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EPISTEMOLOGICAL PERSPECTIVES ON MULTI-METHOD INFORMATION SYSTEMS RESEARCH

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Abstract

There is a continuing discussion on methodological pluralism in IS research. Several claims have been made both for and against methodological pluralism. The debate focuses mainly on discussing the relationship between research methods and IS research paradigms, especially positivism and interpretivism. Also, the literature analyzes the epistemological assumptions of research paradigms, but pays little attention to a direct association of research methods with epistemology. We argue that the potential for methodological pluralism depends heavily on the epistemological characteristics of the research methods themselves. After analyzing various arguments pro and contra methodological pluralism, we then provide an epistemological framework addressing the relevant aspects in this context.

Summary of Arguments

Information Systems (IS) research can be described as a rich tapestry of diverse research methods, research paradigms, and research approaches (Section 1).

Multi-method research is useful and favourable for IS research. Combining different research methods in the context of multi-method research designs can provide different perspectives on a particular phenomenon (Section 2).

Calls against multi-method research designs applying epistemological and ontological arguments, the discussion focuses on the indirect relationship: epistemology-paradigms-methods. We advocate that in discussing the potential for multi-method research designs it is essential to consider the direct relationship: epistemology-methods (Section 3).

A disciplined methodological pluralism must discuss epistemological assumptions of the various research methods to be combined in the context of a multi-method research design. An epistemological framework can help to structure and systematize epistemological issues relevant in this field (Section 4).

Keywords: Epistemology, diversity, methodological pluralism, IS research paradigms, research management, epistemological framework

1 DIVERSITY IN IS RESEARCH

Information systems (IS) research is a) multi-disciplinary and b) multi-national. Ad a) Many other disciplines in addition to information systems – business administration, information science, sociology, psychology etc. – contribute to studying the development, implementation, and usage of information systems and information technology inside organizations (Fitzgerald & Howcroft 1998, Niehaves, et al. 2004, Wade & Hulland 2004). Ad b) Also the contribution of many different (national) research communities to the ‘international’ discussion in IS research is very rewarding. As a consequence, the internationalization of IS research is conspicuous. For example, within the European Union, the increasing shift of research emphasis from national to international institutions and organizations is quite evident, for instance regarding the EU framework research programmes. International research projects are becoming more and more important and will become standard in the future. Not only the

research activities themselves, but also the publication of research results are becoming increasingly international in orientation.

Thus, IS research can be seen as a rich tapestry of diverse research methods, research paradigms, and research approaches (Benbasat & Weber 1996, Wade & Hulland 2004). Different academic disciplines and research communities tend to adopt distinct research methodologies and approaches (Chen & Hirschheim 2004). Chen & Hirschheim (2004) conducted an empirical study analyzing eight major IS publication outlets between 1991 and 2001. The examination of 1893 articles published in US journals or European journals shows that, on a methodological level, quantitative methods dominate the US research culture (71%), while 49% of the articles published in European journal apply qualitative methods. On the paradigmatic level, the vast majority (89%) of US publications are characterized by a positivist paradigm. Though European journals also published mainly research based on positivist principles (66%), they tend to be much more receptive to interpretivist research (34%) than US journals (see Figure 1).¹

	US Journals	European Journals
Methods		
Quantitative	71 %	40 %
Qualitative	20 %	49 %
Mixed	9 %	11 %
Paradigms		
Positivist	89 %	66 %
Interpretivist	11 %	34 %

Figure 1. Methodological and paradigmatic diversity in IS research²

Due to this diversity in IS research, there is an ongoing discussion on multi-method research approaches (see, for example, Deetz 1996, Falconer & Mackay 1999, Lee 1991, Mingers 2001, Weber 2004). The main issues are: How can we benefit from such a variety of approaches and contributions? How can such diversity help to analyze IS-related phenomena from different points of view? In terms of the latter, many researchers advocate an extensive methodological pluralism which allows an “anything goes” combination of distinct methods from distinct paradigms and approaches. Others argue that this would be theoretically unsound, due to a “paradigmatic incommensurability”, mainly in terms of epistemological and ontological assumptions. As a result, a dichotomy of two seemingly irreconcilable positions is currently shaping the discussion in IS research.

