

Organizational Knowledge and Change: The Role of Transformational HRIS

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Abstract. Research on HRIS has uncovered different types of HR systems, namely operational, relational and transformational. Each type of HRIS addresses a particular organizational problem and must be researched with a particular type of research design. In this paper the issue of transformational HRIS is addressed with the emphasis being placed on the need to associate this type of system with the broader concerns of organizational knowledge and its impact on the competitiveness of business. Such a link is achieved through a conceptual tools named the Organizational Knowledge Cycle and illustrated by the re-visitation of the case of Dow Chemicals' People Success System (PSS) in the Benelux [7].

1 Introduction

The global spread of information technologies in the last 30 years has facilitated the establishment of knowledge (individual and organizational) as the driving force of the economy. Thus, in the early 21st century, we can safely talk of organizational knowledge as a competitive market pressure as a major cause/consequence of the organizational integration of information technology [1]. Enabled by IT applications, human networking and organizational communication have become key ingredients in the overall improvement of the effectiveness of organizational processes which, in turn, provides a major contribution to the creation and accumulation of knowledge in the organization.

Organizational knowledge is credited now-a-days as the key variable in sustainable competitive growth [2] [3] [4] [5] [6]. And as more knowledge is created and accumulated within and across organizations with the contribution of IT applications, the greater the demands from the market for more infusion and more diffusion of such applications. There exists therefore a circular loop of cause and effect between the adoption of IS/IT and the creation of organizational knowledge.

In this paper we explore this loop by focussing on one type of IT application - Human Resources Information Systems (HRIS). HRIS, in turn, are made up of various types - operational, relational and transformational. It is our contention that transformational HRIS are better understood in the context of an organizational knowledge management framework. We put forward the organizational knowledge cycle as a conceptual tool to analyse the impact of transformational HRIS on the state

of organizational knowledge in the organization, thereby allowing conclusions to be taken not only about this type of HRIS but also about the process of organizational transformation itself. In order to validate our proposition, we re-visit an empirical case study by [7] of a transformational HRIS - Dow Chemical in the Benelux. Our aim is not to re-interpret the case but simply to show the benefits of the organizational knowledge cycle as a methodological tool for establishing the links between HRIS and organizational transformation.

2 Perspectives on Organizational Knowledge

Nonaka and Takeuchi [8] have put forward a well known theoretical framework for the creation of organizational knowledge where the various elements of knowledge creation are identified and interrelated in a dynamic whole. The framework incorporates two major dimensions, one epistemological and one ontological. The epistemological dimension contains the theory's key proposal, i.e. that the interactive processes of knowledge conversion, between tacit and explicit knowledge, lies at the heart of knowledge creation [8]. There are four possible modes of knowledge conversion, at the epistemological level: from tacit to tacit (socialization); from tacit to explicit (externalization); from explicit to tacit (internalization); and from explicit to explicit (combination). The ontological dimension considers four different levels of knowledge creation: individual, group, organization and inter-organization. Along the ontological axis, the knowledge creation movement starts with the individual's tacit knowledge, is amplified through the four modes of knowledge conversion and is finally crystallized at higher ontological levels (organizational or inter-organizational).

The theoretical framework put forward by Nonaka and Takeuchi [8] is compatible with Orlikowski's [9] epistemological notion of *knowing-in-practice*, i.e. "the mutual constitution of knowing and practice" (p. 251). Supported by the Giddens' [10] structuration theory and by Maturana and Varela's [11] concept of autopoiesis, Orlikowski explains that knowledge lies essentially in the practice. Knowledge is not something which is inscribed in our thoughts or our brains but knowledge is what makes practice come to life. *Knowing-in-practice* is equivalent to Giddens' concept of knowledgeability or the inherent ability of human beings to "go on with the routines of social life" [10, p. 4]. Hence, it is neither "out there", incorporated in external systems or "in here", inscribed in the human brain, but is something that exists in people's ongoing engagement in social practices. Competence or skillful practice is, therefore, is not something that can be presumed independent of practice.

