Creation of Need Knowledge in Organizations: An Abductive Framework

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Abstract

A focus on needs and the ability to generate knowledge about needs is highly valuable for organizations because it extends the range of possible solutions and therefore enables them to create more innovative and sustainable products and services. Our paper will explore how a framework based on an abductive reasoning process for the creation and discovery of knowledge about needs in organizations can look like and what the main steps of such a framework are, in order to integrate this approach into the model of the knowledge-based firm. Moreover we will present empirical findings from a project with Austrian companies where this framework has been used.

1. Introduction

The satisfaction of needs may be viewed as being the broadest and most basic physiological and psychological requirement for a person's well-being [1]. Hence the knowledge about needs is the most important foundation for the development of solutions, products and services. Many new products, in both the manufacturing and service sectors, fail. Failure means that these new products fail to excite customers and fail to reach the sales and market share goals set by the companies. The cause of this problem is a poor understanding of customers' needs [2]. "A customer need is a description, in the customer's own words, of the benefit to be fulfilled by the product or service." [3, p. 4]

Our assumption is that a strong focus on needs and need knowledge enables organizations to create more and more innovative and sustainable products or services than a focus on problems and solutions would do. We follow Hauser [4], Griffin [3] and Arndt [1] who point out that the focus on needs dramatically extends the range of possible solutions.

Therefore from a knowledge based view the knowledge about needs is the most valuable knowledge for organizations as well as for individuals. So a deeper understanding of customers'

needs can lead companies to adopt radically different business models.

Research on the generation of knowledge about customer needs has mostly focused on aggregate levels and has stressed the outstanding role of information technology systems [5]. One of the most common approaches that focuses on identifying the needs of customer segments in a product development context is the "House of Quality" concept which includes the idea of hearing the voice of the customer [4], [6], [3]. While this approach has its strengths in defining the relationship between customer desires and the firm capabilities, our approach focuses much more on the creation and discovery of knowledge about needs and the sharing and transfer of this need knowledge.

From our previous research in the realm of need knowledge and knowledge creating theory [7],[8], we can show that for the discovery of knowledge about needs an adequate enabling space [9] or *Ba* [10] is essential. Based on this preliminary work we have done in the last few years mainly on the individual level and on the process of vision development, the research question of this paper is the following:

What would an abductive framework for the creation and discovery of knowledge about needs in organizations look like and what are the main steps of such a framework, in order to integrate this approach into the model of the knowledge-based firm?

To answer this research question we will introduce a conceptual framework informed by an abductive reasoning approach which consists of three steps, namely qualitative data acquisition, abduction and hermeneutic interpretation of the data, which enables the generation of hypotheses and finally a communicative validation of these hypotheses.

This paper will present the derivation of this framework, show the main aspects of each step and introduce an ongoing project in Austria with several small and mediums sized companies, where we use this framework.

The remainder of this paper is organized as follows. In the next section we provide the theoretical

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background for our framework, especially we will focus on the relevant aspects of the theory of needs, abductive reasoning and hermeneutic. Subsequently we introduce our framework for generating need knowledge in organizations, show the first empirical findings in our project with the Austrian companies and give a special focus on the aspects of knowledge flows, transfer and sharing of this framework. Finally we discuss our findings and present limitations of our work as well as implications for further research.

2. Theoretical background

2.1. The theory of needs

At least since the proposal of Abraham Maslow's theories on human motivation [11], an evident awareness for human needs has risen in economic theories [12]. Although, Maslow's theory of the need hierarchy has been widely influencing the field of management and organizational behavior, the theory had not been empirically verified until the mid 1960ies [12] and is still often questioned [13]. However, the need hierarchy serves the research enterprise we are proposing as a guiding model for structuring and classifying needs in the abductive framework.

