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Combining Artefact Analysis, Interview and Participant Observation to Study the Organizational Sensemaking of Knowledge-Based Innovation

Georg Reischauer [*]

Abstract: *»Kombination von Artefaktanalyse, Interview und teilnehmender Beobachtung zur Untersuchung der organisationalen Bedeutung von wissensbasierter Innovation«.* Innovation studies have hardly investigated the link between innovation and organization with respect to what individual actors in organizations mean when they refer to innovation. More precisely, there are few research designs with the goal to understand (*Verstehen*) the meaning of innovation in organizations. To address this gap on a methodological level, I introduce an interpretative research design to study the organizational sensemaking of innovation. Informed by the knowledge-based view of innovation and organizations, this research design suggests a combination of the qualitative methods artefact analysis, semi-structured qualitative interview and participant observation to generate data. Using qualitative content analysis to analyze the collected data separately, first-order concepts are constructed. Joining these separate concepts with the constant comparison technique creates second-order concepts and therefore a comprehensive understanding of the meaning of innovation in an organization. The application of the interpretative research design in innovation studies enables to build new theory on the link between innovation and organization that is empirically grounded.

Keywords: Innovation, organization, meaning, sense-making, knowledge, qualitative methods, research design, organizational analysis.

1.   Introduction

Innovation presents a complex social phenomenon that involves multiple individual and collective actors (Garud et al. 2013; Van de Ven et al. 1999). While collective actors such as social movements (Rao 2009) or communities (West and Lakhani 2008) are becoming increasingly important for innovation, firms, universities, and other types of organizations still represent key collective actors. In other words, organizations are a key driver of innovation.

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Innovation scholars have been interested in the link between organization and innovation since early on. Scholars have studied, for example, how innovations diffuse between organizations (Zheng 2010), which factors within an organization foster innovation (Crossan and Apaydin 2010), and which processes underpin the emergence of innovation within and between organizations (Garud et al. 2013). However, despite these insights, from a methodological perspective, this research on organizational innovation (Armbruster et al. 2008; Crossan and Apaydin 2010) faces the shortcoming of a narrow research focus.

Referring to the epistemological distinction of Dilthey (1979), these studies of organizational innovation tend to focus on explaining *(Erklären)* how organizations shape innovation. More precisely, this research aims to find and prescribe 'best ways' to promote innovation, which is why they can be considered as normative studies (Deetz 1996). To meet the goal of explaining, frequently quantitative methods such as surveys (Armbruster et al. 2008; David et al. 2000; Gopalakrishnan and Bierly 2001), social network analysis (Zheng 2010), and multivariate analyses (Cohen and Levinthal 1990) are used. While these methods allow for investigating basic relationships between organization and innovation, they face limits when attempting to study them in-depth (Siebenhüner 2007).

The shortcoming of a narrow research focus can be summarized in that there are few research designs in innovation studies that aim to understand (*Verstehen*) what individual actors within organizations actually mean when they use the ambiguous term innovation (Braun-Thürmann 2005; Rammert 2008). Put differently and paraphrasing Chalmers (1999), there are few research designs – such as those by Dougherty (1992), Dougherty et al. (2000), Hoholm and Araujo (2011) – that investigate how individual actors who are part of an organization make sense of 'this thing called innovation.'

I address this gap by proposing a research design to be used in innovation research for studying the organizational sense-making of innovation. The concept of organizational sense-making (Weick 1995) highlights that the social context 'organization' shapes how individual actors make sense of what they experience. Due to the resulting focus on meaning and its understanding, it presents an interpretative research design (Deetz 1996). The research design suggested here focuses certain aspects of organizational knowledge (Nonaka 1994; von Krogh et al. 2000) to arrive at a comprehensive understanding of meaning in organizations. Taking into account the entanglement of theory and methods (Van Maanen et al. 2007), core concepts of this knowledge-based view are integrated into the research design. Based on this knowledge-based perspective and conceptualizing innovation as interplay of the analytic dimensions 'ideas,' 'outcomes,' 'people,' and 'transactions,' a combination of qualitative methods is suggested to generate and analyze data. Their guided use allows for systematically studying the organizational sense-making of innovation.

I will first elaborate on the concept of organizational sense-making that constitutes the goal of the research design. After that, I outline the knowledge-

based perspectives that present the conceptual fundament of the research design. I then present key features of the research design as well as methods and steps to study the organizational sense-making of innovation. I close with discussing contributions and limits.

