

A Critical Perspective on Action Research as a Method for Information Systems Research

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Abstract

This paper reviews the origins, techniques and roles associated with action research into information systems. Many consider the approach to be the paragon of post-positivist research methods, yet it has a cloudy history among the social sciences. The paper summarises the rigorous approach to action research, and suggests certain domains of ideal use (such as systems development methodology). For those faced with conducting, reviewing or examining action research, the paper discusses various problems, opportunities and strategies.

INTRODUCTION

The purpose of this paper is to critically review the origins, techniques and roles associated with a growing information systems (IS) research method known as "action research." This method is widely cited as an exemplar of a post-positivist social scientific research method, ideally suited to the study of technology in its human context. We seek to illuminate both the attractions and the detractions that this method holds for IS researchers.

The discipline of information systems seems to be a very appropriate field for the use of action research methods. IS is a highly applied field, almost vocational in nature (Banville and Landry, 1989). Action research methods are highly clinical in nature, and place IS researchers in a "helping-role" within the organisations that are being studied. (cf. Schein, 1987, p.11). It should not be surprising that action research is the "touchstone of most good organisational development practice" and "remains the primary methodology for the practice of organisational development" (Van Eynde and Bledsoe, 1990, p. 27). Action research merges research and praxis thus producing exceedingly relevant research findings. Such relevance is an important measure of the significance of IS research (Keen, 1991). However, the action research method has proved very unpopular in North American IS research. Action research articles in major North American research publications are extremely rare. Orlikowski and Baroudi (1991) discovered only one action research article among the

155 major research publications between January, 1983 and May, 1988. Action research is contributing only 0.6 percent of this research literature. Despite its overwhelming acceptance in organisational development, it is virtually non-existent among North American IS researchers.

Outside of North America, action research has made more contributions to the literature of the IS research community. In particular, Peter Checkland's *Soft Systems Methodology* (Checkland, 1981, Checkland and Scholes, 1990) influenced IS research by linking action research and systems development. This has increased the presence of action research in the British, Scandinavian and Australian IS literature. However, action research is not a predominant IS research method even in those geographic areas. Given the conducive relationship between the vocational nature of the IS field and the clinical nature of action research, why is action research contributing so little to the IS research literature (particularly in North America)? Perhaps, we are missing a good understanding of the relationship between IS research domains and the features of action research.

The work is organised as follows: first, we will establish a philosophical viewpoint for the study. Following this introduction, we will consider the origins of the method. We will continue by briefly describing the method and then discuss its role in information systems research. We will conclude by clarifying the features of action research that present the information systems researcher with problems and opportunities.

Critical reviewers have revealed serious doubts about the appropriateness of research into information systems. Jarvenpaa, Dickson, and DeSanctis (1985) found that experimental IS research is lacking in task and measurement validity. Ives and Olson (1984) found that IS survey research suffers from poor instruments and lack of control. Baroudi and Orlikowski (1989) found a general lack of statistical power in IS research. Bembasat, Goldstein and Mead (1987) noted that IS case study investigators have a history of ignoring methodological issues, and failing to specify clear objectives. Cooper (1988) points to underlying problems in the natural sciences paradigm currently associated with IS research and suggests the adoption of methodological pluralism.

As the critical revelations of IS research problems continue, interest grows in alternative methods of discovery. No doubt interest will rise in post-positivist research methods such as grounded theory (Glaser and Straus, 1967), deconstruction (Rosenau, 1992) and action research. This latter method has a longer history, and has attracted perhaps the largest following in certain geographic regions (such as Northern Europe, England and Australia). Since the action research method involves the close collaboration of both researchers and practitioners, a thorough understanding of its techniques and implications may be essential to everyone in the field of IS during the final decade of the 1990s.

The Philosophical Issue

No accurate description of action research can avoid consideration of its philosophy. This is because its usage entails some assumptions about scientific knowledge that are not widely institutionalised. This is important for the scientists who apply the method, since some of their colleagues may earnestly question the findings on very fundamental grounds.

This difficulty is diminishing, however, as the field of information systems enters a new stage in its maturity. Many scientists who have interests in the field are becoming more concerned with the social and psychological aspects of the introduction of technology into the human work place, rather than concentrating only on the technical aspects (Blackler, 1988). Some IS research is becoming more sophisticated (or perhaps esoteric) in its social science, and this is confronting IS scientists with the disparate philosophies of science that have haunted the social sciences for decades (Klein, Hirschheim and Nissen, 1991).