Besides the epistemological and ontological dimensions, knowledge creation can also be approached from a pragmatic perspective. Pragmatic knowledge is that which is intended to reach objectives within a limited time period. The objective might be, for example, to improve the levels of an organization's efficiency, effectiveness and competitiveness. In accordance with this perspective Holzner and Marx [cited in 12] proposes the formulation of society's knowledge system as being a five-step process of construction, organization, storage, distribution and application of knowledge. This perspective is consistent with both Nonaka and Takeuchi's [8] SEIC framework for

the formation of organizational knowledge and with Orlikowski's [9] epistemological notion of *knowing-in-practice*. On the other hand, each of the steps of the organizational knowledge cycle has been approached by a variety of authors from the organizational learning and the knowledge management literatures. An overview of some of the most representative authors whose writings support each of the steps of the cycle is presented in Table 1. It is also important to point out that such a cycle is not linear in the sense that it does not have start or end points. Given that individual knowledge pre-exists the organization and that it is difficult to determine exactly when individual knowledge becomes organizational, the cycle can start at any point. Regarding the end point, some knowledge will be applied and utilized by the organization, but some might just remained shared or stored without any utilization.

Table 1. The Organizational Knowledge Cycle.

KNOWLEDGE PROCESS	DESCRIPTION IN AN ORGANIZATIONAL SETTING	SUPPORT FROM THE LITERATURE
Formation or Construction of Knowledge	Purposeful action towards reaching objectives (pragmatic/ strategic view). Searching, identifying, locating, validating and accessing knowledge and information relevant to the organization and its objectives	[8] [13] [14] [15]
Organization of Knowledge	Integration into known categories. Organizational structures. Process architectures. Information and work flows. Organizing, codifying, appropriating, absorbing and incorporating knowledge and information within the bounds of the organization	[16] [17]
Storage or Retention of Knowledge	Recording in oral and written media. Institutions and people themselves as means of retaining knowledge. IT as the means of storing and "textualizing" information. Acquiring and managing the resources which contribute to the creation and accumulation of the organization's stock of knowledge and information.	[18] [19] [20] [21] [22]
Distribution, Transfer or Sharing of Knowledge	Channeling of knowledge to where it is needed. Communication. Dialogue. Facilitation (culture and climate) and Inhibition (organizational politics) factors. Leadership styles. Managing the communication, the diffusion and the sharing of knowledge in the organization.	[23] [24] [25] [26] [27]
Application, Use or Re-Creation of Knowledge	Construction presupposes Application (pragmatic view). Excellence of output. Improvements in performance. Re-creation of knowledge. Innovation. Enabling, evaluating, rewarding and institutionalizing (i.e. cristalizing) organizational results rated as highly performant, excellent or innovative, achieved intra or inter-organizationally	[28] [29] [30] [31]

The knowledge life cycle and its five processes are a theoretical construct representing actual needs for survival and growth of any organization. The expression "process" is used to mean that knowledge is the result of actual practices, embedded in the social and physical structure of the organization. Given the dynamic character of knowledge, the cycle is not intended to mean a sequential type of behaviour. On the contrary, the cycle's processes interact randomly and simultaneously. The process

of Use/Re-creation is the final aim of the cycle and serves as the measure for the effectiveness of knowledge management activities in the organization. Processes, by definition, cut across the whole organization and work within contexts. There are many contexts within the organization where it is necessary to act in order to make it more responsive to the requirements of knowledge creation. Thus, when analysing a knowledge creation cycle it is necessary to spell out the context(s) of interest.

3 Organizational Knowledge and HRIS

The effects of implementing information technology artefacts cannot be pinned down to one or two areas in the organization, but are much more pervasive and continuous. Implementation should not be seen as a “one-off” event, which is finished when the information systems development cycle is complete. We see any form of IT implementation as a process more akin to organizational learning and change than to a single step in the methodological frameworks popularized by information systems development methodologies. The key issue regarding IT implementation in organization is organizational change which, in turn, is a holistic, complex and non-linear process[32]. An organizational change perspective on the application of IT in organizations affords us the necessary linkage between the perspective on pragmatic knowledge outlined above and HRIS.

