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## **Roles of Theories and Models in Interactive Knowledge Creation - Reflections from a Business Network and IT Case Study**

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### **Abstract**

Knowledge creation between researchers and practitioners can take place and be arranged in a number of different ways. The arrangements and knowledge creation processes can utilize different theories and models, or be more tied to the studied context, and the participating actors. In this paper we present some reflections of interactive knowledge creation based on theory and a business network and IT case study that we have performed. We characterise our research process as an iterative and circular one, resulting in further developed theories, concepts, models and practice.

Key words: Knowledge Creation, Action Research, Case Study, Network, IT, Information Systems

### **1. Introduction**

This paper deals with the role of theories and models in interactive knowledge creation. Knowledge creation between researchers and practitioners can take place and be arranged in a number of different ways. The arrangements and knowledge creation processes can utilize different theories and models, or be more tied to the studied context, and the participating actors. The role of theories can be to guide research (generation of empirical data), interpret data, and an aim of a research process (generation of theories) (Walsham 1995). Models can also, similar to the theories, be related to different stages of a research process. Theories and models have effects on our understanding, interpretation, and sense making. Theories can also work as a catalyser when e.g. organizing (Pettigrew 1987).

Theories can consequently be viewed as a way of seeing and also not seeing when conducting research (Walsham 1993). This is a part of a classic discourse in qualitative research. If we take a look at the discovery of grounded theory (Glaser and Strauss 1967) the authors claim that studies of theories early in a research process will ruin the researchers' ability to generate "new" theory. This standpoint has, however, later been reconsidered by Strauss and Corbin (1990) who discuss the advantages of reading the so called technical literature in order to "import" concepts into the ongoing research process creating a grounded theory. We interpret this as a part of a circular research process that is further discussed below.

We use the concept "case study" to describe our empirical research project, in this paper. This should not be interpreted as a contradiction to "action research" that is also used to characterise our involvement in the project. We do not primarily use case study to describe a research method, but rather as a way to delimit the scope of our study. Avison et al. (2001) point out intervention by the researcher as the main difference between case study research

and action research. An action researcher is directly involved in organisational change, where the case study researcher only studies organisational phenomena without taking part in any change activities (ibid.). Our use of case study does not, however, imply that we have only been inactive observers.

In our longitudinal, interpretative, and multiple case study (below) we have used different theories and models to understand firms, interaction in business relationships, networks, and the use of IT. This is the main subject to discuss in this paper. Our paper is also a part of an ongoing debate in the field of information systems between “hard” and “soft” research approaches (Fitzgerald and Howcroft 1998). The use of different theories and models is a part of a pluralistic approach (ibid.) that would allow us to use different theories and models with complementary strengths that could be appropriate. Our approach has several similarities to the “soft” approach according to Fitzgerald and Howcroft (ibid.) with focus on a relativistic standpoint, interpretation, qualitative method, closeness to an empirical field and relevance orientation.

### **1.1 Purpose and Method**

The main purpose of this paper is to discuss an example of, and experiences from, an interactive knowledge creation with the explicit use of theories and models in different roles of the research process.

In this paper we only look briefly into the literature of action research – there is more that can be said on this subject. Instead, we concentrate on reflections from a business and IT case study and share our experiences and reflections, together with some comparison with theories concerning the subject matter.

This paper is structured as follows. Initially we discuss interactive knowledge creation, roles of theories and models in research and action research in section 2. In section 3 we shortly describe the business network and IT case study that we have performed, and two of the theories and models that we have used. We also summarise our research approach in this case study. Section 4, then, contains our experiences and reflections based on the case study.

## **2. Interactive Knowledge Creation**

Our understanding of interactive knowledge creation is based on an epistemology that questions knowledge as being objective, taken from its context, and universal. Instead, we regard knowledge as something that is socially constructed (cf. Berger and Luckmann 1967), context dependent, and particularised. We claim that it is not reasonable to see research based knowledge as being more valuable than knowledge based on practice. Such an apprehension would imply a risk of seeing knowledge creation as a linear knowledge transfer from an enlightened actor to a less enlightened actor. Interactive knowledge creation implies that the driving force for collaboration throughout the entire research process balance the benefits anticipated by the participating actors (Philips et al. 2000).

We view interactive knowledge creation through researcher and practitioner co-operation mainly as a way to ask questions rather than present answers. This is a differing view compared to the frequent notion of interactive knowledge creation as solution finding, i.e. to find a suitable problem to an existing solution. Instead, we argue that interactive knowledge creation should be problem finding, where the problem cannot be identified neither by the researcher as an expert nor by the experienced practitioner, but by both these actors together

participating in an interactive knowledge creation process. Thus, this co-operation builds upon mutual trust between researchers and practitioners.

