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Knowledge Productivity in Organizations: Towards a Framework for Research and Practice

Paul Keursten
Joseph Kessels
Kitty Kwakman
University of Twente

Knowledge productivity is becoming an increasingly critical economic factor. Understanding how knowledge productivity arises and the competence to promote knowledge productivity are becoming more important as well. Therefore, the key questions of this research are: Which learning processes contribute to knowledge productivity? Which variables promote or inhibit these learning processes? How can these learning processes be stimulated by targeted interventions? In this paper we describe our framework and our research approach.

Keywords: Knowledge Productivity, Innovation, Workplace Learning

One of the views underlying the knowledge economy is that the application of knowledge adds more value than the traditional factors of capital, raw materials and labour. The growing importance of knowledge has changed the role of human operations in economic transactions: the focus is shifting from appreciation of physical labour and the ability to coordinate and regulate to the ability to contribute to knowledge generation and application (Drucker, 1993; Castells, 1998).

Where knowledge is dominant (not just among upper management but at all levels of organizations), the daily operations should be designed to support *knowledge productivity* (Kessels, 1996; 2001). This process entails: identifying, gathering and interpreting relevant information, using this information to develop new skills and to apply these skills to improve and radically innovate operating procedures, products and services. Learning is at the heart of this process: tracing relevant information, and developing and applying new competencies are based on powerful learning processes. Can we cultivate the ability to be knowledge productive systematically among individuals and teams? Can learning situations be designed that promote knowledge productivity?

At Twente University, we recently started a research program on knowledge productivity. We are exploring how to stimulate and support the learning processes an organization needs for the improvement and innovation of its products, services and processes. In doing this research, we are building a network of researchers, students and practitioners, who research and learn together. Case studies in various organizations are being conducted to create a strong link between concepts and practice.

At the moment, we are building the conceptual framework of this research program, based on past research and on literature review. This framework could function as a reference for practitioners and researchers interested in creating a work and learning environment that enhances knowledge productivity of organizations.

Research Questions and Aims

In a knowledge economy, knowledge productivity is too important to leave to coincidence. Organizing the work and learning processes that enhance knowledge productivity, becomes part of strategic and day-to-day business policy. However, it is doubtful whether the knowledge potential that is embedded in people, can be developed and made productive by a traditional management process based on formal planning and control mechanisms: the necessary learning processes will not appear on command (Kessels, 2001). To be able to stimulate knowledge productivity, it is necessary to know more about the nature of the learning processes that contribute to this important lever for economic success and about possibilities to organize and stimulate these learning processes. Therefore, the key questions of this research are:

- ▼ Which learning processes contribute to improvement and innovation of operating procedures, products and services?
- ▼ Which variables promote or inhibit these learning processes?
- ▼ How can these learning processes be stimulated by targeted interventions?

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The aims of this research are:

- ▼ Develop and test a framework that explains and clarifies the process of knowledge productivity and the variables influencing this process;
- ▼ Develop and test principles and specific (learning) interventions for promoting knowledge productivity;
- ▼ To develop a research network in which researchers, students and practitioners cooperate in researching and promoting knowledge productivity.

Theoretical Framework

The Changing Nature of Work

In our knowledge economy and society, the nature of work is changing. Much routine work is becoming automated or is being outsourced. Knowledge work, in which workers have to combine and interpret information and knowledge to find solutions for new problems they encounter in their daily work, is replacing routine work more and more. Such knowledge work has the characteristics of learning processes. Knowledge workers can not get their job done and add value without learning. Of course, there still remain more routine aspects of work: work is often not 100% knowledge work, but the part that is knowledge work is growing and is becoming decisive in more and more work environments (cf. Drucker, 1993; 1999).

In this development, the work environment becomes the primary source for learning. This implies a fundamental change in the relationship between working and learning. We were used to view learning as a preparation for work: learning preceded working. Now, learning can also be viewed as a direct consequence of working: having access to meaningful work means having access to powerful learning environments. Organizing work and organizing learning are inseparable in this view on the nature of work.

Knowledge Productivity

The knowledge productivity concept is based on the view that knowledge is a competence that is linked to persons: 'knowledge needs to be understood as the *potential for action* that doesn't only depend upon the stored information but also on the person interacting with it' (Malhotra, 2000, p. 249). Knowledge productivity refers to the competence of individuals and groups to gradually improve and radically innovate operating procedures, products and services. In a knowledge economy, the success of an organization depends on this.

