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KNOWLEDGE PRODUCTIVITY

designing and testing a method
for measuring knowledge productivity in order to give direction to
knowledge management initiatives

Christiaan Stam

INHOLLAND University
Centre for Research in Intellectual Capital
PO-box 261, 1110 AG Diemen
The Netherlands

de Baak – Management Centre VNO-NCW
Professional Development Centre
PO box 88, 3970 AB Driebergen
The Netherlands

+31 (0)6 51 989280
stam@intellectualcapital.nl

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Abstract

The nature of production has changed. As a consequence, organizations have lost sight of the sources of productivity and productivity developments. Main objective of this research is to design and test a method for measuring knowledge productivity in order to give direction to knowledge management initiatives. This research project is based on the paradigm of the Design Sciences. This paper presents the methodological and theoretical framework, the initial design of the method and the results of the first two case-studies.

Introduction

The sources of productivity have always been the main subject of economic debate because it is the main determinant of profitability and competitiveness. In order to improve productivity we should be able to identify the sources of productivity. The past decades our production process has changed. Traditional factors of production, like natural resources, labour and capital have lost significance. At the same time the importance of intangible inputs, like information and knowledge, rose. Knowledge has become the main ingredient in products and services (Drucker, 1993; Castells, 1996; Nonaka & Takeuchi, 1997). Consequence of this transformation is that managers have lost sight of the sources of productivity and productivity growth, which leads to distorted resource allocation and poor (external) communication about organizational performance (Eustace, 2000; Blair & Wallman, 2001; Eustace, 2003; CEC, 2006). Important underlying cause of these problems is the fact that we do not have the concepts to reveal and communicate about this new type of productivity. Moreover, management does not have the methods and tools to reveal the effectiveness of knowledge-based production processes (Sveiby & Lloyd, 1988; Edvinsson & Malone, 1997; Stewart, 1997; Sveiby, 1997) and subsequently they do not know how to improve knowledge productivity. The lack of available information about the effective use of knowledge hinders management to design effective policies aiming at improving organizational performance. It is of vital importance that management and organizations have a clear sight on the drivers of productivity and productivity developments in order to explain and improve organizational performance. Therefore we need a new theory that puts knowledge in the centre of the wealth creating process (Drucker, 1993). Aim of this research is to contribute to this challenge.

Research objective and question

Main objective of this research is to develop a practical method to assess the quality of the sources of knowledge productivity in order to give direction to knowledge management initiatives. Underlying assumption is that knowledge management initiatives aim at improving knowledge productivity (Nonaka & Takeuchi, 1997; Weggeman, 1997). This means that knowledge productivity is the result of knowledge management and one of the drivers of organizational performance. The latter implies that knowledge management directly contributes to improving knowledge productivity and indirectly to improving organizational performance.

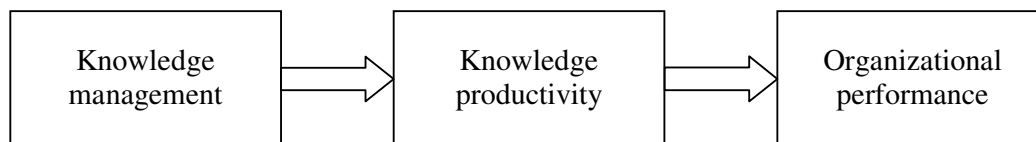


Figure 1: Relationship between knowledge management, knowledge productivity and organizational performance.

Another assumption of this research is that measurement leads to better understanding, better communication and better resource allocation, which eventually leads to better organizational performance. This assumption is in line with the concept of intellectual capital measurement (Edvinsson & Malone, 1997; Stewart, 1997; Sveiby, 1997) and the concept of performance management (Kaplan & Norton, 1999, 2004). In this respect the process of measuring is more than only assigning scaled numbers to items (Swanborn, 1981). The process of measurement should also be seen as an intervention that contributes to improving organizational

performance. Through measurement, organizational performance gets a body, which makes communication and interpretation possible (Mouritsen et al., 2002). In this sense measurement supports the organizational learning cycle.

As the research objective is to acquire knowledge about how to measure knowledge productivity in order to give direction to knowledge management initiatives, the main research question is *how to develop a practical method to measure knowledge productivity in order to give direction to knowledge management initiatives?*

Research methodology

Major element of this research is to design a method and test the effectiveness of the method in practice, therefore this research follows the paradigm of the Design Sciences developed by Van Aken (1994; 1996; 2004b; 2004a). The core mission of the Design Sciences is to develop general knowledge which can be used by professionals in the field in question to design solutions to their specific problems. Driving force of the paradigm of the design sciences is the *utilization problem* (Susman & Evered, 1978; Van Aken, 2004a) or *rigor-relevance dilemma* (Argyris & Schon, 1991; Andriessen, 2004b). ‘Management theory is either scientifically proven, but then too reductionistic and hence too broad or too trivial to be of much practical relevance, or relevant to practice, but then lacking sufficient rigorous justification’ (Van Aken, 2004b: p. 221). Therefore, Van Aken (2004b) proposes to make a distinction between Description-driven and Prescription-driven research programs. Whereas the former aims at explaining problems, the latter aims at generating knowledge to be used in designing solutions to solve problems.

The first important characteristic of the Design Sciences is that they are motivated by solving problems. The second distinguishing characteristic of the Design Sciences is the normative or prescriptive nature of the outcome of a research program. Whereas the typical outcome of descriptive research are algorithmic prescriptions (“if you want to achieve Y in situation Z, then perform action X”). In the design sciences prescriptions are of a *heuristic* nature. This means that they should be used as a *solution concept*. A solution concept is a general prescription, which has to be translated (by the professional in the field) to a specific problem at hand. (“if you want to achieve Y in situation Z, then something like X will help”). These heuristic prescriptions pay respect to the believe that problems are always context related. Although problems and situations might be very similar, this is not a guarantee that a solution that worked in situation A also works in situation B. Therefore, the third main characteristic of the Design Sciences is that the research is justified by *pragmatic validity*. Whereas the descriptive research leads to propositions which are accepted as true on the basis of the evidence provided, the indeterminate nature of heuristic technological rules makes it impossible to prove its effects conclusively. However, testing of the technological rule in its intended context can lead to sufficient supporting evidence or theoretical saturation (Van Aken, 2004b).

In the design sciences the typical research product is the heuristic *prescription*, *technological rule* or *solution concept*. Although the research will be driven by and take place around local problems, the applicability of the solution concepts will be non-local. This means that the solutions can be used to solve similar problems in similar contexts. Solution concepts are typically studied within its intended context of application, in order to be as sure as possible of its effectiveness, also under the influence of less well-known factors. Therefore, the typical research design is the multiple-case. Every case serves a specific purpose within the overall scope of inquiry and therefore follows a *replication* logic (Yin, 2003). “Through multiple case-studies one can accumulate supporting evidence which can continue until “theoretical

saturation” has been obtained’ (Van Aken, 2004b: p.235). Moreover, the multiple-case study operates as a learning system, based on the reflective cycle: each case is analyzed, lessons are drawn and improvements are made before the method is tested again. This process is repeated until sufficient supporting evidence has been obtained.

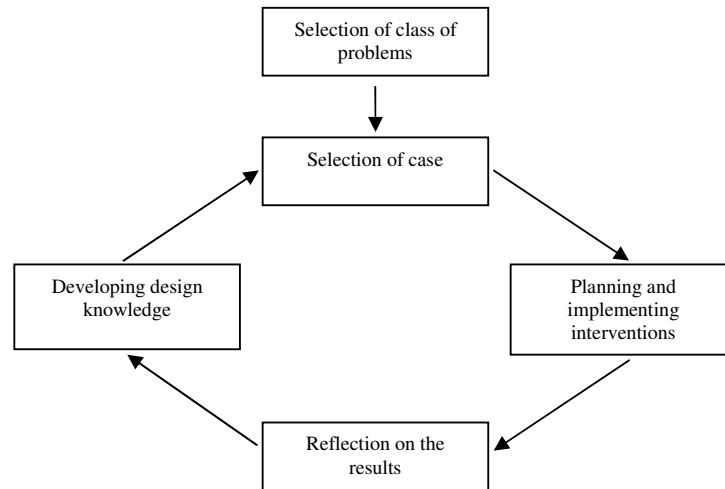


Figure 2: The reflective cycle, Van Aken (1994)

The reflexive cycle (Van Aken, 1994) should be seen as a combination of the regulative-cycle (problem-solving cycle) of the professional aiming at solving a unique and specific problem and the research cycle of the scientist aiming at the development of knowledge which can be used in a class of comparable problems.