## **2.1 Roles of Theories and Models in Research**

According to Checkland and Holwell (1998), any piece of research needs a framework of ideas embodied in a methodology applied to the area of concern. This framework of ideas might be seen as the perspective adopted by the researcher, which is made explicit in the theories and models used in the research. As stated earlier in the paper, Walsham (1995) mentions three roles of theory in the research process; before, during, and after data collection. Mumford (2001) also points out that good research requires good theory to make an important contribution to knowledge creation. She argues that theory might be used with different purposes in the research process; e.g. testing existing theory, generating new theory, applying theory in practice, or guiding the behaviour in the project group (ibid.).

The different roles that theories can take in a research process differ from presumptions that can be found in perspectives that view the research process as linear (see Flick 1998). A linear research process is characterised by a starting point from theoretical knowledge or previous empirical findings, formulation and operationalisation of hypotheses, and testing (ibid.).

If we identify several different roles for theory in a research process we also acknowledge an iterative, or even circular, research process. In a circular research process there is a close link between collecting and interpreting empirical data (see e.g. Strauss and Corbin 1990; Flick 1998). Readings of technical literature has the function of preliminary versions of understanding and a perspective when studying a phenomenon (see above), not an answer.

## **2.2 Action Research**

Action research is a qualitative research method that emphasises collaboration between researchers and practitioners (Avison et al. 2001). A widely cited definition of action research comes from Rapoport (1970 p. 499):

Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework.

In action research, the researcher often has intensive contact with practitioners, who are active, themselves. Intervention by the researcher is natural (Jönsson 1991). The most central part of action research is that this research method is explicitly developed to learn from practice and to find new ways of structuring practice (Argyris et al. 1985). Action research is found to be applicable when developing IT-systems (Wood-Harper 1985) that is a part of our research interest when using and developing Business Action Theory (section 3.2.1).

Action research as a research method has been criticised by several authors for creating many problems when trying to combine action and research (Avison et al. 2001). This is often described as the dilemma of action research, or put in more positive words, the double challenge (ibid.). Rapoport (1970) discusses three problems within action research; the ethical problem, potential goal conflicts, and initiation of collaboration, which often comes from practitioners who view researchers as “problem solvers”. This last problem has also been discussed by Checkland (1981) who argues that the action researcher’s aim is to improve problem situations rather than solve a particular problem.

## **3. A Business Network and IT Case Study**

In this section we describe the case study that we have performed and reflect upon in this paper. We also describe an example of theory and model that we have used.

### **3.1 A Short Description of the Case Study**

Between 1998 and 2001 we have studied an organisational business network in the wood industry. This research project is named “Co-operation and Business Development in the Wood Industry” (the SAIT-project). The project’s aims can be described from a research as well as an industrial perspective (Axelsson et al. 2000). The research aims can be summarised as increased knowledge of inter-organisational learning, change processes and co-operation. Other important knowledge goals from the research perspective are methods and ways of working towards inter-organisational development together with experience based knowledge on the use of these methods and working practices. From the industrial perspective it is seen as important to increase competitiveness for individual firms as well as the whole business network by inter-organisational development of business conditions and relationships. Other aims are e.g. to improve the preconditions for business and product development through inter-organisational co-operation and to develop usable methods for inter-organisational business development. These research and industrial aims should not be seen as mutually exclusive but rather as overlapping, though formulated from two perspectives.

The empirical research consisted of approx. 50 qualitative interviews and approx. 20 business process modelling seminars, where organisational analyses were conducted, graphically documented, and discussed by researchers and practitioners together. The study covered organisations with business relationships to each other, i.e. we studied a sawmill, a carpentry firm, and a house-building company, which acted as each others’ customers and suppliers. Besides these organisations we also studied several other actors in the network; e.g. forest owners, a painting company, house salesmen, and house buyers.

The work that we have performed in this case study corresponds to central concepts and ideals in interpretive and qualitative research, such as interpretation, pre-understanding and the use of multiple methods and perspectives (see e.g. Stake 1995; Yin 1994). The work with the actors and organisations involved has been carried out on three levels:

- At the firm level (the focus is intra-organisational processes)
- At the network, dyad/relational level (the focus is on co-operation between pairs of customers and suppliers)
- At the extended network level (the focus is on how actors act and relate to other actors in the network studied)

The research project consisted of several interactive activities. Parts of the SAIT-project can be characterised as action research (e.g. according to Argyris et al. 1985) with interventions and co-operative actions. The use of several techniques in order to gather empirical data is typical for qualitative case studies according to Denzin and Lincoln (1994). The empirical data consists of results from interviews and discussions with personnel from the companies in the studied network and notes/graphs from business process modelling seminars.

