

The utility of knowledge between exploitation and exploration

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Paper submitted to

21th EGOS Colloquium, June 30 - July 2, 2005

Sub Theme 18: When Organization Studies Meet Economics:
 Alternative Philosophies of Knowledge Management and the
 Theory of the Firm

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1 Introduction

In 1991 James G. March published an much cited paper about the relationship between the exploration of new possibilities and the exploitation of old and well known certainties in organisational learning (March 1991). March holds the view that adaptive processes (i.e. exploitation) are likely to become effective in the short run but self-destructive in the long run. In the following paper the importance of the evaluation of knowledge for fostering processes of exploration or of exploitation is considered from a phenomenological point of view. It is argued that the experience-based character of knowledge assessment encourages adaptive learning processes which offer few opportunities for the development or creation of new knowledge, except by chance or error (Vicari/Troilo 1998). This has important implications for knowledge management which tends to orientate itself towards efficiency, resulting in knowledge assessment that concentrates on being as accurate as possible. With the concept of Schumpeterian learning (Boisot 1999) an alternative approach to the assessment of knowledge is considered and its possible implications for knowledge management are discussed.

2 The value and the utility of knowledge

Any resource taken in isolation is of little use for an economic organisation. As Penrose (1959, 25) states:

“Strictly speaking, it is never resources themselves that are the 'inputs' in the production process, but only the services that the resources can render. The services yielded by resources are a function of the way in which they are used – exactly the same resource when used for different purposes or in different ways and in combination with different types or amounts of other resources provides a different service or set of services.”

This holds true with regard to both material resources (a barrel of oil is useless without the intention to use it for energy production or in the chemical industry) and immaterial resources, for example knowledge about knowledge management is of no use if it cannot be applied in an organisational or scientific context. This differentiation between resources and services is not only the reason why firms with an identical resource pool can have different competitive advantages, something additionally discovered by Penrose (ibid.) and rediscovered in the

resource-based view (Mahoney/Pandian 1992), but is also one reason why the economic value of a resource cannot be estimated without regard to its possible and planned use. For immaterial resources like competencies, capabilities, or knowledge their service-character often lies in their definition. Prahalad and Hamel (1990, 84) demand from (core) competencies, that they “should make a significant contribution to the perceived consumer benefits of the end product”. In this way Grant (1996, 377) defines capabilities as:

“[A9] firm’s ability to perform repeatedly a productive task which relates either directly or indirectly to a firm’s capacity for creating value through effecting the transformation of inputs into outputs.”

Even knowledge which traditional conceptions of organisation science have viewed as being abstract, disembodied, individual and formal (Blackler 1995, 1034) is now considered to be knowing, an activity and enactment (ibid., 1039) or as an “active and recurrent accomplishment” (Orlikowski 2002, 253). Connected with this changed way of looking at knowledge is the renunciation of the demand that one who knows has to be able to articulate his or her knowledge, indeed we do not even need to fully understand, what we know (see cf. the discussion about tacit knowledge (Polanyi 1966) or the importance of intuition in expertise (Dreyfus/Dreyfus 1988)). Furthermore knowledge and capabilities can, like other resources, yield more than one service, which is the basis for the discussion about core competencies in strategic management (Prahalad/Hamel 1990). Last but not least the utility of each of the possible services depends on the circumstances in which they are used. The spectrum of the relevant circumstances spans from environmental factors, such as the legal framework in which the organisation operates, the availability of other resources, or the demand for certain products on the market, to internal factors like availability of the “ancillary competences“ (Robertson 1996, 81) necessary to use a resource. This point can be illustrated more effectively with reference to an example: Sophisticated knowledge about stem cells and their manipulation may render the ability to cure people of diabetes but the ability of organisations to exploit this knowledge depends amongst other things on the existence of laws allowing such research, a sufficient supply of stem cells and laboratories where the research can be done. The potential of products based on this knowledge for economic success depends on the demand and the social acceptance of stem cell research (Pfeffer/Salancik 1978).