From the perspective that multi-method research (especially within a multi-disciplinary and multi-national IS research context) is indeed valuable and favourable, we argue that epistemological (and ontological) issues are in fact restricting the combinability of research methods in the context of multi-method research designs. Nevertheless, we seek to demonstrate that epistemological arguments are still not as restrictive as proposed in recent IS literature. Thus, we offer a conceptual framework which systematizes fundamental epistemological issues in the field of IS research and which helps to support a disciplined methodological pluralism. Therefore, in this paper, we will address the following research question: *What epistemological issues are relevant in the context of multi-method IS research and how can we deal with them?*

Hence, we seek to answer the following sub-questions progressively in the course of this paper:

¹ Due to the fact that paradigms are based on epistemological assumptions, the US-European differences on a paradigmatic level consequentially lead to an epistemological difference in alignment. For an analysis of epistemological assumptions and especially those made by positivism and interpretivism see for example (Chen & Hirschheim 2004, Hirschheim & Klein 1989, Niehaves 2004)

² The data was taken from Chen et al. (2004; figure 8 and figure 10) and then normalized on the basis of each region.

- a. Why is it useful and favourable to apply multi-method research (designs) in IS research? What can we learn, especially from the debate of behavioural science and design science research? (Section 2)
- b. What is the status-quo of the discourse and which aspects have already been addressed on methodological pluralism? Where do we find a failure to relate the debate to the basic issues of epistemology? (Section 3)
- c. What is fundamental to the concept of a disciplined methodological pluralism? How can we systematize the epistemological issues relevant to the field of multi-method research? (Section 4)

The research method chosen for this aim is that of conceptual/philosophical research. We will hence provide philosophical-logical arguments, rather than empirical ones. Our arguments will though (where applicable) also refer to empirical research result, for instance provided by Chen & Hirschheim (2004), Dubé & Paré (2004) and others. Furthermore, we will present additional evidence by giving examples from IS research practice.

2 ARGUMENTS FOR MULTI-METHOD RESEARCH

Both diverse academic disciplines and diverse (national) research communities contribute to IS research. Against the background of this diversity, we observe an ongoing controversy over multi-method research approaches (cp. for example Deetz 1996, Falconer & Mackay 1999, Lee 1991, Mingers 2001, Weber 2004). The main questions are: How can be benefit from such a variety of approaches and contributions? How can such diversity help to see IS-related phenomena from different points of view? In this respect, several calls for methodological pluralism can be found in IS literature (cp. for example Denzin 1970, Lee 1991, Mingers 2001, Webb, et al. 1966, Weber 2004).

The differentiation between behavioural science and design science is a widely used logic for structurally systematizing distinct IS research approaches (cp. for example Davis & Olson 1985, Hevner, et al. 2004, March & Smith 1995). While behavioural science research (BSR) focuses primarily on developing and justifying theories on human-computer-interaction, design science research (DSR) seeks to create IT artefacts intended to solve organizational problems (see Table 1).

	Behavioural Science Research (BSR)	Design Science Research (DSR)
<i>origin</i>	natural science	engineering, sciences of the artificial
<i>paradigm</i>	problem understanding paradigm	problem solving paradigm
<i>objective</i>	develop and justify theories which explain or predict organizational human phenomena surrounding the analysis, design, implementation, management, and use of information systems	create innovations that define ideas, practices, technical capabilities, and product through the analysis, design, implementation, management, and use of information systems
<i>object</i>	human-computer-interaction	IT artefact design

Table 1: Behavioural vs. Design Science (Hevner, et al. 2004)

Following this approach, acquiring knowledge about information systems in an organizational context requires the application of both research paradigms (Hevner, et al. 2004, March & Smith 1995). Thus, behavioural science research and design science research can be regarded as two complementary elements of the IS research cycle. Starting from pre-scientific observation of IS and information technology (IT) usage in practice, theories about IS-related issues are developed by behavioural science researchers. These theories are intended primarily to explain and predict human behaviour, information system functions, and issues interrelated with both of these aspects. Through a process of justification, these theories are considered to be true or valid. Thus, they provide a basic understanding of the (real world) problem situation described in the first instance. This understanding provides the basis for the design of IT artefacts which address a given problem situation. By actually applying them, these IT

artefacts are intended to become useful in terms of problem solving. Thus, they change present IS usage in practice and, for that reason, provide new impulses for theory development (cp. Figure 2).