Literature review

The past decades a *resource-based view* of the firm emerged. Authors like Penrose (1959), Hamel and Prahalad (1990; 1994), and Stalk et al (1992) contributed to this new strategic paradigm. The resource-based view of the firm is based on the assumption that firm-specific competencies have become the most important source of sustainable competitive advantage. The traditional competitive environment was stable and transparent. It was characterized by clear defined markets, customers and competitors. Today’s competitive environment however, is characterized by dynamic changing markets and fast changing customer demands. More and more competition has become the ability to anticipate on these changes and thus asks for a more dynamic strategic approach as an alternative to the traditional industry-based view. ‘In the short run, a company’s competitiveness derives from the price/performance attributes of current products (...). In the long run, competitiveness derives from an ability to build, at lower cost and more speedily than competitors, the core competencies that spawn unanticipated products. The real sources of advantage are to be found in management’s ability to consolidate corporate wide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities’ (Prahalad & Hamel, 1990: p.81). So core competencies are the main resources and can be seen as the collective learning in the organization. The ability to learn is a necessary precondition in order to be able to continuously adapt to changing customer demands.

Authors like Nonaka and Takeuchi (1991; 1997), Leonard-Barton (1995), Sveiby (1988; 1997; 2001), Davenport and Prusak (1998), and many more, claim that *knowledge* is the most important resource. This knowledge management literature can be seen as a further specification or extension (Bontis, 2002) of the resource-based view into a ‘knowledge-based theory of the firm’ (Grant, 1996). ‘In an economy where the only certainty is uncertainty, the sure source of lasting competitive advantage is knowledge’ (Nonaka & Takeuchi, 1997). However, this does not mean that the *knowledge-based view* is a synonym for the resource-based view. Most important and fundamental difference is that the resource-based view only implicitly refers to knowledge, whereas the knowledge-based view gives extensive elaborations on the nature and definition of knowledge and the way it should be managed.

Like knowledge management, the concept of knowledge productivity can also be seen as a further specification of the resource-based view. Difference however, is the believe that the competitive advantage of organizations does not come from knowledge itself, but from knowledge productivity, or the extent to which knowledge has been put into use. It was in *The Production and Distribution of Knowledge in the United States* that Machlup discovered the importance of knowledge as a product. In his recalculation of the national product of the United States, he discovered that total knowledge production in 1958 already accounted for almost 29 per cent of adjusted GNP (Machlup, 1972: original publication in 1962). Moreover, the “knowledge-industry” was not only the largest industry, but also grew faster than the traditional industries. These conclusions led to the observation that there should be some relationship between knowledge, value creation and economic growth.

It was Drucker who translated the macro-economic discovery of Machlup to organizational level, because ‘We know that productivities are created and destroyed, improved or damaged, in what we call the “micro-economy”: the individual enterprise, plant, shop, or office’ (Drucker, 1981). Moreover, he realized that the real productive power of organizations is determined by the ability of the so called knowledge workers to make knowledge productive. In *The post-capitalist society* (Drucker, 1993) he stressed the importance of the development of a new economic theory that puts knowledge in the centre of the wealth creating process. According to Drucker, the competitive advantage of businesses increasingly depends on the ability of organizations to make the knowledge worker more productive. Therefore, ‘knowledge-worker productivity is the biggest of the 21st-century management challenges’ (Drucker, 1999: p.92). In order to face this challenge we should develop a theory that discloses the relationship between the productivity of knowledge workers and the environment. ‘Not to see the forest for the trees is a serious failing. But it is an equally serious failing not to see the trees for the forest. One can only plant and cut down individual trees. Yet the forest is the “ecology”, the environment without which individual trees would never grow. To make knowledge productive, we will have to learn to see both forest and tree. We will have to learn to connect’ (Drucker, 1993: p.180). To get better insight in the sources of productivity we will have to see the interaction between people and their environment.

Preconditions for knowledge productivity

Closely related to and in line with Drucker, it was Joseph Kessels (1996; Kessels, 2001b) who introduced the concept *knowledge productivity*. ‘Knowledge productivity concerns the way in which individuals, teams and units across an organization achieve knowledge-based improvements and innovations’ (Harrison & Kessels, 2004: p.145). Whereas Drucker interpreted knowledge worker productivity as a management challenge, Kessels puts the individual in the centre of his theory. Main underlying assumption of this concept is that ‘the character of labour is changing: routine work is more and more taken over by machines and computers. The work that remains requires independent decision-making and creative

thinking; the physical activities of employees are being replaced by mental and social activities. (...) As this change of the character of labour takes place, it is inevitable that the workplace turns into a learning environment. (...) The conditions for good work become similar to the conditions for good learning' (Kessels & Van der Werff, 2002: p.20). So knowledge productivity requires a good learning environment.

In order to help organizations improve their knowledge productivity, Kessels introduced the *Corporate Curriculum*: 'the plan for learning to increase knowledge productivity, leading to constant improvement and radical innovation, and ultimately to economic advantage' (Kessels, 1996; Kessels & Van der Werff, 2002). The Corporate Curriculum should not be seen as a formal educational or training curriculum. 'Rather, it involves transforming the daily workplace into an environment where learning and working can be effectively integrated. It facilitates the creation of a rich and diverse landscape that encourages and supports employees in the learning they need to do in order to continuously adapt and to innovate' (Harrison & Kessels, 2004: p.155). The Corporate Curriculum consists of all the intended and not intended conditions that affect the learning processes among workers in organizations (Van Lakerveld et al., 2000) and identifies seven critical *learning functions* (Kessels, 1996; Keursten et al., 2004b):

1. Acquiring *Subject Matter Expertise* and professional knowledge directly related to the organization's business and core competencies
2. Learning to identify and *Solve problems* by using the acquired subject matter expertise.
3. Cultivating *Reflective Skills* and meta-cognitions that contribute to finding, acquiring and applying new knowledge.
4. Securing *Communication Skills* that provide access to the knowledge network of others and that enrich the learning climate within the workplace.
5. Acquiring skills for *Self regulation of Motivation* and affection related to working and learning.
6. Promoting *Peace and Stability*, in order to enable specialization and incremental improvement.
7. Causing *Creative Turmoil* in order to stimulate innovation.

According to Van Lakerveld et.al. (2000), distinction can be made to those learning functions that directly refer to the learning processes (1 to 5) and those that refer to the conditions of learning (6 and 7). Within the 5 functions that refer to the learning processes we can make another distinction between those that dominantly refer to the knowledge processes (1-3), and those that dominantly refer to the knowledge workers (4 and 5). The result is that we can make a distinction between three different kinds of learning functions: those related to the individual (competences and motivation), those related to the knowledge processes (subject matter expertise, solve problems, reflection), and those related to the organizational environment or conditions (calm and stability, creative turmoil).

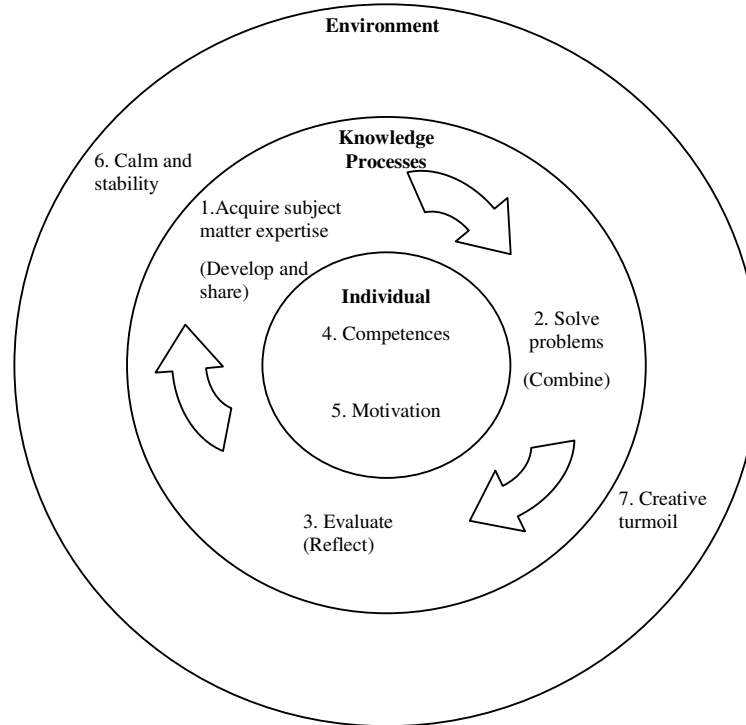


Figure 3: Three layers of the Corporate Curriculum

This model tries to pay respect to the human-centred definition of knowledge of Kessels. ‘It gives centre stage to the person of the learner, active within a complex of relationships, engagements and commitments with others’ (Alred & Garvey, 2000). Therefore the inner circle represents the learning functions that are dominantly related to the individual. The outer circle represents the learning functions that are dominantly related to the organizational environment or conditions for learning. The circle in between can be seen as a combination of the inner and the outer circle and represents the learning functions which are dominantly related to the organizational learning cycle or knowledge processes (knowledge spiral (Nonaka & Takeuchi, 1997), knowledge value chain (Weggeman, 1997), etc.) as defined by the knowledge management literature. Moreover, these knowledge processes are both related to the people and the organization. They are both human and structural capital.

