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The State of Theoretical Diversity

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ABSTRACT

Theory provides the medium for organizing and communicating knowledge that enables scientific collaboration. Review of five years of published work in two major IS journals, *Management Information Systems Quarterly* and *Journal of Management Information Systems*, describes the nature of this theoretical diversity in IS research. Two-hundred-seventy-three articles were evaluated for theoretical citations to identify the range of theories in Information Systems. Approximately half of the papers explicitly cited one of the 111 theories identified. Thirty of the theories were cited multiple times, representing 55% of the citations. The large number of theories used and the small number used more than once indicate that theoretical diversity clearly exists in information systems research. Based on the results, no theory emerged as a potential candidate for the role of grand/unified theory of information systems.

Keywords: theory, review, theoretical diversity, information systems

I. INTRODUCTION

Robey [1996] and Benbasat and Weber [1996] present the potential pros and cons of theoretical diversity in the discipline of Information Systems (IS). Robey [1996] proposes that theoretical diversity is necessary in the current state of information systems research to enable advancement on the broad (and

growing) range of phenomena studied by members of the IS community. This perpsective of theoretical diversity is consistent with the plurality of views envisioned by Van Gigch and Pipino [1986]. Robey suggests a set of collaboration guidelines intended to realize the benefits of diversity while ensuring commitment to scientific and theoretical ideals.

Benbasat and Weber [1996] argue that disciplines attain a relatively stable place and identity among other disciplines only when

- they have developed at least one powerful, general theory (paradigm), and
- the theory (paradigm) is widely accepted as the discipline's own and is not the property of some other discipline.

From this perspective, the existence of theoretical diversity is a potential threat to the viability of IS as a discipline. Another criticism of theoretical diversity is that it contributes to a lack of direction in IS research and fosters an absence of a 'cumulative tradition' [Dickson et al., 1982, Keen, 1980].

Both these perspectives assume theoretical diversity exists in IS research. We contribute to the debate by investigating this assumption. Although it is assumed that theoretical diversity exists, the degree of theoretical diversity in IS research is an important element in the debate. For example, if the degree of theoretical diversity is very low, i.e., many papers reference few theories, it may be possible to compare and contrast constructs and propositions to identify a unified theory that captures all the elements of the few theories. In this case, theoretical diversity may be considered as adequately controlled from the Benbasat and Weber perspective, while seen as overly restrictive from the Robey perspective. Conversely, if each paper references a different theory such that many theories are each referenced few times, it would not be feasible to attempt to merge constructs and propositions to identify a unified theory. Robey would expect the latter situation to exist and consider it beneficial for advancement of the field of IS. On the other hand, Benbasat and Weber would consider such a state of theoretical diversity to be detrimental to the future of IS.

Thus, we attempt to understand and measure the amount of theoretical diversity in IS research.

II. THEORETICAL DIVERSITY

Many scientists argue that research must be based on theories [Bacharach, 1989; Weick, 1989]. Theories organize and advance knowledge by providing a medium for communication. They guide their users to questions being studied by controlling the complexities of the practical concerns and phenomena that are the driving force for applied research. Theory allows us to understand aspects of the phenomena in isolation, providing rationales for selecting aspects on which to focus and setting the context in which other aspects can be safely ignored.

Theory is developed in a variety of ways from qualitative descriptions of phenomena [Eisenhardt, 1989] to meta-analysis of empirical works to the wanderings of the scientific mind [Poole and Van De Ven, 1989; Weick; 1989]. Regardless of how theory is developed, theorists have a common purpose of explaining the world [Van De Ven, 1989]. Many opinions exist to aid theorists in developing theories that are consistent with theoretical ideals of validity, utility, falsifiability, and parsimony. Above all, theory attempts to clarify ideas for communication, to set the conceptual stage for the understanding and debate of the slice of the world explained by the theory, then provide the nature of interactions that lead to increased understanding. In the face of the increasingly complex and accelerating number of phenomena in IS, such perspective is especially valuable.