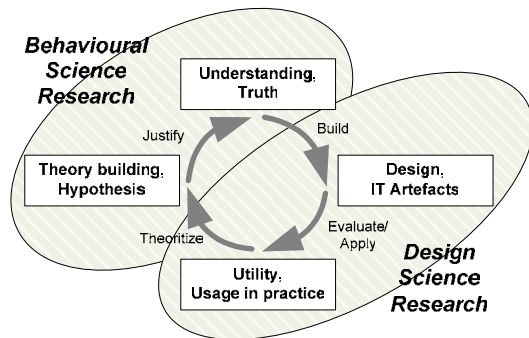


Figure 2. IS research cycle

IS research accordingly comprises two basic approaches: BSR with a problem-understanding focus and DSR with a problem-solving focus (Hevner, et al. 2004, March & Smith 1995). Each approach has developed a (mostly) distinct set of research methods: BSR is based mainly on quantitative methods while DSR relies mainly on qualitative design and engineering methods. In conformity with the argument that BSR and DSR complement one another, IS research is inherently multi-methodological. Applying BSR methods to problem understanding and DSR methods to problem solving means that, even if both categories of methods are not combined in a particular research design, they are interdependent, due to the fact that they obtain research results (reciprocally) from one another.

A similar argument is given by Mingers (2001) who argues in favour of pluralist methodologies. He assumes that all IS research situations are seen as inherently complex and multidimensional, and thus benefit from a wide range of research methods. He offers two basic arguments in order to advocate methodological pluralism: a) different methods provide a different view on a certain phenomenon of interest and b) research (processes) take place in different phases, which show substantially distinct characteristics and thus require the application of different research methods.

Ad a) *“Phenomenal” argument.* Different research methods focus attention on different aspects of the situation, so that multi-method research is necessary to deal with the full richness of a certain problem situation. Applying a particular research method “is like viewing the world through a particular instrument such as a telescope, an X-ray machine, or an electron microscope. Each reveals certain aspects, but each is blind to others. Although they may be pointing at the same place, each instrument produces different, and sometimes seemingly incompatible, representation” (Mingers 2001).

Ad b) *Process argument.* Research is not static, but rather a process comprising several phases which require different types of activities. In the recent literature, four phases are primarily discussed (Mingers 2001, Tashakkori & Teddlie 1998): 1. Appreciation deals with the initial conceptualization of the phenomenon in question and with selecting and applying methods for data collection. 2. Analysis of the data collected. 3. Assessment and interpretation of the results/explanations provided by the analysis. 4. Action is undertaken in order to disseminate the research results and change the analyzed problem situation.³ Mingers argues that each phase necessitates distinct methods in order to meet the given requirements. Hence, IS research can be understood as a complex and multidimensional phenomenon.

Recapitulating, claims can be found in recent IS literature (Hevner, et al. 2004, March & Smith 1995, Mingers 2001) stating that the analysis of a complex phenomenon, such as IS research, requires di-

³ According to Hervner et al. (2004), behavioral science research – as a problem-understanding paradigm – comprises phases one to three (appreciation/data collection, data analysis, and analysis interpretation). By contrast, design science research focuses on problem solving and thus addresses phase four (action in order to disseminate the research results and to change the problem situation).

verse research methods, irrespective of the IS research paradigm or approach. As a result, a methodological pluralism is advocated which allows every method to be combined with every other (see Figure 3).

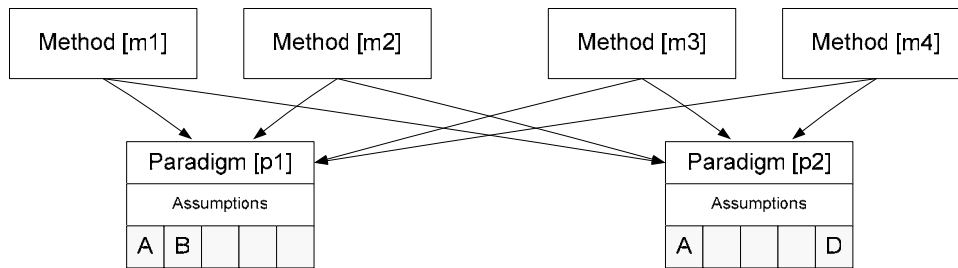


Figure 3. Calls pro methodological pluralism

We see, in fact, the diversity in IS research as well as (especially in this context) the need for joint research which entails the application of different research methods from different academic disciplines and different (national) research communities, influenced by different research paradigms.

