TOWARDS A KNOWLEDGE-DRIVEN ORGANIZATION MODELING KNOWLEDGE CREATION AND STIMULATING SHARING

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Abstract
In this paper a model is proposed for knowledge creation and sharing in knowledge intensive organizations (KIO) providing services in the Dutch building and construction industry. Activation and creation of required knowledge and sharing in such organisations is mostly at an insufficient level and only affects a part of the organization. A large amount of valuable knowledge therefore often remains unused or is used on a very small scale.

The model developed by means of field research, is based on two parallel, complementary and dependent processes which analyze, activate, create and develop the required knowledge in KIO's. In this paper, the development of the required knowledge in KIO's focuses on (i) the internal knowledge which is essential to achieve the goals of the KIO; (ii) the market knowledge which is necessary to develop and maintain the primary processes, services and business opportunities for the KIO.

The model is positioned in a KIO as a central platform with all knowledge fields involved for the analyzing, activating, creating, developing, sharing, applying and continuously evaluating the required knowledge. Therefore the objective is to create a balance between the strategy of the organization and the KM strategy.

Keywords: knowledge management, knowledge intensive organization, knowledge creation, knowledge sharing, knowledge management strategy.

INTRODUCTION

Nowadays knowledge management (KM) has turned out to be very significant because organizations in a complex, dynamic and interdependent environment can no longer rely on the behaviour of an individual professional (Anumba et al. 2005). In the current economy, the success of organizations broadly depends on the means by which organizations competently use their knowledge and skills. For a knowledge intensive organization (KIO), knowledge creation is the key factor to constant competitive advantage (Weggeman 1997, Nonaka and Takeuchi 1996). In an economy where the only certainty is uncertainty, the sure source of lasting competitive advantage is knowledge (Nonaka and Takeuchi 1996). Because of the rapid increasing number of KIO's, the discrepancy between the organizations in the productivity of the knowledge creation processes become more determinative. This also concerns the competitive position of the KIO's (Weggeman 1997).

Organizations active in building and construction still do not have any systematic methods for the creation, capture, storage, sharing, and reuse of a professional's domain knowledge of products, people, and processes (Robinson, Carillo, Anumba, Al-Ghassani, 2001). Additional to this argumentation, customers demand a higher adoptability, which necessitates that a KIO progressively compromise in order to best suit the customers foremost demands. Organizational knowledge is a dynamic parameter that continuously requires modifications and development in a KIO.

According to Miltiadis (2005) organizational knowledge requires the management of records of available and needed competencies. Also the automation of such competency handling becomes a key issue for the effective functioning of KM activities. Theories in general focussed on internal organizational processes for knowledge creation, integration and sharing (Kogut et al. 1992, Sanchez 2003). How organizations can obtain and procure knowledge from particular external resources also got insufficient attention. However, there are discussions in studies showing that consumers and customers often create new knowledge which is valuable for the organizations (Sanchez 2003).

Knowledge absorption from customer relationships involves two key processes of organizational learning: (*i*) creating new knowledge within the organization from customer relationship, and (*ii*) leveraging this new knowledge within the organization and in customer relationships (Sanchez 2003). Social relations effectively integrate implementation and contribution of knowledge in organizations. Hence, it is important for KM to propose organization initiatives that support these relations appropriately.

Due to lack of understanding about KM in organization and the fact that software vendors are marketing their products as the KM prescriptions, organizations not only heavily invest on KM technology, but also view KM as an information technology or other document management systems. KM has fallen victim to a mixture of bad implementation practices and software vendors eager to turn a complex process into a pure technology play (Miltiadis 2005). Thus managing knowledge is far more than implementing intranet, document management systems or ICT communication systems in the organization. Organizations that do not appreciate this issue when using such new 'KM tools' often are confronted with disappointing results. These systems can be applied only to support the actual relations in which KM takes place. In this paper, KM is pursued as a platform of members of the organization into support the knowledge developed, secured, shared, implemented and evaluated. In an organization, such a platform is composed of links in the internal and external environment. Internal this concerns strategy, organization culture, staff, and the supporting infrastructure, and externally the relations with customers, suppliers, partners, and knowledge institutions. The internal and external trust considerably affects the success of the organization, and it should be intentionally applied.

