

Designing a method for knowledge audit in small and medium information technology firms

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Abstract. *Knowledge management is becoming a fast growing field and one of key technologies in this today's knowledge-driven economy. New methods are developing and they are only at their beginnings. Knowledge audit is one of first steps before implementing knowledge management. This article describes problems that can occur in developing new methods for knowledge audit as specific and partial approaches to knowledge audit in some cases. This article also describes criteria that caused designing of some existing methods and describes general approach to knowledge audit. As an example described are some imperfections of existing methods and impossibility to apply them with new demands for knowledge which leads to designing a new method. Chosen example illustrates the design/redesign of existing method for knowledge audit which uses ASHEN knowledge classification and it did not in best way satisfy the needs of information firm so it was redesigned. New redesigned method is shorter in some steps, has identified more knowledge sources and allows better understanding of knowledge flow between departments and between firm and surroundings. In our example, the firm has gained far more qualitative results which allowed it to identify knowledge gaps, review its existing goals and adapt them to intellectual assets. The conclusion emphasizes the need to research the design of new and far more general methods for knowledge audit which will be based on analysis of knowledge needs and specifications.*

Keywords. Knowledge management, Knowledge audit, design of methods

1 Introduction

Knowledge management developed into a concept in mid-90s when Davenport and Prusan published some of their papers on knowledge management. Since its beginnings, knowledge management has had its ups and downs, and, lately, knowledge management is

mentioned as one of “life-saving” tools in modern management. Competition allows the application of many techniques and tools that assist in the gaining of competitive advantage, and knowledge management is one of them.

A knowledge management strategy must precede the introduction of knowledge management. Knowledge audit will provide input data for knowledge management. It will assist the organisation to overcome the barrier i.e. to find out which intellectual potentials it possesses. Knowledge audit is a step that precedes knowledge management, that is, its introduction. This paper will provide some examples where knowledge management may be used thus indicating the potential of this field that still has not been sufficiently researched.

Knowledge audit procedures have also been improved in time, and were not defined in detail in the early stages of knowledge management development.

The objective of this article is to present considerations about procedures that assist an organisation to identify and discover the knowledge it possesses and need to be more successful in the achievement of its goals. The paper focuses on information technology firms that have specific needs different from needs of other companies. They need more knowledge, especially those firms dealing with the development of application programmes.

In the current stage of knowledge management development, a generally accepted overall methodology for the development of the knowledge management system still does not exist. Knowledge in this field is still being acquired through the development of methods and techniques intended for some specific needs. This paper will contribute to research in the knowledge management field by defining a new, improved method for knowledge audit in IT companies.

1.1 Goal

The goal of this paper is to design a new method (or redesign the existing one) for knowledge audit that would be particularly adapted to requirements and

needs of IT firms, and its efficiency would improve the process, compared to the existing methods.

The abovementioned goal is achieved on the basis of the following auxiliary goals:

- Show that IT firms have specific needs for knowledge, and existing methods are insufficient to fully identify such knowledge.
- Show what preconditions must be met by a firm in order to carry out knowledge audit.
- Show, by means of design of new procedures that will result in a more quality knowledge audit in IT firms and through their application, that better identification of existing knowledge in an organisation is possible.

1.2 Hypothesis

This paper is based on the following hypotheses:

H1: Differences between existing knowledge audit methods may be explained as a consequence of specific approaches to knowledge audit.

H2: The existing methods of knowledge audit show deficiencies when applied in IT companies.

H3: The design of a new method (or redesign of procedures in the existing methods) will result in a more quality knowledge audit in IT firms.

2 Knowledge management in small and medium firms

The concept of knowledge management means 'a process by means of which organisations generate new value from intellectual sources or knowledge-based sources'. Even more often, such a knowledge management process includes dissemination of newly-acquired knowledge among employees, departments, even between companies. It is important to notice that this definition does not say anything about information technologies. It often happens that knowledge management is integrated with information technology in some analyses, but that is not actually knowledge management.