3 EPISTEMOLOGICAL ISSUES IN MULTI-METHOD RESEARCH

However, working together does not necessarily mean that mutual understanding prevails. The mainly implicit assumptions which underlie different research approaches may vary substantially due to the disciplinary and national background of the researchers (Orlikowski & Baroudi 1991). For instance, a cross-continental comparison between European and North American IS journals shows that the European ones are more receptive to interpretive approaches, whereas North American journals tend to be positivist (Chen & Hirschheim 2004). The potential lack of understanding in this context may be a result of the different epistemological assumptions made. These entail the validity, reliability, and “quality” of research (results) which depend heavily on these epistemological assumptions. For instance, the controversy over positivist and interpretivist research has a major impact on the information systems field (Chen & Hirschheim 2004, Dubé & Paré 2004, Hirschheim & Klein 1989, Weber 2004). Positivist researchers claim an inter-subjective validity of their research results, while interpretivist researchers emphasize the subjective impact of the individual being faced with his particular research results. The specific concept of research rigor thus depends largely on the epistemological assumptions made by the researcher.

Within the discussion on multi-method research, the terms “research method”, “paradigm”, and “epistemology” are used frequently, often with very distinct meanings. Therefore, we provide a framework which helps to systematize the field and analyze how these terms relate to each other. Various disciplines and different research communities each provide a different *research culture*. Drawing on the theory of culture which was strongly influenced by Edgar Schein, we can differentiate between three levels of culture (Schein 1992), the levels of: artefacts and symbols, norms and values, and basic assumptions (see Figure 4). These levels are characterized by the degree of visibility to an observer. Applying this schema to research culture, we can classify the terms most relevant to the discussion of multi-method research: research methods [m], research paradigms [p], and epistemological assumptions [e].

Ad A) We find research methods and research results at the level of artefacts and symbols to be the most visible components of IS research. In most cases, these entities have to be interpreted, including data, results, and languages. Research methods can be understood in this context as basic activities, such as “administering and analyzing a survey, conducting controlled experiments, doing ethnography or participant observation, or developing root definitions and conceptual models” (Mingers 2001).⁴ In

⁴ The terms method and methodology are often used as interchangeable (see for example Livari & Hirschheim & Klein 1998, Tashakkori & Teddlie 1998) while Mingers (2001) provides a very helpful analysis of the term meth-

the following section we understand the term “multi-method” research as that which is applies more than one research method and is thus explicitly open to utilizing methods from various approaches and paradigms.

(A) Level of Artefacts & Symbols	Visible, but have to be interpreted	Research methods [m], → research results, language, rituals, etc.	For example: Statistical data analysis, conceptual modelling, etc.
(B) Level of Norms & Values	Visible in parts; subconscious	Research paradigms [p], → ideologies, ethics, maxims, guidelines, etc.	For example: Positivism, Interpretivism, etc.
(C) Level of Basic Assumptions	Mostly invisible; subconscious	Epistemological assumptions [e], → assumptions about: nature of man, time, etc.	For example: Origin of knowledge, Influence of the subject, Possibility of truth

Figure 4. Distinct level of (research) culture

Ad B) The word *paradigm* refers to a thought pattern in any scientific discipline or other epistemological context. Kuhn (1962) defines a (scientific) paradigm as: i) what is to be observed and scrutinized, ii) the kind of questions that should be asked and answers obtained in relation to this subject iii) how these questions are to be put, and iv) how the results of scientific investigations should be interpreted (Kuhn 1962). Research paradigms can be found at the level of norms and values. They are visible in some parts, for example when certain paradigms are questioned because they do not seem to take into account significant influencing factors. The growing belief in subjectivity as a major influencing factor on IS research, for example, led to the broad discussion of positivism and interpretivism over the last few years (Falconer & Mackay 1999, Fitzgerald & Howcroft 1998, Lee 1991, Mingers 2001, Weber 2004). Nevertheless, paradigms are in many cases subconscious and not explicitly addressed in every research approach or by everyone conducting research.

Ad C) At the third level of basic assumptions, we find entities that underlie those discussed above. Epistemological assumptions (which shape research paradigms as well as research methods) can be found here. They are mostly invisible and in most cases unknown (subconscious) to the researcher.

