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Integrating Positivist And Interpretive Approaches To Information Systems Research: A Lakatosian Model

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Introduction

Ever since Keen (1980) fired the opening salvos by criticizing research in Management Information Systems (MIS) for lacking a core theory, debates about the scientific basis for the discipline have continued unabated (Bariff and Ginzberg 1982; Benbasat 1984; Culnan 1986, 1987, Hamilton and Ives 1982, Hirschheim and Klien 1989, Orlikowski and Baroudi 1991). More recently, the debate about scientific status of the discipline has centered around the metatheoretical underpinnings and the dominant philosophical assumptions that shape the work of researchers in the discipline. While there is strong evidence to suggest that research in MIS has been dominated by the logical *positivist* model of science, there is a growing interest in the *interpretive* perspective of science (Hirschheim 1984; Klein and Lyytinen 1984; Vitalari 1984; Kaplan and Duchon 1988; Weill and Olson 1989, Orlikowski and Baroudi 1991). Many IS researchers now believe that a change from a purely positivist approach to science is not only appropriate but necessary for growth in information systems research. (Jenkins 1984; Wood-Harper 1984; Boland 1984; Kaplan and Duchon 1988; Cooper 1987; Orlikowski and Baroudi 1991).

Given the radically different views and assumptions that underlie the positivist and interpretive philosophies of science, it seems appropriate to attempt some sort of a Hegelian synthesis of the two models. The purpose of this paper is to attempt such a synthesis adopting the Lakatosian Structured Methodological Falsification (SMF) model as the basis for the synthesis. The Lakatosian perspective argues in favor of the existence and desirability of multiple theoretical foundations in a discipline, and blends together both the traditional tenets of positivism (i.e. falsification of theories) with the more contemporary interpretive notions of science such as social context (Leong 1985). We begin by presenting brief sketches of the positivist and interpretive philosophies and their respective roles in shaping IS research. This is followed by a description of the SMF model, and a comparative analysis of the positivist, interpretive and SMF models of science. Finally, we show how the SMF model can provide a useful metatheory for guiding IS research.

The Positivist Philosophy And Its Role In IS Research

According to the tenets of logical empiricism, scientific progress in any discipline begins with the untainted observation of reality. This is expected to provide the researcher with an image of the real world from which (s)he cognitively generates an a priori model of the process to be investigated. Hypotheses are derived from the model and are subjected to empirical tests and if the data supports the hypotheses, then a confirming instance is recorded. Thus science progresses through the accumulation of multiple confirming instances obtained under a wide variety of circumstances and conditions (Anderson 1983).

The positivist philosophy, suffers from several limitations, especially when applied to social sciences. First, this approach, based on the inductive statistical method, generalizes a universal statement of truth from observations of a certain number of positive instances. The strict inductionist approach is often inappropriate because speculation and creation of an a priori hypothesis are essential for a systematic procedure of theory building (Leong 1985). Second, the empiricist approach is based on the notion of *pure observation*, which is impossible in research, especially in social sciences, since observations are always subject to measurement errors (Anderson 1983). Finally, this approach assumes that knowledge is derived from an objective interpretation of assumptions, without any of the subjective biases or a priori knowledge of the scientist coming into play.

A salutary aspect of the positivist approach to information systems research is that it has led to a focus on the need for good tools and methods that could safeguard against the fallibility of the human mind.

Substantial contributions to IS research have emerged due to the adoption of this model of science. For example, research on methods of structured programming, programming algorithms, and the formalization of systems analysis and design can be viewed as possible research strategies that safeguard against subjectivity in IS development. The dominance of the empirical approach to IS research has however led to criticism that IS research has frequently sacrificed *relevance* for *rigor*. Another danger of the empiricist approach when applied to practical problems is the narrowing of the problem scope to those aspects which are researchable by standard quantitative methods. The simplification and abstraction required for good experimental designs often removes interesting features from the subject of study.

The Interpretive Model and Its Implications for IS Research

The interpretive philosophy is based on the belief that science is subjective and therefore allows alternative models of reality. It emphasizes the creative aspects of science, and is in many ways the polar opposite of the positivist philosophy. The interpretive orientation conceives many possible realities, each of which is relative to a specific context or frame of reference. The social agreements about the meanings of the theories provides the necessary guarantee for the theories. This model also shatters the myth of objectivity of science and asserts that all observations are influenced by a multitude of factors, including past experience and training.

The interpretive view is pertinent to IS research for several reasons. First, since the human element is inextricably linked with the technological aspect of IS research, it is only appropriate that the underlying philosophical perspective mirrors the links. Second, it effectively overcomes the problems associated with the pure empirical paradigm which views the construction of information systems as merely technical artifacts (Cooper 1987). Finally, this view has led to the development of several research programs in IS where behavioral research issues abound.

Repudiating the methodological singularism of the empiricists, the interpretive perspective also advocates the use of multiple methodologies for conducting research. In spite of the dramatic and salubrious shifts that the interpretive perspective brings to IS research, researchers have been cautioned against blindly adopting the principles of interpretive thought and methodological pluralism without a deeper examination of the limitations, assumptions, and relevance of the methodologies to their research.

The SMF Model: A Synthesis of the Positivist and Interpretive Approaches

If the philosophy of science models are placed in a continuum where the positivist and interpretive approaches represent the two extremes, the sophisticated methodological falsification model (SMF) would appear somewhere near the middle (Leong 1985). The positivist approach makes the claim that the methods used in natural science are the only true scientific ones, while the interpretive researchers make the counterclaim that the study of people and their institutions call for methods that are very different from those of natural science (Lee 1991). It appears that the SMF model proposed by Lakatos (1978) could serve as a Hegelian synthesis of the two extremes and offer a reconciliation of the apparently irreconcilable positions of the empiricist and interpretive approaches.