The second definition says that 'knowledge management represents the ability of a community within an organisation to record critical knowledge (i.e. the most important), to improve it in the best possible manner and disseminate it within the organisation to members who need it and who may use it in their work' [3]. According to this definition, in IT firms which derive their knowledge from the Internet, this may represent a big problem and, therefore, such companies need knowledge management.

'Knowledge management enables creation and dissemination in the process of knowledge use in for the purpose of developing and maintaining the values

of basic processes' [9]. This definition of management perceived in the business context says the following: when knowledge management is applied to individual, fragmented knowledge, such knowledge is integrated for the purpose of creating new or maintaining the existing value of basic processes.

Knowledge has been regarded for a long time as a decisive competitive tool for the survival of companies. In practice, many companies that organised their knowledge achieved business success and better performances. In spite of efforts to follow the prescribed knowledge management procedures, small and medium enterprises (hereinafter: SME) are often faced with failure in the application of knowledge management. Research conducted by Chan and Chao was motivated by this problem, taking into account the importance played by small and medium-sized enterprises in the economy of many countries.

According to 2007 results, SME's represent 98% of the total number of all companies in Hong Kong, and employ 50% of the total number of the employed. Compared to big companies, SME's should be much more flexible and successful with the implementation of the knowledge management system due to lower costs and faster communication [4].

Efficient knowledge management depends in the first place on two factors – infrastructure and processes that must be implemented in order to achieve and maintain a firm's competitiveness. [4].

Table 1. Knowledge management factors [4].

INFRASTRUCTURAL POSSIBILITIES
Technology – My company uses a technology that enables employees to cooperate with other employees within the organisation.
Structure – Organisational structure in my company encourages interaction and knowledge exchange.
Culture – Organisational culture in my company encourages interaction and knowledge exchange
PROCESS POSSIBILITIES
Collection – My company has defined processes for collecting knowledge from employees and partners
Transformation – My company has defined processes for the transformation of knowledge into concrete plans and activities
Application – My company has defined processes for the application of knowledge learned on the basis of errors
Protection – My company has defined processes for the protection of knowledge from unauthorised and inappropriate use within an organisation

The research results were produced on the basis of a research conducted in 68 SMEs where the

initiative for the implementation of the knowledge management system has been launched [4].

The results of the research initiated by Chen and Chao show that the understanding of issues related to knowledge management and developed plans are no guarantee that the introduction of knowledge management will succeed. Companies must achieve balance between culture, technology and infrastructure together with the corresponding possibilities to collect, link, apply and create knowledge.

3 Knowledge audit

There are a few definitions of knowledge audit. The shortest and the most general definition of knowledge audit is that it is a "systematic and formal evaluation of company's knowledge resources, processes and flows" [3].

Ann Hylton defined knowledge audit as a "systematic and scientific examination and evaluation of the explicit and tacit knowledge resources in the company". "Knowledge audit investigates and analyses the current knowledge- environment, and culminates, in a diagnostic and prognostic report on the current corporate 'knowledge health'" [5].

According to Liebowitz, knowledge audit answers the question what knowledge exists in an organization, what knowledge is missing, who needs the knowledge that is missing, and how will they use the knowledge so as to solve the targeted business problem [6].

The definition accepted by the European Council says that it is a systems audit based on questionnaires or interviews about knowledge in an organisation. As such, it often includes mapping of knowledge and knowledge flow within or between organisations, teams or individuals. [7].

Knowledge audit is a key step towards knowledge management. The selection of the method for knowledge audit, for evaluation and assessment of processes crucial for knowledge, leads to the conclusion what knowledge and processes crucial for knowledge surround and organisation. Knowledge audit investigates non-material assets including processes, structures, communities, and people with the aim of investing into areas with highest potential for future strategic market advantage [9].

A review and analysis of definitions provided by various authors shows that it has been noticed that knowledge audit is a snapshot of the situation with knowledge flow intertwined in an organisation or outside it, and the goal of knowledge audit is to gain insight into organisation's knowledge in order to create a knowledge management strategy.

