

Critical Realism: A Way Forward in IS Research

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Abstract

Although different strands of “post-approaches” and “post-theories”, for example, grounded theory and structuration theory, have gained popularity in Information Systems (IS) research they are not without problems. We present critical realism as an alternative philosophical underpinning for IS research. Critical realism starts from an ontology that identifies structures and mechanisms through which they are generated as being fundamental to the constitution of our natural and social reality. The paper presents critical realism and Derek Layder’s adaptive theory—this is based on the principles of critical realism—and exemplifies how they can be used in IS-research, for example, in theory development and evaluation research.

Keywords

Critical realism, after postmodernism, IS research, theory development, evaluation research

1. Introduction

Commentators on IS-research have pointed out weaknesses in positivist, realist, and other modernist approaches and theories for research on the design, development, and use of ICT-based Information Systems (IS). In response, IS-researchers have used different types of “post-approaches” and “post-theories”, for example, grounded theory and ethnography as well as structuration theory and actor network theory. The alternatives overcome some of the problems noted by the commentators. Given that we in the last years seen an increase in published IS-research utilizing postmodern, poststructuralist, postrealist, and nonpositivistic approaches and theories, these alternative approaches and theories as well as IS-research based on them need to be scrutinized. (For simplicity, we will refer to these different approaches and theories as “post-approaches” and “post-theories” when distinction is not required.)

The purpose of this paper is threefold. First, to point out some of the limitations and weaknesses in different post-approaches and post-theories for studying IS. Second, to present critical realism as an alternative philosophical underpinning for IS research. Third, to exemplify how critical realism and Derek Layder’s (1998) adaptive theory approach can be used in IS research—Layder’s adaptive theory builds on the principles of critical realism.

The remainder of the paper is organized as follows: the next section briefly presents and discusses different “post-approaches” and “post-theories” and points out some limitations and weaknesses in these theories and approaches. Next we present critical realism. This is

followed by a discussion of how critical realism and Derek Layder's adaptive theory approach can be used in IS research.

2. Problems in Paradise

In response to the cry for the use of post-approaches and post-theories in IS research, researchers have used, for example, approaches like qualitative approaches, interpretive approaches and grounded theory as well as theories like Anthony Giddens' structuration theory—for different IS-examples, see, Lee *et al.* (1997), Trauth (2001), Whitman and Woszczynski (2004), and Michael Myers' "Qualitative Research in Information Systems" (<http://www.qual.auckland.ac.nz/>).

We will not do an exhaustive review of different post-approaches and post-theories, but will point out limitations and weaknesses in: 1) one approach for generating theories, grounded theory, 2) one "theory" (description) of human action and social organization, structuration theory, and 3) the suggestions to integrate and combine different approaches in IS research, for example combining positivist and interpretive approaches.

Several IS-scholars have suggested the use of grounded theory and a number of IS studies using grounded theory have been published—for a good example, see Urquhart (2001). Generally, grounded theory is an approach to the analysis of qualitative data aiming at generating theory out of research data by achieving a close fit between the two (Glaser & Strauss, 1967). Said Strauss and Corbin, "... theory that was derived from data, systematically gathered and analyzed through the research process. In this method, data collection, analysis, and eventual theory stand in close relationship to one another." (Strauss & Corbin, 1998). One of the weaknesses in grounded theory is its concentration on micro phenomena: "The very fixity of this concentration is a factor which prevents grounded theory from attending to historical matters of macro structure as a means of enriching contemporary or, as I [Layder] shall call them, present-centred forms of research on micro phenomena. It should be possible to augment the processual and dynamic analyses of interactional phenomena by a parallel focus on the historically antecedent forms that provide their institutional backdrop." (Layder, 1993). Macro phenomena have no validity to IS-researchers using grounded theory unless these macro phenomena emerge directly from the field data. But, research suggests that macro phenomena, like national culture, influence IS-designers (Hunter & Beck, 1996) and how IS are used and evaluated (Tan *et al.*, 1995; Leidner *et al.*, 1999). Macro phenomena (structural/systemic factors) can hardly emerge in IS research focusing on agents' perceptions, meanings, and actions. Other weaknesses pointed out by Layder include how power can be handled in grounded theory. Grounded theory focuses on situated and interpersonal aspects. This means that a researcher using grounded theory will most likely miss the importance of power "behind the scenes" of situated activities.