Authors arguing against multi-method research [level A] designs often base their arguments on ontological and epistemological issues (see for example Deetz 1996, Falconer & Mackay 1999, Falconer & Mackay 2000, Kuhn 1962). D.J. Falconer and D.R. Mackay, for instance, identify “ontological problems of pluralist research methodologies (Falconer & Mackay 1999). Though several authors call for the combining of interpretive and positivist research methodologies, Falconer and Mackay argue that “cross-paradigmatic research is ill-founded” (Falconer & Mackay 1999, p. 624). Cross-paradigmatic designs in this context are perceived in terms of a failure to recognize the intrinsic worth and nature of alternative methodologies. Researchers advocating the positivist paradigm “... often reduce the difference in qualitative and quantitative research to different ways to collect data, and thereby retain the dream of triangulation as if different research programs simply provide additive insights into the same phenomenon.” (Deetz 1996, p. 194) However, methodological pluralism and cross-paradigmatic research based on different ontologies and epistemologies⁵ is argued to be without sound

odology which can be understood in three different ways: i) Methodology is the study of methods. ii) The term “the methodology” is used for a certain research study’s individual methodology. In this case, the methodology can comprise one or more research methods. iii) The term “a methodology” (generalization of ii) is used to describe a set of research methods which are often combined in the same way in practice, for instance, soft systems methodology (Checkland & Scholes 1990).

⁵ The issue of ontology underpins and governs subsequent epistemological and methodological assumptions (Chua 1986).

foundation (Cavaye 1996, Deetz 1996, Falconer & Mackay 1999). Paradigm incommensurability (Burrell & Morgan 1979, Kuhn 1962) would then, as a consequence, lead to a corresponding incommensurability of research methods coined by different paradigms (see Figure 5).

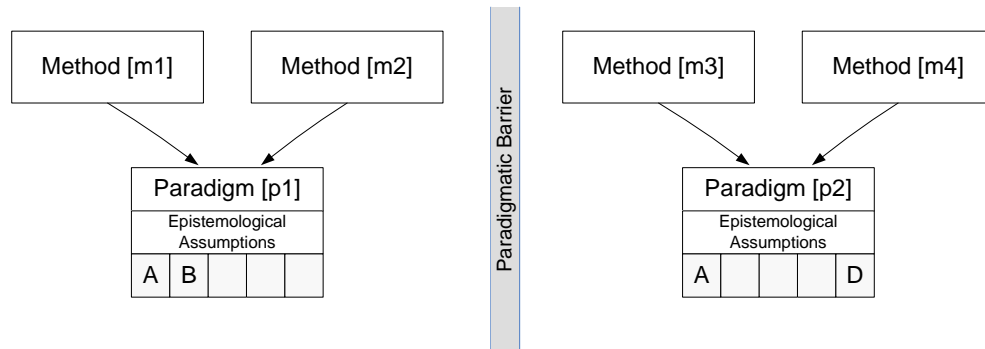


Figure 5. *Calls against cross-paradigmatical research*

“Multimethod research is proscribed for a number of reasons, the most notable of which is the supposedly irreconcilable objectivist/subjectivist ontological and epistemological dichotomies that exist between the empirical-analytical and interpretive paradigm, respectively” (the contra pluralist position summarized by Mingers, 2001, p. 247). The chain of argumentation and positions against methodological pluralism run as follows: Research methods “belong” to certain paradigms [Relation {m, p}] – paradigms show distinct ontological and epistemological assumptions [Relation {p, e}] – the incommensurability of paradigms (based on different assumptions) would thus lead to an incommensurability of research methods [Relation {m, p}, Relation {p, e}]. But what is the critical point when arguing with the indirect relationship of methods-paradigms-epistemological assumptions [Relation {m, p}, Relation {p, e}]?