2.   Organizational Sense-Making: Studying Meaning in Organizations

Generally speaking, an *organization* presents a collective actor who lets individual actors interact (Geser 1990). An organization is thus understood as specific social context that shapes how individual actors behave. This conceptualization of organization as central institution of modern capitalist societies (Türk 1997), which underpins this paper, is distinct to those that considers organization as sum of written and unwritten rules that prescribe individual behavior within an organization (Schreyögg 2008). To empirically study organizations, scholars use different approaches. Organizational sense-making represents an interpretative approach in organization studies (Deetz 1996) that details the research goal of my proposed research design.

Rooted in the work of Weick (1995) and not unknown to innovation studies (Dougherty et al. 2000), *organizational sense-making* has become a core concept to study organizational behavior (Maitlis and Christianson 2014). Contrary to the aforementioned studies of organizational innovation, it centers on meaning. I define meaning (*Bedeutung*) as a basic social element that brings 'order into the chaos of social life' that is characterized by an affluence of possibilities. Thus, meaning structures what is experienced (Luhmann 1971).

Organizational sense-making aims to understand meaning. Its point of departure is the assumption that meaning in organization is socially constructed. More precisely, individual actors who are part of an organization define events that shape their behavior. They arrange these events into interpretation frameworks that organizations provide and that are enacted through interaction. This constellation provides a mutual understanding and allows individual actors to make sense about what is going on and what they are doing (Weick 1995).

Methodologically, applying organizational sense-making results in developing first-order and, ultimately, second-order concepts. While first-order concepts are the 'facts' of a qualitative study, second-order concepts are the "'theories' an analysis uses to organize and explain these facts" (Van Maanen 1979, 540). Put differently, first-order concepts present the understanding of the individual actors' meaning that emerge in the data analysis, whereas second-order concepts aim to understand the overall situation of the studied interaction in organizations. To arrive at second-order concepts, the constant comparison technique from grounded theory (Corbin and Strauss 2008) is used (Allard-Poesi 2005; Van Maanen 1979). This technique enables one to build empirical-

ly grounded theory with which the facets of the organizational sense-making of innovation can be better understood (Eisenhardt 1989).

3. Conceptual Foundation of a Knowledge-Based Research Design

Having discussed the goal of the proposed research design – organizational sense-making –, in the following I outline knowledge-based perspectives on innovation in general and on innovation in organizations. The former illustration clarifies the studied phenomenon, whereas the latter details the social context in which the phenomenon is studied. Together these insights constitute the conceptual foundation of the proposed interpretative research design.

3.1 Dimensions of Knowledge-Based Innovation: Conceptualization of the Studied Phenomenon

By and large, scholars consider innovation as being based on knowledge. However, different methods are used to study this relationship. On the one hand, and as mentioned at the beginning, innovation scholars tend to use quantitative methods. To study knowledge in organizations and knowledge flows between them, especially social network analysis (Zheng 2010), as well as multivariate and regression analyses (Cohen and Levinthal 1990; Gopalakrishnan and Bierly 2001), are used. Sociologists, on the other hand, often draw upon qualitative methods. Qualitative studies of knowledge are especially common in the field of sociology of knowledge that considers society represented in knowledge (Knoblauch 2010). Knowledge as function of the social is, for example, analyzed with discourse analysis, conversation analysis that is grounded in ethnomethodology (Schützeichel 2007), and hermeneutical interpretation approaches (Kurt and Herbrik 2015). The qualitative study of knowledge is also dominant in research on economic conventions. Inspired by the work of Boltanski and Thévenot (2006), scholars are using methods such as participant observation, qualitative content analysis or qualitative interview to better understand how conventions shape economic behavior (Diaz-Bone 2011). In accordance with the organizational sense-making concept, this highlights that qualitative methods are highly adequate to study knowledge.

To arrive at a conceptualization of the phenomenon 'innovation' that takes into account the insights on empirically studying knowledge just discussed and that is adequate for an interpretative research design, I draw upon the work of Van de Ven et al. (1999). Based on a longitudinal mixed-methods study on how innovations develop, the authors developed five dimensions to conceptual-

ize the social phenomenon innovation.[1] Four of them are applicable to the proposed research designed that focuses a single organization.[2]

1) *Ideas (What?):* The dimension *ideas* enables us to specify the entity that an organizations labels 'innovation.' An idea may point to a recombination of existing information, a scheme that challenges a prevailing order, as well as a formula or an approach to solve an issue. The essence of this dimension is therefore to ask what characterizes an innovation in an organization.