The designed platform is comprised of two processes: a Research process and a Development process. These processes proceed along each other parallel and simultaneously, and consist of specific activities that are fulfilled by particular employees or groups. Within the platform, research process and development process are respected as a single process and they are in fact a component of the process of 'KM strategy development'.

This paper focuses on the processes of knowledge creation, sharing and implementation of created knowledge for the entire (decentralized) organization and the activities of the regional companies in the Dutch building industry. The objectives of this paper are identified by initially analyzing the state of the art of the existing knowledge and the KM in the organization of a specific company active in designing and performing the maintenance of buildings in the Netherlands. Based on results of this analysis, the specifications for designing a platform were determined which will be discussed in this paper. Considering the specific requirements, the platform is then designed and worked out.

METHODOLOGY

In this paper the result and findings of a practical oriented research is represented with the aim of designing a structural platform for knowledge creation and knowledge sharing in an organization active in the Dutch building industry. Van Aken (2004) argues that it is essential to design a solution as the result of a practical oriented research. The general purpose of a practical oriented research is to perform the research for developing, attempting, and evaluating the solutions for the real problems in the practice which exist by the assignable actors outside of scientific areas (‘t Hart, 1998).

In this research, a specific methodology is used that consist of several steps. Firstly, the organization is deeply analyzed by using interviews with respondents, analysing of documents and the practice internally and externally, while simultaneously an extended theoretical framework is created. Secondly, based on the outcomes, a model for knowledge creation and sharing in a KIO is developed and tested as a practical model. Finally implementation methods are proposed.

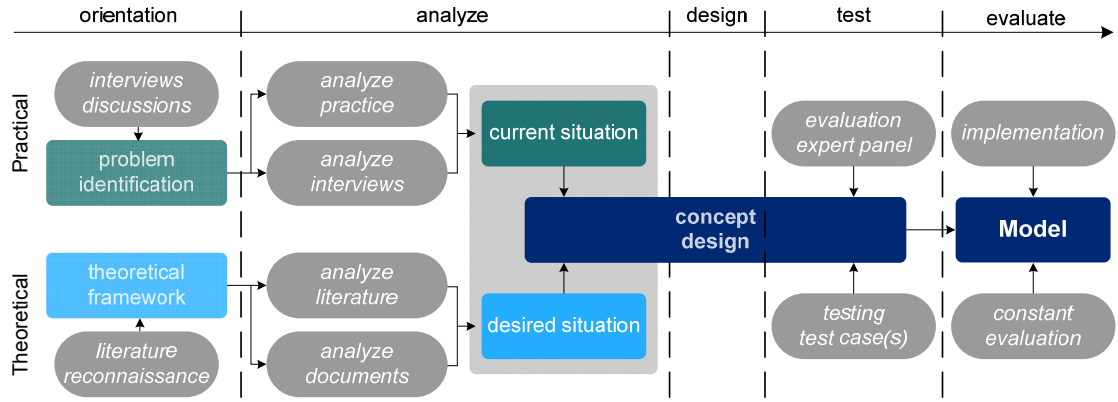

Figure 1: *The research development strategy model*

Figure 1 show the research development strategy model used to design the platform. The research is performed as a combination of a theoretical research, an empirical or practical research, and a third-source nondependent research.