- i. Epistemology is taken into account mainly when analyzing IS research paradigms [Relation {p, e}] (cp. for example Burrell & Morgan 1979, Chen & Hirschheim 2004, Fitzgerald & Howcroft 1998, Lee 1991, Monod 2003). Most authors make clear that the relationship between IS research paradigms and epistemological (as well as ontological) assumptions is based on conclusive logic. The relationship is based on the very nature of IS research paradigms. For instance, positivism is supposed to assume a) that an objective real world exists independently of human thoughts and b) that gathering objective knowledge about this real world is possible in theory (cp. for example Weber 2004). Thus, the influence of epistemology on IS research paradigms can be considered as logically valid to a certain extent.
- ii. However, the discussion on multi-method research focuses on IS research paradigms [Relation {m, p}] rather than relating methodological issues directly to the broader issue of epistemology (cp. for example Falconer & Mackay 1999, Falconer & Mackay 2000). The problem here is that particular research methods [m] do not “belong” to particular research paradigms [p]. The relationship between methods and paradigms [Relation {m, p}] may be influenced to a certain extent by an inherent logic. For example, certain methods may address certain aspects which are only considered relevant in terms of a certain research paradigm. Yet, one of the main factors by virtue of which certain methods seemingly belong to certain paradigms is ultimately the discourse and historical development of IS research. We can find several research methods used by different IS research paradigms. Several analyses which focus on certain research methods, case study research (Yin 2003) for instance, have proven that the method is used in positivism as well as interpretivism (Dubé & Paré 2004). L. Dubé and G. Paré (2004) have analyzed 1691 articles in seven major IS journals (including MIS Quarterly, European Journal of IS, and Information Systems Research) from 1990 to 1999. 210 articles used case research as the primary research method. While 87% are based on the positivist research paradigm (Dubé & Paré 2004, table 2), 13% of these case study research approaches were based on alternative paradigms, mainly interpretivism. Taking the

example of case research, we see that there are certain research methods which seem to conform to more than one paradigm in IS research.

Hence, in order to answer the question of combining research methods in the context of multi-method research, it is more important to analyze epistemological assumptions of research methods themselves. Nevertheless, the lack of epistemological funding of research methods is apparent and discussed extensively in the IS discipline (see for example Fitzgerald, et al. 1985, Hirschheim & Klein & Lyytinen 1995, Keen 1980, Mingers 2001).

4 EPISTEMOLOGICAL FRAMEWORK

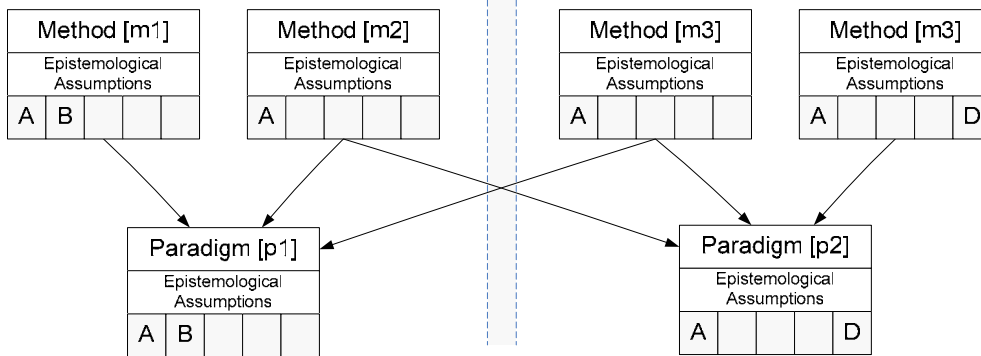


Figure 6. Cross-paradigmatic composition of research methods taking into account epistemology

We advocate a methodological pluralism which addresses explicitly epistemological issues. Not only paradigms [p], but also research methods [m] themselves should be related directly to the broader issue of epistemology [e]. The core of the answer to the question of methodological pluralism lies in the direct relationship of research methods and epistemological assumptions [R {m, e}]. Coming from the perspective that multi-method research is indeed favourable, we consider the possible restrictions to such a pluralist approach. We argue:

- i. Methodological pluralism is advisable due to the fact that IS research is a complex phenomenon. Different approaches and research methods are necessary, especially considering that research is conducted in different stages each of which has distinct requirements (Hevner, et al. 2004, Mingers 2001, cp. also section 2),
- ii. When designing multi-method research, ontological and epistemological aspect play an important role (Falconer & Mackay 1999, cp. also section 3).
- iii. However, by restricting an epistemological analysis only to paradigms and not expanding it by directly analyzing research methods themselves, the restrictive influence of epistemology on multi-method research designs is excessive.
- iv. Therefore, a sound foundation of multi-method research approaches – even across distinct paradigms – is possible in general! It must take into account the epistemological features of research methods themselves [R {m, e}].
- v. Hence, multi-method research can comprise methods from different paradigms, a) if the epistemological assumptions of the methods selected are not contradictory and b) if these assumptions conform the research's or a research group's (paradigm) epistemological statement (see Figure 6).