The present social scientific institutions are broadly based on the empirical tradition, and parallel the current philosophy of the natural sciences. In this, IS science is not an exception. The IS foundations in computer science and engineering imply an appreciation of mathematics and physics. Scientists can conduct research on this basis, and be assured that the findings will be accepted by the widest majority of their colleagues. This means that IS research scientists presently can contribute meaningful research without understanding or participating in the philosophical turmoil at the sociological periphery of IS science.

These alternative philosophies endorse research methods that may not appear to be scientific to the scientist schooled only in the statistical tradition of Pearson, the nomothetic logical positivism of Hempel or the falsifiability of Popper (*cf.* Hirschheim, 1985). The consequences of this limited perspective are threefold: dismiss the findings of such methods as unscientific; accept such findings on good faith or the reputation of the author; or lodge a considerable investment in grappling with the philosophical literature. The latter course is not a short side trip for the busy scientist; it also will not be a totally happy experience. The threatening discovery is quickly reached that some views of science discredit the findings of traditional methods (commonly called "positivist-bashing"). The more recent post-modern views of social science have altogether dismissed the idea of grand unifying scientific paradigms as an impedance (Rosenau, 1992).

Action research is a method that could be described as a paragon of the post-positivist research methods. It is empirical, yet interpretive. It is experimental, yet multi-variate. It is observational, yet interventionist. Enticingly, the research subjects are often quite willing to pay the costs of being studied, especially since they may influence the outcomes of the project. To an arch positivist it should seem very unscientific. To the post-positivist, it seems ideal.

ORIGINS OF ACTION RESEARCH

The action research method developed when the calamities of World War II precipitated massive social changes in the research arena of the social sciences. Kurt Lewin is credited with developing the method at the Research Centre for Group Dynamics (University of Michigan) in order to study social psychology within the framework of field theory (Lewin, 1951). However, another group working independently at the Tavistock Clinic (later the Tavistock Institute) developed a similar

method as a sort of psychosocial equivalent of operational research (Trist, 1976).

The Tavistock Institute dealt with psychological and social disorders caused by battlefields and prison-of-war camps. Previous to this war, these psychological syndromes had not been identified in such a large population of patients. Scientists did not understand enough about the complex causes of such social illnesses to formulate any confidence in any universal treatments. Each case appeared somehow "different". Hence, the idea of social action arose. Scientists intervened in each experimental case by changing some aspect of the patient's being or surroundings. Since scientist and therapist were one, the scientists were participants in their own research. The effects of the actions were recorded and studied. In this manner, a body of knowledge was developed about successful therapy for the illnesses (*cf.* Rapoport, 1970).

Lewin's work sought a general theory of how social change could be facilitated. His original model of action research included iteration of six phased stages, rather than the five now commonly assumed. The six stages were (1) analysis, (2) fact-finding, (3) conceptualisation, (4) planning, (5) implementation of action, and (6) evaluation. While the level of abstraction is slightly different, the essential method is very similar to the later version described above. We will discuss this in detail below.

Action research has been linked closely to systems theory from its inception, although Susman and Evered (1978) (and later, Susman, 1983) make the most seminal connections. These ideas recognise that human activities are systematic, and that action researchers are intervening in social systems. Alan Warmington (1980) explicitly describes the implications of action research for the field of systems analysis.

At Lancaster University, Peter Checkland's (1981) extensive use of action research in the methodology of systems development is a landmark for the technique in information systems research. Checkland's view of human activity systems drew considerable IS attention to action research. Checkland not only used the approach extensively in developing the soft systems methodology, but action research concepts for gaining professional knowledge permeate the soft systems approach itself.

Despite the attention currently focused on action research in the information systems research community, we must recognise that the technique never succeeded in procuring strong status in the main stream of social psychology or social science research (Sanford, 1976). Outside of IS, widely published action research arises

mostly in applied health fields, (*e.g.*, Jowett, 1988; Israel, Schurman and House, 1989; or Webb, 1989) and management research (*e.g.* Lukka, 1987). It seems to have been forced to the periphery of legitimate scientific methodologies today, perhaps because its post-positivist foundations frequently bring epistemological contention into the discussions of the research findings.