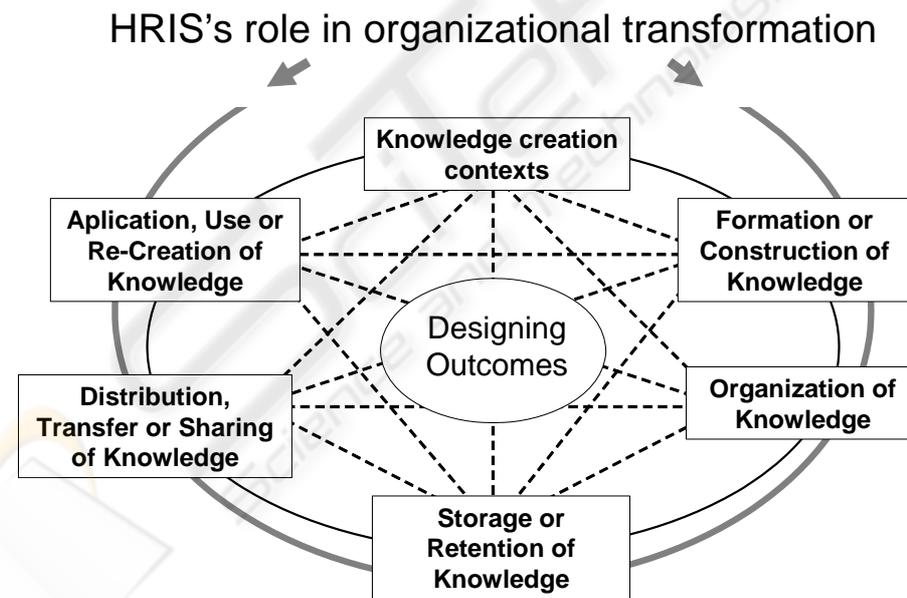


Fig.1.

In Figure 1 a diagram representing the impact of HRIS on the organizational knowledge cycle is presented. It depicts the relationship among the five steps of the

cycle and the knowledge creation contexts. The interaction of the six dimensions gives rise to changes in organizational design, with design being the ultimate destination of organizational transformation. This model will be used to re-visit the empirical case study of Dow Chemical in the Benelux [7].

3.1 Types of HRIS

HRIS is not a specific stage in the development of HRM, but a choice for an approach to HRM. Wright and Dyer [33] distinguish three areas of HRM where organizations can choose to 'offer' HR services face-to-face or through an electronic means: transactional HRM, traditional HRM, and transformational HRM. Lepak and Snell [34] make a similar distinction, namely operational HRM, relational HRM and transformational HRM. In this paper we address only the transformational dimension of HRM.

The first area, operational HRM, concerns the basic HR activities in the administrative area. One could think of salary administration (payroll) and personnel data administration. The second area, relational HRM, concerns more advanced HRM activities. The emphasis here is not on administering, but on HR tools that support basic business processes such as recruiting and the selection of new personnel, training, performance management and appraisal, and rewards. Transformational HRM, the third area concerns HRM activities with a strategic character. Here we are talking about activities regarding organizational change processes, strategic re-orientation, strategic competence management, and strategic knowledge management.

The areas mentioned could also be considered as *types* of HRM that can be observed in practice. In some organizations, the HRM emphasis is on administration and registration, in others on the application of operational HRM instruments, and in a third group the HRM stress is on its strategic role. Within all the types of HRM, choices can be made in terms of which HRM activities will be offered face-to-face, and which will be offered through web-based HR (e-enabled). This question, for the operational type of HRM, provides the choice between asking employees to keep their own personal data up-to-date through an HR website or to have an administrative force in place to do this.

For relational HRM there is the choice between supporting recruitment and selection through a web-based application or using a paper-based approach (through advertisements, paper-based application forms and letters etc.). Finally, in terms of transformational HRM, it is possible to create a change-ready workforce through an integrated set of web-based tools that enables the workforce to develop in line with the company's strategic choices or to have paper-based materials.

In cases where an organization consciously and in a focused way chooses to put in place web technology for HRM purposes, based upon the idea that management and employees should play an active role in carrying out HR work, we can speak of e-HRM. With this line of reasoning, three types of HRIS can be distinguished: Operational HRIS, Relational HRIS, and Transformational HRIS.