The result of knowledge productivity

As we have seen, Kessels defines knowledge productivity both as a process and as a result. ‘Knowledge productivity has been described as the key ability of an organization, a team, or employee, to signal relevant information and to develop new competencies. These new competencies are to be applied to the incremental improvement and radical innovation of work processes, products and services’ (Kessels & Van der Werff, 2002: p. 20). Whereas he, and many others, extensively elaborate on the first part of his definition, only very little has been said about the second part which refers to the result of knowledge productivity. Moreover, hardly any research has been done on the relationship between the preconditions of knowledge productivity (Corporate Curriculum) and the results in terms of incremental improvements and radical innovations.

Starting point of the concept of knowledge productivity is the precondition that organizations in the knowledge economy, to be successful, should continuously improve their processes, products and services, and radically renew from time to time (Drucker, 1993; Nonaka &

Takeuchi, 1997). Based on Walz and Bertels (1995), Kessels (2001b) makes a distinction between *gradual improvements* and *radical innovation*. 'Gradual improvement (involving adaptive learning) elaborates on what is already present and leads to additional refinement and specialization. Radical innovation (involving investigative and reflexive learning) involves breaking with the past and creating new opportunities by deviating from tradition' (Harrison & Kessels, 2004: p.157). These different types of learning are acknowledged as the result of knowledge productivity (Keursten et al., 2004b; Van Lakerveld, 2005). Similarly distinction is made between single-loop versus double-loop learning (Argyris & Schon, 1978), 'higher-level' and 'lower-level' learning (Hedberg, 1981; Fiol & Lyles, 1985); 'learning I' and 'learning II' (Bateson, 1972); 'generative' and 'adaptive' learning (Senge, 1992); 'tactic' and 'strategic' learning (Dodgson, 1993), 'reflexive' and 'adaptive' learning (Guile and Young, 1999 in: Harrison & Kessels, 2004). All of these distinctions refer to incremental improvements to existing practice on the one hand, and radical rethinking of basic goals, norms, and paradigms on the other hand.

The distinction between gradual and radical innovations can also be related to the exploitation/exploration dilemma (March, 1991). This dilemma represents the two strategic options a company has: exploitation of old certainties or exploration of new possibilities. These dual innovation strategies are acknowledged by many authors as well. Von Krogh et.al. (1994) distinguish between an organization's need to survive (maintain its position in its current environment) and its need to advance (forge ahead in an emerging new environment) (Harrison & Kessels, 2004). Abell (1999) summarizes these innovation strategies as 'competing today while preparing for tomorrow'. Based on the punctuated equilibrium (Eldredge & Gould, 1972) and its application on organizational development (Tushman & Romanelli, 1990; Tushman & O'Reilly III, 1996), Zegveld (2000) makes a similar distinction between incremental and radical change. 'The essential difference between incremental and radical change is that incremental change is about aligning and can be related to the process of production and value creation, while radical change is about the process of forming a company's perspective and the process of forming resources' (Zegveld, 2000: pp 26-27). According to Zegveld incremental innovation is about '*doing things better*' and radical innovation is about '*doing better things*'. In order to detect incremental and radical innovation, Zegveld (2000) developed a *Quantitative Framework* for measuring exploitation and exploration.

Knowledge productivity framework

The concept of Knowledge Productivity has been subject to different interpretations. Van Lakerveld (2005) signals three different approaches: the epistemological, the economic (organizational science), and those who stress the importance of learning processes. The main distinction between the latter two seems to be the answer to the question: is knowledge productivity a process or an outcome? Depending on the choice that is made between these two, Stam and Evers (2004) signal two dominant complementary approaches, which they call *economic* and *process* approach. Whereas the economic approach dominantly seems to aim at identifying and measuring knowledge productivity, the process approach dominantly aims at identifying the necessary preconditions for enhancing knowledge productivity. Because the aim of this research is both to measure and improve knowledge productivity, this research combines both the *economic* and *process* approach. In order to measure knowledge productivity Zegveld's (2000) Quantitative Framework is used. In order to assess the quality of the preconditions for knowledge productivity Kessels' (1996) concept of the Corporate Curriculum is used.

In his research about the Corporate Curriculum, Van Lakerveld (2005) finds evidence for the positive relationship between the learning functions of the Corporate Curriculum on the one hand and quality improvements and innovative potential on the other hand. However, he does not make the step from identifying improvements and innovation to organizational performance. Therefore he concludes: ‘the question remains whether organizations with a rich Corporate Curriculum perform better’ (Van Lakerveld, 2005: p.189, translation CS). Future research should elaborate on this topic. Similar conclusions are drawn by Keursten et.al. (2004b). Based on a large reconstruction research in sixteen case studies they conclude that creative turmoil is the driver of the innovation process. Moreover, the reconstruction also revealed a positive relationship between the quality of the Corporate Curriculum and successful innovation processes. However, the case studies did not provide any evidence about the deliberate use of one or more of the elements of this concept. Therefore, they conclude, it would be interesting to find out if a deliberate use of this concept leads to a better performance.

Learning is not a process of gradual change, but intermittent change. Relative long periods of relative stability are alternated with short periods of fundamental change. As Zegveld is mainly concerned with the result, he argues that periods of relative stability can be recognized by incremental innovation, whereas periods of fundamental change can be recognized by radical innovation. As Kessels is mainly concerned with the conditions that lead to innovation, his reasoning is the other way round. ‘Gradual improvements benefits from conditions of relative stability and the time to reflect on what is needed in order to improve current operations and processes. Radical innovation is more likely to flow from the creative turmoil (...)’ (Harrison & Kessels, 2004: p.157). Based on the conviction that good conditions for learning eventually result in incremental and radical innovation, Kessels developed a set of learning functions as preconditions for knowledge productivity (Corporate Curriculum). Based on the same distinction between incremental and radical change, Zegveld developed a Quantitative Framework for measuring exploitation and exploration. Within this research, these two approaches are combined in a Knowledge Productivity Framework (Figure 4). This theoretical framework was used as a starting point for the design of a practical method to measure knowledge productivity and to assess the quality of the preconditions of knowledge productivity in order to give direction to knowledge management initiatives.

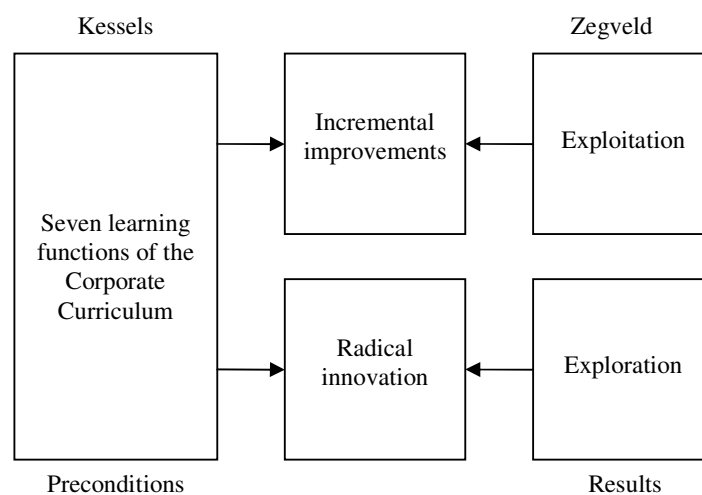


Figure 4: Knowledge Productivity Framework

Knowledge Productivity Enhancer

The design objective within this research is to develop a practical method to measure knowledge productivity in order to give direction to knowledge management initiatives. The process of designing and testing the method consists of four phases (Andriessen, 2004a): defining the application domain; creating a list of requirements; designing the method; evaluating the design. This section follows these steps in designing a first draft of the method, which is called the *Knowledge Productivity Enhancer*.

Defining the Application Domain

The first step is to define the context of application, which consists of a *class of problems* and a *class of contexts*. Relevant distinctions between different types of problems are given in the Danish Guidelines (STI, 2003b), Andriessen (2004a), and RICARDIS-report (CEC, 2006). All sources make a distinction between *internal management problems* and *external reporting problems*. Andriessen even adds a third class of problems related to *statutory and transactional issues*. As the main aim of the Knowledge Productivity Enhancer is to give direction to knowledge management initiatives, the method seems to fit into the class of problems aiming at solving internal management problems. This method is designed for and will be tested in Dutch medium-sized knowledge intensive professional service firms (class of contexts).

Creating a List of Requirements

The second step of the design cycle is to create a list of requirements for the new method. Van Aken (1996; 2004c), Weggeman (1995) and Andriessen (2004a) make a distinction between four types of requirements. Within this research, three types of requirements should be taken into account. *Functional requirements* are the performance requirements related to the problems that should be solved by applying the method. *Operational requirements* are the requirements from the perspective of the user. *Design limitations* are the boundaries set by the preferred solutions. *Limiting conditions* are the technical requirements the environment places on the method when applied. Whereas this method is not subject to limiting conditions, an overview is given of the first three types of requirements.