Actors and organisations trying to determine the utility of knowledge therefore face a situation where they have to analyse:

- the services their knowledge can possibly yield,

- the interplay of factors influencing their ability to render these services from the knowledge they have, and if need be
- the interplay of factors influencing the economic potential of the services.

The complexity of the task is amplified by the fact that rather than only having to consider the present state of these influences, they have to be able to predict how the situation may be altered or change in the future, because they are interested in the future utility of knowledge.

This utility determines the economic value of the knowledge which is defined as “value in use” (Georgescu-Roegen 1968, 237) or as “the value of the hopes it represents of net earnings in future years” (Shackle 1982, 47).¹ A rational economic actor will evaluate knowledge with respect to the expected “pleasure” or usefulness of the services it can render. If he buys it on the market he will not pay more for it than its expected yield rather he will invest more in its development. Although this formula appears to be simple it is virtually impossible to fulfil its demands. The reasons for the difficulties in the evaluation of knowledge lie partly in the nature of knowledge and partly in the time-relatedness of the evaluation. The so called information-paradox stated by Arrow (1970, 152) is valid also for knowledge: It is not possible to evaluate (the utility of) knowledge before knowing it, but once a potential buyer knows it, he will not be willing to buy it anymore (see also Shackle 1972, 272-273). In addition the evaluation of knowledge relates to the future and this poses in most cases insurmountable difficulties even to the evaluation of known knowledge. The future is characterised by uncertainty (Knight 1921, 233) and the decision-maker finds himself in a situation of not-knowing or ‘unknowledge’:

„Human plans and decisions concern the future. In adapting to the future, people have available to them incomplete information about the past and partial information about the continuous present (the moving point of actual decision). They can have no ‚information‘ about the future. Since it has yet to happen, there can only be opinion about it. In Shackle’s graphic term, the future is characterised by ‚unknowledge‘“ (Wiseman 1991, 151).

Given these arguments we can see that the discussion about the evaluation of knowledge deals with knowledge on at least four levels:

1. the knowledge to be evaluated

¹ . A second factor influencing the value of knowledge is its scarcity. Although knowledge in most cases is not scarce in the sense that its utility is reduced when it is shared with others, the value of the services knowledge can render can be reduced by sharing (Probst et al. 1998, 242; Boisot 1999, 74-75). Despite this importance of scarcity by and large the following considerations concentrate on utility.

2. the knowledge (or competencies) to render services from this knowledge
3. the knowledge about the future and the future possibilities to render these services as well as their profitability
4. the evaluation of the knowledge itself

For the following discussion these levels have been grouped into three terms. The knowledge on the first level is called focal knowledge, the second two levels are termed ancillary knowledge and the result of the assessment: valuation. It is evident that these levels are interrelated in multiple ways. Focal and ancillary knowledge not only determine the valuation but are themselves affected by the assessment. Knowledge which is marked as important or useful usually undergoes a more detailed inspection than 'useless' knowledge. It is scrutinised and applied and in this way new experiences are made and a better understanding is developed which often increases the focal and the ancillary knowledge. Many of the processes described by March (1991, 73) as exploitation of knowledge can be subsumed under this. (We will return to this topic later.)

In spite of the fact that an analytically grounded, realistic assessment of the future value for all types of knowledge mentioned above, and strictly speaking all types of resources, is impossible²; to cite Shackle (1972, 47) again: "*knowledge of the future* is a contradiction in terms", such evaluations are obviously permanently made in every organisation. Every action undertaken and every decision made expresses an evaluation of the knowledge on which the action or the decision is grounded. The knowledge supporting the decision is believed to be more relevant than other possibly existing facts speaking against the decision. That is not to say however, that every act or decision is preceded by a considered valuation. If this was the case no individual or organisation would be able to act. Actions and decisions happen in most cases routinely or refer at the very least to routines and rules which are known by the actor on the level of practical consciousness (Giddens 1984, 7). Following Neisser (1976) and Weick