4 The Empirical Case: Dow Chemicals

The Dow Chemical Company is one of the largest chemical companies in the world. This US-based company (Midland, Michigan) is now active in 33 countries around the globe. In 2001, Dow completed an important milestone, namely the merger with Union Carbide, which strengthens Dow's position as a global chemical company. Until the mid-1990s Dow had been a country-oriented company, with fairly autonomous sites around the world only loosely coupled with Dow sites in other countries. In the last decade this changed and Dow aims to become a global company. Dow's organizational structure is flat (a maximum of six layers) and based upon worldwide-organized businesses. This provides employees with a high level of independence and accountability, working in self-managing teams, including process operators as well as managers.

4.1 Dow Benelux B.V.

Dow Benelux is part of the global Dow Company, and has ten production locations and three office locations. Dow's largest production site outside of the United States is located in Terneuzen (the Netherlands). This site consists of 41 units, of which 26 are factories. The total number of employees at Dow Benelux in 2001 was about 2800, with about 600 in Belgium and 2200 in the Netherlands. It produces more than 800 different products, most of which are semi-manufactured goods for application in all kinds of products used in aspects of our daily lives. Examples of markets where Dow is a major 'player' are: furniture and furnishings (carpets, furniture materials), maintenance of buildings (paint, coatings, cleaning materials, isolation), personal care (soap, creams, lotions, packing materials), and health and medicine (gloves for surgeons, diapers, sport articles).

Before the 1990s, Dow Chemicals was mainly a "blue collar/manual work" organization. During the first half of the 1990's, they suffered hard times and the company made financial losses. Global competition was increasing and technological developments were speeding up. Dow's management concluded that if the company wanted to survive it had to become more flexible, more responsive, and permanently alert. Therefore a new strategic plan was developed: the Strategic Blueprint.

This need for change led to the development of a new global HR strategy that broke with the tradition of *job* security and switched to *career* security. Since the mid-1990s, Dow no longer guarantees a lifelong job, but instead the company offers a career that can develop at Dow, but also elsewhere. Furthermore, Dow made a switch from a 'manual work/blue collar work' organization towards a 'brainwork/white collar work' organization during the 1990s. Therefore, to transfer the knowledge and experience from 'one head to another' became a very important challenge for the company.

In 1997, Dow started to introduce the People Success System (PSS): "a system of Human Resource reference materials and tools that help provide the underpinnings of

Dow's new culture"¹. Before the introduction of PSS (which is technically based upon Peoplesoft), Dow already had a number of electronic HR systems in use. PSS's difference was that it was based upon the idea of having one database, and more importantly, with PSS, a completely new HR philosophy was introduced.

Coming up with a new HR strategy was part of the initiative to improve Dow's performance after a period of tough years with annual losses of 1 billion US dollars. The new HR strategy was part of the new so-called Strategic Blueprint, introduced as a 'roadmap for the company's transformation'. Dow wanted to become a real global company, instead of an internationally dispersed one. In order to achieve this, internal policies, including HRM, had to be unified. The use of state-of-the-art information technology to support a new HR policy was seen as the obvious choice! Therefore, the way forward to the implementation of web-based HR, i.e. e-HRM, was open and the new HR system was called the People Success System (PSS).

5 The PSS Analysed in Terms of the Organizational Knowledge Cycle

This section contains the discussion of our proposition, i.e. that transformational HRIS can usefully be analysed in terms of the Organizational Knowledge Cycle as put forward at the outset.

5.1 The Knowledge Creation Context: Linking the HR Strategy and Dow's Overall Strategy

Dow's HR strategy, the so-called People Strategy, is rooted in the company's overall strategy, the Strategic Blueprint. This People Strategy should ultimately provide the strategic leadership that is necessary to allow all Dow employees to use their 'full potential'. Besides this, the People Strategy has to make employees realize that they are responsible for their own development in order to support the company in advancing to the next performance stage. Dow, in response, practices a 'pay-for-performance' philosophy, expresses the sentiment that it wants employees to stay for a long period of time, and offer employees the possibility to develop themselves and advance their careers.

Dow's top management introduced the People Success System as part of the organizational change process. The PSS is seen as 'a global, integrated competency-based Human Resources system for Dow employees'. It included four prime components: performance expectations, compensation, development, and opportunities. The stated goals of the PSS were:

- To provide an integrated Human Resources system that supports the strategy of the company and enables the culture required for individual and business success to flourish.