Functional requirements define the results the method needs to produce. These requirements follow primarily from the problem definition of this research. Therefore, the main requirement of the method is that it should give direction to knowledge management initiatives. In order to do so, the KP-Enhancer should:

1. Create awareness about the importance of knowledge productivity for improving organizational performance.
2. Reveal and assess the quality of the preconditions for knowledge productivity.
3. Measuring the result of knowledge productivity in terms of incremental and radical innovations.
4. Generate possibilities for improvement.
5. Develop a strategy for knowledge management.
6. Improve communication about knowledge productivity.

Operational requirements define the ease of use of the method from the perspective of the users of the method. First of all, the method should be practical and user-friendly. The method should ‘speak for itself’, should be easy to understand and easy to apply. Second, as

organizations are reluctant to invest in new concepts or methods, the Knowledge Productivity Enhancer should require a limited amount of time. Third, as the aim of the method is to improve the management of knowledge resources, operational requirement is also that the method makes knowledge productivity tangible in the sense that it can be managed. Fourth, in order to assess progress, the method should be replicable, without help from outside, for the (knowledge management) professional.

Finally, the design limitations are the boundaries of the method set by the preferred solutions. The designer of the method often sets these boundaries. This method, following the outcome of the initial literature review, has three design limitations. First limitation is that the assessment of the preconditions of knowledge productivity will be based on the concept of the Corporate Curriculum (Kessels, 1996). Second limitation is that the measurement of knowledge productivity in terms of incremental and radical innovations is based on Zegveld's Quantitative Framework (Zegveld, 2000). Third design limitation is that the process of giving direction to initiatives for improvement will be based on the Danish Intellectual Capital Statement Model (STI, 2003b).

Designing the Method

The Knowledge Productivity Enhancer combines the concept of the Corporate Curriculum, Zegveld's Quantitative Framework and the Danish Guidelines for Intellectual Capital Statements and consists of three phases. Aim of the first phase is to identify problems and set the objectives for applying the method. Main aim of the second phase is to gather data for analysis of the current situation. The third phase gives direction to knowledge management initiatives. An additional fourth phase, in which progress is monitored, is added to stress that applying the method is only the start of a longer process. As it takes time to monitor progress, this phase is not included in this research project.

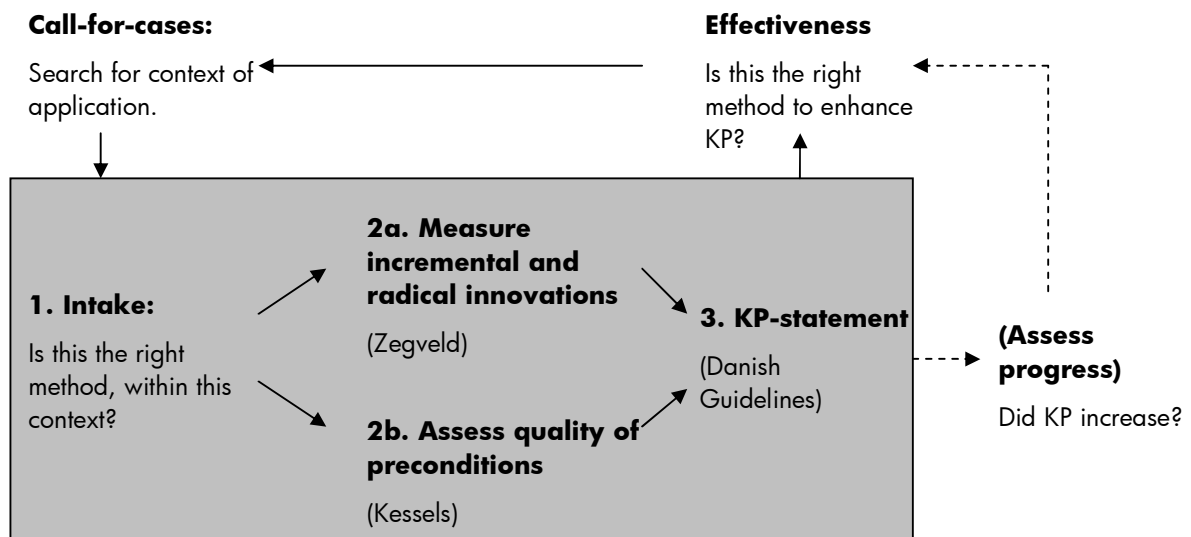


Figure 5: Design of the method within the context of the multiple case study

Within this research project, applying the method should be seen as a part of the learning cycle of the developing multiple case study. Each case-study is preceded by a *call for cases* and each case study is concluded with an assessment of the effectiveness of the method. These two steps makes the connection between the application of the method in practice (practice stream) and the theoretical reflection (knowledge stream) which is characteristic for Design Based Research (Andriessen, 2006). Aim of the practice stream is to solve specific

problems. Aim of the knowledge stream is to develop knowledge that can be transferred to comparable situations.

Call for Cases

Aim of this step is to find a suitable context of application. In order to qualify as a case study within this research, organizations should fit into the class of contexts for which the method is designed and the problem at hand should fit into the class of problems for which the method is designed. If both criteria are met, then the organization qualifies to serve as a case. The result of this step is a strong indication that the organization qualifies as a case study and is willing to apply the method.

Intake (phase 1)

If an organization seems to qualify as a case study, the next step is to verify this assumption. Yin (2003) refers to this step as 'screening case study nominations'. The intake is based on a semi-structured interview with the sponsor and/or contact person. Main questions to be answered are:

1. Does the organization fit into the class of contexts for which the method is designed?
2. Does the problem at hand fit into the class of problems for which the method is designed?
3. Is this the right moment to apply the method and do we get the necessary support?

If the organization qualifies as a case study, the intake is used to make a formal planning for applying the method. In this sense, the call-for-cases and the intake can be compared with the acquisition of a consultancy assignment. Moreover, these steps provide the opportunity to establish a good working relationship with the 'customer'. The intake takes about one hour and the interviewees do not have to prepare for the interview. The report of the interview is verified by the informants and serves as a reference point for evaluating the effectiveness of the method (see below).

Analysis of Current Situation (phase 2)

Aim of this phase of the method is to gather data. The output of this phase serves as input for the next phase in which we will analyse the data in order to give direction to knowledge management initiatives. The analysis of the current situation is based on Zegveld's Quantitative Framework and Kessels' Corporate Curriculum. The former measures the result of knowledge productivity in terms of incremental and radical innovations. The latter reveals the preconditions for enhancing knowledge productivity.

Measuring incremental and radical innovations (2a)

Due to practical reasons, within this research Zegveld's analysis has been simplified. Main simplification has been the reduction of the number of years from twelve to five. According to Zegveld (interview September 2005), a series of five years would be the minimum to recognize a pattern.

Incremental innovation (exploitation)

As we have seen above, incremental innovation relates to single-loop learning and is about incremental improvements to existing practice. Within Zegveld's quantitative framework, incremental innovation is detected by measuring the (in)consistency of the application of a generic strategy. Reasoning behind this is that different generic strategies result in different performance outcomes, which means that a shift from one to another strategy will be reflected

in the financial data. Moreover, a change in the focus from one to another generic strategy should be explained by the (implicit or explicit) desire to improve existing practice. Based on Porter (1980) and Karnani (1984), Zegveld makes a distinction between an efficiency strategy, added-value strategy and a volume strategy. An efficiency strategy implies the aim of continuously reducing costs and thus increasing value per unit turnover and therefore can be detected if most of the created value can be related to a decrease of company specific costs per unit turnover. Successful deployment of an added value strategy implies a trade-off between the premium price the customer is willing to pay and the increased cost development as the result of extensive research, product design and intensive customer support to gain additional margins. Therefore, an added value strategy can be detected if most of the created value can be related to an increase of added value per unit turnover. Finally, a volume strategy can be detected when most of the created value can be related to a higher turnover without changing the added value per unit turnover or company specific costs per unit turnover (Zegveld, 2000). Companies are either volume or performance driven. If they are performance driven, they can either have a focus on added-value or on efficiency.

Aim of the Quantitative Framework is to detect stability or instability on a longitudinal basis. In order to do so 'financial data has been chosen since it can be related to specific developments in the value chain and since financial data is widely available' (Zegveld, 2000: p. 50). These financial data is used to detect a change in the selection of one of the three generic strategies (volume, efficiency and added value). The two excluding aspects of exploitation are defined as:

1. Stability in exploitation
Stability implies that a substantial part of the development of the total operational value of a company can be related to a single generic strategy.
2. Change in exploitation: incremental innovation
Incremental innovation implies that no one single generic strategy realises a substantial part of the development of the total operational value of a company.

According to Zegveld (2000) stability and change are two excluding aspects of exploitation, companies can either be categorized as stable (related to a single generic strategy) or as *incremental innovation* companies. Only if the figures detect a change in the focus from one to another strategy, then we speak about incremental innovation. 'Incremental innovation can be the result of a change of deployment from one generic strategy towards a different generic strategy or can be the result of an absence of a generic strategy within the period of analysis. A discontinuity in the deployment of a generic strategy can be the result of explicit or implicit choices by management or by core stakeholders and will affect the process of production and the process of value creation' (Zegveld, 2000: p.49). Based on Luehrman (1997), Zegveld (2000) proposes to measure the development of exploitation by measuring Operational Cash Flow (OCF) and the contribution of the three generic strategies to the build up of OCF (see Appendix I). If the figures reveal a shift in the contribution to OCF from one to another generic strategy, the company qualifies as an incremental innovation company.