² Davidson (1996, 28-29) argues that stochastic methods are only successful applicable for coping with uncertainty regarding the future if all observations can be reconstructed as realisations of ergodic stochastic processes. That means, that the time and space averages of the underlying stochastic processes coincide (for an infinite realisation) respectively tend to converge (for an finite realisation). So it is possible to gain estimations without persistent errors about future realisations by projecting the calculated statistics based on the past and/or current realisations. To argue that the economic future is ergodic means nothing but that (human) agency does not matter. An actor or an organisation can do what it want, it will not change the future in a statistically significant way. This point of view is inconsistent with the insights in path-depending processes in the economy, may these positive or negative feedback-loops come from experience based learning processes (David 1985) or network-effects (Katz/Shapiro 1986; Arthur 1989).

(1979) the processes underlying this 'valuation' can be described as schemata operating in a perceptual cycle.

In the perceptual cycle the schema of the present environment directs movements and exploratory activities. This makes more information available thus modifying the schema further (Neisser 1976, 54). Although it often works in a tacit, routine form, a schema can be invoked consciously by an actor looking for assistance in dealing with a concrete, often unfamiliar, situation (Stotland/Canon 1972, 68). It helps the actor facing the threat of uncertainty by making sense of ambiguous, equivocal situations (Weick 1995). The use of schemata obviously has consequences for the assessment of knowledge. These consequences are scrutinised in the following sections of the paper.

3 Developing estimations about the utility of knowledge – a phenomenological approach

In his phenomenological approach Schütz distinguishes between the daily conduct of actors and their wilful planned, rational actions (1973a, 20). In the former the actor is guided by "operating instructions" ("Gebrauchsanweisungen") (Schütz/Luckmann 1979, 37), recipes and rules of thumb. These are based on experiences and have stood the test of time and their continuous success convinces the actor that they will still work regardless of whether he or she knows and/or understands the 'theoretical' background of the recipe. Behind this conviction is the view that the world is given and that its relevant aspects will not change, an idea for which Husserl coined the catchphrases "I-can-do-it-again" ("Ich kann immer wieder") and "and so on and so on" ("und so weiter"). This view allows for the development of schemata and 'typifications' whose relevance becomes especially obvious in the case of planned rational actions.

Schütz (1973a, 19-20) argues that acting is based on previously developed projects. The projects start with "phantasying" (ibid., 20) the projected act as being complete, that is the state to be achieved after the act. Using the result as a starting point the actor reconstructs the steps necessary to reach it. The consequences of this kind of planning are (ibid. 20-23):

1. All drafts of future acts are based on the knowledge the actor has at the time of projecting. This knowledge belongs to prior experiences of the actor and/or is passed to him by its social environment (ibid., 13-15).

2. Planning rests on the conviction of repeatability mentioned above. Recipes and causal textures (Weick 1979, 53) (a term not used by Schütz) which were successful before will work again.
3. Planning in such a way requires the use of ‘typifications’. After all every act is unique. Generally the circumstances are different and at the very least the actor has become older and has acquired more experience. To find out or, perhaps better, to construct a similarity between the actual act and acts which were successfully carried out in the past, it is necessary to suppress the irrelevant aspects of the situation as it is proposed and to concentrate on the typical ones.
4. The forming of types is context-dependent. The project to be realised, the situation at hand, the knowledge of the actor, and the others actors involved all require consideration. In short, the problems are important for the question as to which aspects of an object, a situation or a person are emphasised in the typification. Schütz (1971a, 235) calls the fact that “every problem requires [...] another kind of typification” its “problem-relevance”.
5. The ability to typify situations and projects in such a way rests on the use of schemes or schemata by the actor (Schütz 1971a, 233-238; 1974, 105-111). Schütz calls a scheme the connection between the concrete, for example a wooden, yellow painted table with coffee stains, and the typified, a table. Schemes are also used to choose the appropriate typifications for objects, situations and people.