4 Knowledge audit methods

Knowledge audit methods that have been presented in the past couple of years are the following: method of Chaffey and Wood [3], then the method oriented towards basic processes by Perez-Soltera [11] and the method of knowledge audit presented by Gianpolo Iazzolino and Rinaldo Pietrantonio [12], which is based on two things: a scheme of classification of business objectives and intellectual capital model.

Every audit method or procedure is specific and largely depends on the situation in which it was applied. Nevertheless, some features could be regarded as common. These features are:

- Year of development of the methodology;
- Orientation;
- Manner of knowledge division;
- Possibilities for repeating knowledge audit;
- Possibilities of carrying out knowledge audit on a smaller sample /part of the organisation;
- Tools used during audit.

The most important among these features are orientation and manner of division of knowledge characteristic of the knowledge audit method. The possibility to repeat knowledge audit on a smaller sample makes knowledge audit adaptable to smaller parts of the organisation, while some methods do not envisage this possibility. And finally, tools used in knowledge audit are questionnaires and interviews. However, some knowledge audits have their own tools and techniques, such as the knowledge audit method by Gianpolo Iazzolino and Rinaldo Pietrantonio.

Conducting audit on only one part of an organisation may save a lot of financial resources because certain amount of time of company's employees must be wasted on it. Since IT companies are project-based, audit is necessary only on one part of the organisation.

Furthermore, some existing methods did not take into account the possibility to include in knowledge audit persons who are not members of the organisation, and this is precisely one feature of fluid organisations. Persons who are not members of the organisation may participate in a project, and knowledge audit must take this into account. One of the examined procedures for knowledge audit envisages the possibility to include persons who are not members of the organisation, when audit is focused on basic processes in the organisation.

Limitations of existing knowledge audit methods and procedures in an IT firm:

- Insufficiently project oriented;
- Possibility of conducting knowledge audit on only one part of the organisation;
- Inclusion of persons who are not members of the organisation.

The existing limitations will be overcome by a specially adapted knowledge audit that will take into account the organisational structure, its fluidity and in

this manner give special results that will, as it was already mentioned, be used for knowledge management.

5 Design of a knowledge audit method

The existing procedures and methods of knowledge audit are good, but need to be redesigned to be usable in IT companies. A good basis for redesign is the knowledge audit procedure presented by Chaffey and Wood. This procedure may be renewed, which is suitable for project-based and fluid organisation, but it is oriented towards a product or a service. When this project would be redefined and redirected towards an ongoing project or projects, it would completely cover needs for knowledge audit in IT companies.

IT companies, in particular those dealing with the development of application programmes, are characterised by project-based organisation [8].

Why should one focus on projects in the first place? The answer is simple. During each project, team members working on the project acquire new knowledge and experience that future projects may depend on, and knowledge is often forgotten, unexploited, and never shared with other teams or members of the organisation [2].

A team that works on a project has a precisely determined goal and usually exists only for a certain period of time. In case of a project-based organisation, participants are chosen from different parts of the organisation and work independently on a project field. It used to be regarded that participants in a project are, in accordance with the concept of pure project-based organisation, recruited from different parts of the organisation, but today's organisational practice does not insist on that and it is normal that external associates may be employed to deal with project assignments [1]. In addition to that, more experienced members of an organisation, who already have a lot of knowledge from the domain in which the project is conducted, are usually engaged in a project and sharing of knowledge and collection of experience happens already during the project itself.

Redesigning the existing knowledge audit method or procedure may save a lot of time and funds, instead of defining and designing a new knowledge audit procedure.

For the purpose of simplicity, speed and in order to save time, it is better to focus on redesign of the existing knowledge audit procedure. The existing procedure will be redesigned and it will thus become possible to overcome the limitations of existing procedures and methods listed in the previous chapter, which are of key importance for business success and market conditions of an IT firm. Such a knowledge audit procedure will be oriented towards project-based organisation which will enable its

implementation in a part of an organisation working with one or more projects and it will allow the inclusion of persons who are not members of the organisation, but are involved in the project.

The decision about the procedure or method to be redesigned will depend on the manner in which the existing procedure accesses knowledge audit, on the tools it applies and on the results of the existing procedure.