Radical innovation (exploration)

Radical innovation relates to double loop learning and is about the process of forming resources, which leads to a radical new perspective to the company. Like exploitation, radical innovation is a neutral concept and can lead either to creative destruction or creative accumulation. Moreover, like exploitation, radical innovation may be the result of explicit or implicit developments.

In his research, Zegveld (2000) investigates the relationship between the company's perspective and the development of resources. Based on several studies he concludes that the

build-up of resources is stable when, from the company’s perspective, no fundamental changes occur within the firm’s basic orientation towards its resources (customers, employees, partners and shareholders). However, a different perspective on resources leads to a situation where a different and new positional advantage and different competencies are developed, which subsequently leads to a different build up of resources. This new perspective or radical innovation can be detected by measuring the stability of the build-up of resources.

According to neo-classical theory growth is driven by exogenous changes in the different factors of production. However, using only two factors of production (labour and capital) could not fully explain economic growth. Therefore, more and more economists focused on innovation and the development of knowledge as the (endogenous) source of continuous productivity increase in order to explain the productivity gap (Solow, 1957; Romer, 1990). Nowadays, the assumption that changes in productivity that can not be explained through changes in labour or capital are caused by knowledge, seems to be generally accepted. ‘Starting with the neo-classical model by Solow, different authors have developed different models for calculating the surplus or residual value and hence the *Total Factor Productivity* (TFP). (...) The residual value is defined as the creation of additional output above the level of the different inputs or resources’ (Zegveld, 2000: p.65). In economic theory a change in the build up of residual value is a determinant of change of perspective. Therefore, based on Solow, Zegveld proposes to use the concept of Total Factor Productivity (TFP) to calculate the residual value caused by knowledge.

Model	Total Factor Productivity (TFP) (Solow)	Total Resource Productivity (TRP) (Zegveld)
<i>Output</i>	Private non-farm GNP	Added value of companies defined as: Turnover minus all outsourcing intermediate goods and services. Output is defined as: Employment costs + Depreciation + Net profit.
<i>Capital</i>	Employed capital	Depreciation
<i>Unity</i>	Manhour	Employees (fte)
<i>Periodicity</i>	Yearly	Yearly
<i>Correcton</i>	Inflation	None

Figure 6: Translating TFP into TRP (Zegveld, 2000)

The contribution of Zegveld has been that he applied the concept of TFP to companies instead of countries by broadening the concept of TFP to *Total Resource Productivity* (TRP). ‘By adapting the TFP model to companies, the residual value is defined as knowledge or intellectual capital’ (Zegveld, 2000: p.53). TRP measures the accumulation of knowledge and the build-up of the residual within the company and may provide insight into how well a company allocates and exploits its resources. Therefore, the build-up of the residual is a determinant of change of the perspective. Reasoning behind this is that discontinuity in the residual build-up at company level should be interpreted as a shift in the deployment of knowledge or intellectual capital. A radical shift in the development of the residual build-up implies a more radical impact due to the deployment of new intellectual capital and can therefore be defined as radical innovation. Radical innovation is defined as a new combination of resources which leads to a new perspective for the organization.

The aim of TRP is to detect stability or change in the perspective of the organization. The two excluding aspects are defined as:

1. Stability in exploration
Continuity of the perspective of a company and hence continuity of the different stakeholders in relation to the company. Results in a longitudinal continuous build-up of total resource productivity.
2. Change in exploration
Change of the perspective of a company and hence a discontinuity in the importance of the different core stakeholders in relation to the company.

To detect radical innovation, a change in build-up of knowledge should be observed, whereas ‘a discontinuity of the company’s perspective results in a longitudinal discontinuous build-up of the total resource productivity’ (2000: p.59). According to Zegveld, a sudden positive shift in the development of company specific TRP implies radical innovation or a radical change in the perspective of the company. ‘This change of perspective is related to the development and successful initial deployment of residual value or intellectual capital related to this new perspective’ (Zegveld, 2000: pp.103-104). This reasoning follows the resource-based view of the company which argues that innovation is about new combinations of resources. Within Zegveld’s model, ‘residual value is defined as “intellectual capital” (...) or company specific knowledge which is developed by combining and recombining resources’ (Zegveld, 2000: pp.70-71). Based on the calculation of residual change (see Appendix I) we can determine whether a firm qualifies as a radical innovation firm or not. Radical innovation can be recognized by a significant change in the residual build-up.

Assessment of the quality of the preconditions for knowledge productivity (step 2b)

Parallel to measuring incremental and radical innovations data is gathered about the quality of the preconditions for knowledge productivity. Aim of this step is to reveal the sources of knowledge productivity and get better insight in the current situation. Assumption is that the quality of the preconditions determines the extent to which incremental and radical innovations will be achieved. Therefore, the quality of the preconditions are an indicator of future performance and not directly related to Zegveld’s quantitative analysis. The assessment of the quality of the preconditions for knowledge productivity is based on Kessels’ *Corporate Curriculum* (Kessels, 1996). As we have seen, the Corporate Curriculum consists of seven learning functions.

Learning function 1: Subject matter expertise

The first learning function has been defined as ‘Acquiring *subject matter expertise* and professional knowledge directly related to the organization’s business and core competencies’ (Kessels, 1996; Keursten et al., 2004a)’. In a sense, the first learning function covers the main part of the concept of knowledge management (Nonaka & Takeuchi, 1997; Weggeman, 1997; Davenport & Prusak, 1998; Stam, 2004). Subject matter expertise stresses the importance of ‘strategic grounding’ (Stam, 2004) as it is about knowledge which is directly related to the main work processes and work-related objectives (Keursten, 2001; Keursten et al., 2004b; Van Lakerveld, 2005). Moreover, subject matter expertise is both about *tacit* and *explicit* knowledge (Polanyi, 1974; Kessels, 2002), and it is about the way knowledge is developed, shared and codified throughout the organization (Kessels & Keursten, 2001; Keursten, 2001). Subject matter expertise is about the strategic grounding and processing of knowledge and therefore asks for knowledge-based strategies and facilitation of knowledge processes.

Learning function 2: Solving problems

The second learning function has been defined as ‘learning to identify and deal with new problems using the acquired subject matter expertise’ (Kessels, 1996; Keursten et al., 2004a). From a knowledge management perspective, *solving problems* refers to the process of applying (Weggeman, 1997; Davenport & Prusak, 1998), combining (Spek & Spijkervet, 1994; Nonaka & Takeuchi, 1997) or exploiting (Sprenger et al., 1995) knowledge. Within these processes, which are at the ‘end’ of the knowledge value chain, knowledge is put into use, or in other words: made productive. All other knowledge processes support this second learning function. Second distinguishing characteristic of this learning function is that it stresses the gap between existing subject-matter expertise (as a result of the first learning function) and the knowledge that is needed in order to find solutions for new challenges. Solving problems is the competency with which this gap can be closed. However, the gap will never be closed entirely. New situations always ask for new interpretations of existing knowledge, therefore the need for the ability to solve problems will remain. Moreover, solving problems is a personal capacity and cannot be separated from its context (Sveiby, 1997). If the context is complex and dynamic, the professional’s work should be based on a body of knowledge which has to be interpreted and applied depending on the specific circumstances (Weggeman, 1997). Solving problems is about the ability to renew and stretch expertise and therefore asks for creativity and room for experimenting with new ways of working.

Learning function 3: Reflective skills and meta-cognitions

The third learning function has been defined as ‘cultivating reflective skills and metacognitions to find ways to locate, acquire and apply new knowledge’ (Kessels, 1996; Keursten et al., 2004a). The main message of this learning function is that we should not only learn how to develop, share and apply knowledge (first two learning functions), but also reflect on the effectiveness of these processes (Kessels & Keursten, 2001). Meta-learning reflects an organisation's attempts to learn about (and improve) its ability to learn (Argyris & Schon, 1978). Main questions related to this learning function are: Why are we good in solving problem A, and why is it that we do not know how to handle problem B? What can we learn from our experiences and can we do it better? Reflective skills are necessary in order to learn from past processes (Van Lakerveld, 2005). This learning function enables organizations, teams and individuals to manage their own learning processes. ‘How can we improve our ability to develop, share and utilise knowledge in the workplace, and help others to do so’ (Harrison & Kessels, 2004: p.156). From a knowledge management perspective, this learning function refers to the process of evaluation (Weggeman, 1997; Stam, 2004). Moreover, this process makes the connection to the concept of the learning organization (Senge, 1992). Reflection stresses the idea that the output of the process also serves as input for a new (production) cycle (Nonaka & Takeuchi, 1997; Zack, 1998). Reflective skills are of vital importance for the development of meta-cognitions. Important preconditions for the development of reflective skills are open communication, constructive feedback and creating time and space to look backward (Kessels & Keursten, 2001).