### **3.2 Theories and Models used in the Case Study**

#### *3.2.1 Business Action Theory*

In order to capture the process and communicative dimension of business-to-business interaction, Business Action Theory (BAT) and a phase model (e.g. Axelsson et al. 2002; Goldkuhl 1998; Melin and Goldkuhl 1999), were applied in this case study.

The BAT phase model contains six generic phases of business interaction (exchange of value): 1) Establishing Business Prerequisites Phase, 2) Exposure and Contact Search Phase, 3) Proposal Phase, 4) Contractual phase, 5) Fulfilment Phase, and 6) Assessment Phase. Business Action Theory is based on the speech act theory of Austin (1962), Searle (1969) and Habermas (1984). A central starting point of speech act theory is that all communication should be seen as action and that every such act consists of two parts: A propositional part (i.e. references to the world talked about), and an illocutionary (or performative) part (i.e. the action mode with force to establish different inter-personal relationships). Austin (1962) criticised the "descriptive fallacy" in philosophy and science, i.e. the misconception that language is used only for describing the world. Certainly we use language to describe the world, but we also do other things with it. We promise, request, command, declare, issue, appoint, excuse, and thank, just to mention some illocutionary acts. The Action Workflow Model (Denning and Medina-Mora 1995) is also a source of inspiration for BAT.

The BAT phase model has been used both as a guide when developing research questions and as a theoretical lens when analysing and theorising from the empirical data. This can be compared to two of the roles of theories discussed by Walsham (1995) and Mumford (2001); theories as a guide to research and interpretation of empirical data.

### 3.2.2 *Action diagrams*

During our case study, we have conducted business process modelling seminars in each studied organisation. The aim has been to analyse and understand both internal and external business actions needed in order to fulfil a business transaction between a customer and a supplier. These modelling seminars have resulted in increased organisational knowledge and understanding for both researchers and practitioners. The result of the modelling seminars has been discussed both in one organisation at a time and within the entire network of organisations. The business modelling activities, aiming at describing, analysing, and understanding business processes, has been documented in action diagrams (Goldkuhl 1992). A business process consists of activities ordered in a structured way with the purpose of producing valuable results for customers or clients. Analysing business processes implies that different types of actions performed within a business process are described. The process logic captures how different actions are related to each other. Actions can be classified as material actions or communicative actions. When analysing business processes such information and material flows can be described in action diagrams.

Action diagrams illustrate sequences of business actions. By describing material and information objects and relating them to activities as prerequisites (input) and results (output), the business actions and actors (performers of activities) are identified. The action diagrams show how the business works by focusing on the business logic. The action diagrams describe ordered sequences of activities, alternatives and conjunctions, conditions for actions (such as "if" or "when"), occasional actions, activities triggered by communication or time, activities interrupted by communication or time, as well as parallel activities. Using action diagrams makes it possible to describe all business processes within an organisation from, for example, the first customer contact to the delivery of goods.

The action diagrams have been used to describe and interpret the empirical data. This can be compared to one of the roles for theory proposed by Walsham (1995) and Mumford (2001).

## **4. Experiences and Reflections**

In this section we discuss some of our experiences from conducting the case study. We start this discussion by presenting how knowledge creation was performed in our research process. After this, we highlight a couple of our reflections from this process and conclude the paper with some final remarks.

#### 4.1 Interactive Knowledge Creation as an Iterative Research Process

We characterise our study as an interactive knowledge creation (together with practitioners) that has iterative steps (collection and interpretation/analysis of empirical data, theories and models) and a circular nuance. In figure 1 below, we describe our research process based on the performed case study.