Like medical conditions, needs are expressed by signs and symptoms; those might either point to a lack of resources, like in the case of an illness, or positively seen, to the prosperity of the human being [15]. Needs generate feelings and desires which manifest themselves in signs and symptoms. McLeod argues that knowledge of needs is inferential meaning that needs can be derived from their manifestation. For example, having the patient reporting about symptoms, the doctor may discover – by her expertise - the medical needs the patient has. Symptoms as well as signs of needs and desires can be reported and observed, respectively [15].

Needs can be classified into two categories [15], [16]: Absolute or fundamental needs are those being independent of one's own goals (e.g. plant's need of sunlight). Absolute needs have to be satisfied in order to not suffer from serious harm. Thus, those needs involve inescapable necessity and dependency.

In contrast, relative or instrumental needs depend on (the individual's) goals and aims (e.g. If I want to speak Hungarian, then I need to practice). Without the aim, there would be no necessity to practice.

We are proposing a hierarchy of needs, desires and satisfiers, where needs are the most fundamental category on which desires are based. Needs are often expressed in desires [17] which are subject of continuous change due to personal beliefs,

individual's values, and so on, and are to be met by satisfiers, which are the most obvious phenomena in our hierarchy and are easily observable. These satisfiers are manifestations of concrete solutions to desires and needs, respectively.

A **satisfier** is either an object or description of a proposed state of affairs in which a need is satisfied. This might be a description of a vision or the imagined future (c.f. learning from the future, story telling [18]). Satisfiers are seen as a precise realization of needs and desires, respectively. The question to be asked is how does it look or feel like when the fulfillment of a need or desire has become real.

Desires are personally coined and intentional [16]. There are differences in personal desires: I may desire (or want) x and *not* y, although x *and* y are of the same quality and both satisfy the need Z. [17] Additionally, what I desire need not be desired by person B.

By inferencing the underlying need of a desire, we suppose to open up a greater space for the satisfaction of needs. By knowing Z, the satisfaction may be to realize x, y or even by a new possibility q which is a satisfier to the need Z. By doing so, it may satisfy me and person B in an equal way.

This assumption is supported by Thomson's remarks on the relation between desires and their motivation: "Desires for very different things can have a similar motivational source." [16, p. 179] What he calls "motivational source" might be substituted by the term needs (or interest, as Thomson calls it) as they are the driving force for our acting. So, a desire can be seen as a specific instance of a need.

To really understand personally coined desires of an individual, we have to put ourselves in her shoes asking the question 'What is the quality of the desire to this the very individual?' We need to understand hermeneutically [16] and have to take the person's context into consideration. So, we have to sense in an empathic way to approximate the implicit source of an individual's desire (c.f. empathic and generative listening leading to deeper understanding [19]; generative knowledge interviewing [20])

In contrast, **needs** have, according to Thomson [16], three distinctive qualities:

- They are objective in the sense of being a discoverable fact,
- they are matters of priority, and
- are undeniable values.

McLeod suggests in contrast to the phenomenological thesis, that "needs are not themselves experienced" [15, p. 215]. They "are not to be confused with the desires they generate." [15, p.

215] Thus, he argues that "needs may be indirectly manifested in desires, in feelings and in other psychological states." [15, p. 216]

"What I need depends not on thought or the working of my mind (or not only on these), as wanting or desiring do, but depends on the way things really are." [17, p. 62] Needing depends on the quality of the needed things itself rather than on personal attitudes. So, I either need Z *or* W irrespectively of my certain emotional state or desire.

To sum up, satisfiers are explicit and concrete realizations of desires and needs: *What* satisfies my desires and needs? Desires are personally coined instances of needs: *How* do I want to satisfy my need? Needs are most fundamental and are the basis for our desires and satisfiers, they are the motivational source of our acting. *Why* do I desire a certain thing or an imagined future?