Clark (1972) cast action research as a methodological "orphan" in post-World War II science. He attributes the failure of action research to "get off the ground" in the 1950's and 1960's to the funding structure of social science research. He reasoned that research was being increasingly sponsored by public money. In response, leading researchers tended to seek projects that relied on "hard" quantitative data: projects that sported the computer analysis that attracted government attention. This post-war emphasis on professionalism and precise data collection methods led to a general decline in qualitative research skills.

Another factor is the relationship between action research and consulting. This should not be surprising, since the main stream of consulting literature can be traced back through Lippit and Lippit (1978) to Edgar Schein's *Process Consultation* (1969). Schein based process consultation on Lewin's action cycle, and Gordon Lippit was Lewin's Ph.D. student. The consulting literature and action research literature emerged among separate streams of thought from Lewin, and rarely reference each other. Still, observers may easily confuse these two intellectual cousins, requiring action researchers to defend their method against the challenge that "this is nothing but consultancy!" (Jönsson, 1991, p. 393).

We see that information systems research scientists considering the adoption of the action research method must recognise its tenuous stature as a scientific method. This is not a main stream social science technique being applied in the new field of information systems. Rather, it is an obscure, contentious method found on the periphery of main stream social science being transported into the information systems field. Perhaps, as its proponents imply, this is the field within which it will finally flourish. However, it may alternatively continue to dwell on the periphery of IS research as it has in other branches of social science.

DESCRIPTION OF THE METHOD

Action research is an interventionist approach to the acquisition of scientific knowledge that has sound foundations in the post-positivist tradition. Blum (1955)

explains the essence of action research as a simple two stage process. First, the diagnostic stage involves a collaborative analysis of the social situation by the researcher and the subjects of the research. Hypotheses are formulated concerning the nature of the research domain. Second, the therapeutic stage involves collaborative change experiments. In this stage changes are introduced and the effects are studied.

However, in order to achieve scientific rigor, additional structure is usually imposed on action research. The most prevalent description (Susman and Evered, 1978) details a five phase, cyclical process which can be described as an "ideal" exemplar of the original formulation of action research. In practice such methods often vary depending on the application. This ideal approach first requires the establishment of a client-system infrastructure or research environment. Then, five identifiable phases are iterated: (1) diagnosing, (2) action planning, (3) action taking, (4) evaluating and (5) specifying learning. Figure 1 is a diagram of this action research structural cycle.

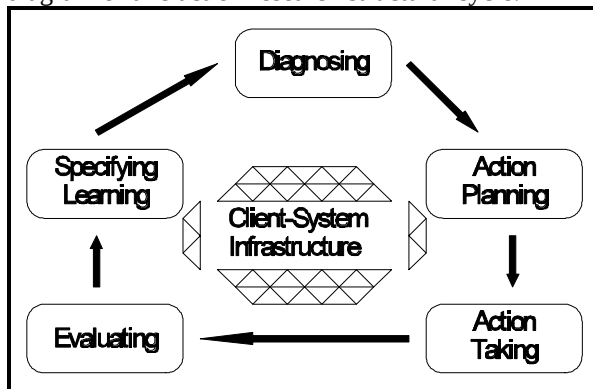


Figure 1. The action research cycle [from Susman, 1983].

The client-system infrastructure is the specification and agreement that constitutes the research environment. It provides the authority, or sanctions, under which the researchers and host practitioners may specify actions and provides the legitimization of those actions as beneficial to the client or host organisation. Considerations include the boundaries of the research domain, and the entry and exit of the scientists. It must also patently recognise the latitude of the researchers to disseminate the learning gained in the research. This infrastructure must define the responsibilities of the client and the researchers to each other. For example, the infrastructure will probably assume that the

researchers will not purposely specify actions that are harmful to the organisation.

A key aspect of the infrastructure is the collaborative nature of the undertaking. The research scientists work closely with practitioners located within the client-system. These individuals provide the subject system knowledge and insight necessary to understand the anomalies being studied. Clark describes these practitioners:

"For convenience it is useful to think of the practitioner as part of a set of actors who are oriented to solution of practical problems, who are essentially organisational scientists rather than academic scientists." (Clark, 1972, p. 65)

Diagnosing corresponds to the identification of the primary problems that are the underlying causes of the organisation's desire for change. This involves self-interpretation of the complex organisational problem, not through reduction and simplification, but rather in a holistic fashion. This diagnosis will develop certain theoretical assumptions (*i.e.*, a working hypothesis) about the nature of the organisation and its problem domain.