- The theoretical research is mainly based on literature and internet sources. Specifically in this research, there is knowledge acquired about the points of significance and bottlenecks regarding the knowledge factor. This research is done according to Wester and Maso (1991) in 4 phases: exploration, specification, reduction, and integration. The goal here was to create a theoretical framework concerning KM and all the relevant aspects. The best matched definitions are found out and related aspects are explored. In the theoretical research, it has been also inquired and focused on the latest represented results for relevant practice problems regarding KM, knowledge creation, and knowledge sharing within the organizations functioning in the building industry.
- The empirical or practical research is started by identifying the exact problem in the practice of the organization. This is done by two different methods: a quick scan on the organization all round the knowledge factor, and by the means of interviews with the most relevant concerned employees to the research problem. In the next phase after the problem definition, the organization is been deeply analyzed by three different practice oriented analyzing models: 7S-Model, SWOT analyzes, and INK management model. Moreover, to create an overview about the precise situations and conditions regarding the knowledge factor and KM, several semi-structured interviews are held with employees at different levels in the

organization. The outcomes of the interviews are used as an appliance and an input for the analysing 7S-model and SWOT analyzes.
- The third-source independent research is concerned with the media's like internet, technical journals, professional newspapers, and intranets. These sources are ideal origins to obtain the latest actual development about the KM. Other third-sources used in this research are the R&D publications, conference articles, final study projects from university graduates, and PhD thesis's.

The research development strategy model is based on the regulative cycle of van Strien (1986). Van Strien (1986) calls it regulative, because it intervenes in a practice with the aim to reach more desired circumstances. The regulative cycle of van Strien (1986) is shown in the figure 2.

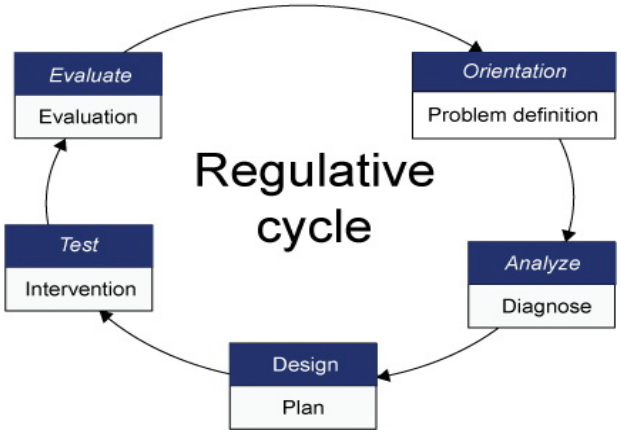

Figure 2: *The research strategy according to regulative cycle of van Strien (1986)*

Van Strien (1986) distinguishes three important differences between scientific and practical oriented research. With the situation around this research, the recognised differences show that this research:
(i) is not generalized but individualized, because it is based on one aspect, the knowledge factor;
(ii) has the objective to design a adequate intervention which is applicable in the practice. Adequate intervention is intended here as a framework that creates solutions for the specific practical bottlenecks;
(iii) has the result which indicates what should be differently performed in the future.

The regulative cycle of van Strien (1986) consists of five phases:
(i) orientation: first, the problem is further intensely analyzed and accurately formulated, and second, the objectives of the research are determined.
(ii) analyze: the boundary conditions and requirements are described. On one hand, the organization is deeply analyzed regarding the formulated problem. Simultaneously, the theoretical research is expanded and the relevant aspects will be profound investigated;
(iii) design: on the basis of the outcomes of the analyzing phase a solution is created, and the obtained objectives are described. Beside that, the implementation methods are proposed;
(iv) test: the designed solution is tested in the theory by reviewing the literature, and in the practice by means of an expert committee. The proposed corrections and improvements are applied into the designed solution;
(v) evaluate: this is a constant phase in which the design and the implementation are evaluated.
The phases of the regulative cycle are not strictly separated. Particularly there is an overlap between the analysing phase and the design phase in the form of a repeated process.

KNOWLEDGE MANAGEMENT IN KNOWLEDGE INTENSIVE ORGANIZATIONS

According to Kapteyn (1982) knowledge and KM are primitive terms which can be understood without any precise definition. But before discussing the KM, firstly it is important to clarify the differences between data, information and knowledge (Stair and Raynolds, 1998).