2) *Outcomes (Which? / With Which Result?):* At the center of the dimension *outcomes* is the question which consequences an innovation generates. In other words, this dimension highlights that innovation involves evaluations of the effects of innovation.

3) *People (Who?):* The dimension *people* points towards the fact that most innovations are too complex to be developed alone. To facilitate innovation, individual actors need to work together. To direct and coordinate the actions of individual actors, modern organizations institutionalized the function of management (Chandler 1977). This dimension thus focuses who is involved in the steering of innovation.

4) *Transactions (How?):* The dimension *transactions* highlights the role of relationships. Innovation requires individual actors to exchange in form of collegial and hierarchical interactions or based on written rules. This dimension thus directs our attention to interactions (Van de Ven et al. 1999).

3.2 Dimensions of Tacit Organizational Knowledge: Conceptualization of the Social Context of the Studied Phenomenon

From a knowledge-based view, empirical investigations of innovation in organizations focus organizational knowledge. In this view, knowledge in general is defined as justified true belief. As consequence, personal beliefs and the justification of knowledge become central. In other words, knowledge is not considered as separate entity that exists 'as a thing on its own' but that is interwoven with both individual actors and the organizational context. Building upon that, organizations are considered as consisting of two types of knowledge: explicit and tacit knowledge (Nonaka 1994; von Krogh et al. 2000).

Explicit organizational knowledge refers to the '*know-what,*' the knowledge formulated in sentences or captured in drawings. It is 'digital' in the sense that it stores past findings. This recorded knowledge is sequentially drawn upon. *Tacit organizational knowledge* "is deeply rooted in action, commitment, and involvement in a specific context" (Nonaka 1994, 16) and presents the '*know-*

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[1] For other conceptualizations of dimensions of innovation cf. Rammert (2010) and Braun-Thürmann (2005).

[2] The fifth dimension by Van de Ven et al. (1999), 'context,' incorporates elements outside an organization and thus goes beyond the scope of this paper.

how.' It realizes in interaction and socialization. Tacit organizational knowledge has an 'analogue' quality: current issues are processed concurrently (Nonaka 1994; von Krogh et al. 2000). The difference between explicit and tacit organizational knowledge addresses the nature of innovation in organizations (Crossan and Apaydin 2010). However, as several scholars have pointed out, the focus on analog processing and the practice of individual actors in organizations make tacit knowledge a key concept to study innovation (Gopalakrishnan and Bierly 2001; Kayworth and Leidner 2003; Nonaka 1994; von Krogh et al. 2000). For this reason and due to the aim of the research design to investigate the organizational sense-making of innovation, tacit organizational knowledge is conceptualized as social context that shapes the meaning of innovation and that is studied.

To empirically investigate *tacit organizational knowledge*, we can analytically distinguish between two dimensions of tacit organizational knowledge:

1) The *individual dimension* can be measured by centering the enactment of tacit organizational knowledge in form of social practices. *This enacted tacit organizational knowledge* presents knowledge that is realized in the interaction between individual actors in the organization. Enactment thus refers to how "[o]rganization members actively form (enact) their environments through their social interaction" (Smircich and Stubbart 1985, 724) and how these interactions result in systems of shared meanings (Smircich and Stubbart 1985). Empirical research on this kind of knowledge defines social practices that are involved in creating and diffusing knowledge as unit of analysis (Erden et al. 2014). Knowledge is thus considered as being situated in several respects, among them in the dynamics of interactions and in the physical context (Gherardi 2008).

2) The *organization-wide dimension of tacit organizational knowledge* can be analyzed by focusing its visualization in form of artefacts. *Visualized tacit organizational knowledge* is knowledge that is linked to the overall organizational context. This knowledge becomes available to individual actors trough socialization in the organization. Although organizational culture is frequently studied to detail how the overall organizational context shapes knowledge and innovation (Dougherty 1992; Kayworth and Leidner 2003), this paper deviates from this approach by taking into account the 'visual turn' in organization studies that seems to highly promising for innovation studies. In a nutshell, visual data is interpreted to arrive at an understanding of meaning and to complement findings analyzed with established qualitative methods. For studying knowledge, the archeological approach to visual data is especially relevant. Here, visual data is considered as artefacts that 'store' and 'transfer' organizational knowledge. Hence, the units of analysis of visual data in this approach are artefacts (Meyer et al. 2013). They both construct and embody organizational knowledge (Bechky 2008) and are part of the organizational life world (Froschauer 2009). For this reason, the analysis of artefacts

allows "for a reconstruction of the meaning structures they materialize" (Meyer et al. 2013, 505).