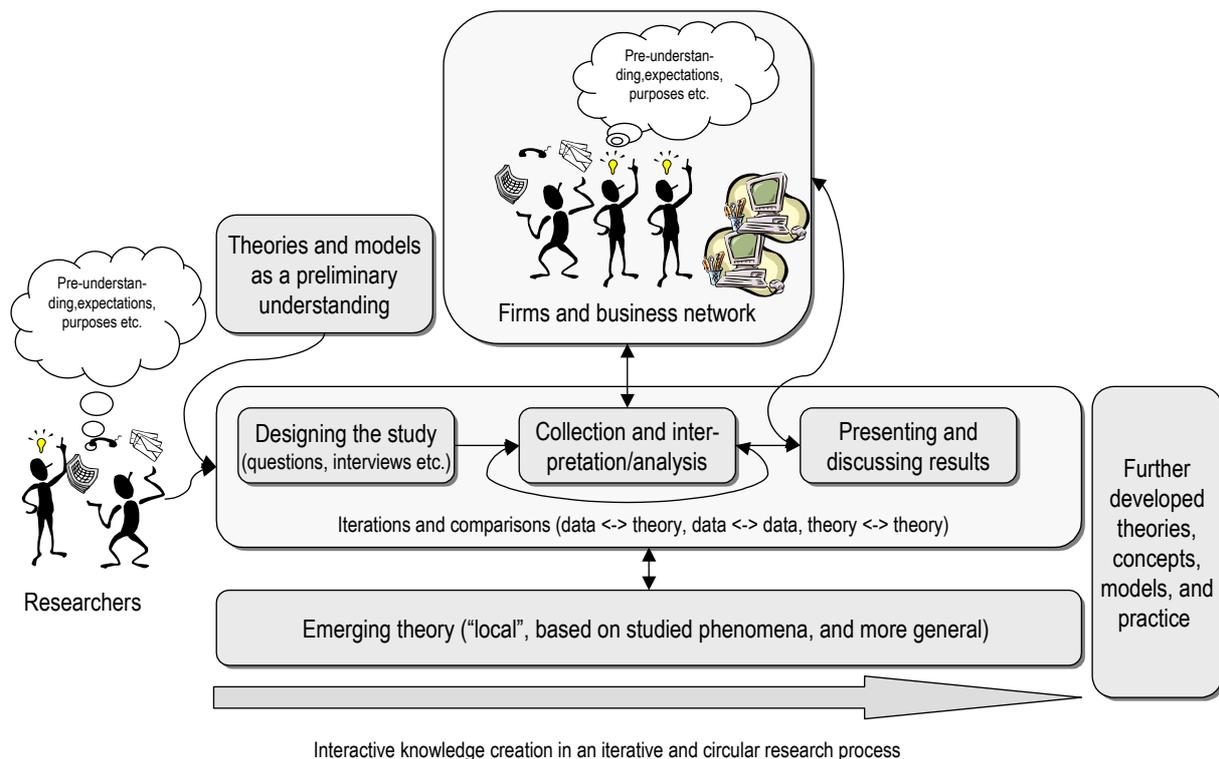


Figure 1. Interactive knowledge creation as an iterative and circular research process

Our pre-understanding and expectations as researchers together with practitioners pre-understanding and expectations were important subjects to discuss in the beginning of the study. We tried to agree on both similarities and differences in interests and goals. Our pre-understanding of the wood-industry as a mature line of business (with institutionalised patterns of organising, communication, and use of information technology systems) was challenged in the light of the firms studied. The carpentry firm (a SME), e.g. acts in the industrial network as if it was a large firm, in a sense dominating some of its business relationships with suppliers and customers. They also use management concepts and thinking in their everyday life as a common sense that usually is “reserved” for larger companies and part of a story telling usually found in management books. Examples found are the focus on core competence, a conscious outsourcing strategy and supplier development in order to be more competitive.

Except from using theoretical framework when designing the study, we also let the participating firms (with their exclusive knowledge of the business) suggest interviewees.

When interpreting/analysing the empirical data, the BAT phase model and its six generic phases of business interaction (section 3.2.1) were challenged. The model could not handle the long-term business relationships sufficiently, that we found between the firms in the studied network. Another aspect that needed to be improved in the phase model was the concept of business relationships. We found that actors used repeated interactions as a mean to manage relationships as well as a determination of reciprocal abilities (on a strategic level). These results can be found in Axelsson et al. (2000); Goldkuhl and Melin (2001). The improvement of the model was also inspired by further studies of literature in long-term business relationships (e.g. according to Håkansson and Snehota 1995) and management in virtual or imaginary organisations (Hedberg et al. 1997). The model was thereby refined. The comparative approach (data vs. theory, data vs. data, and theory vs. theory) was an important part of our work.

Actors in firms were also involved in interpretation of data. We used action diagrams (section 3.2.2) in order to map out and discuss business processes in modelling seminars. This was an important arena in our interactive knowledge creation together with the common presentation and discussion of results. The process modelling seminars and the discussion of the results gave the participants a better understanding of the actions, communication, use of information systems, material- and information flows in and between firms.