Researchers and practitioners then collaborate in the next activity, action planning. This specifies organisational actions that should relieve or improve these primary problems. The discovery of the planned actions is guided by the theoretical framework, which indicates both some desired future state for the organisation, and the changes that would achieve such a state. The plan establishes the target for change and the approach to change.

The action-taking phase then implements the planned action. The researchers and practitioners collaborate in the active intervention into the client organisation, causing certain changes to be made. Several forms of intervention strategy can be adopted. For example, the intervention might be directive, in which the research "directs" the change, or non-directive, in which the change is sought indirectly. Intervention tactics can also be adopted, such as the recruiting of intelligent lay persons as change catalysts and pacemakers.

After the actions are completed, the collaborative researchers and practitioners undertake the evaluating of the outcomes. This includes a determination of whether the theoretical effects of the action were realised, and whether these effects relieved the problems. Where the change was successful, the evaluation must critically

question whether the undertaken action, among the myriad routine and non-routine organisational actions, was the sole cause of success. Where the change was unsuccessful, some framework for the next iteration of the action research cycle (including the adjustment of the hypotheses) should be established.

While the activity of specifying learning is formally undertaken last, it is usually an ongoing process. The knowledge gained in the action research (whether the action was successful or unsuccessful) can be directed to three audiences. First, what Argyris and Schön (1978) call "double-loop learning," the restructuring of organisational norms to reflect the new knowledge gained by the organisation during the research. Second, where the change was unsuccessful, the additional knowledge may provide foundations for diagnosing in preparation for further action research intervention. Finally, the success or failure of the theoretical framework will provide important knowledge to the scientific community faced with future research settings.

The action research cycle can continue, whether the action proved successful or not, to develop further knowledge about the organisation and the validity of relevant theoretical frameworks. As a result of the studies, the organisation thus learns more about its nature and environment, and the constellation of theoretical elements of the scientific community continues to benefit and evolve.

Hult and Lennung (1980) summarise this process with their meticulously developed definition of action research:

"Action research simultaneously assists in practical problem-solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feed back in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable ethical framework."

Action research therefore attempts to link theory and practice, thinking and doing, achieving both practical and research objectives (Susman, 1983). We see the gaining of knowledge as an active process, such that we redefine our beliefs in the light of the outcomes. We desire a means for dealing with reality more than we desire a representation of reality. Action research is a

pragmatic approach which desires to "come to terms" with the world.

ROLE OF THE METHOD

Like any research method, action research is most valid within a domain of ideal research questions. Some research questions can be more effectively answered by other methods. Some research questions cannot be effectively answered by any other method. In this section we will begin with the features of the known domain of ideal research questions within the IS field. Following this, we will explore the features of this method that present the researcher with problems or opportunities.

Domain of Ideal Use

The type of learning created by action research represents enhanced understanding of a complex problem. The researcher obtains information about a particular situation and a particular environment. This then, gives a contingent value to the truth learned. The researcher expects, however, to generate knowledge which will further enhance the development of models and theories. The aim is the understanding of the complex human process rather than a universal prescriptive truth.

Also, the mutually accepted ethical framework discussed above may cause some concerns. If the goals of the researcher and client differ drastically there is tension. The researcher has lost sight of the fact that he is to be of value to those whom he researches. Therefore, parties must negotiate their goals. Some method for satisfying of each of their goals must be found (Warmington, 1980).

Finally, in the process of learning, an explicit clear conceptual framework must exist which the researcher imposes on the situation, which is acceptable to him/her and the organisational actors in the action research study (Warmington, 1980). This is needed so that the explicit lessons will emerge from the research cycle.

The ideal domain of the action research method is revealed in three distinctive characteristics of the method:

- (1) The researcher is *actively involved*, with expected benefit for both *researcher* and *organisation*.
- (2) *The knowledge obtained* can be *immediately applied*. There is not the sense of the detached

observer, but that of an active participant wishing to utilise any new knowledge based on an explicit, clear conceptual framework.

- (3) The research is a cyclical process *linking theory and practice*.