4. Key Features of a Knowledge-Based Research Design

Synthesizing the insights of the previous chapters allows us to outline the three key features of a knowledge-based research design to study the organizational sense-making of innovation: scope, a combination of qualitative methods, and the strategy case study design.

4.1 Scope

Table 1: Scope of a Knowledge-Based Research Design to Study the Organizational Sense-Making of Innovation

	Dimensions of Tacit Organizational Knowledge (Level of Analysis)	
Dimensions of Innovation (Focus of Dimension)	Enacted (Individual)	Visualized (Organization-wide)
Ideas (Characterization or What?)	Social Practices related to Innovation	Artefacts related to Innovation
Outcomes (Evaluation or Which?)		
People (Steering or Who?)		
Transactions (Exchange or How?)		

The scope of the knowledge-based research design is summarized by a matrix that is shown in Table 1. The vertical axis plots the dimensions of innovation that analytically decompose the studied phenomenon. The horizontal axis displays the two dimensions of tacit organizational knowledge that detail the studied social context. The intersection of the axes highlights the units of analysis. To study the enacted and thus individual dimension of tacit organizational knowledge, social practices related to innovation are focused. The inquiry into the organization-wide dimension centers visualized tacit organizational knowledge in form of artefacts related to innovation. These two units of analysis are studied separately but, as discussed below, are finally joined to arrive at the organizational sense-making of innovation. These then integrated findings enable innovation scholars to build an empirically grounded understanding of what innovation means in an organization.

4.2 Combination of Qualitative Methods

The study of both social practices and artefacts draws upon a combination of qualitative methods. While meaning can also be measured with surveys and analyzed with methods such as multidimensional scaling analysis, social network analysis or sequence analysis (Mohr 1998), qualitative methods are especially relevant for studies of organizational sense-making (Maitlis and Christianson 2014). This is because they allow for developing "an interpretive, grounded theoretical understanding of sense-making processes 'hovering low over the data'" (Allard-Poesi 2005, 176). Two types of qualitative data are suggested:

1) *Data on social practices* – that are generated with semi-structured qualitative interviews and participant observation as well as analyzed with qualitative content analysis – present open research-elicited and thus reactive data.

2) *Data on artefacts* – that are produced and analyzed with artefact analysis – present process-generated and therefore non-reactive data (Baur 2009).

The choice of these qualitative methods is based on general methodological reflections in organizational analysis (Buchanan and Bryman 2009; Froschauer and Lueger 2012) and on the previously discussed methodological implications of knowledge-based perspectives. Due to that different qualitative methods are used concurrently, the knowledge-based research design presents an embedded mixed method research (Creswell and Plano Clark 2011). The triangulation of different qualitative methods to separately study social practices and artefacts enables a more comprehensive picture of the organizational sense-making of innovation compared to just relying on a single qualitative method.

4.3 Case Study Design and Sampling

The research strategy of the knowledge-based research design is the *case study* (Gerring 2007). A case is a "spatially phenomenon (a unit) observed at a single point in time or over some period of time" (Gerring 2007, 19). A crucial aspect of the case study strategy is to address the 'central subject problem' well known to historians, i.e. to delineate the boundaries of the central subject to be studied, and to hold the unity of this case (Abbott 1992). The knowledge-based research design considers the meaning of innovation as case. This means that not an overall organization is studied with respect to innovation but the meaning innovation in an organization is centered. The case study strategy can be applied in two distinctive ways:

1) On the one hand, it can provide a '*snapshot*' of the meaning of innovation in the studied organization. For this application, the purposive sampling technique of *critical case sampling* is suggested. It aims for a single extreme case that allows "maximum application of information to other cases" (Teddlie and Tashakkori 2009, 175).

2) On the other hand, also *comparative research* is possible. Innovation scholars can compare the organizational sense-making of innovation within the same organization over time and thus conduct a qualitative panel study. Also comparisons between different organizations to identify differences and similarities with respect to the organizational sense-making of innovation are possible. For both types of comparative case study research, the purposive sampling technique of *theoretical sampling* is advisable (Teddlie and Tashakkori 2009): those cases that are likely to replicate or expand the emergent theory development concept should be chosen (Eisenhardt 1989).