This sketch of phenomenological thought regarding the planning of acts, although incomplete, (the important aspects of the reciprocity of perspectives and the different motives of actors have not been mentioned) draws a quite complex picture of the planning process. Based on the biographically determined knowledge they have at hand, actors develop projects and use schemes to find the problem-relevant typifications and to apply them to objects, situations and people. The schemes, as an integral part of an individual’s knowledge, work simultaneously as the actor fantasises about possible results of an act and in the process of reconstructing the steps necessary to achieve the result. Last but not least the actor is able to learn. Every experience he has alters his knowledge and with that the schemes he uses as well as his projects (Schütz 1973b, 85).

The inevitable importance of experiences (they may be personally or socially derived) for the knowledge of actors has certain consequences for their ability regarding ‘knowing’ or fantasising about future events. While objectively the future can not be known, under the idealisations of “I-can-do-it-again” and “and so on and so on ” subjectively the actors take it for

granted, until presented with evidence to the contrary (Schütz 1971b, 282) that their anticipations based on their experiences at hand building the project will become realised at least in type. Schütz (1971b, 286-291) points out, that there is a paradox in this subjectivist view:

whatever occurs could not have been expected precisely as it occurs, and [...] whatever has been expected to occur will never occur as it has been expected" (ibid., 287)

Schütz names two reasons for this paradox. The first reason is the difference between the openness of anticipations and the concrete character of realised events. An expectation based on the idealisation of "and so on" refers not to a specific occurrence in its uniqueness and its unique setting within a unique context, but to occurrences of a certain type typically placed in a typical constellation. The stock of knowledge used by an actor in forming his expectations is composed of typifications and so are the anticipations. Because of this the anticipations "are necessarily more or less empty, and this emptiness will be filled in by exactly those features of the event, once it is actualized, that make it a unique individual occurrence" (ibid., 286).

The second reason lies in the relations between the project, its realisation and the projecting actor. If the project includes something that the actor will do, the actor has to place himself in it. He can only do so on the basis of his existing knowledge about his knowledge and capabilities and his experience-based expectations about their possible development. His knowledge and expectations will have changed when the projected act is materialised, even if nothing unexpected has happened. The actor will have grown older and the experiences he will have had while carrying out the project will have enlarged and restructured his stock of knowledge (Schütz 1971b, 290).

These cursory remarks show that in a phenomenological account the utility and thus the value of the focal knowledge can only be estimated on the basis of the ancillary knowledge at hand at the time of estimation. Like the focal knowledge the ancillary knowledge is based on the past experiences of the actor. The same is true for the valuation itself. The actor can at best know from the past how valuable a special part of his focal knowledge was. However, even this knowledge is highly context- or problem-dependent as the discussion about core rigidities (Leonard-Barton 1992) shows. Knowledge and competencies useful for producing one good can hinder the development of another. The possibility that certain abilities and approaches might become a hindrance can be known to the actor in the abstract, but without having experienced concrete rigidities he cannot project their consequences. Every estimation about the future value of knowledge is at the very least highly influenced if not totally determined by past experiences made or socially derived by the actor. From the use of typifications, it fol-

lows that the estimations referring to the future utility of knowledge also have a certain emptiness and openness which can only be filled by concrete occurrence of the event, but the experiences provide a frame (Spender 1992, 10-12) for the interpretation and evaluation of the possible uses of knowledge. The frame or schemes are the basis for new projects, whose materialisations are interpreted in the light of the frame, which has been altered or enlarged by the experiences made during the project. This promotes the creation of socially constructed path-dependencies, because as a rule actors will pursue only promising ways of using knowledge and other resources. Which ways seem promising are determined by the actors experiences. In the terminology of structuration-theory which has borrowed much of its knowledge-concept from Schütz, the focal, the ancillary knowledge and their valuation work as rules and resources enabling and restraining action and being reproduced by their use (Giddens 1979, 81-94).