Checkland (1985) based the intellectual context on a simple model of the elements of any piece of research (see Figure 2). He referred to this as the "organised use of rational thought." The essential elements of this model are *F*, an intellectual framework of linked ideas -- a theory; *M*, a methodology for using this framework; and *A* the area of application -- research question. The *ideal domain* of a research method is one where *M* provides the richest scientific knowledge about *F* in the

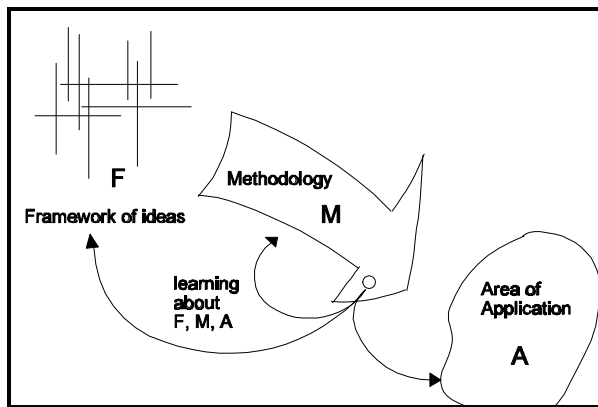


Figure 2. Organized use of rational thought (from Checkland 1985).

context of *A*. Considering action research within this model, Figure 3 depicts how this method cycles the research themes of *F* and *M* through *A* to generate reflection, action and ultimately scientific findings (Checkland, 1991). From Checkland's perspective, action research is a cycle of continuous inquiry where theory interacts with practice. This continuous interaction of theory and practice is the major characteristic of the ideal domain of the action research method.

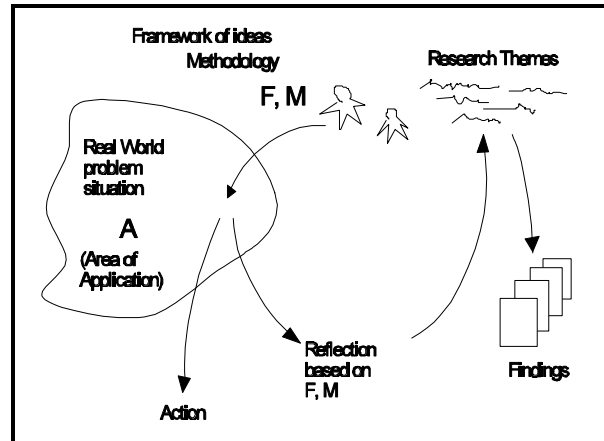


Figure 3. Cycle of Action Research (from Checkland 1991).

To claim that theory and practice interact where research is most closely focused on the techniques and principles of a vocation is tautological. Yet, if the field of study in IS is "vocational in character", as Banville and Landry (1989, p. 58) have suggested, then the ideal domain of action research (as characterised above) includes the very broadest range of IS research questions.

Within this domain, we can further identify at least one area of research which may be outside the ideal domain of the more common approaches. This area deals with new or changed systems development methodologies. Galliers and Land (1987) identified six general application areas in IS research: society, organisation, small group, individuals, technology and methodology. They find that, out of the available research methods, mathematical modelling and laboratory experiments are inappropriate for research into methodologies. The complex, multivariate settings of systems development methodologies inevitably opens a validity question for any method that assumes abstracted causality. Case studies, under the characteristic constraint of non-intervention (Jenkins, 1985) are incapable of studying new or changed methodologies, since the introduction of such changes is necessarily interventionist. We cannot study a newly invented technique without intervening in some way to inject the new technique into the practitioner environment, *i.e.*, "go into the world and try them out" (Land, quoted in Wood-Harper, 1989). This leads us to conclude that action research is one of the few valid research approaches that researchers can legitimately

employ to study the effects of specific alterations in systems development methodologies. It is both relevant and rigorous.

Relevance. Alternative research methods (to action research) must struggle to maintain relevance to the real world. Laboratory experiments and statistical models are necessarily abstracted from the richly multivariate circumstances in the real world. The empirics of action research require that it take place fully within such multivariate real-world environments. Relevance is less of a problem.

Rigorous Intervention. It is impossible to study changes to a systems development method within a rigorous case study research approach. This is because the introduction of the methodical changes necessarily requires intervention. The researchers must alter the subjects insofar as the researchers must suggest the changes in method and provide training or training materials, *i.e.*, the method as a structure for behaviour must be changed in the research subject domain.

The relevance of action research to systems development methodology has not been forcefully stated in the past. We suggest that action research, as a research method in the study of human methods, is the most scientifically legitimate approach available. Indeed, where a specific new methodology, or an improvement to a methodologies is being studied, the action research method may be the only relevant research method presently available.