5. Studying Organizational Sense-Making of Innovation

Based on the outlined key features of the knowledge-based research design, in the following I discuss the qualitative methods for data collection and data analysis for each dimension of tacit organizational knowledge. These steps generate first-order concepts (Van Maanen 1979). After that, I elaborate on how to join the findings from the separate analyses of enacted and visualized tacit organizational knowledge to arrive at the organizational sense-making of innovation and thus at second-order concepts (Van Maanen 1979).

While for analytical reasons, data generation and data analysis are presented separately here, it is important that in actual research practice, they are applied concurrently. This cyclical research process (Corbin and Strauss 2008; Froschauer and Lueger 2012) is characteristic for interpretative research designs such as this one. Moreover, as I will show, the analysis of enacted tacit organizational knowledge and thus social practices supports the analyses of the visualized tacit organizational knowledge and thus artefacts.

5.1 Separate Study of Enacted Tacit Organizational Knowledge

Social practices related to innovation present the unit of analysis for enacted tacit organizational knowledge. *Social practices* are "shared routines of behaviour, including traditions, norms and procedures for thinking, acting and using 'things'" (Whittington 2006, 619). This emphasizes that social practices are not a separate entity – such as explicit organizational knowledge – but also involve materiality. A social practice differs from a *praxis*, the actual activity, and the *practitioner*, the individual actor who both acts and embodies several social practices (Reckwitz 2002; Whittington 2006).

To collect data on social practices related to innovation, two qualitative methods are proposed: *semi-structured qualitative interviews* and *participant observation*. While the former method enables insights on the innovation dimensions 'ideas' and 'outcomes,' the latter method generate insights on 'peo-

ple' and 'transactions.' Thus, the social practices related to innovation are reconstructed based on two variants of open research-elicited data (Baur 2009).

As different dimensions of the same social phenomena are studied, both methods of data generation should be used concurrently and not sequentially. The overall sampling goal for both methods – the concrete sampling technique for each method is discussed in the following – is to generate a comprehensive understanding of the social practices in the organization that are related to innovation. More concretely, data should be generated – and concurrently analyzed – until the state of theoretical saturation, i.e. until no new insights are generated and the first-order concepts are well developed (Corbin and Strauss 2008).

5.1.1 Data Generation on Social Practices Related to Innovation

The *semi-structured qualitative interview*, the first method to study social practices, presents a form of interview that uses an interview guideline with a few open questions. Hence, the questions are neither standardized nor closed as is typical for surveys (Cassell 2009). The interviews should be recorded and then transcribed.

The semi-structured qualitative interview is used to generate data on the innovation dimensions 'ideas' and 'outcomes.' The dimension 'ideas' highlights the characterization of innovation, whereas 'outcomes' refers to the evaluation of innovation. Examples for open questions on these dimensions are: What is defined as innovation? What distinguishes innovation in this organization from innovation in similar organizations? What factors foster/inhibit innovation? Which artefacts represent innovation? What are past examples for successful/failed innovation? What were the effects of a successful/failed innovation? How did the expected effect of the innovation differ from the actual one?

To increase the responsivity, it is advisable to take into account the current state of the studied organization. For example, one could refer to concrete recent accomplishments – or setbacks – related to innovation. As noted, to not restrict the study of social practices a priori, only few open items should be used.

The criterion to choose the initial interview partners is their formal involvement in the organizational activities that should yield to innovation. Examples for such positions are employees and heads of the research and development department or positions 'at the top of the organizational pyramid' that set the innovation agenda. However, it is important to further ask for contacts that in the organization are considered relevant for innovation. In other words, the purposive sampling technique of snowball sampling should be applied. This technique asks interviewees to identify other individual actors who may be included for this research (Teddlie and Tashakkori 2009).

When using *participant observation*, the second method to study social practices, a researcher participates in situations that are part of the organization's everyday life and also signals his role as researcher (see e.g. Petschick 2015; Noack

2015, both in this HSR Special Issue). Participant observation presents an established qualitative method to generate in-depth insights on both social practices and innovation. Hoholm and Araujo (2011), for example, participated in meetings as well as the everyday work life at production sites and the research and development department to explore how innovation processes develop over time. For doing participant observation in an organization, a researcher needs to take aspects such as the assignment of roles or the length of participation. Fine et al. (2009) provide guidelines for using this method in organizations. The result of participant observation is a protocol of the observed situation.