Satisfiers
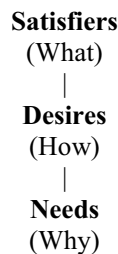(What)
|
Desires
(How)
|
Needs
(Why)

Figure 1. Hierarchy satisfiers – desires – needs

For the purpose of the framework we propose, we define needs as requirements to be met for the individual's well-being and the organization's sustainable existence. These include needs and desires and are motivational forces of behavior as the individual is trying to satisfy his or her needs.

2.2 Abductive reasoning and hermeneutic circle

The main focus in the modern knowledge-based management theory is to foster innovation through sustained knowledge creation [21]. Consequently, the focus is on the process of knowledge creation itself and its enablers, not on managing the knowledge assets, which are referred to as inputs and outputs of this process [22]. So in other words to answer the question of how we can get the New into the system, seems to be crucial. This is strongly connected with the emergence of new knowledge within a given system.

C.S. Peirce argues with his model for abductive inference that "knowledge emerges from the interaction between three stages of inquiry: the first, abduction, relies on observations to stimulate possible hypotheses by what Peirce calls 'an appeal to instinct.' Deduction follows, in which the consequences of those hypotheses are examined. Lastly, inductive hypothesis testing selects the most likely explanations." [23] With his work Peirce wants to show how it is possible to make new discoveries in a methodological and logical way or as Reichertz [24, p. 220] puts it: "Abduction is . . . a cerebral process, an intellectual act, a mental leap, that brings together things which had never associated with one another: A cognitive logic of discovery." Peirce describes abduction as "…the process of forming an explanatory hypothesis. It is the only logical operation that introduces any new ideas…" [25, CP 5.171].

Abduction is therefore a special kind of cognition in order to generate beliefs about the world. These beliefs are self-correcting, since it is the nature of hypothesis construction to have a constant revision of the abduction-deduction-induction process [23]. Abduction often "appears with moments of surprise arising from new information or data" [26, p. 63]. A discovery-oriented research process combines all the above mentioned steps (abductive, inductive and deductive) and is inherently iterative and recursive [27].

The principles of this constant revision process bear many similarities with hermeneutic interpretation. Hermeneutics has its roots in the greek hermenéia, Aristotle wrote Peri Hermeneias that translates to "On Interpretation" in which he used "the syntax of language as the basis for revealing the nature of things" [26]. Bleicher [28, p. 1] loosely defined hermeneutics "as the theory or philosophy of the interpretation of meaning".

The Hermeneutic circle was initially used as a "technique for interpreting text by iteratively contrasting the parts of the text under study with one's sense of its whole to discern the author's meaning" [26, p. 41].

One of the leading theorists in the development of twentieth century hermeneutics, Hans-Georg Gadamer, sees hermeneutic more broadly as a phenomenon of understanding. For him the "oscillation between the horizon of one's own fore-knowledge and the horizon of the text (or other phenomena we wish to understand)" [26, p. 46] is an important aspect of the hermeneutic circle and its application. In order to understand a text or phenomenon it is crucial to have a wider vision, maybe to look differently at things. "To acquire a horizon means that one learns to look beyond what is close at hand—not in order to look away from it, but to see it better within a larger whole and in truer proportion." [29, p. 272]

To sum it up, the hermeneutic circle "…defines the process by which we experiment with possible interpretations. Making one interpretation may change the way we interpret another resource." [23] It is important, necessary and unavoidable that we interpret data. Doing it in the abductive way by studying facts and devising a theory to explain them as we propose in this paper increases the chances that we come up with genuinely new hypotheses about the underlying needs of the satisfiers we observe. Inductive or deductive reasoning would result in linear inference and would therefore not be enough in order to create new knowledge.

2.3 Knowledge-based management and abductive reasoning

Based on Polanyi's epistemological distinction [30] between tacit and explicit knowledge, Nonaka describes organizational knowledge creation as a spiral process of four different modes of conversion between these two types of knowledge (socialization, externalization, combination and internalization) [10]. He argues that making a "hidden concept or mechanism explicit out of accumulated tacit knowledge, abduction or retroduction is effective rather than induction or deduction. The sequential use of metaphor, analogy, and model is a basic method in abduction" [31, p. 5] and is proposed to be effective in externalizing deeper layers of knowledge [33].