Problems & Opportunities

Researchers who wish to apply action research will have several problems to be concerned about. However these problems are more likely to be general difficulties with research in social science, rather than problems peculiar to action research. For example:

(1) The lack of impartiality of the researcher has led to rejection of the action research method by a number of researchers. But this is not necessarily a problem singular to the action research method. It is rooted in the philosophical supremacy of the researchers. Philosophical supremacy refers to the refusal of scientists to accept any knowledge founded in any alternative philosophy of science other than their own (Baskerville, 1991). The same problem would confront a researcher who chooses to study new methods using opinion questionnaire survey methods. The lack of relevance

would lead to the rejection of this knowledge by a number of researchers.

(2) Some of the action research offered to the scientific community lacks discipline. This makes it difficult for the work to be assessed for the award of research degrees and for publication in academic journals. It also undermines credibility of the method with research funding agencies. Unfortunately, the lack of scientific discipline may be due -- well -- to a lack of scientific discipline. Here we distinguish *rigorous* action research from *liberal* action research. Rigor relates to fitting the research methods to the problem in order to produce valid scientific explanations, and the use of multiple methods to produce valid research constructs (Straub, 1991). Liberal action research results when the researchers become so involved in the immediate practical effects of the research that they neglect the scientific discipline. This loss can be a natural consequence of the researchers' concern for their subjects. Rapoport (1970) recognised this as the *goal dilemma* of action research. On the contrary, rigorous action research clings tenaciously to its disciplined constructs of cyclical theoretical infrastructure, data collection and evaluation. That is, there is a clear cycle of activities, there should be a premise, a pronounced theory (under test), there should be empirical data collection (*e.g.* diaries). We note that the lack of scientific discipline is a reasonable complaint about liberal action research, but we also recognise that there are similar complaints about other research methods (*e.g.*, survey methods, *cf.* Baroudi and Orlikowski, 1989).

(3) Action research is sometimes branded as "consulting masquerading as research." The historical reasons for this were discussed earlier. At least four factors clearly differentiate action research and consulting (*cf.* Gummesson, 1988): (a) researchers require more rigorous documentary records than consultants; (b) researchers require theoretical justifications and consultants require empirical justifications; (c) consultants operate under tighter time and budget constraints; (d) the consultation is usually linear--engage, analyze, action, disengage--while the action research process is cyclical. But these differentiations are not widely known, and even seasoned action researchers sometimes have trouble delineating action research from consulting (Jönsson, 1991). Rapoport called this the *role dilemma* of action research. Perhaps this too arises from sloppy action research, action

research that loses its scientific threat and finally converts entirely into consulting. The researcher using this method often must remain particularly strong and loyal, since client interests tend to subjugate scientific necessities (Seashore, 1976).

(4) Action research is context-bound, and not context-free. Therefore it is difficult to determine the cause of a particular effect, that could be due to the environment (including the researchers), researcher, or methodology. This means that action research produces narrow learning in its context because each situation is unique and cannot be repeated. Certainly action research is more deeply engulfed in any multivariate social experimental approach. But this is the nature of an idiographic method. It still has an underlying theory that is tested and either falsified or sustained. Because the theory arises from particular needs, action research is a fine theory discovery method. This is a very important characteristic of action research, since the theoretical progress of IS research is alarmingly slow (Alavi, Carlson and Brook, 1989) Like other scientific methods, further testing and even cross-method triangulation must generalise by confirming or falsifying any causal links suggested by action research theories. In this regard an action research study is no less effective and credible than most cross-sectional statistical survey methods.

These problems are actually general problems of social science research. In reality action research shares these problems with the other methods. Perhaps the distinguishing difficulties with action research are those of degree, rather than taxonomy. Rapoport identified three dilemmas in action research: *ethics*--personal over-involvement with the research, *goals*--the two taskmasters in social research: subject & science, and *initiatives*--the practical pressures that interfere with the conduct of "a disinterested pursuit of knowledge". Scientists who employ other methods, even survey research, know these three dilemmas, too. These are not peculiar to action research.

However, these dilemmas are much stronger in action research projects. Perhaps many, if not most, action researchers are trapped by these pitfalls. When they attempt to present their findings, the shortcomings of the projects are rightly discovered. If this is the case, then the difficulty with action research is not one of poor understanding of the method by those who review the research, but rather, poor understanding of the method by those who conduct the research. The solution is

better training for action researchers. Such training will help prepare action researchers for negotiating the dilemmas.