4 Knowledge and knowledge management between exploitation and exploration

The purposes of knowledge management stated in the literature are diverse. They range from revealing the knowledge hidden in the organisation and their members to promoting the sharing of knowledge within the organisation and to the promotion of knowledge creation and organisational learning. The measurement and valuation of the knowledge of an organisation is seen as an important but still unsolved problem (Bertels/Savage 1998, 20-24; Venzin et al. 1998, 31). The objectives of the efforts to evaluate the knowledge of organisations are also manifold. The most common reason is the wish to improve internal performance. Other reasons lie in the public effects of such reports or the objective to explore value creation opportunities (Sveiby 2004).

The importance attached to the measurement and evaluation of knowledge can be seen from the number of methods that have been developed. Sveiby (2004) counts 28 methods although several were developed for measuring intangible assets or intellectual capital in general. The structuring effect of experiences described in the section above is evident in all of them. According to Sveiby (2004) four types of approaches can be distinguished:

- direct intellectual capital methods
- market capitalisation methods
- return on assets methods
- scorecard methods

All approaches are based more or less directly on the past performance of the organisation. Even the scorecard methods like the intangible asset monitor (Sveiby 1997) or the balanced scorecard (Kaplan/Norton 1992) rely on peoples experiences, if they measure the customer satisfaction or the return on investment per expert.

Leaving the methodological problems of the assessment methods aside, it follows from the preceding sketch of the phenomenological approach that this past-oriented kind of evaluation is useful for decisions about fields of activity which are similar to familiar ones. Their predictions refer to proven typical uses of knowledge in typical contexts. Within these limitations they give clues as to which fields of knowledge will be useful and thus valuable and which will not. This fosters experience-based learning in the organisation. In addition the openness or the emptiness of the predictions allows the inclusion of similar contexts and/or similar fields of knowledge. Therefore they can support strategic approaches concentrating on the (core) competencies of organisations (Prahalad/Hamel 1990).

In both cases the valuation promotes adaptive processes of learning and knowledge creation. A positive assessment of a certain field of focal or ancillary knowledge increases the likelihood that the engagement in this field of knowledge is intensified therefore increasing the efficiency of exploiting it. Organisations putting their hopes on similarities (i.e. on core competencies) might develop a dominant logic (Prahalad/Bettis 1986; Bettis/Prahalad 1995) of interpreting themselves, their environment and especially the factors responsible for their success. As long as this logic is reinforced by ongoing success, it supports the adaptive alteration and enlargement of the knowledge of the organisation.

The limitations of this kind of assessment become obvious, if the circumstances for the use of knowledge change substantively or new knowledge has to be evaluated. A change can be caused for example by discontinuities like inventions or innovations, the appearance of new competitors or governmental interventions. If the organisation then sticks to its dominant logic it becomes a “straightjacket”(Ghemawat 1991, 14) as the famous example IBM (Mills 1996) shows. If new knowledge has to be assessed the difficulty lies in the missing experiences. Sometimes the new knowledge is also poorly understood, as Boisot (1999, 14) notes using the relation between science and technology resp. as an example:

“It is a commonplace that new technologies are often quite informal and ad hoc when they first make their appearance. As time passes, however, informal technical practices get standardized as certain abstract principles gradually come to light. Knowledge of the aerodynamics of flight, for example, followed rather preceded the experiments of the early pioneers with different aircraft designs. And much more

contemporary medical practice is still a standardization of 'what works', with theoretical underpinnings only following later – indeed, sometimes, much later."

The missing experiences eventually combined with a poor understanding of the knowledge, especially the more general principles underlying it, make it hard if not impossible to develop the typifications needed for an estimation of its value. This is, in Weick's (1995, 99) words an occasion for sensemaking, but the question remains which schemes the actors should use while doing so.