The question arises as to which epistemological issues are relevant to the discussion? Also, how can we systematize them? Therefore, we discuss basic epistemological issues relevant to IS research and systematize them in the form of an epistemological framework.

Epistemological assumptions are those that deal with the nature of human cognition. Epistemology can be understood as the science of analyzing the way human beings (IS researchers in this case) grasp

knowledge about what is (perceived to be) existing (Burrell & Morgan 1979, Niehaves 2004). It addresses the question of how a person can achieve true cognition. Epistemological assumptions exert a major impact on a) research method selection and b) on the validity, reliability, and “quality” of research results. Neglecting, for example, the validity of inductive conclusions (see below), precludes empirical research methods in the form of statistical analysis (ad a). If one emphasizes the influence of the subject during the research process (see below), research results achieved by another researcher claiming that objective cognition would be possible, have little validity (ad b). Therefore, firstly, the epistemological analysis of research methods applied in IS research – especially in the context of multi-method approaches – is highly relevant to research practice. Secondly, the epistemological assumptions of certain research methods to be combined within a multi-method approach have to be a) compared epistemologically and b) aligned in terms of the background of the epistemological position taken/research paradigm advocated by the subject(s) conducting the research.

<p>[I] What is the object of cognition? (Ontological aspect)</p>	<p><i>(Ontological) realism.</i> A world exists independently of human cognition, i. e. independent of thought and speech processes [cp. e.g. Bunge (1977)].</p>	<p><i>(Ontological) idealism.</i> The „world“ is a construct depending on human consciousness [cp. e.g. von Foerster (1996)].</p>	
<p>[II] What is the relationship between cognition and the object of cognition?</p>	<p><i>Epistemological realism.</i> objective cognition of an independent reality is possible. It claims the possibility of eliminating subject-dependent distortions of the cognition of reality, as soon as suitable measures for the removal of appropriate intervening variables are found [cp. e.g. Loose (1972)]</p>	<p><i>Constructivism.</i> Cognition is subjective, i. e. „private“. The relationship of cognition and the object of cognition is thus determined clearly by the identifiable subject [cp. e.g. Glasersfeld (1987), Lorenzen (1987)].</p>	
<p>[III] What is true cognition? (Concept of truth)</p>	<p><i>Correspondence theory of truth.</i> True statements are those which correspond with „real world facts“ [cp Wittgenstein (1963)].</p>	<p><i>Consensus theory of truth.</i> A statement is true (for a group), if and only if, it is acceptable to the group [sp. Habermas 1973)].</p>	<p><i>Semantic theory of truth.</i> A requirement for true statements is the differentiation of an object and a meta language [cp. Tarski (1994)].</p>
<p>[IV] What is the origin of cognition/knowledge?</p>	<p><i>Empiricism.</i> Experience-based knowledge is called <i>a posteriori</i> or <i>empirical knowledge</i> [Alavi et al., 1989, Berkley, 1975, Hume, 1978, Locke, 1982, Carnap, 2003, Quine, 1961]</p>	<p><i>Rationalism.</i> Non-experience-based knowledge is referred to as <i>a priori knowledge</i>. [Leibniz, 1962, Chomsky, 1965, Descartes, 1996, Bonjour, 1998]</p>	<p><i>Kantianism.</i> Conciliating positions recognize both experience and intellect as sources of cognition. Thoughts are meaningless without content, cognitions are blind without being linked to terms [Kant, 1999]</p>
<p>[V] By what means can cognition be achieved? (Methodological aspect)</p>	<p><i>Inductivism.</i> Induction is understood as the extension from individual cases to universal phrases, the generalization. An inductive conclusion means the transfer from statements via (observed, empirical) individual cases to a universal law a statement on the basis of an assumption of homogeneity on nature [cp. e.g. Rott (1995), Seiffert (1996)].</p>	<p><i>Deductivism.</i> Deduction is seen as the derivation of a statement (thesis A) from other statements (hypothesis A₁, ..., A_n) with the help of logical conclusions. It is the derivation of the individual from the universal and is applied, for example, in mathematical axiom systems [cp. e.g. Gethmann (1995)].</p>	