Data are raw facts. Information is a collection of facts which if organized in a specific context, it has a collective value more than the value of the fact itself. Knowledge is a personal ability which is the product of information, the individual experiences and skills, and the attitude, that an individual at a certain moment comprises (Weggeman, 1997). Knowledge is divided into two types of explicit and tacit (Nonaka and Takeuchi, 1996). Explicit knowledge is decoded, and easily documented and shared. Tacit knowledge is related to human being and can be technical (know-how, experience, skills), or cognitive (metal models, beliefs). KM is defined as to set the right knowledge available, by the right place, in the right quantity, at the right moment.

It is difficult to find a precise definition for KIO's even though there is a lot of literature on the subject. Weggeman (1997) defines KIO as: "an organization with mainly knowledge operative employees in the primary processes or at least in the technical staff who have dominant effect on the functioning of the primary processes. In a KIO, the knowledge operative employees are engaged to inventory, develop, integrate, share, apply, and evaluate the knowledge, to realize the organizational objectives, and to satisfy the internal and external clients".

For the KIO, managing knowledge is an essential factor. Because of the demand of the market for new products and a shorter time-to-market product strategy, a consistent displacement is recognised from a capital- and labour-intensive organization toward a KIO (Starbuck, 1992). This modification of becoming more knowledge intensive represents another perspective of the organizations. Identification, acquisition, development, dissemination, utilization, and preservation of knowledge in the organizations have been identified as basic KM activities (Davenport, Jarvenpaa, Beers, 1997). Three fundamental stages introduced for the KM and learning process in the organizations are knowledge acquisition, knowledge dissemination, and knowledge utilization. While it may be necessary to run all three stages simultaneously, focusing on a single area is more manageable. Organizations today become increasingly dependent on the available knowledge in the company. To keep the internal knowledge up-to-date, the learning processes become more significant. Organizations don't learn, but the individuals learn in the organizations. Therefore, the employees are supported with their learning processes to improve the learning capabilities of the organization. Schein (1997) identifies the next distinction in 'Organizational learning'. This means learning by individuals and groups in the organization, versus the 'Learning Organization' that typically means learning by the organization as a total system. Knowledge-intensivity is basically just one of the characteristics of modern organizations. Sydänmaanlakka (2000) suggested some characteristics related to KIO. First, their business environment changes very rapidly, which forces them to change their strategies accordingly. In addition, the role of employees has changed from simple and controlled work to complicated knowledge work in which the employee has a lot of authority. Finally, the organizational structures are based on primary processes and projects, and the structures can be changed flexibly to best serve the business objectives.

Due to the fact that the business environment of the KIO's modifies extremely rapid, technical development expands quickly, and consumers and customers grow up and demand higher quality for products and services, KIO's need to take the competitive advantage by continuously adjusting to the external environment and the market.

According to the INK-model (INK means Instituut Nederlandse Kwaliteitzorg, www.ink.nl) KIO's are divided into two domains and an innovation-link (Dorr, Zuidema 2002). The innovation-link provides feedback and reacts for the improvements in the organization. The two domains are the organizational domain and the result domain. The *organizational domain* includes the primary processes and all the aspects that are necessary to be managed for primary process to obtain the results which satisfies the customers and stakeholders. When the objectives of the primary processes are not obtained, the process should be analyzed, and the bottlenecks need to be found to be able to structurally improve the process. The *result domain* includes the results of the organization which is offered to the market, the financial results, satisfaction of the employees, and the external relations with customers, suppliers and society. INK-model argues that KIO's have to analyze the result domain of the organization and use the outcome to improve and renovate the primary processes or the entire organizational domain.