We assume that these deeper layers of knowledge also include the knowledge about needs, which should be made externalized in order to share and to use them.

Nonaka and Nishiguchi point out that the "synthesis of knowledge or knowledge creation in designing new products, the diagnosis of design problems, and the product maintenance processes can all be categorized as abductive reasoning processes" [32, p.60]. "Acquisition of design knowledge from in-depth understanding of what is being designed enhances an individual's and subsequently an organization's abduction ability. … Further, an improvement in a firm's innovative ability requires the strengthening of knowledge infrastructures in which knowledge is constantly being broken down into narrow skills and recombined into new forms of knowledge in an abductive reasoning process." [32, p. 63].

Modern knowledge-based management defines knowledge creation as a continuous dialectical process. Therefore dialogues among participants who bring in various viewpoints based on various backgrounds are crucial [10]. "From a dialogical perspective, new organizational knowledge originates

in the individual ability to draw new distinctions concerning a task at hand. New distinctions may be developed because practitioners experience their situations in terms of already constituted distinctions, which lend themselves to further articulation." [34, p. 949]. A very good example for this is the well-known case of the development of Matsushita's Home Bakery, the first fully automated machine for home use [35]. In this example the critical step in the knowledge creation process that led to the development of the new product was the articulation of "twisting stretch" by the software developer. The authors have shown that articulating this novel conceptual combination required the construction of a model that would abductively hypothesize ways in which the modifier would apply to the head concept [34]

3. Research gap, research question and research methodology

As shown above, the abductive reasoning process is a key mechanism for knowledge creation. Making the knowledge about needs explicit is crucial for the creation of innovative and sustainable solutions, products or services.

From our point of view the main research gap in this context can be identified as the lack of theoretical work to describe the generation of need knowledge as an abductive process, which defines this knowledge creating process in a methodologically consistent and replicable way. Furthermore we identified the lack of theoretical work to integrate the important aspect of creating knowledge about needs in the existing theory and model of the knowledge-based firm.

Based on these research gaps we can define the following research question:

How can an abductive framework for the creation and discovery of knowledge about needs in organizations look like and what are the main steps of such a framework?

Due to the emergent nature of our research, we used a Grounded Theory based analytic approach that provides a set of flexible analytic guidelines enabling iterative data analysis and conceptual development. In Grounded Theory [36], [37], [38] empirical data of most heterogeneous sources is used. The development of our conceptual framework especially builds on theoretical engagement with literature and our insights and empirical data from a big knowledge-based community development process that we have facilitated two years ago.

In doing this kind of research we not only write about abduction, we try to create favorable conditions or enabling spaces that allow us to experience

abductive inferencing in our research work (also see [24] and [39]).

4. Conceptual framework

The conceptual framework for the creation of need knowledge in organizations is an abductive approach, which consists of three steps. The first step is the data acquisition based on the approach of learning from the future. The output of this step is a number of satisfiers, articulated by the members of the organization in a process of asking questions by facilitators. The second step generates hypotheses about the substantial needs on which the satisfiers are based on, stimulated by the observations of the first step and enabled by different views on these observations. Finally the third step covers the validation of the hypotheses by communicative validation and quantitative analysis. In the following the three steps will be described in detail.

4.1. Step-1: Data acquisition

The most important purpose of step-1 is the creation of an enabling space, which enables the participants to make explicit a number of wishes, dreams, visions, goals and ideas. We call the overall set of these outcomes satisfiers. We follow Scharmer [40], [41] and Uotila et al. [42], [43] who argue that engaging in a different kind of learning cycle, one that allows to learn from the future as it emerges, is more effective to generate sustainable satisfiers, rather than from reflecting on past experiences. Learning from the future means to sense, tune in, and act from one's highest future potential—the future that depends on us to bring it into being [40]. Therefore organizations have to develop a new cognitive capability, the capability for sensing and seizing emerging opportunities.