A theory having gained popularity among IS-researchers is Anthony Giddens' (1984) structuration theory. Most notably is Orlikowski's work on applying structuration theory to the development and use of IS in organizations (Orlikowski, 1992, 2000). Figure 1 depicts Orlikowski's structural model of technology and shows the relationship between technology, human agents, and institutional properties.

According to Orlikowski (1992), technology is identified as the "product of human action" (arrow a), coming into existence and being sustained through human action, and being constituted through use. Only through the appropriation of technology by humans does it exert influence. However, technology is also "the medium of human action" (arrow b). Technology constrains and enables social practices. Institutional properties influence human

agents (arrow c)—“institutional conditions of interaction with technology.” Arrow d reflects the influence of technology in reinforcing or transforming organizations’ institutional properties—“institutional consequences of interaction with technology.”

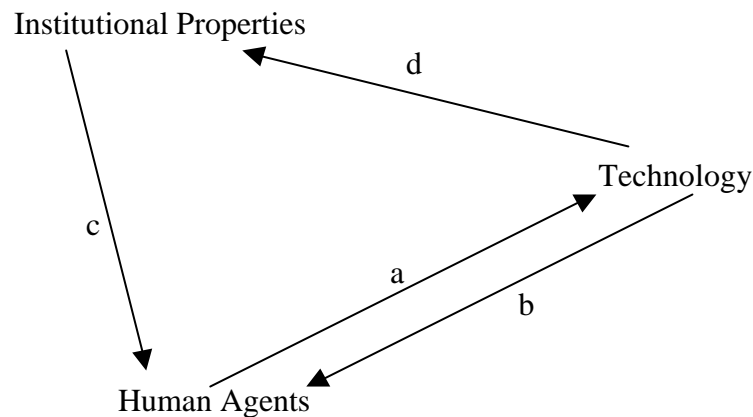


Figure 1. Structural model of technology (Orlikowski 1992).

Structuration theory overcomes some of the problems associated with realist and structuralist theories, but Giddens’ view on agency and structure is problematic when studying artifacts like IS. Giddens’ conception of agency and structure means that structure cannot be separated from agency. It is an attempt to treat human action and social structure as a duality rather than a dualism; action and structure are seen as two aspects of the same whole (a duality). According to Reed, it is “a single-level social ontology that conflates ‘agency’ and ‘structure’ in such a way that they are analytically rendered down to localized social practices bereft of any institutional underpinnings or contextualization. The ontological status and explanatory power of ‘structure’—i.e., as a concept referring to a relatively enduring institutionalised relationships between social positions and practices located at different levels of analysis that constrain actors’ capacities to ‘make a difference’—is completely lost in a myopic analytical focus on situated social interaction and the local conversational routines through which it is reproduced.” (Reed, 1997). Jones (1999) after reviewing IS research based on Giddens’ structuration theory concludes: “...it is evident that the specific attempts to adapt structuration to incorporate material aspects of IS have encountered a number of serious problems which remain as yet unresolved”.

Some IS-scholars advocate that IS-researchers should integrate or combine positivist and interpretive approaches (Lee, 1991; Trauth & Jessup, 2000), integrate case study and survey research methods (Gable, 1994), or combine qualitative and quantitative methods (Kaplan & Duchon, 1988). These suggestions seem to have some similarities with what critical realism writers suggest in terms of using methods and techniques, but there is one major difference. Critical realism writers are based in a specific philosophy of social sciences and in discussing how to use different methods and techniques in research they start from the ontology and epistemology of critical realism. IS-writers arguing for integrating and mixing different methods and techniques do this without discussing their ontological and epistemological views.

Summarizing, from an IS research perspective we can identify at least four major problems with the use of different strands of post-approaches and post-theories as well as the idea to integrate and combine different approaches and methods. First, the post-approaches and post-theories fascination with the voices of those studied have lead to an increase in IS research as

mere reportages and local narratives. Second, their focus on agency leads to that they ignore the structural (systemic) dimension. Third, their rejection of objectivist elements leads to problem when researching artifacts like IS. Fourth, the idea to integrate and combine different approaches and methods, founded in different and incompatible ontologies, are presented without an elaborate discussion of how to “handle” the incompatible ontologies. We are not claiming that the criticized approaches and theories cannot be useful in IS research, but that they have a number of limitations and that they certainly not are panaceas.

To overcome some of the noted problems, Jones (1999), Walsham (1995), and Mingers (2001a) have argued that the development of a “position” based on critical realism could be a valuable avenue to explore in IS research. Next section presents critical realism.