Learning function 4: Communication skills

The fourth learning function of the Corporate Curriculum has been described as ‘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’ (Kessels, 1996; Keursten et al., 2004a). Communication skills stresses that knowledge is processed through people. More and more research is being done to identify the critical skills of the knowledge worker (Sprenger et al., 1995; Tissen et al., 1998; A. Abell & Ward, 2000). Important skills are the ability to communicate and collaborate, as it is through communication and collaboration that knowledge is developed and shared. Another aspect of

this learning function is the extent to which the environment supports knowledge sharing. From a knowledge management perspective, this aspect refers to the preconditions for knowledge management in terms of structure and culture, as these aspects have an important impact on the knowledge processes and the knowledge friendliness of the company (Weggeman, 1997; Stam, 2004). Communication skills is about the ability to communicate and collaborate and the knowledge friendliness of the organization in terms of structure and culture.

Learning function 5: Self regulation of motivation

This fifth learning function has been defined as ‘acquiring skills to regulate motivation, affinities, emotions and affections concerning working and learning’ (Kessels, 1996; Keursten et al., 2004a). This learning function, also at the heart of the Corporate Curriculum, is the most implicit learning function (Keursten et al., 2004a) and refers to the importance for knowledge workers to identify personal themes and ways to develop these. It is about skills that give meaning to learning and enhance commitment (Kessels, 1996), because ‘in a knowledge economy it is useless when a manager says: Be smarter, or show more creativity! Being smart and creative depend heavily on personal interest’ (Kessels & Van der Werff, 2002). People are only smart if they want to be (Harrison & Kessels, 2004: p.156). Personal interest is closely related to the process of inspiration, passion or motivation and sense-making (Leenheers, 2004). In their reconstruction study, Keursten et.al. conclude that ‘personal motivation and affinity with a particular topic was the driving force behind innovations and improvements’ (Keursten et al., 2004b: p.167). Moreover, a positive correlation has been found between attention to intrinsic motivation and the performance of individuals in the learning process (Vansteenkiste e.a. in: Van Lakerveld, p.16). Self regulation of motivation puts the locus-of-control with the individual, because it implies that the extent to which organisational objectives are achieved, heavily depends on personal entrepreneurship. ‘A personal entrepreneur works from an intrinsic passion and primarily strives for personal interest. He has the ability to organize his work in such a way that it suits his personal preferences. He sees himself as a firm, although he is an employee’ (Rondeel & Wagenaar, 2002: p.123, translation CS). Although motivation can not be ‘managed’, it can be supported by providing space for personal entrepreneurship.

Learning function 6: Peace and stability

The sixth learning function has been described as ‘promoting *peace and stability* to enable exploration, coherence, synergy, and integration’ (Kessels, 1996; Keursten et al., 2004a). This learning function refers to the need for incremental improvements through further specialization (Ansoff & Sullivan, 1993; Harrison & Kessels, 2004). Peace and stability gives employees the opportunity to explore existing knowledge and search for possibilities to apply this knowledge into their daily practice. Moreover, peace and stability also refers to the need for time for reflection, learning and knowledge sharing. Time and peace provide the opportunity to reflect on the efficiency and effectiveness of processes, products and services. Peace and stability provides a context in which people can experiment, without direct consequences. Peace and stability provides the certainty and the time which is necessary for specialization and improvement (Van Lakerveld, 2005).

From a knowledge management point of view, this learning function refers to the organizational need for a certain degree of redundancy in creating knowledge. Redundancy means that the knowledge level within the organization exceeds the minimum level of knowledge needed to perform the necessary tasks. (Nonaka & Takeuchi, 1997). ‘Lack of redundancy and time to reflect exploit existing (intellectual) resources, and consume these without generating new knowledge. Lack of peace and stability results in impoverishment of intellectual assets’ (Kessels, 2001a; Kessels & Van der Werff, 2002). However, the drawback

of this learning function is that ‘too much peace and stability might bring about overly one-sided specialization and an excessive internal focus’ (Kessels, 2001b; Keursten et al., 2004a). In this sense, Sveiby (1997) argued that stability should be seen as a counter balance of growth and renewal.

Peace and stability is an important precondition for knowledge productivity in general and incremental innovation in particular. Important elements of this learning function are specialization, time to reflect and redundancy.

Learning function 7: Creative turmoil

The seventh learning function has been described as ‘causing creative turmoil, which leads to radical innovation’ (Kessels, 1996; Keursten et al., 2004a). Creative turmoil refers to the need for creativity as a driver of innovation and improvement (Shapero, 1985). The cause of the turmoil is often ‘an existential threat: a matter of winning or losing, surviving or going under, being in or out of the game’ (Harrison, 2004, p.156). Although Van Lakerveld (2005) found a positive relationship between work-pressure and learning, not all pressure is creative turmoil. Creative turmoil is mainly recognized by pressure which is caused by ‘the importance that is attached to the outcome of the process or because people themselves feel a strong urge to solve a particular problem’ (Keursten et.al. p.168/18).

Many authors have referred to the necessity of a certain degree of ‘strategic ambiguity’ (Nonaka & Takeuchi, 1997), ‘strategic imbalance’ (Itami, 1991), ‘strategic distance’ (Senge, 1992), ‘strategic confusion’ (Stacey, 1995) or ‘strategic disorder’ (Levy, 1994) as a requirement of creativity. According to Senge (1992) ‘distance’ between vision and reality is the source of creative tension as distance makes it necessary to take action in order to come closer to the objective. Similar reasoning can be found in Itami (1991) and Nonaka and Takeuchi (1997). A certain degree of chaos, disorder or even failure may prevent complacency, and could stimulate organizations to stretch beyond their strategic comfort zone. Moreover, creative chaos can stimulate individuals to fundamentally change their ways of thinking and create new knowledge.

Keursten et.al. (2004b) argue that external pressure is important to really make a difference in daily work. However, not all unrest is creative turmoil and too much creative turmoil may yield a thousand new ideas but leaves little opportunity to elaborate on them, and will therefore limit innovation. Creative turmoil without the time to reflect will lead to ‘destructive chaos’ (Schon, 1983). This implies that the sixth and the seventh learning function should be in balance. Creative turmoil is seen as a precondition for creating radical innovations. Main prerequisite for this learning function is strategic ambiguity.

Survey

The main elements of the seven learning functions of the Corporate Curriculum (see Appendix II) have been operationalized into 10 statements about the current situation within a company. All employees within the organization are invited to give their perception about these statements. Aim of the survey is to make analysis of the current situation possible and generate input for the next phase, in which the findings are translated into a Knowledge Productivity Statement.

Create a knowledge productivity statement (phase 3)

Main aim within the third phase of this method is to generate a *Knowledge Productivity Statement* (KPS). As the aim of this phase is to give direction to knowledge management initiatives, the process of generating a KPS is based on the process of generating an Intellectual Capital Statement, as developed by the Danish Ministry of Science Technology and Innovation (STI, 2003b).

Intellectual capital statement model

An Intellectual Capital Statement consists of four elements, which are described in the *New Guideline* (STI, 2002, 2003a, 2003b). The first element is the *knowledge narrative*. ‘A narrative is a plot about a certain phenomenon. It shows the sequence of a set of events, it dramatizes the linkages between these events, and it points out not only the “good” things that characterize the phenomenon but also the crucial “bad” elements that have to be avoided to make the point of the narrative succeed’ (Mouritsen et al., 2002: p.14). The second element are the *management challenges*, which are the challenges that have to be overcome in order to implement the knowledge narrative. The third element are the *initiatives*, which are the actions that can be taken to do something about the management challenges. Finally, the fourth element are the *indicators*, which monitor the progress of initiatives. They make initiatives visible by making them measurable.