Interlinking the INK-model with the PDCA-model, the Plan, Do, Check and Act cycle that Deming (1986) introduced, shows that Plan and Do cover the organizational domain in the INK-model, while Check covers the result domain, and Act the innovation-link. Therefore, to take action for renovating the organizational domain, it is essential that KIO continuously studies and provides a complete up-to-dated overview of the result domain. This helps a KIO to proactively renovate, change, and reconstruct the primary processes and the entire organizational domain. This results in the obtaining of the required objectives for the organization, and to create advantage against the competitors in the market. This is, however, a constant cycle of restructuring the organizational domain in the best way to obtain the objectives, and analyzing the result domain to find the best solutions to improve organizational issues. The results of the analyzing phase of our research showed that KIO's in building and construction do not appreciate that the basis of inter organizational renovations relies on results in the external environment. Usually, in such practice the objectives of innovations are not obtained. Mostly they analyze the organizational domain and therefore they don't have enough knowledge and information about the external environment.

A MODEL FOR STRATEGIC KNOWLEDGE MANAGEMENT IN KIO'S

The platform is initiated to develop and optimize the processes of knowledge acquisition and dissemination in a KIO. Such platform utilizes and exploits the internal and external knowledge of the organization. This platform is called Knowledge Platform (KP). Establishing the KP is not only an organizational matter, but first of all, it concerns the strategically setting of KP, subsequently to organizational, technological, and processional establishing. KP is a central platform in a KIO where the strategy for KM and the processes of knowledge acquisition and knowledge dissemination are developed and needs to be continuously evaluated. The developed KM strategy should be applied and implemented in the organization. The organization is then capable to structurally create the required knowledge which is analyzed and determined in KP, and share it in the organization with use of particular strategies. Applying or utilizing knowledge means to offer the knowledge as a product/market combination that creates surplus value for the clients in comparison to competitors. With this core capacity the possibilities are indicated to create surplus value in the markets with respect to the current and possibly new competitors. With other words, a particular product/market combination is the concrete utilization of the available knowledge that could be seen as a core competence of KIO.

The Knowledge Platform contains a main process, which creates the KM strategy for the entire KIO. There should be than two sub-processes designed in the KP. A Research Process

to create knowledge through a structured process directed on the required knowledge for the activities of the organization, and simultaneously a Development Process to market the knowledge in a process directed on the expectations of the customers and the external environment. Within KP research and development processes are entirely considered as one main process. These processes consist of each 4 steps which are executed by a number of specific people or groups which are determined within KP. However, there is a distinction made between the steps which provide an input to the strategy development, and the steps which are carried out for the strategy provision and the decision-making as an output from KP. Particular employees and groups are responsible for the steps and the activities of the steps and they report directly to the steering committee of KP during the regular meetings. The reports should be documented for later reference, modifications, and researches. The meetings of KP are the decision-making moments which occur for the clarification and finally lead to the development of KM strategy. These decision-making moments has a Go/No Go form in the sense that if the taken actions have been sufficient for this step of the process or they should be more actions taken before progressing to the next step of the process. The steering committee has the responsibility to supervise and control all the steps, activities, and progresses. This committee consist of the strategic and top managers, middle managers, and knowledge fields experts.

The process of Knowledge Platform is illustrated in figure 3. All research and development processes, including their steps and responsible groups, are described.