3. Critical Realism

Critical realism was developed as an alternative to traditional positivistic models of social science as well as an alternative to postmodern approaches and theories. The most influential writer on critical realism is Roy Bhaskar (1978, 1989, 1998). Archer *et al.* (1998) and Lòpez and Potter (2001) contain chapters focusing on different aspects of critical realism, ranging from fundamental philosophical discussions to how statistical analysis can be used in critical realism research.

Critical realism can be seen as a specific form of realism. Its manifesto is to recognize the reality of the natural order and the events and discourses of the social world. It holds that “we will only be able to understand—and so change—the social world if we identify the structures at work that generate those events and discourses ... These structures are not spontaneously apparent in the observable pattern of events; they can only be identified through the practical and theoretical work of the social sciences.” (Bhaskar, 1989). Bhaskar (1978) outlines what he calls three domains: the real, the actual, and the empirical (Table 1). The real domain consists of underlying structures and mechanisms, and relations; events and behavior; and experiences. The generative mechanisms, residing in the real domain, exist independently of but capable of producing patterns of events. Relations generate behaviors in the social world. The domain of the actual consists of these events and behaviors. Hence, the actual domain is the domain in which observed events or observed patterns of events occur. The domain of the empirical consists of what we experience, hence, it is the domain of experienced events.

	Domain of Real	Domain of Actual	Domain of Empirical
Mechanisms	X		
Events	X	X	
Experiences	X	X	X

Table 1. Ontological assumptions of the critical realist view of science (Bhaskar 1978).

Xs indicate the domain of reality in which mechanisms, events, and experiences, respectively reside, as well as the domains involved for such a residence to be possible.

Bhaskar argues that “...real structures exist independently of and are often out of phase with the actual patterns of events. Indeed it is only because of the latter we need to perform experiments and only because of the former that we can make sense of our performances of them. Similarly it can be shown to be a condition of the intelligibility of perception that

events occur independently of experiences. And experiences are often (epistemically speaking) ‘out of phase’ with events—e.g. when they are misidentified. It is partly because of this possibility that the scientist needs a scientific education or training. Thus I [Bhaskar] will argue that what I call the domains of the real, the actual and the empirical are distinct.” (Bhaskar, 1978). Critical realism also argues that the real world is ontologically stratified and differentiated. The real world consists of a plurality of structures that generate the events that occur and do not occur (these structures are called generative mechanisms). From an epistemological stance, concerning the nature of knowledge claim, the realist approach is non-positivistic which means that values and facts are intertwined and hard to disentangle.

Layder addresses how to do research from a critical realism perspective. In general he is sympathetic to empiricism, and even to some of the ideas in grounded theory, although he is critical to extreme empiricism as in “pure” grounded theory. Layder is also, in part, sympathetic to ideas from middle-range theory (Merton, 1967). Layder says: “Put very simple, a central feature of realism is its attempt to preserve a ‘scientific’ attitude towards social analysis at the same time as recognizing the importance of actors’ meanings and in some way incorporating them in research. As such, a key aspect of the realist project is a concern with causality and the identification of causal mechanisms in social phenomena in a manner quite unlike the traditional positivist search for causal generalizations.” (Layder, 1993). Layder developed his philosophy and framework primarily for being used in theory development and elaboration and less so for theory testing.

Layder suggests a stratified or layered framework of human action and social organization. The framework includes macro phenomena, like structural and institutional phenomena, as well as micro phenomena, like behavior and interaction. Figure 2 depicts Layder’s framework and describes levels (elements/sectors) of potential areas of interest in IS research.

		Element	Focus
H I S T O R Y	CONTEXT		Macro social forms, e.g. gender, national culture, national economic situation
	SETTING		Immediate environment of social activity, e.g. organization, department, team
	SITUATED ACTIVITY		Dynamics of "face-to-face" interaction
	SELF		Biographical experience and social involvements

Figure 2. Research map (adapted from Layder, 1993).

We will briefly present the different elements and, for convenience, start with the self and work towards the macro elements. The first level is *self*, which refers "... primarily to the individual's relation to her or his social environment and is characterized by the intersection of biographical experience and social involvements." (Layder, 1993). Self focuses on how an individual is affected by and responds to social situations. In encountering social situations individuals use strategies and tactics, based on their "theories" (mental models), to handle the situations. In general, the self and situated activity have as their main concern "...the way individuals respond to particular features of their social environment and the typical situations associated with this environment." (Layder, 1993).