Consequently the main focus of step-1 of our framework is learning from the future. From a system theoretic [44] point of view it is essential that the learning from the future occurs in all systems which are relevant for the participants. So if the participants for example are bakers, they have to learn from the future from a customer's point of view, from the baker's point of view and from the employee's point of view at least. These multiple perspectives in combination with learning from the future give an excellent basis for detecting and generating need knowledge in step-2. It is very important to mention also satisfiers whose realization is not realistic at the moment, because of the embedded need knowledge in these satisfiers. Peltokorpi and Nonaka point out that "… exposure to diverse ideas during the externalization phase is important as every step in the

innovation process is proposed to be about someone asking about imaginary possibilities, speculating about what would happen if, and reflecting on yet-unrealized and perhaps unrealizable solutions." [33, p. 56]

Step-1 can be done either in a 1:1 setting by use of interviews or in a workshop setting with several participants. The basis of both settings is the creation of a special kind of *Ba*. *Ba* is a time-space-nexus which can be described as a "shared space" of interaction, interpretation and dialectical processes, a form of "learning foundation" in its own right which generates knowledge [45]. The special kind of *Ba* which is essential for step-1 has its center in the access to self-transcending knowledge [41]. We have introduced this *Ba* as *vocation ba* [8]. In section 5 of this paper we will describe a workshop design we used in a project with Austrian companies. Figure-2 sums up the first step of our framework.
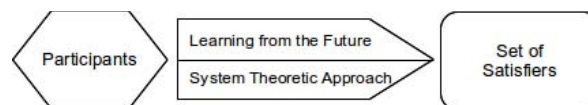

Figure 2. Data acquisition (step-1)

4.2. Step-2: Hypotheses generation

As argued above abduction is proposed to be effective in externalizing deeper layers of knowledge. Abduction relies on observations (step-1) to stimulate possible hypotheses. Furthermore we have shown that making distinctions is crucial for both, the abductive reasoning process as well as the knowledge-based management approach. When new distinctions are made and accepted, they can be synthesized dialectically and new organizational knowledge emerges [34]. Therefore an important purpose of step-2 in our framework is to consistently define different views on the set of satisfiers generated in step-1 to create distinctions and so externalize deeper layers of knowledge of these satisfiers. Using the concept of abduction, the output of step-2 in our framework is a set of hypotheses.

The first view we have chosen is the perspective of generative listening. With this approach we follow several authors [19], [20], [46–52] who introduced this special kind of listening in different contexts. Generative listening is described as a listening from the emerging field of future possibility [46] and transformative conversation [19]. So generative listening is on the one hand strongly connected with learning from the future and on the other hand it enables the creation of self-transcending knowledge [8], [41]. Using the approach of generative listening

on the satisfiers which were generated in step-1 enables the emergence of hidden needs of the participants.

In our second view we use the theory of the four causes (material, efficient, formal, and final) by Aristotle [53]. Material cause explains what something is made of, formal cause explains the form which a thing follows to become that thing, efficient cause is the actual source of the change, and final cause is the intended purpose of the change. Of particular importance for our work is the final cause or purpose (telos), which is strongly connected with the needs on which the satisfiers are based on. By choosing this method we follow Nonaka who similarly proposed levels of questions (level A: question about specification, level A0: question about concepts, level A00: "why or for what do you do it") [54, p. 426] and suggests to "ask 'why' five times" in order to convert implicit knowledge to explicit knowledge and to foster phronesis [55, p. 387].