5 Schumpeterian learning

On possible solution to problems connected with the evaluation of new or unfamiliar knowledge offers Boisot's (1999) Schumpeterian-Learning. Based on his conceptual framework "Information-Space" (Boisot 1995), he distinguishes between N(eoclassical)- and S(chumpeterian)-learning. N-learning is based on the conviction that knowledge is cumulative (Boisot 1999, 96):

"Learning [...] becomes a stabilizing process through which individual and organizations [...] through repeated error detections and corrections, gradually gain access to an objective world and adapt to it."

The actors in such a world can rely on a stable and trustworthy knowledge base which amongst other things simplifies the assessment of knowledge. But on the other hand the economic value of knowledge assets leaks away over time. With the services they can render and the ways to yield them being fully understood and as the knowledge is diffused fully into society, it is no longer possible to profit from the possession of the knowledge assets.³ Because not only the focal knowledge but also the ancillary knowledge and their valuation become well known to more and more actors (excluding cognitive and other individual boundaries which could hinder the actors to use the knowledge) they become a kind of public good. A "market-equilibrium is reached and no trades are possible at a price above the cost of providing such knowledge" (ibid.). The only strategy an organisation can use to protect the value of its knowledge assets is to erect barriers against their diffusion. These strategies are well known: the use of patents and of brands, secrecy clauses and others barriers to entry are the tools employed to shield knowledge assets and their exploitation. But it is known as well, that barriers to entry often also become barriers to exit (Caves/Porter 1976). At least if the under-

³ Here becomes the scarcity of knowledge relevant as a factor influencing its value.

lying conviction of the cumulative character of knowledge turns out to be false the potential for such barriers to exist may be as dangerous for an organisation as a dominant logic can be.

The conviction “that change not stability is the natural order of things” (Boisot 1999, 99) forms the basis for the S-learning. In such a world all knowledge must remain incomplete, provisional and subject to revision. There may be a progression of knowledge “in the sense that successive approximations may give us a better understanding of the underlying structures of reality” (ibid.), but this progression is not necessarily cumulative. Paradigm shifts (Kuhn 1962) are possible which means that much old knowledge is destroyed in an act of “creative destruction” (Schumpeter 1961).

Under these assumptions, argues Boisot (1999, 100), there are no reasons that even codified and abstract constructions of knowledge can ever be free of systematic errors or be more than a fragile scaffolding for the daily life of the actors. The tour of developing, discovering and inventing knowledge has no last stop. This also means that there are no lasting opportunities for exploiting knowledge. The development of a better understanding of the general principles underlying certain knowledge assets, which allows us to use the knowledge for a wider range of purposes, and the codification of the knowledge is possible, but it is also always possible that the hypotheses underlying this knowledge are destroyed by other hypotheses. Under these circumstances not only the knowledge but also its evaluation can at best have provisional character. The attempt to base decisions regarding the use of knowledge on such evaluation can be misleading.

The answer to this problem given by Boisot is to go at least partly without a evaluation of knowledge. He argues (Boisot 1999, 100-101), that scrutinising and codifying knowledge enables its diffusion. As a result it gets absorbed and impacted in possibly unpredictable ways. It becomes “subject to wide variety of subjective interpretations and the larger the population within which absorption and impacting takes places, the greater the cognitive variety that is thereby generated” (ibid., 100). The interpretations can confirm or challenge the codes and abstract structures that the learning actors employ. If interpretations are confirmed, N-learning happens, the codes and structures are internalised. If the interpretative schemes used challenge the chosen codes and structures either one of them, the schemes or the codes and structures, are rejected or the learning actors engage in an attempt to reconcile them by scanning and problem-solving activities. “Existing schemes and patterns may be retained, but they will be juggled around until a better fit between codes, structures, and data is achieved” (ibid.). Crucial to S-learning is that knowledge is not protected but shared. The diffusion of knowledge

makes a wide range of interpretations possible because the way every actor interprets and typifies knowledge is determined, as mentioned in section 3, by his biography and is therefore more or less idiosyncratic. This view contradicts neo-classical orthodoxy which argues that “new information biases interpretative schemata of different agents in the same direction” (Boisot 1999, 102). Boisot argues that this assumption is only reasonable for codified and abstract interpretative schemes. But most of the interpretative schemes and the knowledge used in carrying out the interpretations is more contextual. It depends for example on cognitive styles and capacities, biographical situations and other individual circumstances.