In *situated activity* the focus is on the dynamics of social interaction. The area of self focuses how individuals are affected and respond to certain social processes whereas situated activity focus on the nature of the social involvement and interactions. This means that interactions and processes have features that are the result of how the participating individuals' behaviors intermesh and coalesce.

The focus in *setting* is on the intermediate forms of social organization. A setting provides the immediate arena for social activities. A setting can be things like the culture of the organization, artifacts like ICT-based IS that are used in situated activities, power and authority structures. It should be stressed that setting is not just a particular patterns of activity. The wider macro social forms that provide the more remote environment of social activity is referred to as the *context*. Although there is not a clear border between settings and context and some social forms straddle the two elements it can be fruitful to distinguish them. In general, context refers to large-scale and society-wide features.

Viewing the design, development, implementation, and use of IS as layers of human activity and social organization that are interdependent has two major advantages. It enables a researcher to be sensitive to the different elements with their distinctive features. Critical realism and Layder's framework stress that the layers operate on different "time scales". This means that a researcher has to view the operation of the elements not only vertically but also horizontally.

Critical realism has influenced a number of social sciences fields, e.g., organization studies. With few exceptions, critical realism is almost invisible in the IS-field. Mutch (1997, 2002) and Dobson (2001) argue for the use of critical realism in IS research and discuss how critical realism can overcome problems associated with postmodern approaches and theories, e.g. Mutch (2000) notes how critical realism can overcome problems in actor network theory. Mingers (2001a) used, in part, critical realism to argue for the use of pluralist methodologies in IS research. He also used an approach influenced by critical realism in reviewing the use of multimethod research in the IS literature (Mingers 2001b).

4. IS Research Based in Critical Realism

Critical realism has primarily been occupied with philosophical issues and fairly abstract discussions, and there has been less focus on how to actually carry out empirical research. Derek Layder's (1998) 'adaptive theory' is an approach, based in critical realism, for primarily developing and elaborating theory in conjunction with ongoing empirical research. It attempts to combine the use of pre-existing theory and theory generated from data analysis in the formulation and actual empirical research.

Figure 3 depicts the different elements of the research process according to Layder. There is not some necessary or fixed temporal sequence between the elements. Instead the elements

are loosely and flexibly positioned in relation to each other. Layder stresses that theorizing should be a continuous process accompanying the research at all stages.

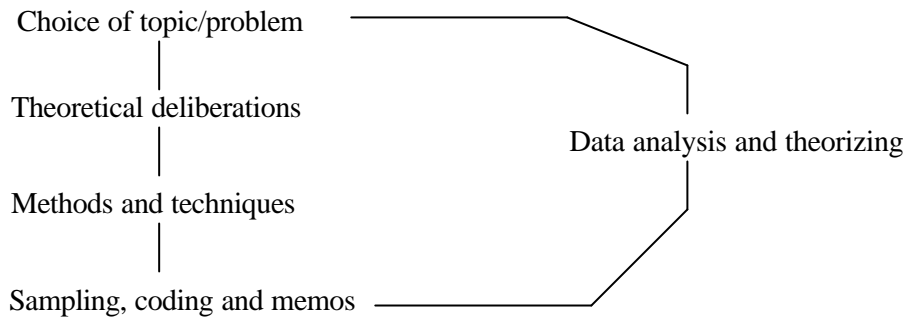


Figure 3. Elements of the research process (Layder 1998).

To exemplify how Layder's adaptive theory can be used in IS research, we will use a study on Executive Information Systems (EIS) carried out in the US, Sweden and Mexico. (The study was done together with Dorothy Leidner and the results have been published in several papers and articles.) Here a new discussion of the research is carried out. The overall purpose of the study was to increase our knowledge on the development and use of EIS.

Layder's adaptive theory approach has eight overall parameters. One parameter says that adaptive theory "uses both inductive and deductive procedures for developing and elaborating theory." (Layder, 1998). The adaptive theory suggests the use of both forms of theory-generation within the same frame of reference and particularly within the same research project and time-frame. In our project we used both forms of theory-generation. Based on previous EIS studies and theories as well as Huber's (1990) propositions on the effects of advanced ICT on organizational design, intelligence, and decision making, we generated a number of hypotheses (a deductive procedure). These were empirically tested. Critical realism proceeds by trying to discover underlying structures that generate particular events and patterns. Statistical analysis can be used to, for example, detect patterns (tendencies) within the data (Porpora, 2001; Mingers, 2000). The result was used as a starting point for more substantive investigations. In the same project we also used an inductive procedure. Although, previous theories as well as the results from other parts of the project were fed into the inductive procedure we primarily used an inductive approach to from the data generate patterns of EIS use.