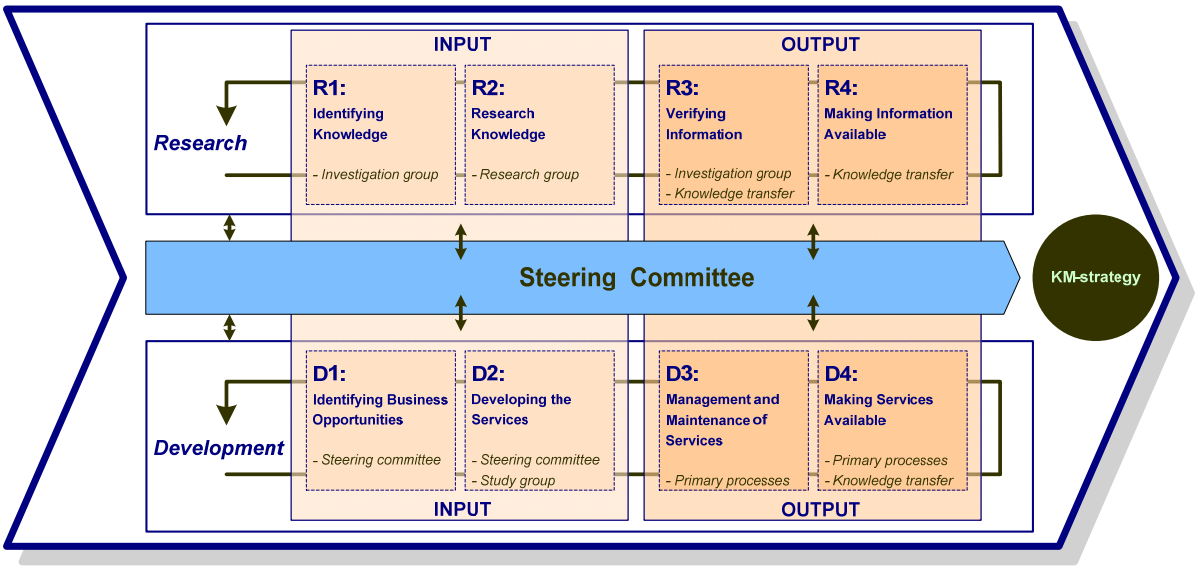

Figure 3: *The structure of the Knowledge Platform*

The Research process

Input

R1- Identifying Knowledge: inventory and make explicit of the available knowledge on all levels and all processes of the organization as internal sources. It is also indicated what is relatively the quality of that knowledge, and how far that knowledge is utilized in the organization. This is done by an investigation group which is from one or several knowledge workers.

R2- Research Knowledge: search, explore, and pursue which knowledge is missing in the organization and should be created. Investigate which knowledge sources and knowledge streams are weak in the organization. It is also indicated how the required knowledge should be created and what are the required investments for this. This is performed by the research group in cooperation with relative study group and project group. This activity is done with

the eye on the report of D1 (see under development process).

Output
R3- Verifying Information: critically inspecting, comparing, and collating of the obtained information. Inventory and analyze of the advantage and disadvantages of the information regarding to aspects strategy, culture, employees, means, investments, market, and expected results of the organization. This is performed by the investigation group in cooperation with the knowledge transfer group with the eye on the report of D2 (see under development process).
R4- Making Information Available: inventing the manners how to share the new created knowledge in the organizations. Socialize, externalize, combine, and internalize (Nonaka et al. 1996) of the new acquired knowledge in procedures, handbooks, education materials, workshops, discussion groups, and external publications for the benefit of the organization. This is performed by the knowledge transfer group with the eye on the report of D3 (see under development process).

The Development process
Input
D1- Identifying Business Opportunities: distinguishing and recognizing of the potential business and services opportunities for the organization as external chances; set up a market investigation; in brainstorm sessions (with strategists, middle managers, and knowledge workers) the business opportunities can be invented and inventoried. These are tasks for the steering committee of a KP.
D2- Developing the Services: defining of the required service assortment, central and by establishments; investigating the effectiveness of the position of the services in the market comparing to the competitors; investigating what kind of investments by which service developments should be done; developing a policy for the future of the services with the eye on the present and (potential) future customers. These are tasks for the steering committee and the relative study groups.

Output
D3- Management and Maintenance of Services: defining the type of management and leadership style for each (primary) process; setting up objectives for changes, designing or re-designing plans for the processes of the developed services, and setting up how these changes should take place in the organization; determine what kind of organizational structure and organizational culture fit by these changes. These are tasks for the managers of the primary processes or the division managers.
D4- Making Services Available: determining of the ways how these changes should be implemented in the organization; creating and preparing a platform, which the internal and external capitals can learn about these changes, and what will be changed in their activities in the future; the objectives of the changes in the organization should be published. These are tasks for the division managers and the knowledge transfer group.