Both views together are strong enablers to create a set of hypotheses about substantial needs of the participants. Figure-3 sums up the second step of our framework.
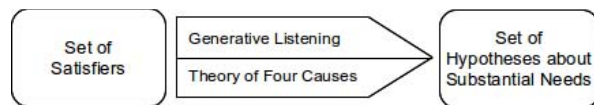

Figure 3. Hypotheses generation (step-2)

4.3. Step-3: Validation of hypotheses

The set of hypotheses generated in step-2 of our framework has to be validated in the final step. The hypotheses can be validated qualitatively and quantitatively.

For the qualitative validation we employ the method of communicative validation [56]. Communicative validation is used in qualitative social research to enhance the validity of results. With this approach "…data or events from the research are presented to the subjects of the investigation with the aim that they assess them in respect of their validity" [57, p. 185]. "Communicative validation makes it possible to relate the theory developed in the research process back to the informants." [57, p. 189]. We have selected this method because from a knowledge based view this method seems to enable the knowledge creating process.

For the quantitative validation we use an online questionnaire containing the hypotheses generated in step-2. This questionnaire is sent to all participants and using the Likert scale each hypothesis can be rated from 0 to 5, where 0 means that the hypothesis does not fit at all and 5 means that the hypothesis fits perfectly. Additionally the participants are asked to give us some information about them, for example information about the size of the organization, the region where the company operates, etc. Afterwards we are doing a quantitative analysis of the collected data. The detailed description of this quantitative analysis is out of the scope of this paper and will be the focus of future papers analyzing the empirical findings in projects where we used our framework.

Qualitative and quantitative validation together enable us to accept or to reject hypotheses about needs on which the satisfiers are based on and so to finally create a catalog containing explicit knowledge about substantial needs. Figure-4 sums up the final step of our framework.
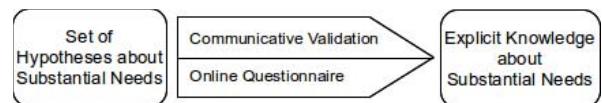

Figure 4. Validation of hypotheses (step-3)

5. Empirical findings in a project with Austrian companies

Currently we are using our framework introduced in this paper in a rather large project in Austria. The project started at the 1st of February 2013 and will end at the 30th of September 2013. The main purpose of this project is to create a catalog of substantial needs of Austrian bakers. The Austrian Federal Economic Chamber, who initiated this project, will take this catalog of substantial needs as a strong fundament to design new services for the bakers, which should support them being sustainably successful in the future. Until now we have finished step-1 namely the data acquisition part of our framework. 120 bakers participated in the workshops. As at the date of submitting the paper the project is still ongoing, we will lay a strong focus on the empirical findings of step-1 of our framework.

In this project we realized step-1 with a workshop setting. All of the 120 bakers attended one of five workshops in different Austrian regions. Each of these workshops has been conducted in an identical way and lasts for about 3 hours, including a 20 minute break in between. All of the participants have been owners or chiefs of a bakery and all of the bakeries employ several persons.

Following the system theoretic approach of step-1 we identified four different systems, which are relevant for bakeries: firstly the customers, secondly the baker as an owner or chief of the bakery, thirdly

the employees and finally the Austrian Federal Economic Chamber as an institution which gives support. Following the approach of learning from the future we had to create some kind of enabling space or Ba, so that learning from the future in each of the four identified systemic dimension would be possible.

Therefore, after workshop-opening, introduction and some short theoretical input, the main part of the workshops consists of four exercises, one for each systemic dimension. In the first exercise the participants slip into the role of their satisfied customers in the distant future (2 years) and reporting from a customer's point of view what has been ended and what has been newly created. The facilitators of the workshop inspired the participants mentioning as many ideas and answers as possible and considering also satisfiers whose realization is not realistic at the moment. In the second exercise the participants did the same task from a baker's point of view in the distant future, and in the third exercise they did the same task from an employee's point of view in the future. With the last exercise the participants slipped into the role of the Austrian Federal Economic Chamber and answered the question what kind of support the Austrian Federal Economic Chamber has given in the distant future to realize the satisfiers they have collected in the first three exercises.