A study analyzing the topics of papers submitted to *Information Systems Reserch over* five years shows the broad range of phenomena of interest to researchers in IS [Swanson and Ramiller, 1993]. Topics range from information systems development to end-user computing to information systems strategy. These diverse interests of practitioners and researchers leads to application of a variety of theories.

Benbasat and Weber [1996] define theoretical diversity as the reliance on reference disciplines for theory applied to IS phenomena. Some theories that explain phenomena in a reference discipline may have application to *similar* phenomena in IS. To the extent the phenomena are similar, this cross-fertilization and diversity is valuable as a point of departure and can often be quite insightful. IS theorists must explain the similarity of the phenomena in the reference discipline and the phenomena of interest from an IS perspective. Applying theory defined for one phenomena, regardless of its origin, to other phenomena without attention to the congruence of the underlying phenomena, assumptions, constructs, and propositions does not advance understanding. Such an approach cannot be expected to consistently produce results that are truly relevant in terms of IS phenomena. This is also true if the adopted theory is not consistent with established theoretical ideals, such as, utility, ability to falsify constructs and propositions, and parsimony [Bacharach, 1989].

Robey [1996] recommends disciplined methodological pluralism proposed by Landry and Banville [1993] as the path to the future for IS. Robey states [pg. 406], "Disciplined methodological pluralism refocuses us on the aims of science and research and requires us to justify every choice of theory and method in relation to those aims." Thus, we must examine our theories to understand how they are consistent with the characteristics of ideal theory.

A theory is primarily focused on questions of the "how," "when," and "why" of a phenomena, while the question of "what" precedes theory to identify the phenomena [Bacharach, 1989]. At first glance this may seem contradictory to the assertions of Kuhn [1970] pertaining to the guiding role of theory in scientific inquiry. However, it is clear that theory cannot exist without phenomena. Indeed, increased support for theory can only be provided through consistent prediction of phenomena. Similarly, theory can only be falsified by phenomena that do not conform to the explanations or predictions of the theory. Thus, the goal of theory is to organize thinking about complex phenomena, and then communicate this organization to facilitate explanation and prediction of phenomena.

The following sections present the methodology applied for revealing theoretical diversity, the results in terms of theories and frequency of citations, and a discussion of the implications of results for the future of the information systems discipline.

III. METHODOLOGY

This section describes the procedures used to select a representative sample of IS research articles, identify the theories cited in those articles, record the frequency with which those theories were cited, and rank the theories by frequency of citation. These procedures quantify theoretical diversity to provide a context for the debate on the impact of theoretical diversity in the IS discipline.

The sample consisted of all articles appearing in two IS journals, i.e., *Management Information Systems Quarterly (MISQ)* and *Journal of Management Information Systems* (JMIS), over the five year period from 1994 through 1998. These articles were reviewed to identify all references to theory. Because the process of examining each article for theoretical references is time consuming, we had to limit the sample. We selected two Journals and a five year period. Although there are many IS Journals and the field has existed for many years, we believe the more than 200 articles identified provided an acceptable sample for two reasons:

1. The pace of change in IS practice dictates that technology and phenomena continuously become obsolete. This pace encourages the use of multiple theories and requires the sample to be recent for evaluating the current state of theoretical diversity.
2. Our goal is to assess the state of theoretical diversity, not to provide a complete inventory of theories used in IS research.

These two highly respected long-lived peer-reviewed journals are among the most likely places to find the theories used in IS.

We followed an objective method of identifying theories. This method is not subject to interpretation and also is easy to replicate. The approach included searching for the keyword "theory" throughout the text, then identifying the name of the theory from the surrounding text and recording any references to articles associated with the theory. This approach required careful inspection of the articles and was intended to identify the range of theories applied in IS research. It also provided for adopting the perspective of the authors of the articles and identifying theories that were initiated for the first time in the sample.

The search process resulted in a list of theories identified in the articles. The list of theories was sorted to identify the most frequently occurring theories, then reduced to a list of unique theories in this sample and the frequency with which each theory was cited.

IV. RESULTS

The results quantify the scope of theoretical diversity in IS. Measurements of the number of theories and the number of theories referenced multiple times over the period indicate a high level of theoretical diversity in IS research.