Weggeman (2000) introduces the Knowledge Value Chain (KVC) as the minimum set of activities that should be performed if an organization wishes to implement KM. He argues that the order, in which that activities or processes are represented in the KVC is a logical, fixed order. The KVC can help managers and knowledge workers to reduce the complexity of the knowledge stream through decompose that stream in factors. In this case, it will be possible to consider and to optimize every connection of the chain separately and in relation to the prior and next process. The KVC consists of six consecutive processes which are

permanently evaluated. The Knowledge Platform contains all the activities of the KVC and also pursues the same order. The Knowledge Platform is actually based on the KVC and follows the same evaluation process within Research and Development as it is illustrated as continuous arrows in both sub-processes. Figure 4 shows the processes of KVC.

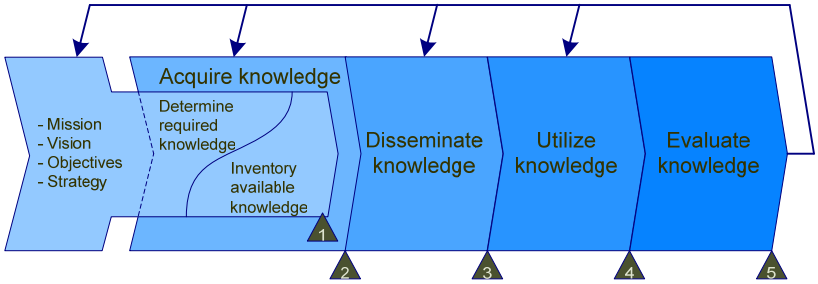

Figure 4: *The Knowledge Value Chain (Weggeman 2000)*

IMPLEMENTATION OF THE KNOWLEDGE PLATFORM

As mentioned in the research development strategy model (see figure 1), the concept design of the Knowledge Platform is been tested by an expert panel which consists of professionals from different hierarchical functions in the KIO. First, the objective was checked if this model is a practical solution for the stated problem, secondly if the model can be operated successfully, and finally if the model can be implemented in this specific organization. The expert panel made comments and remarks for corrections which are assimilated to the model. This finally resulted in a model ready for implementation.

A proposal is made for implementing the model using the Troika of Promoters (Hausschildt, Kirchmann, 2001). They introduced three types of promoters with specific authorities and capabilities for the implementation of the (culture related) change in the organizations. These promoters are Power promoter as the sponsor with hierarchical power, Process promoter as the champion with knowledge of organizational know-how, and Technological promoter as the expert with knowledge of technological know-how.

However the implementation of the model needs to be divided in a few phases with detailed structural and cultural preparations. Implementing the total model might take several years depending on factors like size, culture, structure, and the development of the present KIO. Once the model is entirely implemented, every cycle of sub-processes should vary between a few months and a year.

CONCLUSION

This research focussed to the modelling of knowledge creation, sharing and accumulation. It is validated by means of an expert panel involved in and experienced with the organisation. In this case the knowledge management strategy was considered as a section of the strategy of the organization. It might be indicated that a Knowledge Intensive Organisation need to be transformed to a ‘learning organization’ where employees exchange and share their knowledge. However, the research was limited to the design and did not cover the implementation and the effect of use of the model. We believe however, that provoking the employees to share their knowledge with other employees or groups within the organization will lead to diminish costs and reduced time of primary processes. Communication in a ‘learning organization’ will change from a hierarchical and traditional way to flat and extensive daily professional and social contacts and trainings. To prove the assumptions some

experiments using the model in practice are initiated in several knowledge intensive organisations. Also evidence can be generated if constantly developing the internal knowledge and adjusting it to the strategy of the organization will lead to the final target.
Further research on Knowledge Platform is regarded to expand the model, and develop it from a platform to a very specific R&D department for larger full-grown organizations.

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