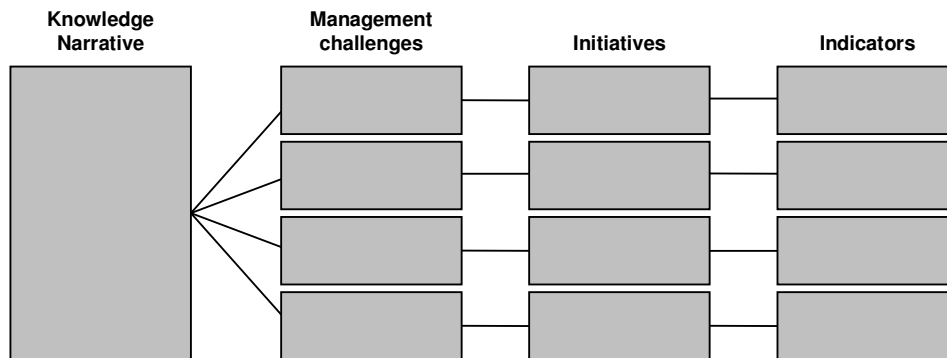


Figure 7: *The Intellectual Capital Statement Model, Source: STI (2003), Intellectual Capital Statements – The New Guideline*

Though the Intellectual Capital Statement Model is designed to create intellectual capital statements, it seems to fit the concept of knowledge productivity and the aim of this research for several reasons. First, this model is designed to translate strategy into knowledge-based action. Intellectual capital statements translate the knowledge narrative into activities that the firm has to put in place to enhance the performance of its knowledge resources (Mouritsen et al., 2001). This aspect supports the aim of this research to give direction to knowledge management initiatives. Second, intellectual capital statements give knowledge an object, which makes it possible to monitor and manage knowledge resources. ‘To achieve this, the intellectual capital statement’s knowledge narrative is related to a monitoring system, which identifies the knowledge management activities’ (Mouritsen et al., 2002: p.20). Intellectual capital statements help to make the object of intangibles clear by creating a language for thinking, talking and doing something about the drivers of companies’ future earnings (Roos et al., 1997; Mouritsen et al., 2002). ‘Counting and numbering are means by which knowledge may be drawn forth as an object that has features, attributes and aspects. It is by counting the development of these aspects that knowledge management activities get a form – and a practice. Only when attached to numbers is it possible to identify and communicate, in a reasonable form, what knowledge is all about’ (Mouritsen et al., 2002: p.19). This aspect supports the objective of solving internal and external communication problems, because when translated to indicators the complexity of knowledge is reduced, and made manageable and communicable.

Third, the lack of existing models for monitoring knowledge resources asks for a model that includes the logic of reading. Reading an intellectual capital statement is different from reading a financial statement, because the intellectual capital statement does not have the

institutions that make certain readings conventional, as in the case of the financial statement. 'The logic of reading the indicators can therefore not be "outside" the document but has to be made part of it' (Mouritsen et al., 2001). Fourth, managing knowledge resources is a process. The step-by-step approach of the model guides the manager through the process of formulating a statement. Participating in this process is at least equally important as the outcome. The aim of intellectual capital statements is to visualize the path towards realizing the knowledge narrative. In other words, they create the infrastructure required to make the knowledge narrative possible (Mouritsen et al., 2002). However, the main benefits of the process do not come from the statement itself, but from the act of preparing the statement (STI, 2003b; Andriessen, 2004a). This aspect supports the assumption that the process of measuring is more than assigning scaled numbers to items. There is more to an intellectual capital statement than the indicators (Mouritsen et al., 2001). However, aim of the indicators is to monitor the implementation of interventions related to the knowledge narrative and take actions accordingly.

Generating an intellectual capital statement means filling in the different elements of the model. Whereas it seems as if the process of creating such a model is very linear, it has been designed as an iterative process. 'Preparing intellectual capital statements is a creative activity where a meaningful whole is gradually developed. The important thing is not to get locked in one place' (STI, 2003b: p.19). In order to avoid the work stagnating to a halt, the Danish Guidelines suggest to work with the entire model at the same time. 'The work is completed when you have a coherent explanation. You should be continuously critical of all the elements, and they should be reassessed until everything is coherent' (STI, 2003b: p.22). As it is often difficult to immediately determine the knowledge narrative, the guidelines suggest to start with the existing activities and underlying objectives, before determining the narrative. However, more important than the sequence of activities is to be open for surprises and new insights. Another important aspect of working with this model is coherence between the different elements. The Danish Guidelines suggest to use words like 'therefore' and 'because' to illustrate coherence. Moreover, at each stage of the process it is important to ask the question 'why?', because the answer to this question illustrates the relationship with the other elements.

Knowledge productivity statement

The process of generating a Knowledge Productivity Statement (KPS) follows the process of the Intellectual Capital Statement Model. However, some minor modifications have been made. The main difference is that the KPS does not start from the concept of intellectual capital and its different types of intangibles, but from the concept of the Corporate Curriculum and its seven learning functions. Starting point of the process is the output of the analysis of the current situation (phase 2). Generating a KPS takes place in several workshops with a selection (max. 10) of the respondents to the survey. Developing a KP-statement is a process that consists of four steps:

1. Make an inventory of existing initiatives and underlying challenges. As the Corporate Curriculum serves as starting point, the inventory focuses on initiatives and challenges related to the seven learning functions. In a sense, these elements could be translated into 'learning challenges' and 'learning initiatives'.
2. Develop a knowledge narrative. This narrative or knowledge strategy expresses the company's ambition to increase the value a user receives from a company's *goods or services* and translates the so called *use value* into *knowledge resources*. The latter are needed to give direction to the challenges.

3. Reformulate challenges, select initiatives. Based on the ambition (knowledge narrative) and the quality of the preconditions for knowledge productivity (outcome survey), we now can reformulate challenges and initiatives. Which initiatives deserve priority? Which initiatives should be launched? Which can be eliminated?
4. Define indicators. Finally, after the narrative, challenges and initiatives have been completed, indicators are defined to monitor the progress of the initiatives.

Once fully completed, the analysis will be presented in a Knowledge Productivity Statement, analogue to the Intellectual Capital Statement Model above. This statement serves as the main output of the Knowledge Productivity Enhancer.

Based on the experiences with applying the Danish Guidelines, some additional operational requirements should be taken into account when generating a KP-statement. First, a KP-statement is a communication tool and therefore should be easy to read. The complete statement should fit on one page and should be understandable for all employees. Second, the number of challenges and initiatives should be limited to those that are perceived to be of greatest importance to realizing the organizational objectives. The total amount of initiatives in the final statement should be realistic to implement. Therefore, the number of challenges should be limited to 4 or 5. Finally, the indicators should be SMART: specific, measurable, action-oriented, realistic and a measure of time.

Evaluating the Design

Within this research, the design of the method is an iterative process. After each case study the effectiveness of the method will be evaluated. The lessons learned will be used to improve the design, before applying it in the next case study. The evaluation will be based on the experiences of the researcher, a semi-structured interview with the customer (case study) and a statistical analysis of the outcome of the survey.

The interview is used to develop understanding and give meaning to the outcomes of the case study. Semi-structured interviews are variously described as informal, unstructured, narrative or non-directive and are in essence a conversation between two or three people – the interviewer and the informant(s) (Mador, 2003). Semi structured interviews are a particularly useful method of collecting data where the nature of the research is exploratory and the focus is upon gaining understanding from the perspective of the actors involved.

Main elements within the evaluation are the application domain (class of problems and class of contexts), effectiveness (results) of the method, functional and operational requirements of the method, and the design of the method.

Testing the KP-Enhancer

The aim of this research is to design and test a method. Therefore, after the design, the next step was to test the method in various iterations using the developing multiple-case study. This final section of the paper elaborates on the findings within the first two tests.

First Iteration: Testing the Initial Design

The KP-enhancer was first tested by IT Solutions BV, a Dutch ICT service provider specialized in Oracle database systems and Java-technology. IT Solutions BV has about 100 employees divided over four business units: Education, Internet Solutions, Consultancy and DBA Solutions. The method was applied between October 2005 and January 2006. As this was the first time the method was applied, the aim within this case study was to test the initial design of the method. The main problem within this company appeared to be an internal

control issue. By applying this method, IT Solutions BV expected to get a better understanding of the sources of knowledge productivity and how to improve knowledge productivity. The main effects of applying the KP-enhancer within this case-study were increased awareness among employees about the importance of knowledge productivity, and increased involvement of employees in translating strategy into action. The most appreciated part of the method was the phase in which we generated a KP-Statement. Although the method generated some progress in the thinking about preconditions for knowledge productivity and indicators for measuring knowledge productivity, this progress was perceived as insufficient.

The main difficulties within this first iteration were caused by applying Zegveld's Quantitative Framework. As a result of the reduction of the analysis to a series of five years, the outcome was seriously disturbed by one deviating accounting figure (2002). This disturbance made the conclusions about the stability or instability questionable, which resulted in rejection of the outcome by the participants of the workshops. Increase of the number of figures would probably have reduced the disturbing effect of 2002. However, due to practical problems we were not able to extend the number of measures. Therefore we decided to ignore the outcome of this analysis and focus on the analysis based on Kessels' Corporate Curriculum. Another problem was caused by Zegveld's conceptualization of incremental innovation. As most of the participants interpreted incremental innovation as everyday (minor) improvements of existing practice they had difficulties with connecting this concept to a shift in generic strategies. Moreover, they did not accept the fact that the analysis did not detect incremental innovations (i.e. minor improvements). Another finding in this case study was that the method lacked coherence. Although the different parts (i.e. survey, quantitative analysis and KP-statement) were suggested to form a coherent method, the relationship between the three was not clear to the participants. On the one hand this lack of coherence was caused by the difficulties with applying the Quantitative Framework. On the other hand, the method seemed to lack connecting elements.

Based on the experiences in the first iteration, the design of the method was changed on three points. First, we improved the reliability of the questionnaire by increasing alpha-scores per learning function through deleting several items in the survey. Second, in order to bridge the gap between Kessels' learning functions and Zegveld's Quantitative Framework, we developed a set of additional statements about incremental and radical innovations. Third, in order to increase coherence between the second and the third phase, we developed a board-game to generate collective findings. This paper focuses on the latter improvement.