Figure 7. Epistemological Framework

Here, basic and central epistemological questions must be differentiated from one another and will be presented in the following in the form of an epistemological reference framework. The basic concept of this framework is the explicit breakdown of epistemological questions, which are highly relevance to IS research.⁶ Based on an extensive literature review in the field of a) IS research (international journals, books, and major conference proceedings) and b) philosophy of science, questions were formulated which address the epistemological foundation of current research paradigms (especially interpretivism and positivism) (Weber 2004), research approaches (including qualitative and quantitative research) (Tashakkori & Teddlie 1998) as well as research methods (for instance, empirical-statistical research or conceptual modelling) (Niehaves, et al. 2004) (see figure 7).

The question [I] (ontological aspect) of the existence of a “real” world (cp. for example Falconer & Mackay 1999, Falconer & Mackay 2000, Walsham 1995, Weber 2004) as well as [II] of the relationship between the cognition and the object of cognition, have been discussed intensively in the IS literature (cp. for example Chen & Hirschheim 2004, Fitzgerald & Howcroft 1998, Fitzgerald, et al. 1985, Hirschheim 1985, Lee 1991). Both are fundamental in the discussion of positivism and interpretivism, for instance (Weber 2004). Question [III] about the concept of truth has not yet been widely considered in the IS research literature. A brief mention can be found in (Weber 2004) and (Fitzgerald & Howcroft 1998). Nevertheless, this aspect becomes highly important in analyzing a) the influence of language on research, b) expert-oriented research, c) conceptual modelling and modelling in general (especially Tarski’s semantic theory of truth), d) interpersonal validity/truth of research results etc. Question [IV] about the origin of knowledge (Monod 2003) as well as Question [IV] about the means of achieving knowledge (methodological aspect) have also been discussed in recent literature (Niehaves 2004).

The presented set of questions (see Figure 7) suggests a basis for the epistemological discussion of IS research methods and approaches and offers the chance to support a comprehensive comparison of the particular assumptions made.

5 SUMMARY AND FUTURE RESEARCH

Different (national) research communities and different academic disciplines – often characterized by distinct research cultures – contribute to IS research. Two basic positions can be found in addressing the question of how to deal with this diversity in IS research: a) pro methodological pluralism and b) contra methodological pluralism. We pointed out the relevance of analyzing the direct relationship of methods and epistemology [R {m, e}] when discussing the possibility of multi-method research approaches and the fact that this is a shortcoming of the current discussion in IS literature. Furthermore, we provided an epistemological framework which helps to analyze and systematize the epistemological issues relevant in the field.

For future research, the framework presented in this paper could be applied to certain multi-method IS research approaches. As first step, it would be useful to analyze a certain number of IS research publications in high-quality journals. Here, it seems fruitful to analyze research approaches that use a) different methodologies from different disciplines, b) different methodologies adopted by different research communities, and c) diverse methodologies taken from different disciplines as well as from different research communities.

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An attempt is in fact made to address the largest possible spectrum of research methods of IS research with the given central questions. However, there can be no claim of completeness. Certain questions might be added or even omitted, for example those depending on the individual assessment of the researcher or issues dependent on particular research methods. Furthermore, many questions should not be answered independent of each other. Interdependencies can be identified, though, on the basis of global arguments and can thus be taken into account by the specifically positioned researcher. For this reason, however, the commonly prevailing reduction to two contrary positions, which represent both ends of the epistemological continuum, is not directed at the appropriate objectives. It is only possible to achieve the objective of the framework and to create a basis for the inter-subjective and inter-paradigmatic comparison of research methods and results, if the researcher is able to use a differentiated basic positioning.

Moreover, the epistemological framework presented should be applied to analyzing the assumptions of different IS research or research evaluation methods, for example the Bunge-Wand-Weber ontology (cp. for example Shanks & Tansley & Weber 2003) for evaluating conceptual modelling methods, (social) simulation methods, case research (Dubé & Paré 2004), or interviewing and observation methods in the context of organizational design. Here, particular research methods are taken as “modules” whose epistemological assumptions are analyzed independently of current multi-method research approaches. By doing so, this general analysis would help answer future questions relating to the combination of research methodologies in the field of IS research.

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