The audit procedure presented by Chaffey and Wood provides good foundation for redesign. The procedure offers the possibilities for partial audit i.e. audit that will be carried out in some departments of a firm only.

6 Project oriented knowledge audit method

It has been noticed that the required results may be achieved by redesigning the existing audit method which is the most compatible with project orientation. Some steps in the existing knowledge audit procedure will not have to be conducted because they are implied. This, in the first place, refers to the definition of audit goals and identification of the ideal situation. The goal of knowledge audit has been aligned with project goals, and the identified ideal state indicates that additional funds do not have to be spent on the realisation of the existing and future projects of the same type.

Since the redesigned method is project-oriented, it will be oriented towards people participating in the project i.e. towards team members. It is to be assumed that leaders of project teams will include in their teams persons who have shown a higher level of knowledge in their work because he or she wishes this people to successfully complete the project. Precisely this increased level of knowledge was one of the motives for design (redesign) of the project-oriented knowledge audit method.

The second motive for project-orientation is that the usual qualities of people who are members of the project team are voluntary and prudent cooperation within the team. This means that there will be fewer barriers to obstruct the knowledge flow within the team.

Furthermore, participation in a team in the realisation of the project is often rewarded thus stimulating members of the team, which is an additional motive for project-orientation.

A facilitating factor in IT firms is that they employ people who have more knowledge of the type they need for successful completion of work because they are used to use free databases and forums that are available on the Internet. By using the forum, members will learn how to share knowledge, which is another facilitating factor.

This redesigned project-oriented knowledge audit

method will consist of the following steps:

Project selection – it is assumed that one or more projects are carried out in an organisation in a certain moment. A project which represents a good reference for other projects must be selected. .

Selection of audit tools, among which the following may be chosen:

- Questionnaires for collecting large amounts of data;
- Interviews for in-depth analyses of problems;
- Focus groups for investigating issues and understanding relations;
- Narration techniques for in-depth analysis of knowledge and the extent to which it is context-related.

Identification of knowledge assets – the ASHEN model will be used in this step. It is focused on points of knowledge discovery. The tool to be used in this step is a questionnaire.

Employee knowledge profiles which are prepared on the basis of information collected by means of knowledge audit. An employee knowledge profile consists of competences, abilities, knowledge and experience. In addition to personal nomination, experts may be recognised from recommendations by other employees, teams and leaders in an organisation and from published documents (internal or external). This step allows for the use of a questionnaire or an interview as tools for collecting information about employee knowledge.

Creation of a knowledge map – the map shows relations and knowledge flow among persons. Visual representation of such information provides different perspective of knowledge and where it is situated. The development of a knowledge map assists an organisation to understand knowledge features. The network enables simple reading of problems and the discovery of isolated parts of network. A knowledge map is created on the basis of data and results collected by questionnaires and interviews with employees.

Creation of a knowledge value chain which represents processes fundamental for knowledge. The knowledge audit process results in a knowledge inventory which categorises the existing knowledge assets and activities that speed up the project flow. By using knowledge models, the value chain will be used in order to account for different manners in which knowledge may be used to speed up the project flow. The value chain indicates where different types of knowledge are combined and used during the project. According to the model presented by Zak, the existing knowledge may be categorised in the following manner [10]:

- Basic knowledge – the minimum of knowledge necessary for survival on the market, but not in the long-run.
- Advanced knowledge – it ensures the competitiveness of an organisation and differentiation from the competition

- Innovative knowledge – knowledge enabling an organisation to play a leading role in its sector.

Conclusion – the same as in information audit, knowledge audit must be followed by the analysis and comparison of achieved results with the desired situation. Knowledge gaps will then be analysed and followed by the development of a knowledge management strategy.

Testing of conclusions with the project team is the next stage in which results given by audit are tested with the project team. This offers the chance for innovative solutions that may arise from final reports.

Supporting good practice – the support to knowledge management currently existing in the organisation. All organisations have some kind of system the functions of which are very similar to the knowledge management system. A good starting point for knowledge management programmes is the promulgation and underlining of examples of good practice.