The question therefore remains as to where the value of the knowledge assets is extracted and how, if at all, it can be evaluated. Boisot considers three possibilities:

1. The lock-in of knowledge assets. Network-effects and increasing returns can in highly integrated industries protect existing knowledge assets from the replacement through new knowledge, even if the latter is superior (Arthur 1989). A famous example is the QWERTY-layout of computer-keyboards and typewriters (David 1985). The protection through the lock-in hinders the learning process and allows valuation on the basis of the idealisation of “and so on”.
2. Selectivity in knowledge sharing (Boisot 1999, 106-108). Knowledge assets often can be configured as a system of interlinked technologies, the interfaces between the entities being either organisational or technological. “The critical skill to manage the systemic deployment of knowledge assets is systems integration. Sometimes it is achieved through modularization, where what is codified and abstracted is the relationship or interface between technologies which themselves remain ‘black boxes’. [...] At other times, integration calls for tacit skills that are hard for outsiders to imitate even if the system components being integrated are themselves quite accessible” (ibid., 107). Sharing knowledge either at the component level or at the level of linkages allows the organisation to extract value from the knowledge not shared while also profiting from the learning processes induced by the shared knowledge. This requires that the knowledge assets gained from are not themselves diffused. Their assessment can be based on experiences but the risk exists that they are devalued by diffusion or the introduction of new knowledge.
3. Being a faster learner than the competitors. If both components of knowledge mentioned above are shared, then the organisation has to be a faster learner than its competitors to retain the competitive advantage with respect to the knowledge assets it has created (ibid. 108). First-mover advantages can quickly get lost if the organisation does not possess the ab-

sorptive capacity (Cohen/Levinthal 1990) to keep pace with its competitors. In this case the (permanently evolving) knowledge assets and their assessment are less decisive for the competitive advantage than the absorptive capacity of the organisation.

Boisot's approach contrasts with others approaches in knowledge management which aim to assess knowledge as exactly as possible. He acknowledges that a precise and correct assessment of knowledge is only possible under conditions which exclude an important aspect of knowledge management: the creation of new knowledge (Nonaka/Takeuchi 1995). These conditions require a stable environment and the possibility to accumulate knowledge about it in such a way that the objective structure becomes visible. It is a world where uncertainty cannot exist for a longer period of time because its ergodic character (Davidson 1996, 28) allows the actor to infer the objective probabilities from repeatable experiences. It is also a world where agency can have no statistically significant effect (ibid., 26). This view of the world can be described as Newtonian (Perlman/McCann 1996, 16; Boisot 1999, 98) and has to be contrasted with a view of the world which acknowledges its non-linear, discontinuous character. In the latter world uncertainties are not only possible but common and Boisot acknowledges that the existence of uncertainties is one prerequisite for the creation of new knowledge. It therefore comes as no surprise that he can get something out of Arrow's information paradox: "When I buy an information good [...], surprise is precisely what I am paying for" (Boisot 1999, 74).

His concept of S-learning shows a relation between exploitation and exploration in organisational learning (March 1991), where both types appear as prerequisites for each other. Exploitation leads to the codification and the abstraction of knowledge which allows its diffusion. Diffusion enables the creation of different interpretations which in turn can initiate exploration processes which lead back to exploitation processes. The process of selection of valuable knowledge has an evolutionary character and reminds us not only of processes of strategic learning described elsewhere (Kuwada 1998) but is also strongly reminiscent of subjectivist approaches of economic theory which treat it as a process. In particular the connections to the tradition of Austrian economics exceed the reference to the Schumpeterian concept of creative destruction. Boisot's conception of time, knowledge and learning and the role that competition and uncertainty play in the learning process can be found in modern Austrian works (c.f. Langlois 1986; O'Driscoll/Rizzo 1996).