In this research we will focus on how organizations can develop the ability to achieve such changes: on the learning processes that contribute to the ability to be knowledge productive. A specific innovation, improvement or invention – possibly patented – may be of great economic value, but the true value lies in the *ability* to generate such improvements and innovations rather than in the actual innovation. This ability is closely linked to the ability to learn. As we saw earlier in this text, learning plays an integral part in the knowledge work that brings about these improvements and innovations. In this respect, the speed and cleverness of learning processes directly influence productivity of knowledge workers (cf. Drucker, 1999). Therefore, increasing the learning ability of individuals and organizations is closely linked to economic success.

The view of knowledge as a personal competence necessitates a critical re-examination of familiar ideas:

- ▼ the belief that knowledge can be imparted
Competencies are not transferable. Each person needs to acquire and develop them independently. Knowledge transfer is the focus of educational and training programs, where the instructional material is viewed as the explicit knowledge form and the didactics as the transfer medium. Accepting the view that knowledge is a competence, from the perspective of knowledge productivity, deeply affects the structure of the surroundings where people work, schools, occupational and corporate education programs and university education.
- ▼ the idea that knowledge can be shared
This idea has arisen chiefly in the context of the learning organization and is often invoked to justify the immense investments in electronic knowledge systems. Even the mythical assertions that knowledge can be shared infinitely with others without diminishing the supply of knowledge, however, have only the effect of a stencil machine. Knowledge as a competence cannot be shared.
- ▼ the distinction between explicit and implicit knowledge (e.g. Nonaka and Takeuchi, 1995)
Viewing knowledge as a personal competence is incompatible with the notion of explicit knowledge. Explicit knowledge, which consists of codified, established, described, documented knowledge, is simply information about another person's competence. Gaining access to explicit knowledge, provides me with information about somebody else's competence. Reading a book or Lotus Notes entry, however, will not provide me with another person's competence: I will need to acquire and develop that competence myself.

Towards a Framework for Knowledge Productivity

As a starting point for this research, we developed a preliminary conceptual framework for knowledge productivity, which we would like to test, improve, elaborate and validate in this research. This framework is based on work and insights from various domains (Human Resource Development, Organizational sciences, Learning theories). In this framework (see figure next page), we distinguish the following elements:

Outcomes for the Organization

The assumption behind the idea of knowledge productivity is that, in order to have long term success in today's knowledge economy, an organization needs to continuously improve and from time to time radically innovate its products, services and work processes (Drucker, 1993; Nonaka & Takeuchi, 1995).

The distinction between gradual improvement and radical innovation is inspired by the work of Walz and Bertels (1995). Gradual improvement elaborates on what is already present and leads to additional refinement and specialization. Radical innovation is based on breaking with the past and creating new opportunities by deviating from tradition.

Therefore, the results of knowledge productivity will be measured in terms of improvement and/or innovation of products, services and processes.

Knowledge Processes

These results depend on the development and utilization of the knowledge that is needed to realize the desired improvements and innovations (e.g. Leonard-Barton, 1995). In this (learning) process, we distinguish three processes/abilities (Kessels, 2001; Nonaka, Toyama & Byosière, 2001):