One-hundred-forty-one (52%) of the 273 papers explicitly mentioned theory. Some papers cited multiple theories. One-hundred-eleven theories were cited 178 times in these papers. Thirty theories (27%) were cited in more than one paper. These 30 theories represented 54% (97/178) of the total number of citations. Only 9 (8%) of the theories were cited in 4 or more of the sample papers. The most frequently cited theory, i.e., the theory of reasoned action, was cited in only 9 papers, i.e., less than 5% of the reviewed works.

Tables 1 and 2 present the complete list of the theories identified, with Table 1 showing theories found multiple times and Table 2 showing theories found only once.

Table 1. Theories Cited Multiple Times.

Theory	**No. Times Cited**
Theory Of Reasoned Action	5 (J), 4 (Q)
Adaptive Structuration Theory	3 (J), 3 (Q)
Contingency	3 (J), 3 (Q)
Transaction Cost	2 (J), 4 (Q)
Agency	3 (J), 2 (Q)
Media Richness	5 (Q)
Diffusion of innovation	2 (J), 2 (Q)
Expectancy	1 (J), 3 (Q)
General Deterrence	2 (J), 2 (Q)
Cognitive Dissonance	1 (J), 2 (Q)
Cognitive Learning	2 (J), 1 (Q)
Communication	1 (J), 2 (Q)
Game theory	3 (J)
Information Processing Theory	3 (Q)
Self-Justification	1 (J), 2 (Q)
Social comparison theory	2 (J), 1 (Q)
Theory of Planned Behavior	2 (J), 1 (Q)
Economic Theory	2 (J)
Economic Production Theory	2 (J)
Escalation of commitment	1 (J), 1 (Q)
Ethics theory	2 (J)
Excitation Transfer theory	2 (J)
Graph Theory	2 (J)
Normative Influence	1 (J), 1 (Q)
Persuasive Argumentation theory	1 (J), 1 (Q)
Prospect	1 (J), 1 (Q)
Script Theory	2 (J)
Social Info. Processing	1 (J), 1 (Q)
Resource dependence	2 (J)
Critical Social Theory	2 (Q)

(J) = JMIS, (Q) = MISQ.

Table 2. Theories Cited Once

Theory	Journal Cited
Absorptive capacity	Q
Accounting Theory	J
Activation theory of learning and recall	J
Actor Theory	J
Attribution theory	J
Auction Theory	J
Autonomy Theory	J
Belief/Attitude-Behavior Linkage theory	J
Boland's Theory	J
Channel expansion theory	Q
Cognitive Evolution Theory	J
Cognitive Fit Theory	J
Cooperative Learning Theory	J
Coordination Theory	J
Cybernetic Theory	J
Decision & Control	J
Decision Dilemma	Q
Dimensional Integrity Theory	J
Discrepancy of Job Satisf.	Q
Distraction-Conflict Theory	J
Economic theory of Criminal Activity	J
Esthetics Theory	J
Events Theory of Accounting	J
Generate Theory	Q
Genre theory	Q
Hofstede's Theory	J
Hyperpersonalization	J
Implementation Process Theory	Q
Incomplete Contract Theory	J
Information Economics Theory	J
Information Influence	Q
Innovation Characteristics Theory	Q
Integrated Theory of Innovation Process and Innovation characteristics	Q
Job Characteristics Theory	J
Justice Theory	J
Kernel Theory	J
Leadership-confidence theory	Q
Learning theory	J
Magel's Information Center Phase Theory	J
Mathematical Set Theory	J
Media Synchronicity	Q

J = JMIS, Q =represents MISQ.