After each exercise the participants shared their ideas and answers in small groups of 3 to 5 persons. On the one side this sharing helped the bakers to clarify their own ideas and on the other hand it strongly supported the knowledge sharing between the participants.

The answers and ideas to each of the four exercises have been written down into prepared questionnaires, each answer and idea into one line. On average the participants generated 8 answers for each exercise, so at the end of the workshop we have collected on average 32 answers for each participant. Afterwards we transcribed all answers and imported them into ATLAS.ti. The purpose of ATLAS.ti is to help researchers uncover and systematically analyze complex phenomena hidden in unstructured data. Using the two views in step-2 of our framework, which we described above (see 4.2) we are coding the more than 3.600 answers and ideas collected in the workshops. The unit of the analysis (defined as a quotation in ATLAS.ti) is each participant. The unit of coding (a code in ATLAS.ti) is the needs that are included (implicit as well as explicit) in their answers. We came up with 591 codes using the two views (generative listening, theory of the four causes) of our framework as well as original words and phrases in the answers. In a second coding cycle we

consolidated these codes to finally 441 codes and then derived 12 hypotheses about categories of needs from these codes. Additionally we used memos with initial thoughts, draft codes to identify emerging concepts.

On the 23rd of September 2013 we will have a final workshop. Following step-3 of our framework, the communicative validation, the purpose of this workshop is twofold. On the one hand we will present our hypotheses about the needs on which the satisfiers are based on, which we created in step-2. On the other hand there will be the opportunity for the participants to validate these hypotheses by commenting, complementing and correcting them. This workshop will take place in a highly interactive manner. We expect more than 100 participants for this workshop. This workshop will cover the step of qualitative verification by communicative validation. Two weeks before this workshop all participants will have the opportunity to complete an online questionnaire. In this questionnaire the hypotheses about the needs are listed and the participants can give each of them a weight from 0 (not at all) to 5 (extremely). The evaluation of this questionnaire will cover the step of quantitative validation and the results will have influence on the workshop.

Finally based on the results of step-3 we will create a catalog of substantial needs of Austrian bakers. Table-1 gives an overview of the empirical findings in this project so far.

participants	120
answers and ideas	3.600
codes – first coding cycle	591
codes - second coding cycle	441
number of hypotheses about needs	12

Table-1.Overview of empirical findings

6. Knowledge-based aspects of the framework: knowledge flows, transfer, sharing and exchange

In the following section we will analyse our abductive framework in the context of knowledge-based management. Thereby we will especially focus on the aspect of knowledge creation, knowledge conversion and knowledge sharing. The following findings resulted from the reflection and evaluation of step-1 of our still ongoing project with the bakers in Austria and the theoretic analysis of step-2 and step-3 of our framework.

- *Creation of self-transcending knowledge:*
Scharmer introduces self-transcending knowledge as a third kind of knowledge. He defines it as tacit

knowledge prior to its embodiment that describes the ability to sense and see the emerging opportunities before they become manifest in the marketplace [40]. Also for Nonaka, future-building knowledge creation is a self-transcending process [10] and knowledge visions serve as a self-transcending objective aimed at getting the organization to surpass itself [22].

Due to the design and methodology we use in step-1 of the abductive framework, the creation of self-transcending knowledge is enabled strongly. The rather huge number of answers and ideas collected in the workshops and the high percentage of really visionary and future-oriented ideas are a strong manifestation of the self-transcending knowledge created.

- *Ability to learn from the future:*

Strongly connected with the generation of self-transcending knowledge is the ability to learn and act from the future as it emerges. As a positive side benefit for the participants of the project, some of them told us informally, that they will use the tools for learning from the future which they have got to know in the workshop in their company. However, having the bakers use the tools by themselves was not a goal of the project in a narrow sense.