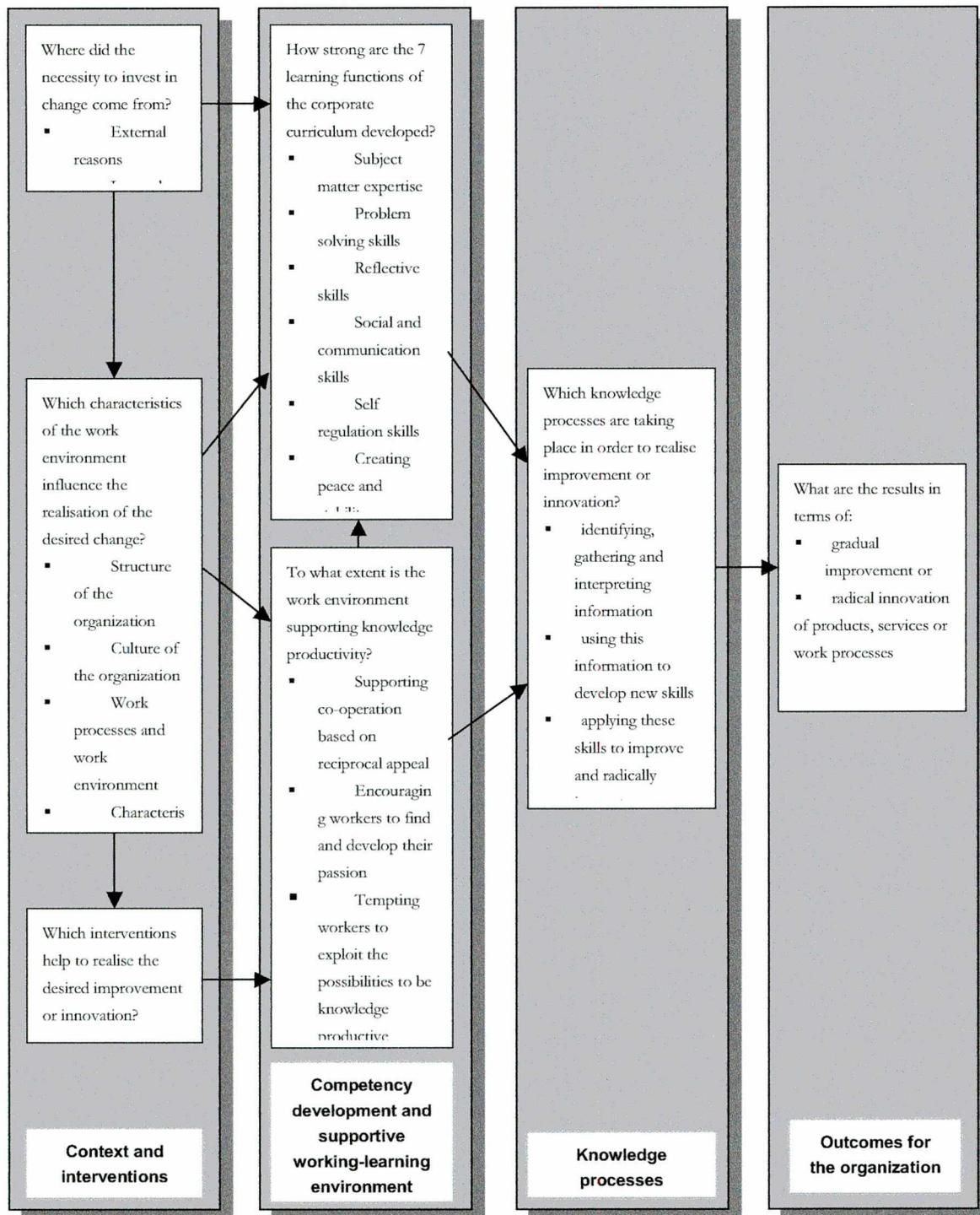
- ▼ identify, gather and interpret relevant information;
- ▼ use this information to develop new skills;
- ▼ apply these skills to improve and radically innovate operating procedures, products and services.

In this research we will describe and analyze the learning processes that lead to innovation and improvement.

Competency Development and Supportive Working-Learning Environment

The importance of knowledge development instigates the demand for a *corporate curriculum* that develops the competencies needed to be knowledge productive (Kessels, 1996; Kessels, Van Lakerveld & Van den Berg, 1998). It also raises the question how the work environment can be supportive to this development.

Figure 1. A Conceptual Framework for Researching Knowledge Productivity



Corporate curriculum. In 1996, Kessels introduced the Corporate Curriculum concept, which is an organizational plan for learning. This is not a formal curriculum prescribing the programs and courses that staff should attend. Rather, it involves transforming the daily workplace into an environment where learning and working integrate: the arrangement of a rich and diverse landscape that encourages and supports employees in their learning.

The corporate curriculum serves seven related learning functions.

- ▼ acquiring *subject matter expertise* and professional knowledge directly related to the organization's core competencies (e.g. a bank's financial services or the care provided by a hospital);
- ▼ learning to *identify and deal with new problems* on the basis of the acquired subject matter expertise (e.g. switching to a new tax system or introducing customer-oriented patient care);
- ▼ cultivating *reflective skills* and meta-cognitions to find ways to locate, acquire and apply new knowledge (asking questions like: how do we learn from our experiences? Why is it that we excel in developing sustainable energy but are unable to convince those around us of its value?);
- ▼ acquiring *communicative and social skills* that help people access the knowledge network of others, participate in communities of practice and make learning at the workplace more productive;
- ▼ acquiring skills to *regulate motivation, affinities, emotions and affections* concerning working and learning (it is important for knowledge workers to identify personal themes and ways to develop these);
- ▼ promoting *peace and stability* to enable exploration, coherence, synergy and integration; employees should receive the opportunity to master and elaborate a plan, idea or operating procedure. However, too much peace and stability might bring about overly one-sided specialization and an excessive internal focus, complacency or laziness;
- ▼ causing *creative turmoil*, which leads to radical innovation. Creative turmoil also results from a powerful drive to resolve a tricky question. The cause is often an existential threat: a matter of winning or losing, surviving or going under, being in or out. However, not all unrest is creative turmoil. Disturbance alone, without the drive to innovate, is irritating; too much creative turmoil may yield a thousand new ideas but leaves little opportunity to elaborate any of them. The learning functions peace & stability and creative turmoil are clearly conflicting, even though they are supposed to offset one another.