Table 2 (continued)

Theory	Journal Cited
Newell and Smon's Theory	J
Option Pricing Theory	J
Organizational Climate Theory	J
Participative Decision Making Theory	J
Relational Database Theory	J
Reliability Theory	J
Resource-based theory	Q
Rhetoric-of-Risk theory	Q
Risk based Theory	J
Role Theory	J
Schema Theroy	J
Self-determination theory	J
Self-Efficacy Theory	J
Self-perception Theory	J
Self-Presentation	Q
Signal detection theory	Q
Social Cognitive	Q
Social Definition theories	Q
Social Interaction Theory	Q
Social Paradigm	J
Social Presence Theory	Q
Sociotechnical Systems theory	J
Speech Act Theory	J
Stage Theory	J
Status Congruence Theory	J
Stimulus-response	Q
Structured Programming Theory	J
Systems theory	Q
Task/Technology fit	Q
Team Development Theory	J
Team theory of Group Productivity	J
Theory of Competitive Advantage	Q
Theory of Ethical Relativism	J
Theory of Link Grammars	J
Theory of Minority Influence	J
Theory of User Acceptance	J
Trait theory of Media Selection	Q
Trandis's Theory of Behavior	J
Trichotomy Theory	J

J = JMIS, Q= MISQ.

The distribution of articles by journal is shown in Table 3. Approximately 50% of the papers in the sample do not mention or cite theory. These results indicate that both journals publish a substantive number of papers driven by

applications of technology or phenomena observed in practice, and do not provide a theoretical perspective.

Table 3. Number of Theories referenced in Each Journal

	JMIS	MISQ	Total
Number of references	109 (61%)	69 (39%)	178
Multiple citations	53(49%)	44 (64%)	97
Single citations	56(51%)	25(36%)	81

Note: Multiple and single citations percentages refer to the division within a single journal.

V. DISCUSSION

This section examines the current state of theoretic diversity in IS and discuss implications for the future. We conclude that theoretic diversity exists and the potential for advancements in the future is high.

CURRENT STATE OF THEORETIC DIVERSITY

One-hundred-eleven theories were identified in the 200 plus papers examined. Obviously, the resources required to understand, adapt, and use these theories could be applied to the study of a dominant theory. In such a case, it is likely that more substantive progress could be made on the single theory versus the incremental advances gained from the many theories. However, such an approach is not currently possible for the IS discipline, as no reasonable candidate for dominant theory has yet appeared.

The relatively small number of theories (30) cited in multiple papers and the fact that the most highly cited theory appeared in just 5% of papers clearly demonstrates the extensive nature of theoretical diversity in IS. When combined with the large number of theories cited, it is clear that there is not a single theory that can be relied on as the paradigm for IS research. Thus, it is not currently feasible to reassign resources devoted to exploring the current range of theories to the study of a dominant theory, because no such dominant theory exists in IS.

The large number (52%) of papers that do not reference theory describe and define new phenomena. These studies are precursors to and the basis for

future theories. The broad and growing spectrum of IS activities in organizations necessitates continuing identification and examination of emerging phenomena. It is especially challenging to identify theory that is abstract enough to incorporate emergent/unanticipated behaviors, while simultaneously being concrete enough for falsification. This finding implies that articulation of a unified theory of IS will be difficult.

The results of this study indicate that the IS discipline is more focused on identifying phenomena, than on explaining and predicting. Theory appears to be used for its descriptive and communicative characteristics. To become widely accepted, theory must present reasonable explanation and reliable prediction of phenomena. A broad range of theories is consistent with the diverse interests of the IS community [Swanson and Ramiller, 1993]. However, the rate of phenomena identification limits the resources available for theory building and testing.

The adoption of theory from reference disciplines is not problematic for IS. The key to adopting theory should be the consistency of the phenomena for which the theory was defined and the IS phenomena. Theory from other disciplines will only apply perfectly in IS if the phenomena are identical. Such a finding contributes to the science of IS to the extent that it has the potential to improve the practice of IS. More likely is the situation where the phenomena is different in an IS context. In this case, IS theorists can adopt, but must then adapt the theory. Adaptation requires understanding how the theory relates to the phenomena in the reference discipline, how the phenomena in the reference discipline relates to the phenomena in IS, and suggesting how modifying the theory makes it relate more closely to the IS phenomena. Ignoring the potential benefits of applying such theories to solve IS problems is both costly and foolhardy. However, we should only adopt theories consistent with the theoretical ideals of utility, validity, falsifiability of constructs and propositions, and parsimony.