These remarks have been made to draw attention to the traditions of economic thought discussed above that may provide us with clues as to how the discussion about knowledge management can be enriched.

6 Concluding remarks – possible consequences for knowledge management

The preceding analysis has shown that knowledge management which orientates itself only to efficiency increases the tendency of organisations to exploit familiar knowledge at the expense of the exploration of new knowledge. Because of the uncertainty of the future the utility of knowledge can only be detected in hindsight. The possibility to formulate expectations based on typifications exists only for familiar knowledge and these expectations refer not to a concrete use of the knowledge but to a typical one situated in a typical context.

To foster the development and use of new knowledge, which can turn out to be more efficient and effective for organisations than familiar knowledge management has to create organisational structures which allow playful learning processes rather than being overly concerned with efficiency considerations (Boisot 1999, 116). It has to acknowledge that uncertainty and variety play important roles in the development of knowledge and that familiarisation with new knowledge is a time-consuming process. Most of the organisational concepts necessary to meet these conditions are well known, at least in the literature.

In leadership an organisation can apply the “umbrella strategy” described by Mintzberg and Waters (1985, 263). With this strategy, the leaders of a firm „set general guidelines for behaviour - define the boundaries - and then let the other actors manoeuvre within them“ (ibid.). If the boundaries of the umbrella are crossed, because of actions of the members of the organisation or because of changes in the environment:

„the central leadership has three choices: to stop them, ignore them (perhaps for time, to see what will happen), or to adjust to them. [...] In the last case, the leadership exercises the option of altering its own vision in response to the behaviour of other. Indeed, this would appear to be the place, where much effective strategic learning takes place - through leadership response to the initiatives of others“ (ibid., 264).

This brings an element of competition into the organisation. The altered vision can initiate new framing and planning circles (Spender 1992).

Spender identifies two processes which are at work in strategy formation. One process is the phenomenologically motivated „interpretative strategist’s circle“ (ibid., 11), as described by

Daft and Weick (1984), which Spender constructs from four elements: Creating a frame => Situation Evaluation => Planned Action => Interpreting results. The second process is the classical planning circle, formulated for example by Ansoff (1965): Gap detection => Planning of Action/Strategy => Implementation of Strategy => Measuring of Performance (Spender 1992, 13). Spender (ibid., 15) argues that these two processes are pragmatically interdependent:

“[W]e see that planned action is not simply the implementation of a cognitive framework. It is the result of both the disciplined mapping out of the logical possibilities contained within the framework and the evaluation of the costs and benefits of each. With its analysis of the resource requirements, their availabilities, and their relevance, it contextualizes the abstractions of the cognitive framework. The cognitive process produces only a generalized framework, a rationality. It is the subsequent disciplined working through that contextualizes the rationality within which action becomes reasoned.”

Needless to say, Spender not only sees an influence from the interpretative process to the planning circle but also vice versa. The results of the planning process may lead to a re-evaluation of the cognitive framework, alter the framing of the planning and thus influence the planning circle.

Necessary variety can be fostered by providing the organisation member with raw data and giving them the possibility to process rich information (Kuwada. 1998, 725). Confrontation with raw data that has not been processed within the current organisational interpretative scheme gives the members of the organisation more opportunity to offer their own interpretations. Face-to-face communication allows them to exchange rich information and to confront their own and others' assumptions.

Last but not least slack or unused resources are needed for the learning process (ibid.). On the one hand the process itself takes time and on the other hand the members need the opportunity to try new knowledge out which often makes ancillary resources necessary.

It can be learned from the Austrian approach, that these steps offer under no circumstances a guarantee that exploration in learning will appear but without them the prospects are far worse.

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