Participant observation is used to generate data on the innovation dimensions 'people,' which focuses on who steers innovation in the organization, and 'transactions,' which centers how innovation 'happens' and thus which interactions are linked to innovation. This *a priori* focus has implications for when and where to participate. To generate data on the dimension 'people,' situations that are likely to demand decisions with respect to innovation are promising. Negotiations or progress meetings are examples for such situations. To collect data on the dimension 'transactions,' it is suggested to become a participating observer in those situations that foster interactions related to innovation. Such situations are likely within departments or working groups that have the official aim to generate innovation or to produce new knowledge. Examples include the research and development department, laboratories, or the business development department. Moreover, also irregular occasions that center innovation present promising situations to generate data. Meetings that report on the progress of innovation projects are a paradigmatic example for such a situation. In addition, situations in which individual actors who are engaged in innovation informally meet should be considered. Such situations are likely to arise, for example, in the break room or near the water dispenser. As further discussed below, besides studying situations with respect to the two innovation dimensions, participant observation may also support the choice of artefacts that are related to innovation.

5.1.2 Analysis of Data on Social Practices Related to Innovation

The analysis of the qualitative data generated with semi-structured qualitative interviews and participant observation draws upon variants of the qualitative content analysis (Mayring 2010). While especially the sociology of knowledge is commonly used to analyze qualitative interview data and protocols from participant observation (Kurt and Herbrik 2015; Schützeichel 2007, Engelhardt 2015, in this HSR Special Issue), it is not used in this research design that studies the meaning in the social context organization. This is due to that the social phenomenon innovation is *a priori* conceptualized in basic ways. Orientating towards existing studies on organizational sense-making (Allard-Poesi 2005), qualitative content analysis – which shares similarities with the analysis approach of

grounded theory (Corbin and Strauss 2008) – is used to analyze the data on social practices related to innovation.

To analyze transcriptions of semi-structured qualitative interviews, the *inductive qualitative content analysis* is proposed (Mayring 2010). This variant creates categories by inductively developing selection criterions and by choosing a low level of abstraction. This procedure allows for gradually building a category system to understand what 'has been said.' The overall guiding principle for these analyses are the two dimensions of innovation 'ideas' and 'outcomes.' Hence, this data should be analyzed with respect to the characterization of innovation and with respect to the evaluation of innovation. As it will be shown in the next passage, the inductive qualitative content analysis also draws upon the results of the summarizing variant. For this reason, it is important to use both variants concurrently and not consecutively.

To analyze the protocols from participant observations, the *summarizing qualitative content analysis* is suggested (Mayring 2010). It condenses the data towards key categories that are similar to keywords. This variant of qualitative content analysis is used to gain insights on the innovation dimensions 'people' and 'transactions.' Hence, the protocols are analyzed with respect to the steering of innovation and with respect to how interactions are linked to innovation in the studied organization. Together with the inductive qualitative content analysis, the analysis of these two types of data yields to a first-order category system (Van Maanen 1979).

5.2   Separate Study of Visualized Tacit Organizational Knowledge

To study visualized tacit organizational knowledge, the unit of analysis *artefacts* is centered. Generally, artefacts are considered as historic remains of behavior in an organization. While the concept of artefacts can also include verbal manifestations (e.g. anecdotes, jargon, stories, metaphors) and behavioral manifestations (e.g., rituals, customs), the term is commonly used to refer to physical manifestations. Following this understanding of artefacts in the narrow sense, artefacts are defined as physically present and graspable 'things' that are part of an organization. Examples for artefacts understood this way are art and design, clothes and uniforms, physical objects (e.g. plants, functional objects), the architecture of buildings, and the physical layout within buildings (Hatch 1997).

Recently, there have been attempts to spur debates on how to analyze this spatial dimension of the social. Both qualitative methods – among them participant observation and interviews – and quantitative methods – such as social network analysis or survey – can be used to measure different spatial aspects (Baur et al. 2014). The choice of methods to analyze space in this research design is linked to recent developments in innovation studies. Scholars increasingly highlight how the architecture of buildings and the design of workplaces shape innovation (Allen and Henn 2007; Magadley and Birdi 2009; Moultrie et

al. 2007). For example, using literature review, interviews, and benchmarking data, it was found that physical environments that facilitate innovation are characterized by communicativeness, modifiability, smartness, attractiveness, and reflection of organizational values (Oksanen and Ståhle 2013). Moreover, also scholars in the sociology of knowledge emphasize that space shapes how knowledge is created and reflects how an organization approaches knowledge (Schroer 2010).