¹ Brochure for employees new to Dow: "Enabling People Success at Dow"

- To support a global business organization of empowered employees who know what to do, know how to do it, and who want to do it: a de-layered organization with 'broad spans of control', self-directed teams, and that has created a workforce ready for change.

5.2 PSS's Contribution to the Company's Formation or Construction of Knowledge

Overall, people at Dow appreciated the fact that, with the PSS, information became available that was not previously accessible. The global compensation system especially received a lot of hits at the beginning, because it provided information about salaries at all job levels at all Dow sites around the world. People could compare between countries and between job levels. This contributed to the open culture that had been announced as part of the HR changes at Dow.

Interestingly, due to the introduction of a whole new HR philosophy, there was so much information available that it discouraged people from exploring the system. It could create a feeling of getting lost, not knowing how to find the way. With the implementation of the web-based version of the People Success System, most of the information available concerned compensation. The new HRM policy included a new global compensation system, based upon the idea that compensation had to be comparable among all Dow sites.

One interesting aspect is that the opinion exists that the PSS stresses very much the social issues (training, conflict management, language, and social skills) rather than the professional technical skills. As one person close to this topic said: *"We simply rely on their (new employees) education; presuming that they have their technical and professional skills. In my view, many mistakes were made in the recruiting of new employees because of the issues in the system: too much attention is given to the social aspects and not to the normal professional skills"*.

5.3 The Organization of the Company's Knowledge through PSS

Using PSS's navigator, employees could find plenty of information about Dow's HR philosophy as described earlier, which was in itself very relevant since this was completely new and different from Dow's earlier HR approach. Thus, initially, the PSS was mainly an information provider. However, from the first moment on, new tools were regularly implemented. Today, Dow Chemicals claims to be one of companies who have made the largest investments in ICT in recent years. With the implementation of these tools, the PSS has become more interactive, and provided HR instruments to employees and line management. Table 2 provides information about the main specifications of various components in the PSS.

Table 2. Content of the PSS at Dow Chemicals.

Main components of PSS	PSS services
Performance expectations Helping employees understand what is expected from them in their job, what knowledge, skills and behavior are required, and how their work will be evaluated.	<ul style="list-style-type: none"> • Job Families • Competencies • Development Stages • Competency matrices • Competency profiles • Managing Performance
Development Helping employees plan their careers: to develop their knowledge and skills for their current and future job.	<ul style="list-style-type: none"> • Employee Development Process, e.g.: <ul style="list-style-type: none"> - Seek feedback - Define and Document a Plan - Implement the Plan • Employee Development Tools, e.g.: <ul style="list-style-type: none"> - 360° Development tool - Mentoring Process - Managing Personnel Growth - Learning resources list - Writing SMART goals
Opportunities Guiding employees through the opportunities and career transitions.	<ul style="list-style-type: none"> • Career Opportunity Maps, e.g.: • Job Announcement System • Future Leader Process • Succession Planning Process

5.4 PSS's Capability for Storage or Retention of Knowledge

The PSS initially contained mostly information, much about all the aspects of the HR policy and the philosophy behind it. Especially the information about the new compensation system attracted a lot of attention. The system provided information about the salaries of all the job families at all levels, and in all countries where Dow has a site. For example, employees could (and did) compare their salaries with those doing the same job in other countries. Also information about the salaries of the most senior employees at the company attracted much attention.

5.5 PSS's Key Capabilities: Distribution, Transfer or Sharing of Knowledge

As the system became more sophisticated, the enthusiasm for using the system itself increased. Quite soon after the implementation, in 1997, Dow's Job Announcement System (JAS) became available. Until then, the people at Dow had been reluctant to believe that this system would really create the transparent and flexible internal labour market promised. At Dow, the traditional way of filling vacancies was to contact friendly colleagues or line managers within the company. Some people expected to be blocked by their managers if they wanted to apply for a job elsewhere in the company. However, the JAS has been the greatest success story with the PSS, initially and still today. Line managers have to publish job vacancies on the JAS, and employees, right from the very start, have used the opportunities offered to apply internally for jobs. Some line managers were not pleased by the fact that their

employees 'walked out', and complained to HR "Help, my people are walking out". HR's reply in such cases was "Then you have a problem" meaning that the line managers had to work on the way they managed their people.

