knowledge quality by the creation of the communication infrastructure between employees,
- strengthening the involvement and participation of employees in the execution of contracts,
- improving the efficiency of planning and control in the areas of contracts,
- increasing the degree of formalization of human resource management processes as a result of electronic procedures and documents.

4. Conclusions

The activity of mechanical engineering industry enterprises is heavily dependent on external conditions, but in the long perspective the extremely important factor to achieve economic efficiency is the appropriate management of internal business processes. One of the key areas that determine the effective functioning of these companies is human resources management with the use of IT solutions. The presented conception in this article of the system supporting knowledge management in human resources management includes 4 functionalities, which main objective is to enable effective planning, organizing and controlling the employees involved in the contract realization.

The implementation of the functionalities in the area of human resources management in the system SSKM should lead to obtain the following results in improving the management processes:

– the use of the system will allow to increase the degree of formalization of human resources management processes as a result of electronic procedures and documents,

– the functionalities will enable the improvement of the monitoring and evaluation of staff involved in the execution of contracts,

– the use of the system will lead to strengthen knowledge resources of employees and their skills and experience as a result of efficient allocation of staff to different tasks in the framework of ongoing contracts,

– employees skills matrix will enable to specify the knowledge deficit and resulting from that the permanent improvement of employees' competence in order to improve business processes of contracts,

– the access to the knowledge resources of a enterprise's employees and external experts can enhance skills and qualifications required in the execution of contracts,

– implemented functionalities will increase the awareness of employees, and thus cause the increase of employee's motivation and satisfaction from participating in contracts,

– ensuring the adequate infrastructure will enable communication between staff and improving the knowledge quality in the enterprise,

– the information of the competence level of employees in the context of the tasks performed in contracts will enable the adaptation of the internal and external training process to the needs of a enterprise,

– dynamic allocation of employees to tasks of contracts will increase the effectiveness of the planning and control of contracts.

The process of implementing the proposed functionalities of the System Supporting Knowledge Management in mechanical engineering industry enterprises will be monitored and analyzed. The effects of the functionalities' implementation in the area of human resources management should be verified in practice to meet the expected requirements of the users.

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