Combining these insights with the previously discussed rising relevance of the visual dimension of organizations (Meyer et al. 2013) and the fact that artefacts incorporate innovation-relevant knowledge (Bechky 2008) highlights that is highly useful and appropriate to study artefacts in order to generate findings on the organizational sense-making of innovation. More concretely, the analysis of artefacts adds to a study of the meaning in organizations due to the fact that they present process-generated and thus non-reactive data (Baur 2009). The focus on one aspect of space – artefacts – that is qualitatively studied in more detail presents an analysis of interaction in space (Baur et al. 2014).

5.2.1 Data Generation on Artefacts Related to Innovation

The study of artefacts is specified by *artefact analysis*. In a nutshell, artefact analysis considers artefacts as products of human actions. Both the production and usage of artefacts is considered as interwoven with the concrete social context (Bechky 2008; Schubert 2014). As noted, this research design centers artefacts in the narrow sense, i.e. material artefacts such as physical objects, buildings, and physical layout.

Organizations are full of artefacts. Data generation on artefacts is thus not concerned with creating new data but with choosing suitable artefacts with respect to the research goal. Within this research design that aims to understand the meaning of innovation in an organization, the ultimate orientation are possible links of an artefact to one or more of the dimensions of innovation, i.e. 'ideas,' 'outcomes,' 'people,' and 'transactions.' For example, a room that was told to be inspiring could be considered as an artefact. Based on this ultimate orientation, two more concrete ways to select artefacts related to innovation are imaginable. First, as indicated above, the data generated by semi-structured qualitative interviews and participant observation can provide valuable information. For example, an interviewee may refer to important artefacts. It might also be observed that certain artefacts are frequently used in the context of innovation. Second, innovation scholars can apply general principles from artefact analysis. One principle is to choose artefacts that individual actors in the organization consider relevant for decision-making and communication both in general and with respect to innovation. Another principle is to identify those artefacts that have been part of the daily organizational life for a long time and thus are important for the organization with respect to how it presents itself to externals (Froschauer 2009).

Similar to the sampling tactic used for the study of social practices, also the selection – and concurrent analysis – of artefacts should proceed until the state of theoretical saturation (Corbin and Strauss 2008).

5.2.2 Analysis of Data on Artefacts Related to Innovation

The selected artefacts are subject to a systematic interpretation using *artefact analysis* as suggested by Froschauer (2009). Similar to the analysis of semi-structured qualitative interviews and participant observation, the aim of this analysis is to arrive at first-order concepts (Van Maanen 1979). The interpretation of an artefact, which should be conducted in teams, consists of two stages that are discussed in the following. Exemplary foci that support how to address an element in each stage are displayed in Table 2 and Table 3. Throughout the interpretation, there should be an orientation towards what the findings can add to better understand one or more of the dimensions of innovation, i.e. 'ideas,' 'outcomes,' 'people,' and 'transactions.' This highlights the complementary function of artefact analysis: insights can be generated especially for those innovation dimensions on which there might not yet be sufficient findings available.

Table 2: First Stage of Interpretative Artefact Analysis: Artefact-Oriented Deconstruction

Inner Fractionalization (a)	Workday Life Contextualization (b)
Materiality (Surface? Consistency? Smell?) *Structure* (Components? Spatial Design? Primary and Secondary Elements? Foreground and Background? Color?) *Text* (Wording? Style?)	*Demarcations* (What is Part? What is not Part? How are Boundaries Drawn?) *Associations in General Workday Life* (General Associations?) *Associations in Organizational Workday Life* ('Normal'? 'Not Normal' in Organization?)

Source: Own compilation based on Froschauer (2009).

In the first stage of the interpretation, the artefact is deconstructed in its material context and its usage context in workday life. This involves two steps. (a) The inner unity of the artefact is fractionalized by focusing the materiality, structure, and text of the artefact. These aspects of the artefact are thus focused and discussed with respect to one or more innovation dimensions. (b) The artefact is related to its possible everyday usage. In other words, it is discussed in relationship to the general workday life and thus in the overall societal context. This involves considering demarcations, associations in general workday life, and associations in general organizational workday life (Froschauer 2009).