The policy and the activities that an organization develops to promote these seven learning functions form its corporate curriculum. In recent years, a large scale Dutch study in the healthcare and welfare sector (Van Lakerveld, Van den Berg, De Brabander & Kessels, 2000) has provided an empirical foundation to the individual learning functions and the corporate curriculum construct overall. This study shows a clear relationship between the power of the learning environment (the learning functions of the corporate curriculum) and the ability of an organization to improve and innovate (knowledge productivity). Next to this nationwide study, smaller studies give support to these notions (e.g. Van der Waals, 2001).

A supportive work-learning environment for knowledge productivity. Recent research projects provide important foundations for planning and designing knowledge productive workplaces (Baumard, 1999; Dutrénit, 2000; Huysman and De Wit, 2000):

- ▼ Formal knowledge management systems seem to add little to an organization, while socialization of experiences and development of collective competence are essential for resolving crises. Personal networks appear to be especially important for designing knowledge productive workplaces. Mutual concern, trust, curiosity and inspiration by a common mission benefit knowledge sharing.
- ▼ Knowledge workers are likely to judge their workplace according to the career development opportunities and the invitation to engage in an inspiring working relationship with like-minded spirits. Employees have reason to seek out workplaces where they can enrich, innovate and expand their repertoire of competencies. They are becoming increasingly aware that they need to maintain their reciprocal appeal.
- ▼ Content is an important factor: Why do some people learn about new information before others do? How do they find the energy to continue when others have given up? An environment in which workers can work on issues that interest and intrigue them, and that triggers their desire to continuously learn and apply these new learnings is attractive for knowledge workers, and stimulates them to work to their full potential.

These considerations allow us to formulate three provisional development principles for the knowledge-intensive organization's curriculum:

- ▼ *Enhancing reciprocal appeal (the social context)*

Knowledge-productive workplaces are rich learning environments in which the social context fosters collaborative efforts. No single manager, instructor or trainer, however, is exclusively responsible. Participants work hard to maintain their reciprocal appeal, which means that they do their best to provide each other with a fruitful learning environment. Important characteristics of this social context for learning seem to be: reciprocal

respect, appreciation and integrity, sufficient safety and openness for constructive feedback and confrontations. The communicative and interactive skills of the participants are required to meet high standards.

▼ *Searching for a passion (the content component)*

People are clever only if they want to be. A knowledge-productive environment encourages people to find their passion. Knowledge-productive environments encourage cultivation of a personal, substantive theme. Such an individual theme inspires curiosity and enables information to be traced more quickly. It facilitates establishing connections with attractive, professional networks and stimulates exceptional achievements where others might give up. Designers and knowledge workers need to become competent to navigate through the diffuse arena of affinity, motivation, passion and ambition to be able to apply their competence systematically.

▼ *Tempting towards knowledge productivity*

Cultivating reciprocal appeal serves primarily to create a favourable social context. Searching for a passion establishes the foundation for substance. Promoting knowledge productivity also requires the competence to work systematically on the social context and the substantive component. The desire to guide, manage, control and monitor is becoming increasingly difficult to fulfil. The growing interest in self-guidance is apparent in both work and learning contexts. This leads us to ask how we can tempt each other towards knowledge productivity. The main objective is to acquire the competence to design a workplace that develops sustainable instruments, useful for dealing with future issues: the competence to become cleverer, learning to learn, organising reflection, increasing reflexivity and basically applying knowledge to knowledge development.

Context and Interventions

The corporate curriculum and the design of a supportive work environment will be influenced by the internal and external context of the organization and by the specific interventions done in this context. As a starting point for this research we distinguish three elements to describe in our studies:

▼ The reasons to invest in improvement or innovation

The triggers for investing in improvement or innovation can come from outside the organization (e.g. market developments, technological developments, social developments) and/or inside the organization (e.g. problems in work processes, worker satisfaction/retention, change processes).

▼ The characteristics of the work environment

It is important to look at which characteristics of the work environment seem to influence knowledge productivity. In this research we will explore the influence of:

- the structure of the organization (e.g. hierarchical levels, boundaries between units and departments, roles that are defined);
- the culture of the organization (e.g. style of management and leadership, unwritten rules, communication patterns, the way it deals with risks and failures);
- the design of the work processes and (physical) work environment (e.g. procedures and systems, information flow and access, organization of client contact and interaction, quality and feedback systems);
- the characteristics of the people involved (e.g. educational background, age).