The Lakatosian SMF model introduces the notion of a *research program*, much like the Kuhnian notion of a *paradigm*. The research program, consists of the *hard core* of fundamental assumptions and theoretical propositions accepted as absolute truth by the scientists within that research program. Surrounding the hard core is a protective belt of auxiliary hypothesis and mid-range theories. This protective belt has to bear the brunt of tests and get re-adjusted or completely replaced. Lakatos emphasized that every research program needs a *positive heuristic* and a *negative heuristic*. The positive heuristic is a set of partially articulated methodological rules or hints on how to change or develop the research program, while the negative heuristic suggests paths of research that should be avoided and is generally used to defend the hard core.

In a Lakatosian research program, successor theories are formed with the aid of the positive heuristic by adding additional clauses to the predecessor theories. The research programs are evaluated in terms of their

progressivity. A research program is *theoretically progressive* if modifications to the program lead to novel findings and is *empirically progressive* if at least some of the novel predictions are corroborated by data. A research program is *degenerative* if its positive heuristic no longer helps generate novel findings. Abandonment of a research program takes place when a rival research program supersedes it. This occurs if (a) the rival program accounts for all the truths of the former program, (b) the rival program offers excess corroborated empirical evidence over the former and (c) the former program is degenerative.

Leong (1985) provides a comparative analysis of the scientific bases and methodological positions adopted under the positivist, interpretive, and SMF models. Following Chua (1986) and drawing from the work of Leong (1985) we describe the SMF perspective in terms of its beliefs about physical and social reality, beliefs about knowledge and, beliefs about the relationship between theory and practice.

Beliefs About Physical And Social Reality: The SMF model effectively combines the positivist and interpretive perspectives by arguing that the demarcation of science from pseudoscience is objective in the world of ideas and propositions. However, theoretical commitment to ideas is influenced by the scientist's mental states, beliefs, and consequences. Thus while criticism of scientific theories may be based on empirical evidence, the abandonment of a research program involves the a coalition of ideas and beliefs of the community of scholars that is involved in the research program.

The distinction between criticism of a research program and its abandonment can be illustrated with an example from IS research. Over the years, considerable attention has focused upon cognitive style as a basis for MIS/DSS design. Huber (1983) in a stinging criticism of the research program on cognitive styles concluded that cognitive styles should play hardly any role in MIS design and went so far as to advocate the abandonment of this stream of research. However, in a subsequent study, it was shown that by changing the focus to cognitive processes rather than styles, useful operational guidelines for MIS design could be obtained (Ramaprasad 1987). Interpreted in the SMF context, it suggests that the positive heuristic of this research program is still able to generate novel findings.

Beliefs About Knowledge: The Lakatosian SMF framework suggests that while absolute truth may not be achievable by science, scientific research programs should in the long run lead to ever more true and fewer false consequences, and thus have increasing plausibility. In the development of science, researchers must aim at maintaining consistency as an important regulative principle, and treat inconsistencies as problems that must be addressed. While strict rules on methodology may be unnecessarily restrictive, norms for doing good science must be established. Research programs must be evaluated by their heuristic power - how many new facts do they produce and how capable are they in explaining refutations during their development.

An example of a Lakatosian research program in IS can be found in the research stream that has focused on the "business value" of information technology investments. Over the years, numerous studies have focused on the economic advantages accruing to businesses that invest in information technologies (IT). This research stream, however, has been dogged by confounding empirical results. Continued theoretical work in this area has however led to more integrative models of IT-firm performance (Bharadwaj et al. 1995) and better explanations for the seemingly contradictory findings (Hitt and Brynjolfsson 1994). Thus, while it may be argued that the productivity paradox is still unresolved, this research program has exhibited cumulativeness and has progressively given rise to better models with greater validity and predictive powers. The heuristic power of this research program can be described as "high", as it has led to the development of new facts (e.g. IT investments have served to increase consumer value) and has helped generate explanations for the contradictory findings.

Beliefs About Relationship Between Theory And Practice: The SMF model combines the divergent perspectives of the interpretive and positivist models by suggesting that although "absolute truth" may not be achievable by science, scientific research should in the long run yield ever more true and fewer false consequences (Leong 1985). Furthermore, a theory is scientific only if it has corroborated excess empirical content over its rival. While "subjective experience" may serve as an important arbiter in research, good methodological decisions are needed for conducting proper science, and norms for doing

good science must be clearly laid out. Empirical testing of a theory provides the necessary but not the sufficient condition for refutation of theories.

Conclusion

Analysis of IS research based on the SMF approach requires a delineation of the central core of the IS discipline, and the protective belt of research programs that surround the core. Information systems research is increasingly viewed as a social science that seeks to explain the effects of information technology on individuals, groups, and organizations, and establish the criteria for effective development, deployment, and use of such technologies. Positive heuristics for guiding research are very important for a rapidly evolving field like MIS. While such heuristics should not be too restrictive thereby limiting the scope of research, a total lack of positive heuristics would result in unfocussed and fragmented research.

IS research must emulate research in other social sciences and deploy a wide variety of methodological approaches. Recent attention to intensive research and special issues devoted to studies that employ intensive research techniques bear testimony to the growing acceptance and popularity of methodologies that augment the pure empirical approach. The SMF perspective can serve as a useful model for guiding research. It emphasizes the need for selecting the appropriate methodology from a variety of techniques after assessing the problem-solving efficiency, advantages, and limitations of the research methods. Finally, it recommends a triangulation of approaches in order to improve the robustness and validity of the results.

References available upon request from author