CHARACTERISTIC STRATEGIES

In the preceding paragraphs, we have shown that action research is no less credible as a social science research method than any of its alternatives. The action researcher, however, faces more challenges in maintaining rigor in the research. The social science research community has entertained enough liberal action research to confuse reviewers and examiners about the exact characteristics of proper action research. In this section, we will offer some characteristic strategies for researchers who demand scientific rigor while conducting action research. These quality guidelines will also be useful to those who must examine action research for graduate degrees, and those who must review action research for publications or grants.

Consideration for the paradigm shift

Action research does not occur in the traditional positivist philosophy of science and has an domain of ideal research questions. Is action research appropriate for the question (*e.g.*, immediately relevant methodology or theory-formulation)? Also, who composes the main body of scientists concerned with this research question? If this body chiefly contains scientists whose reference disciplines do not recognise methodological pluralism, then the action researchers must substantiate carefully the interpretive scientific foundations of their project in order to achieve credibility. Without credibility, the research will not spawn future follow-up work.

Establishment of a formal research agreement

The ethics of human subjects research discourage research without the "informed consent" of the subject. This implies that conducting action research under the disguise of consulting would be unethical. Further, clients may welcome the research content of action research -- pleased to learn that their problems are worthy of scientific interest. They may fund peripheral costs of the research, such as data compilation and preparation of working papers. Further, the client may wish to review publications for public relations purposes. In return, the researcher may charge no fees, or discount consulting fees in return for an action research agreement.

The consent and disclosure agreement is only part of the client-system infrastructure. The researcher

should prepare the subjects for the "warrants" that will authorise the research team to initiate action within the organisation. Researchers should clearly brief subjects concerning the experimental nature of the action-taking, and the iterative nature of the learning cycle.

Provision of a theoretical problem statement

One of the most important differences between the diagnosis stage of an action research project and the advice stage of a consulting project is the careful theoretical foundation of diagnoses. The theoretical foundation must be present as a premise if the experiment (the intervention action) is to remain valid as research. Therefore, the diagnosis document should include a scholarly statement of the theoretical underpinnings of the diagnosis. Understandably, iterations of the research cycle may lead to learning that adjusts the theory to keep it consistent with the observations. The mutations of this theory should be recorded carefully in the research notebooks.

Planned measurement methods

Action research is certainly empirical, although the collected data may be very unstructured. Rigorous action researchers plan methodical data collection methods. This is critical for credibility since it is ultimately impossible for the researchers to sustain claims of validity in their data analysis if the data cannot be produced for examination.

Argyris, Putnam and Smith (1985, p. 239) view "Talk as data: a window onto the logic of action." They suggest a range of reliable data collection techniques such as audiotaped observations, interviews, action experiments and participant-written cases. Action experiments entail discussions with subjects "on the spot" during action taking, while participant-written cases are the written recollections of the subject following action taking.

Outside of the context of action research, Naur (1983) has suggested the use of diaries as research data collections. Researchers may collect data by keeping diaries -- and requiring their subjects to keep diaries. Teams can keep group diaries to reduce the volume and subjectivity of the data. Such diary activity alone is a serious intervention, since there is evidence that diary-keeping can improve the management of information systems development projects (Jepsen, Mathiassen and Nielsen, 1989). Formal, detailed diaries pose serious difficulties for data analysis -- considering the volume and unstructured nature of the data. The researchers can

impose some organised structure to the diaries that will aid in data analysis.

Data validity is a problem in these techniques, partially because of the interpretive nature of the data, but also because of the intersubjectivity of data capture. The researchers inevitably influence their subjects and vice-versa. The presence of a disassociated "watcher," a *monitor*, may improve validity somewhat. The monitor is an independent, knowledgeable individual who seeks to validate the research. The monitor attends interviews, reviews diaries or other data collections, and proofreads working papers. The role of the monitor is to discover inadvertently misguided research assumptions caused by the close personal involvement of the primary researcher.

Regardless of the data collection method, rigorous action researchers design and specify the measurement techniques clearly when setting up research infrastructure. Above all, rigorous researchers clearly pronounce the measurement approach before undertaking the intervention.

Maintain collaboration and subject learning

Another characteristic strategy of rigorous action research is the careful preservation of collaboration with subjects. The subjects may well have key knowledge that is critical to the discovery of important aspects of the theory under test. Rigorous action researchers avoid dominating the diagnosis and action planning phases (*i.e.*, assuming the authoritative role of the external consultant).