Development of goals and priorities for a knowledge management strategy– the results of knowledge audit serve directly as an input and beginning of knowledge management i.e. they help define the goals to be achieved by knowledge management.

7 Testing of new knowledge audit method

As it was already mentioned, the suggested project-oriented knowledge audit method has been tested in an actual firm. To ensure that testing will be successful, two audits will be carried out. The first one will be based on knowledge audit method proposed by Chaffey and Wood within one part of an organisation. The suggested redesigned method of these authors has been implemented and oriented towards projects in which that same part of the organisation participates.

The firm in which knowledge audit will be carried out does business in the County of Varaždin. NTH Media d.o.o. is a company founded in 2002 in the Republic of Croatia. The founders of the NTH company were motivated by the fact that the County of Varaždin offers cheaper labour, constant inflow of quality labour force due to the fact the Faculty of Organisation and Informatics is located in the same town, and due to its favourable geographic position.

The conducted audits and results of knowledge audit show that the results provided by the old and new (redesigned) methods are different, but not completely. The audits agree in some conclusions, such as the need for better and more detailed description of business processes and procedures. The audits also agree in one thing, which is that the firm has a culture of sharing knowledge and experience,

which is one of the main factors of success in knowledge management.

The results of knowledge audit show that project-oriented knowledge audit procedure identified more sources of knowledge, and it was carried out by a project team which consisted only of 4 members. The results of knowledge audit will be compared in relation to: identified knowledge assets, knowledge map and employee knowledge profiles.

In short, by comparing results of knowledge audit, the new audit procedure identified more knowledge assets in terms of quantity, a bigger and more developed knowledge map, and fewer employee knowledge profiles.

Table 2. Identified knowledge assets

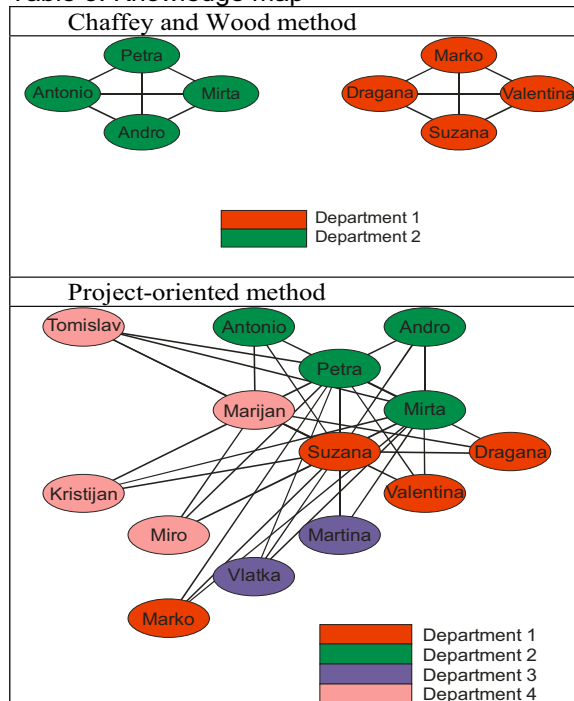
Chaffey and Wood method
<ul style="list-style-type: none"> - Process manual - Job procedure, check list - Country rules - Commercial conditions table - Instructions from partners in the country of business - Template and guides describing the delivery of services - Contract templates for contracting services - Internal documents written by other employees
Project-oriented method (redesigned by authors of this article)
<ul style="list-style-type: none"> - Process manual - Job procedure, check list - Country rules - Commercial conditions table - Instructions from partners in the country of business - Template and guides describing the delivery of services - Contract templates for contracting services - Internal documents written by other employees - Technical documentation by partners - External sources: partners' websites - Internet

The knowledge map resulting from this method describes communication better and allows the organisation to understand features of knowledge better. The result was an image which actually represents a visual interpretation of the organisation's knowledge, flows and relations within an organisation. The knowledge map resulting from this method is more elaborate, there are more direct links. Nods representing participants in the project have been identified, as well as those nods that have the largest number of direct links.