▼ The interventions and activities to realise the desired improvement or innovation

In order to learn which interventions seem to work in which situations, we will describe and analyse the important activities and interventions that are taken during the process of improvement and innovation. In the frame of this research, we will focus on those interventions that are directly linked to the process of knowledge productivity.

Research Approach

To research the relationship between the variables described in the conceptual framework, we plan to use four research strategies (the methodology of the first three is discussed in Van den Akker, 1999):

▼ *Reconstruction studies.* This type of studies is aimed at reconstructing the process of knowledge creation and utilization that brought about important improvements or innovations. The reconstruction studies are case studies in which we take a specific improvement or innovation as a starting point. We research how this was achieved and how knowledge development played a role in this. Important steps, actions and events are being identified, reconstructed and linked to the elements of our conceptual framework. These reconstruction studies allow us to test, revise and refine our conceptual framework and to indicate interventions that seem to be important to enhance knowledge productivity.

▼ *Parallel studies.* The parallel studies closely resemble reconstruction studies, with one difference: they are conducted during the innovation/improvement process in an organization. The researcher follows, observes and

describes what happens in the process. These parallel studies allow us to follow the dynamics of knowledge creation processes more closely than is the case in reconstruction studies.

- ▼ *Development studies.* In this type of studies, the researcher works together with an organization to bring about the desired improvement or innovation. The design, implementation and evaluation of learning interventions in the organization plays an important role in development research. This cycle will probably be completed several times during the whole innovation/improvement process. Development studies allow us to experiment with different interventions and to develop and test new interventions for knowledge productivity. Findings from the other types of studies can be used as input for the development studies.
- ▼ *Experiments in a simulated environment.* In these experiments, we can explore and test different interventions and compare strategies in a controlled environment. Five years ago we developed the 'Knowledge game', a simulation of a knowledge economy, and since then the game was used and tested in a large number of organization. This game allows us to study the relationships between strategies, interventions and outcomes (in terms of financial gains). These experiments can be useful in preparing development studies as well as in testing findings from reconstruction, parallel and development studies. Results of the other three types of studies can be brought into the context of the knowledge game, which enables us to test these results in a controlled way. We are planning to do such simulated experiments at various points during the research.

An important element in our approach is the building of a network of researchers, practitioners and students. This network can be viewed as a virtual organization, a community that works and learns together. We will design specific activities for network members to meet and learn together, e.g.: workshops, panel discussions, site visits, collaborative projects.

Intermediate Results

A first challenge was to elaborate the framework presented in this paper into specific variables and questions that can be used by researchers in the case study. This resulted in a list of questions for each element of our framework. We also worked out a practical approach for doing the actual case studies, in which personal interviews with all the key persons involved and document analysis are the main data gathering techniques. For analyzing and reporting case results, we developed a format using our theoretical framework as starting point. The challenge here was to make the approach flexible enough to be useful in a variety of situations and also standardized enough to make it possible to compare the results. In order to be able to compare results, we designed a format for describing each case. In December 2002, the first 8 case studies were finished. These were conducted in Shell (two in China and two in the Netherlands), Unilever (in China and in the Netherlands) and Heineken (in Indonesia and the Netherlands). We deliberately chose to do the research in an international context, which will enable us to gain some insight in the cultural aspects of knowledge productivity. This first round of case studies gives us information for answering the research questions, but equally important in this stage, will be very useful in fine tuning our framework and research approach. At the moment we are doing a cross case analysis of these 8 cases. The results thus far support the main elements in our framework.

Contribution to New knowledge in HRD

In the past decade, many researchers, politicians and business leaders have argued that knowledge and the capability to create and utilize it are the most important sources of economic and social success (see for a selection: Nonaka, Toyama & Byosière, 2001). Although this view has gained widespread support, a research based theory on how learning processes support improvement and innovation still needs to be developed. Much of the literature in this field deals with assumptions, ideas, visions and examples. Research in which these ideas are linked and empirically tested in practice is still scarce. This research is contributing to fill this void and will result in tested principles and guidelines for turning the daily work environment into a learning environment that stimulates continuous improvement and/or radical innovation. In our research we are turning the focus from formal learning programs towards designing powerful work-learning environments.

We are building a data base of about 40 to 60 cases over the next years, and are planning to make this data base accessible for researchers and practitioners. Based on our research, we will be contributing to scientific conferences and journals.

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