In order to strengthen coherence it seemed as if the method should generate more 'tangible' output through collective analysis of the outcome. Therefore, to discuss the outcome and to collect shared findings that could give direction to a KP-statement, a board-game was developed. Main questions to be answered in this game are: "what result(s) are you aiming at (incremental innovations and/or radical innovations)?" and "which learning function(s) need to be improved in order to realize this result?" The game is played after the presentation of the outcome of the survey. The game is played in several rounds. The first round each participant is asked to put a 'result' card on either incremental or radical innovations. Everyone is asked to elaborate on his/her choice. At the end of this round everyone is asked to reconsider his/her choice. The second round, each participant is asked to put a 'priority' card on the learning function which needs to be improved first. Again everyone is asked to elaborate on his/her choice and finally everyone is asked to reconsider their initial choice. The third and fourth round are repetitions of the second round. The result of the game is a visualization of the importance of the different results that the company is aiming at (incremental and/or radical innovations) and the kind of improvements which are needed to achieve this result, given the

outcome of the analysis of the learning functions. These collective findings serve as a starting point for generating a KP-statement.

Second Iteration: Testing Coherence

Midfield Consultants is the second organization where we applied the KP-Enhancer. Midfield has 43 employees (36 consultants and 7 support staff), divided over three locations. The focus of Midfield is on Small and Medium-sized Enterprises (SME's). Specific SME related topics are *company succession & transfer, franchise & commercial co-operation, expropriation & real estate consultancy* and *project & subsidy management*. The method was applied between February 2006 and May 2006. As the improvements after the first iteration were mainly meant to improve coherence, the main aim of the second iteration was to test coherence between the different elements of the method. Midfield's main motive to apply the KP-Enhancer was that the management expected the method to raise awareness about the importance of two internal projects (*age-conscious personnel policy* and *securing knowledge and networks*), give direction to these internal projects and involve people in implementing the activities related to these projects.

Again, like in the first iteration, the process of generating a KP-statement was perceived to be the most valuable element of the method. It was perceived valuable because Midfield finally managed to get their strategic ambitions on paper. Moreover, the fact that it fitted on one page and that it was action-oriented was also highly appreciated. After completion of the method, the outcome was presented at a special meeting to all employees. As a result many people committed themselves to one or more projects. In this sense the outcome appeared to be very useful and in line with the expectations. To a lesser extent, the method had also been applied to improve corporate reputation and the ability to attract new employees. Asked after the effects related to these issues, it appeared that the KP- statement had successfully been used in interviews with potential employees in order to introduce the company and the challenges they were facing. In this sense it seems as if the KP-statement also contributed to improve external communication.

Main finding of the first iteration was that the method lacked coherence. The efforts to integrate the various elements within the method after the first iteration, seems to have worked out very well within this case-study. The process of generating a KP-statement was perceived as a very "natural next step" after the analysis of the current situation. The collective findings – generated during the KP-board game in the first workshop – seem to have bridged the gap between analysis and action. The game played an important role in generating these findings and shift gear from passive to active participation. However, the KP board game also generated friction and resistance in the process, which almost resulted in the termination of the method. The introduction of the method and the presentation of the outcome of the analysis during the first workshop confirmed the initial expectation with some of the participants that the method was too "scientific". According to some of the participants, the time that was invested in reflection and in generating collective findings lacked practical relevance. These hesitations about the effectiveness of the method eventually led to an outburst of anger by one of the participants. It seems as if the game at the end of the first workshop served as the trigger. According to this participant, the workshop was "childish, repeating things we had already done before and a loss of time". At first this outburst resulted in an awkward moment which seemed to endanger the continuity of the process. However, the discussion that followed also resulted into increased awareness of the problem they were trying to solve (lack of ability to reflection). In this sense the outburst of anger had been very productive and contributed positively to the final outcome.

Although the analysis of the current situation should have been based on both the survey and the quantitative analysis, Zegveld's Quantitative Framework was not used in the process of analysing the current situation within this case study. The main reason for this was the fear that presenting these 'academic' calculations (after the crisis) would further endanger the continuity of the process. Though the assumption was that insight in these measurements were necessary to analyse the current situation, the method seemed to work very well without these measurements. It seems as if the quantitative analysis is not a necessary element within the method. Moreover, the outcome of the survey seems to generate sufficient input for making a KP-statement. Therefore, combined with the experiences in the first iteration, we should consider to leave out this element in the next iteration.

The KP-statement was appreciated for its communicative power. The fact that it made the implicit strategy explicit, that it fitted on one page and that it gave an overview of actions to be taken, made that it was very useful within this context. "It does not present anything new, but it brings existing elements together in a convenient arrangement". However, in order to stress the relationship with organizational ambitions, an additional column was added including the mission statement, strategic objectives and the collective findings of the analysis of the current situation.

After initial hesitations about the effectiveness of the method and a crisis early in the process, the method seems to have been very effective in the sense that it led to the main intended results (*raising awareness, give direction, and involve people*). The survey was received very positively and the KP-statement, as tangible result of the process, was highly appreciated. Important finding of this iteration is also that the method seems to work very well without the Quantitative Framework.

Further Research

The objective of this research is to acquire knowledge about how to measure knowledge productivity in order to give direction to knowledge management initiatives. The main focus of this research until now has been on the theoretical design of a method and testing the initial design in two iterations. Within the contexts of the first two case-studies, this method seems to have generated satisfying results. Therefore, the main focus within the next iterations will shift from the development of the method to the implementation of the method. Main objective within these iterations will be to acquire knowledge about implementing the KP-Enhancer. Consequently the main question to be answered will be how to implement the KP-Enhancer? In order to answer this question, special attention will be paid to the next issues:

1. The method seems to contribute to collective sense making. What happens if people within an organization go through a process like this? (Weick, 1995) How to contribute to the construction of meaning?
2. In line with earlier research (Van Lakerveld, 2005), the first two iterations confirm that Reflection is a problem within many organizations. This method forces organizations to practice reflection. How to reflect, when reflection is the problem?
3. As the KP-Enhancer is an intervention method, then what are the specific requirements with respect to the interventionist?

From a methodological point of view, the third question also raises the issues of objectivity and bias. As this research is based on participative observation, the central methodological problem (or dilemma) is balancing adequate subjectivity with adequate objectivity (Bruyn, 1966). How to maintain enough distance to be able to locate the contextual experiences in a wider theoretical and social context? Related to the issue of objectivity, and perhaps helpful in

answering this methodological question is the issue of plausible rival explanations (Campbell & Stanley, 1963). What are alternative conclusions that can be taken from the same data and which of the alternative explanations seems to be the most plausible?

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Appendix I: Detecting incremental and radical innovation

Detecting incremental innovation

Calculating generic strategies

- Volume (V) = turnover
- Efficiency (E) = turnover/employment costs
- Added Value (A) = added value/turnover

(Added value is defined as employment costs, plus depreciation, plus tax, plus interest and other financial costs, and net profit.)

Calculating Operational Cash Flow (OCF)

- Performance = $A - (1 \div E)$
- $OCF = V * (A - 1/E)$
- Change in OCF = $OCF^{t1} - OCF^{t0}$

Calculating Cash Impact (ci)

- $ciV = (V^{t1} * (A^{t0} - 1/E^{t0})) - (V^{t0} * (A^{t0} - 1/E^{t0}))$
- $ciA = (V^{t0} * ((A^{t1}) - 1/E^{t0})) - (V^{t0} * ((A^{t0}) - 1/E^{t0}))$
- $ciE = (V^{t0} * (A^{t0} - 1/(E^{t1}))) - (V^{t0} * (A^{t0} - 1/(E^{t0})))$

Detecting radical innovation

Data needed

- Output = added value (O)
- Capital = depreciation (C)
- Number of employees (e)

Calculate labour and capital productivity

- Output/employee (Oe)
- Capital/employee (Ce)

Calculate residual change

- Change of output/employee ($dOe = Oe^{t1} - Oe^{t0}$)
- Change of capital/employee ($dCe = Ce^{t1} - Ce^{t0}$)
- Capital/Output (C/O)
- Residual change ($dR = 1 + (dOe - C/O * dCe)$)

Source: (Zegveld, 2000).

Appendix II: Operationalization of the Corporate Curriculum

Learning functions:

1. Subject matter expertise
 - Knowledge grounded in strategy
 - Effective knowledge processes (develop, share/codify)
2. Problem solving
 - Effective knowledge processes (apply)
 - Ability to renew and stretch (creativity)
3. Ability to reflect
 - Effective knowledge processes (evaluate)
 - Reflective skills
4. Communication skills
 - Competences of the knowledge worker
 - Culture of knowledge sharing
 - Structure for knowledge sharing
5. Self regulation of motivation
 - Space
 - Personal entrepreneurship
 - Management support
6. Peace and stability
 - Room for specialization
 - Time for reflection and sharing
 - Organizational redundancy
7. Creative turmoil
 - Strategic ambiguity

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