Another parameter says that adaptive theory "rests upon an epistemological position which is neither positivist nor interpretivist." (Layder, 1998). Adaptive theory, in order to look for the most powerful forms of explanation, draws upon both positivist and interpretivist theories. In an effort to transcend the limitations of the theories, adaptive theory occupies the intermediate ground between both theories. In our study this was, in part, accomplished by using and combining positivistic research and interpretive research, but this was done from critical realism ontology.

One parameter says that adaptive theory "embraces both objectivism and subjectivism in terms of its ontological presuppositions" (Layder, 1998). The adaptive theory conceives the social world as including both subjective and objective aspects and mixtures of the two. In our project, one objective aspect was the ICT used in the different EIS—viewed as a generative mechanism—and one subjective aspect was perceived effects of EIS use. (This can be contrasted with IS-research based on structuration theory, which views technology as "instantiations.")

Two other parameters say that adaptive theory “assumes that the social world is complex, multi-faceted (layered) and densely compacted” and “focuses on the multifarious interconnections between human agency, social activities and social organization (structures and systems)” (Layder, 1998). The idea that the world comprises both subjective and objective features means that adaptive theory assumes that “the social world is complex and dense. Furthermore, it also assumes that the texture of this complexity and density is formed from the multifarious interconnections between agency and structure.” (Layder, 1998). In our study we focused the interconnections between agency and structure. We addressed self, e.g., perceptions of EIS, situated activity, e.g., use of EIS in day-to-day work, setting, e.g., organizational structure and culture, and context, e.g., national culture and economic situation. We found, for example, that national culture influenced how EIS were used and how they were perceived. We also found “interconnections” between EIS use and organizational strategy and organizational structure. The “effects” of these generative mechanisms “showed up” in the domain of experienced events.

Our study and the results (theory) were influenced by, e.g. Huber’s propositions and the theory saying that EIS are systems for providing top-managers with critical information, as well as we were influenced by Robert Quinns’ competing values approach (Quinn, 1988; Quinn & Rohrbaugh, 1983; Quinn *et al.*, 1996). The latter theory was brought in to theorize around the data from the interpretive part of the study. Adaptive theorizing was ever present in the research process. Theorizing was done before “hypotheses-testing” was done. We used theories about national culture (extant theory) to generate hypotheses (theorizing) on how national culture (context) could influence how EIS were used and perceived (situated activity and self). Also in the “interpretive” part was theorizing present. It was present in generating questions—using extant theory and the results from the hypotheses-testing—as well as in analyzing the collected data. Based on our study, we argued that it is a misconception to think of EIS as systems that just provide top-managers with information. EIS are systems that support managerial cognition and behavior—providing information is only one of several means—as well as it can be one important means in organizational focusing and change. The above is related to the parameter saying that adaptive theory “both shapes, and is shaped by the empirical data that emerges from research. It allows the dual influence of extant theory (theoretical models) as well as those that unfold from (and are enfolded in) research. Adaptive theorizing is an ever-present feature of the research process” (Layder, 1998).

We also envision that critical realism can make a major contribution in IS evaluation research. Work has started on developing a realistic IS evaluation perspective (Carlsson, 2003) which builds on critical realism and realistic evaluation (Pawson & Tilley, 1997). Driving this is the aim to produce ever more detailed answers to the question of *why* an IS initiative works for *whom* and in *what* circumstances. This means that evaluators attend to how and why an IS initiative has the potential to cause (desired) change.

In this perspective an evaluator works as an experimental scientist, but not according to the logics of the traditional experimental evaluation research school. Said Bhaskar: “The experimental scientist must perform two essential functions in an experiment. First, he must trigger the mechanism under study to ensure that it is active; and secondly, he must prevent any interference with the operation of the mechanism. These activities could be designated as ‘experimental production’ and ‘experimental control’.” (Bhaskar 1998). Figure 4 depicts the realist experiment.