If we summarise some of the results from the case study we have developed BAT further (see above) together with a more thorough understanding of coordination in and between firms (Melin 2002). We have also contributed to the development of business processes in the participating firms (e.g. the carpentry firms' order handling process). If we take a look at the improvement in the order handling process, some of the areas of discussion can be related to our use of BAT. Several phases in the order handling process have been improved, e.g. the quality of the proposals, contracts and the basic data for fulfilment and assessment.

By “local theory” in figure 1 we refer to a substantive theory (Strauss and Corbin 1990). A theory that has evolved from a study of a phenomenon situated in one particular situational context. By a more general theory we mean a more formal theory that emerges from a study of a phenomenon examined under many types of situations.

## **4.2 Reflections upon Interactive Knowledge Creation**

In this section we reflect upon our research process from different perspectives.

### *4.2.1 The Inductive and Deductive Paradox*

Guidance of theories and models can of course be both positive and negative in an interactive knowledge creation process. Positive in a way that theories and models help us to focus, categorize and analyse situations and phenomena. Negative in a way that our sense making is too influenced so that we tend to miss dynamics in a specific context, and “new” knowledge – not covered by the applied theories and models.

A conclusion from our research process is that there does not have to be a choice between an inductive and a deductive approach. Instead, we would like to characterise our way of action as interplay between induction and deduction that includes both guidance from theory, models, and practice. This approach implies a combination of directed attention towards certain phenomena and openness for unexpected empirical findings, which is also discussed by e.g. Goldkuhl (1999) and Walsham (1993).

#### 4.2.2 *Closeness and Distance*

The use of theories and models in research is also a question of closeness and distance to the field of research. Action research has been criticised for being difficult to control (Avison et al. 2001). The researcher runs the risk to be absorbed by problem solving in the particular organisation and, thus, get too close to the research object. The project has, in that case, turned from research to mere “consultancy”. The directed attention offered by theories and models used in the research process might help the researcher to avoid this risk. Therefore, we claim that theories and models used in combination with an inductive research approach is one way to overcome this action research dilemma.

Mumford (2001) points out three problems valid in action research; i.e. getting in, staying in, and getting out of the research situation. Of course, getting in is a problem of its own; the researcher has to get in contact with an organisation that is willing to let him or her in, expose their problems and needs, and co-operate in a project for a long time. In order to get in, it is important that both researchers and practitioners feel that they will benefit from the project. To be able to stay in the project, the researchers and the practitioners must experience that good relations are developed and maintained (ibid.). There are problems connected to both these stages, but getting out might be the stage most relevant to the discussion of closeness and distance. When getting out of the research project, the practitioners might feel abandoned by the researcher (ibid.). In the same time, the researcher might be so involved in the organisation that he or she is unwilling to finish the project. We think that using theories and models during the research might help the researcher from being too close to the studied object and, thus, to find it easier to leave the empirical activities behind and reflect upon the findings.

#### 4.2.3 *Structure and Flexibility in Action Research*

Action research is a flexible research method, which facilitates a quick response towards new upcoming situations and changed directions. Nevertheless, as a research method there also has to be structure involved in the process. Without structure there will be no stringency in the research and the research results might be of low quality. This is close to the discussion about relevance and rigor in information systems research, expressed by Keen (1991) and others. Keen (ibid.) states that relevance must drive rigor, since rigor is irrelevant without relevance. He also argues that theory by itself does not create neither relevance nor rigor. It is how theory is used in the research project that matters.

Action research has been characterised as a research method with high relevance but low rigor (Avison et al. 2001). Avison et al. have, in their efforts to improve rigor in action research projects, pointed out that action research reports need to have some explicit reference to the control structures of the project, in order to make it possible to interpret and validate the results (ibid.).

We totally agree that there has to be both structure and flexibility, both rigor and relevance, in an action research project. Our experiences are that using theories and models in the research process is one way to strengthen the structure.

### 4.3 **Final Remarks**

Our interactive knowledge creation process encourages us to continue to combine inductive research with the use of theories and models to both obtain directed attention and openness. Still, there is possible to criticise our way of action on several points. One might argue that the organisational changes performed in the project would be impossible to reach without

researchers being present. Our aim has, though, been to achieve long lasting results and we have therefore worked close together with the practitioners in order to develop durable knowledge in the organisation. Another problem, which has been discussed above, is whether theories and models give positive guidance or direct attention too much. We mean that a balanced picture will appear by combining theories and models with an inductive openness and curiosity to the research field. Using theories may also imply that reality is adjusted to fit into the theory. This is another danger that researchers must be aware of, if adopting this kind of research approach.

The results of project reported here are in many ways promising, but there has to be more research done to further test and refine ways of conducting interactive knowledge creation.

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