Project-oriented knowledge audit was carried out with a project team consisting of only 4 persons, which coordinated all the activities that were necessary for successful completion of the project. Persons who are members of a project team are thus

represented by nods with the largest number of direct links.

Table 3. Knowledge map



This knowledge map explicitly illustrates the advantages of the redesigned knowledge audit method. Different colours show firm departments where audit was carried out, and it is obvious that project-oriented knowledge audit includes 4 departments, while knowledge audit carried out according to the old procedure covers only 2 departments. The new audit procedure included only those members of the team who participated in projects.

During the implementation of old and new audit method, respondents were asked about their knowledge and experience. Questions were identical in the old and new audits. The management of the organisation in which audit was carried out was familiar with questions. On the basis of the analysis of audit results, it may be concluded that knowledge audit gives better results and provides better and more precise identification of some areas. However, it is a fact that the knowledge audit process received these data by interviewing only a few employees. This resulted in the creation of fewer employment knowledge profiles.

Knowledge audit profile consists of the following parts:

- General information about the employee;
- Areas of expertise of employees;
- Data about education and training of employees;
- Area of interest for future work;
- Data about interest to share acquired knowledge.

Employee knowledge profiles are used for planning and introducing knowledge management and organisation where existing knowledge is identified since knowledge in knowledge profile is classified and divided into basic, advanced and innovative. When knowledge management is started in an organisation, employee knowledge will be used as a basis for the creation of a knowledge base.

8 Conclusion

This paper investigates the most recent knowledge audit procedures and methods that have been presented in the last few years and evaluates them on the basis of the possibility of their application in IT firms. Information technology firms usually have project-based organisation with increased need for knowledge. Learning in such companies is usually possible through projects, and it is therefore interesting to apply project-oriented knowledge audit through the course of which the organisation learns.

This paper shows that differences in the existing audit methods may be explained as a consequence of different approaches to knowledge audit. This resulted from the analysis of different focus of such methods, the manner of division of knowledge, the manner of conducting audit, tools that are used, and group over which they are implemented.

IT companies have specific needs for knowledge and are characterised by project-based organisation, while the existing methods are not so oriented.

Redesign of an existing Chaffey and Wood method resulted in a new method which deals with knowledge audit in IT firms in a more quality manner. This was illustrated by successful implementation of this method where audit quantitatively identified more knowledge-based and knowledge-flow based goods, precisely because of its different orientation. On the basis of the results of knowledge audit, it is possible to become better prepared for introducing knowledge management and for more detailed identification of insufficiently exploited knowledge areas, which have potential. Barriers in knowledge sharing and in using the existing knowledge sources have also been identified, and knowledge management will have focus on them.

A new knowledge audit method is oriented towards projects and project-based organisation which is most frequently encountered in IT firms. Redesign of the existing method allows for more quality knowledge audit and identification of more areas of innovative knowledge that are of key importance for progress and survival on the market. The inclusion of knowledge audit in analysis, after the completion of the project, will make possible the identification of weak points and the elaboration of the so-called project checklist on the basis of the results of knowledge audit. This directly influences the

reduction in resources necessary for the following project. Such knowledge audit may be transparent, and will probably not take too much time. We believe that this new project-oriented knowledge audit method may be described as a procedure carried out before the introduction of knowledge management and as a knowledge audit procedure in the analysis following the completion of the project.

Nevertheless, on the basis of articles and interviews analysed during the preparation of this paper, we conclude that knowledge management is insufficiently represented in Croatian companies. The application of knowledge management is easier in IT firms precisely because of the presence of IT technologies and because it does not require the allocation of significant resources. Better knowledge audit procedures and more quality audit results will make possible quicker introduction of knowledge management.

Knowledge management is still a young and developing field in which new methods are searched for and developed, and these methods differ very much. The contribution of this paper is the observation and conclusion that redesign of the existing audit method makes this method more efficient and applicable in companies characterised by project-based organisation. The application of this method is possible in particular in IT firms with predominantly project-based organisation.

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