Table 3: Second Stage of Interpretative Artefact Analysis: Organization-Oriented Integration

Organizational Embeddedness (a)	Organizational Comparison (b)
Production and History (How Produced? Who Produced? Why Produced? Historical Context? Consequences of Production?) *Usage* (For Whom Produced? How Used? How Reproducible and Changeable? Consequences of Usage?) *General Role* (Linkages of Production and Usage? Linkages with Internal Differentiations [e.g., Departments] *Functions* (Integration into Processes? Functions in Organizations?)	*Comparison to Artefacts of the Organization* (Similar Artefacts?) *Comparison to Artefacts in other Organizations* (Similarities to Artefacts? Differences to Artefacts?)

Source: Own creation based on Froschauer (2009).

In the second stage of the interpretation, the artefact is related to the organizational context. Hence, the interpretation centers how the artefact might be integrated into the studied organization and into organizations in general. This stage again has two steps. (a) The several facets of the organizational embeddedness of the artefact are considered. This includes its production and history, usage, functions, and general role in the organization. The interpretation thus takes into account how these aspects could be linked to the dimensions of innovation. (b) The artefact is compared to the wider organizational context. More precisely, the focused artefact is compared to other artefacts of the same organization that are considered relevant for innovation or generally relevant. Furthermore, the focused artefact is compared to artefacts in other organizations (Froschauer 2009). The result of this two-stage interpretation is a multifaceted understanding of how an artefact is related to innovation.

5.3   Integrative Study of Tacit Organizational Knowledge

To arrive at the organizational sense-making of innovation, the insights of the separate analysis of social practices and artefacts are joined. As illustrated in Table 4, this integration takes place along the four dimensions of innovation. The findings of the separate analyses – that both present first-order concepts – are thus integrated alongside the dimension 'ideas,' 'outcomes,' 'people,' and 'transactions.' To guide this integration process, general guiding questions that are also found in Table 4 can be used.

Table 4: Integrative Study of Tacit Organizational Knowledge

	Dimensions of Tacit Organizational Knowledge (Level of Analysis)	
Dimensions of Innovation (Focus of Dimension)	Enacted (Individual)	Visualized (Organization-wide)
Ideas (Characterization or What?)	What characterizes innovation in this organization?	
Outcomes (Evaluation or Which?)	Which innovation in this organization is evaluated?	
People (Steering or Who?)	Who steers innovation in this organization?	
Transactions (Exchange or How?)	How does innovation happen in this organization?	

To create second-order concepts (Van Maanen 1979) and thus to theorize the overall relationship between the meaning of innovation and the studied organization, the constant comparison technique from grounded theory is applied. As illustrated in Table 4, the iterative comparing of first-level concepts takes places alongside the four innovation dimensions (and thus on the horizontal axis) and integrates first-level concepts that were generated on each of the two dimensions of the tacit organizational knowledge (and thus on the vertical axis). Due to this step, conceptual linkages on a higher level of abstraction are developed (Corbin and Strauss 2008). The resulting second-order concepts present the methodological form that details the organizational sense-making of innovation.

6. Discussion

In this article, I argued that innovation scholars have hardly investigated the link between organization and innovation with the research goal to understand (*Verstehen*) what individual actors in organizations mean when they refer to innovation. To address this gap, I introduced an interpretative research design to study the organizational sense-making of innovation. Informed by concepts from the knowledge-based view of innovation and organizations, this design suggests a mix of qualitative methods to separately develop first-order concepts of the meaning of innovation. Joining these concepts with the constant comparison technique creates second-order concepts and thereby enables innovation scholars to arrive at a comprehensive understanding of what innovation means within the studied organization.

The interpretative research design contributes to innovation studies especially in two ways. First, its exploratory scope provides scholars in innovation studies with the methodological tools to build new empirically grounded theory on the linkage of innovation and organization. Second, due to the sociological perspective on innovation in organizations, the research design presents a con-

tribution to the growing sociological research on innovation (e.g. Bormann et al. 2012; Braun-Thürmann 2005; Faßauer 2012; Rammert 2010; Rao 2009).

However, the research design is not without limits. First, it is conceptualized to provide a snapshot of the meaning of innovation in an organization. Although it can be used similar to a panel study, it does not fully capture the development of meaning over time. Second, it focuses on sense-making within an organization and therefore does not explicitly consider interorganizational sense-making (Abrahamson and Fombrun 1994).

As with meaning in general, meaning of innovation in organizations presents a challenge for empirical research. However, given the richness of new insights that can be gained, such attempts seem highly fruitful for innovation studies in order to generate new insights on the link between innovation and organization. The interpretative research design suggested in this article hopes to provide the means to inspire such attempts.

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