The cycle of subject learning is also critical for developing the knowledge necessary to claim any idiographic usefulness for the theory under test in the action research project. During the learning cycle, the subjects acquire learning about the immediate problem situation. This leads to imperative modification of action-taking and sustains the action research cycle. Without subject learning, the action research cycle ends prematurely.

Promote iterations

Action research is also characteristically cyclical. The research data should record the repetitive planning, taking and evaluating of organisational actions. In this environment action failures (in terms of the immediate problem situation) are as important as action successes. Rigorous action research cannot disguise negative effects of some actions, as these may provide richer learning than the positive effects. The cycles will continue until the immediate problem situation is relieved.

Unfortunately, this sometimes occurs before adequate data is collected to resolve conflicts within the theory. That is, in some cases, an action research project may not generate enough data to support adequate analysis of a generated theory -- even idiographically.

Restrained generalisation

Action research, being naturally idiographic, presents researchers with a serious conflict regarding any generalisation from the project findings. As mentioned earlier, only the most tentative causal links can be claimed owing to the multivariate nature of the study. Yet for a vocationally-oriented field like information systems, it is the promise of generalisability that interests the majority of scientists. For it is generalisation that makes theories *relevant*. Some scientists believe such relevance is as important as rigor in the achievement of important information systems research (Keen, 1991).

For the action research, however, the traditional foundation of generalisation, *diachronic reliability*, is problematic. This is the traditional repeatability criterion underlying many positivist methods. An action research project, by nature of its intervention into a unique organisational setting, can never be repeated. Kirk and Miller (1986) suggest *synchronic reliability* is more useful in qualitative research. This form of reliability is based on the consistency of observations within the same time period. These observations represent alternate forms of data (*e.g.*, two researchers) relating to the same phenomenon. These data would never be identical, but should be consistent with the theory under test.

Some authorities dismiss reliability altogether as a necessary premise of generalisability. Gummesson (1988) argues that *validity* (the degree to which the research accomplished its intended goals within its scientific paradigm) is a sounder criterion for generalisation. Generalisation based on the validity of action research, although lacking any substantial proof of reliability; is no less acceptable than generalisation from statistical samples based on reliability, yet lacking substantial proof of validity.

"It no longer seems so 'obvious' that a limited number of observations cannot be used as a basis for generalisation. Nor does it appear to be 'obvious' any longer that properly devised statistical studies based on large numbers of observations will lead to meaningful generalisations."

-- Evert Gummesson
(1988, p.78)

Action researchers legitimately can generalise their findings, on the basis of the validity of their research. In addition, action researchers can design synchronic reliability into the structure of their research project. But they must exercise restraint in their conclusions, since these must be reported from a limited number of observations. This, of course, implies another characteristic of rigorous action research: circulation of the results to the scientific community. Thus, the theory will evolve under the pressure of further study and correction.

SUMMARY

Action research is regarded by many as the ideal post-positivist social scientific research method for information systems research. The present scientific institutions in information systems, however, broadly favour the current philosophy of the natural sciences. Further, action research rose from problems experienced in the field of social psychology, yet never succeeded in procuring major status in the main stream of social psychology or social science research. This suggests that action researchers in information systems assume certain risks that their findings will be rejected on philosophical grounds.

The features and characteristics of the approach define a domain of ideal use for the method. Within this domain, perhaps the study of information systems development methodology is most critical to our field. A number of problems confront the action researcher, such as a lack of impartiality, a lack of discipline, confusion with consulting, and its context-bound nature. However, these problems confront researchers using alternative methods as well. The difficulty with action research may be a matter of degree, and the easy loss of scientific rigor.

Action researchers can achieve scientific rigor through a number of characteristic strategies. First, they must establish an ethical client-system infrastructure and research environment. They plan their data collection carefully. Then they observe iterative phases that

formulate theory, plan action, take action, and evaluate the action. Through this process they promote collaboration by the subjects and support their subjects' learning cycles. Despite the idiographic nature of the study, the researcher may imply certain generalisations based on the theory and the learning. Reports of the research disseminate the scientific knowledge achieved by the study for future work that can confirm or refute any causal suggestions or claims of generalised theory.

The origins and techniques of action research have yet to draw a large following in the main stream of social science. Altogether, the features of the domain of ideal use, the features of the method that create problems and opportunities, and the strategies for applying the method, represent the major characteristics of the role of this method for information systems researchers. A critical review of these reveals that this research approach could appropriately assume a growing role in main stream information systems research and practice.

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