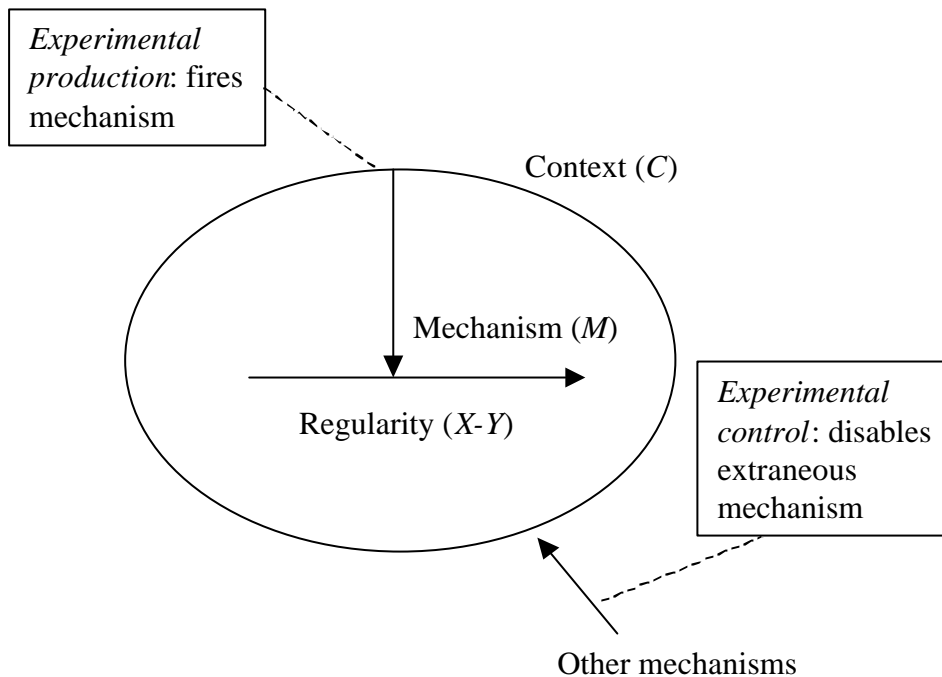


Figure 4. The realist experiment (Pawson & Tilley 1997, p. 60).

Realist evaluators do not conceive that IS initiatives “work”. It is the action of stakeholders that makes them work, and the causal potential of an IS initiative takes the form of providing reasons and resources to enable different stakeholders and participants to “make” changes. This means that a realist evaluator seeks to understand *why* an IS initiative (IS implementation) works through an understanding of the action mechanisms. It also means that a realist evaluator seeks to understand *for whom* and *in what circumstances (contexts)* an IS initiative works through the study of contextual conditioning.

Realist evaluators orient their thinking to context-mechanism-outcome pattern configurations (CMO configurations). This leads to the development of transferable and cumulative lessons from IS evaluation research. A CMO configuration is a proposition stating what it is about an IS initiative (IS implementation) which works for whom in what circumstances. A refined CMO configuration is the finding of an IS evaluation.

Realist evaluators examine outcome patterns in a theory-testing role. This means that a realist evaluator tries to understand what are the outcomes of an IS initiative and how are the outcomes produced. Hence, a realist evaluator is not just inspecting outcomes in order to see if an IS initiative works, but are analyzing the outcomes to discover if the conjectured mechanism/context theories are confirmed.

In terms of generalization, a realist evaluator through a process of CMO configuration abstraction creates “middle range” theories. These theories provide analytical frameworks to interpret differences and similarities between types of IS initiative (IS implementations).

Given that the goal is develop theories—construct and test context-mechanism-outcome pattern explanations—for practitioners, stakeholders, and participants, IS evaluators need to engage in a teacher-learner relationship with these IS practitioners, stakeholders, and participants.

Realistic IS evaluation research design employs no standard formula. The base strategy is to develop a clear theory of IS initiative mechanisms, contexts and outcomes. Given the base strategy, an evaluator has to design appropriate empirical methods, measures, and comparisons. Realistic IS evaluation research is supportive of the use of both quantitative and qualitative evaluation methods.

5. Conclusion and Further Research

This paper has pointed out some limitations and weaknesses in different strands of post-approaches and post-theories for studying the design, development, and use of ICT-based IS. Critical realism was proposed as an alternative philosophical underpinning for IS research and we exemplified how critical realism and Layder's adaptive theory can be used in IS-research. Further IS-studies based on them can form a valuable contribution to IS-research and the IS-field. Our suggestions make no claims as to being the final word in the debate about how to research the design, implementation, and use of ICT-based information systems, but critical realism and adaptive theory can lead to a stream of research that can bring new knowledge to the IS-field.

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