- *Knowledge flows and sharing:*

Due to the work in small groups after each exercise in the workshops the ideas as well as the knowledge included in these ideas and answers are shared. Furthermore the knowledge flows and with it the creation of collective knowledge is pretty well enabled because of the possibility to get inspired by the ideas, thoughts and knowledge of the others. Some bakers remarked after the workshop that this work in small groups was extremely useful for them. We will get more precise answers in step-3 as well as in a final evaluation of our project. Following Nonaka [31] that knowledge creation is conceptualized as a dialectical process, the dialectical approach in our framework which is realized by different views in step-1 as well as in step-2 enables the creation of new knowledge. "As several empirical studies have shown when new distinctions are made and accepted, new organizational knowledge emerges; and when the new distinctions are developed into new products or processes, or are embodied in new actions, innovation and learning respectively occur." [34, pp. 942-943].

- *Knowledge conversion:*

The structure of the workshop in step-1 of our framework and the used methodologies seem to be helpful for the conversion from implicit knowledge of the participants to explicit knowledge. Supporting

evidence for this assumption is also the rather huge number of answers written down in the workshops.

- *Creation of need knowledge:*

As shown above (2.1) needs are requirements to be met for the individuals' well-being and the organization's sustainable existence. Due to the abductive approach of our framework, we expect the creation of explicit knowledge of one's own substantial needs as well as explicit knowledge of substantial needs of the whole system to be strongly supported. This creation of explicit need knowledge is realized through hypotheses, which are generated in step-2 of the framework. The empirical findings of step-1 and step-2, which confirm this important aspect of our framework, are briefly described in Table-1.

- *Sharing of need knowledge*

The validation of hypotheses in step-3 should enable the sharing of need knowledge in a very efficient way. The communicative validation which will be realized in our project by a workshop for all participants can be assumed to not only enhance the validity of results but also to share need knowledge on an individual level as well as on a collective level. Furthermore the highly interactive manner of this workshop is designed to create an enabling space for co-creating new services based on the need knowledge. Admittedly, we have to wait for the data of this workshop and its evaluation to verify this desired outcome of our framework.

7. Discussion and conclusion

7.1. Implications for theory and practice

The focus on needs and knowledge about needs in organizations dramatically extends the range of possible solutions and enables organizations to create more innovative and sustainable products and services. So the overarching goal of this work has been to introduce a framework for the creation and discovery of knowledge about needs in organizations. The primary theoretical contribution of this work is the integration of the theory of needs as well as abductive reasoning and hermeneutic interpretation into the theory of the knowledge-based firm. To the best of our knowledge it is the first theoretical work that describes the generation of need knowledge as an abductive process in a methodologically and replicable way.

This research has several implications for practice. As our project with bakers in Austria has shown our framework enables even rather large organizations to detect and generate need knowledge with a small amount of time. This need knowledge

allows the development of new services and products which helps the organizations to be sustainably successful in the future. Furthermore our framework has important practical implication for the knowledge sharing, knowledge flows and knowledge transfer within organizations.

7.2. Limitations and future research

A potential limitation of our research is the fact, that there is at the time of submitting our paper only one project where we have used our framework. We cannot rule out the possibility that the structure of step-1 of our framework has to be (slightly) modified, if the requirements of organizations are very different to the ones we have already worked with. Closely linked with this is the fact that we do not have practical experiences with a 1:1 setting of step-1 of our framework. If the use of interviews in step-1 instead of a workshop design is possible, it will have implications for step-2, which have to be considered. So for future work, a case study different to the described project with Austrian bakers needs to be selected. Finally the quantitative validation in step-3 has to be enhanced.

Based on these limitations on the one hand and the encouraging results of our project on the other hand, our future research will cover the following areas:

- Implementing, analyzing and evaluating more projects with other organizations using our framework and if appropriate adapting the framework.

- Theoretical foundation of the quantitative validation of the hypotheses about need knowledge and enhancing the set of analyses depending on the requirements of the organization.

- Analyzing whether an IT support in step-1 for gathering the ideas is possible and useful.

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