5.6 The Outcomes of PSS: Application, Use or Re-Creation of Knowledge

An overall view is that it took Dow's employees (line managers and employees in the plant) three years to get used to the People Success System. By the end of 2004 all employees had to have a personal development plan. This meant that they had to use tools in PSS. People were 'forced' to schedule time (in advance) to work with the system, in order to learn how to work at Dow or for personal development.

At the same time we have found an indirect connection: the transparency of the company has increased and its policies have become more open - the same information is available to the management and to the employees. The most impressive example is the openness of the compensation part of the PSS. Salaries of all positions are visible to everybody, anyone can see how much the leaders earn, and in all countries.

With the new Strategic Blueprint and the new HR philosophy (competence-based) there can be more people than before on a senior level within a group of workers. There can now be more than one 'first operator' working on a shift, and an increase in the number of team members who can do specific tasks, and this makes job rotation possible.

Since the implementation of the PSS, employees can see how to change and develop, and this is very new to them. According to some views, the idea of career self-management is not yet fully working: employees need more time and this has to be granted by their team leader. Within Dow, a more revealing opinion can be heard about the opportunities the PSS gives. There is a commonly held view that there are many examples of individuals who have wanted to develop themselves at Dow, and who have been successful due to the PSS.

Communication is now very fast and it is very simple to communicate with anybody. In the plant, however, there are still employees who never check their e-mail. However, one hears that direct contacts have been dramatically reduced. HR specialists say that people are now more aware of what the company wants from them. People are trying to do something about their knowledge and skills. All the information needed about how to develop is on-line, so there is no need to physically go to the HR department.

In terms of cost effectiveness, it is difficult to determine whether the PSS has helped in reducing costs. The e-learning component Learn@dow has saved money. It reduced costs in terms of space, time and human resources. The number of courses that can be offered through the HR intranet is also far more than the number that could be offered class room-based.

In conclusion, it can be said that the organization's members, in the first stage of usage, worked with the PSS mainly as an operational e-HR tool. They used it a source of information. When more tools and resources were added usage switched, to some

extent, towards relational e-HR, albeit with caution. We have concluded this in view of the fact that young new employees use the competency assessment tool for new employees right from their start at Dow. They use the development tool to compile their development plan for the near future and are happy to use learn@dow. In this way the workforce has become more *change ready*.

6 Conclusions

In this paper we have put forward the organizational knowledge cycle as a conceptual tool to analyse the impact of transformational HRIS on the state of organizational knowledge in the organization, and have used a published case study [7] to illustrate our proposition. Our aim is to provide an alternative set of epistemological and methodological tools to analyse transformational HRIS. A question we have asked ourselves at the outset was whether an intranet-based system was really necessary to achieve an improvement in the strategic role of human resource management, i.e. a major transformation, at Dow Chemicals. Our conclusion is that it was indeed necessary given that an intranet-based system created the opportunity to reach every employee at any time anywhere around the globe. Information technology also provided the best opportunities to personalize information (by personalized portals), to provide a better service to clients and to improve increased efficiency in many administrative processes.

Besides, it is also clear that a global intranet-based system offered the opportunity to develop one global standard, a centrally-steered HR policy and global standard HR practices. Dow's top management perceived this as advantageous for the company as the whole. However it also implied opportunities to serve employees better, especially in giving them more control and also the responsibility to develop themselves: up-to-date information, relevant electronic links, and relevant instruments to work with individually. It is also clear that the PSS created opportunities to standardize and centralize HR processes, and to make HR processes more efficient, for example by electronic database management, online recruitment, online training, and online assessment tools.

The PSS has been instrumental in improving skillful practice at Dow which is the same as saying that it has contributed to an improvement on the organization's knowledge. However, in talking of organizational knowledge, it is important to bear in mind that knowledge is neither "out there", incorporated in external systems or "in here", inscribed in the human brain, but exists as something in people's ongoing engagement in social practices. This perspective is compatible with the view that organizational knowledge can be pragmatically conceptualized as a five-step process of construction, organization, storage, distribution and application. Each individual step of such cycle has been discussed by a variety of authors in the organizational knowledge and learning literatures, giving intellectual validity to this framework. We hope that future research into HRIS that can take the concept of the organizational knowledge cycle further by establishing more precise links between the steps of the cycle and the characteristics of transformational HRIS.

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