At this point in the information age we believe the goal should appropriately be to identify and describe phenomena. As mentioned by Robey

[1996], to end this search prematurely would likely result in exclusion of areas where IS has great potential to contribute to society. That is, the most significant contribution of IS may yet be unknown. We expect it is. Indeed society has neither the ability nor desire to control the acceleration of technological change and the associated phenomena it determines. An essential applied technology-oriented discipline such as IS has the obligation to pursue the dynamic range of activities occurring in practice. In addition, it is not clear how a dominant theoretical paradigm could be more valuable than a diverse set of theories. Indeed, it seems more risky to stay with the false comfort of a dominant paradigm than to embrace diversity.

IMPLICATIONS FOR THE FUTURE OF IS

Two things could happen in the future. On one hand, over time the phenomena of interest to scientists in IS may be reduced as phenomena are classified and linked to other phenomena to create an abstract hierarchy through a diverse set of theories. On the other hand, rapid advances in IS and technology may produce more and more new phenomena and outpace our ability to study and theorize. While we operate in the first scenario, the dedication to methodological pluralism and celebration of the diversity of theories should result in continued advancement of knowledge in the field. However, if we operate in the second scenario, the overwhelming number of theories and phenomena that are not linked or well understood could diffuse our intellectual resources and limit scientific progress [Benbasat and Weber, 1996].

As the field matures, it is likely that the rate at which new phenomena are found will begin to fall. The emergence of a unified theory will follow the emergence of a comprehensive set of accepted phenomena that define the field of IS. At that point, the number of non-theoretic papers and the number of theories could be expected to decrease and the number of theories cited multiple times are likely to increase. Testing these implications is only possible when this study is replicated. In addition, the process of moving from the current state of

high theoretical diversity to a future state of a dominant theory will likely be evolutionary versus revolutionary as suggested by Kuhn [1970].

The substantive number of non-theoretic papers published by these leading journals indicates the IS discipline is continuing to identify phenomena. That the range of theories is broad was necessitated by the rapid expansion in the use of information systems over the past three decades and the accompanying expansion in the numbers of phenomena. Recognition of phenomena must precede theory. Phenomena are events and changes in conditions that occur whether theory exists or not. Only explanation and prediction of phenomena can validate or falsify theory.

To ignore the work of previous scientists, regardless of discipline, due to bias driven by desire for theoretical or disciplinary purity is not consistent with our understanding of the fundamental goal of science. Theory does not spring forth in complete form in one paper as an insight of one scientist. Theories are built on the work of many scientists over time linked through commitment to phenomena, scientific methods, and theoretical ideals. While theories and disciplines may evolve to maturity as defined by Kuhn [1970], it is not necessary that the theories that ultimately become dominant be obvious during the maturation process.

Concerns over the "babble" effect of theoretical diversity might have merit if it were not for the substantive evidence that communities of IS researchers exist. For example, group support systems research has spanned decades and resulted in a community of scholars that read and cite each others' works, communicate at conferences, and share perceptions of the phenomena/topics, theories, and methods that are appropriate for advancements in this area. In other words, researchers are capable of detecting the signals and filtering the noise to define research communities (or invisible colleges) that enable progress on particular phenomena. As IS researchers we must continue to justify our theories and methods in terms of phenomena and theoretical ideals to provide clarity of communication. However, the breadth of IS phenomena implies that a

large set of theories will continue to be necessary for members of the IS discipline.

Theory guides research and it provides a framework that helps researchers focus on and explain specific phenomena. However, the realm of theory is in relating the questions of "how," "when," and "why," i.e., explaining and predicting the phenomena of the world. Such questions can only be asked after the questions of "what" is to be explained and predicted have been answered. Therefore, research conducted to identify and describe relevant phenomena is useful and valid, as it has been since the inception of IS and as it does in many other applied disciplines. The aim of IS researchers and many scientists in other disciplines that engage in descriptive research is to inform the development of theory for the advancement of science and society.

One limitation of the study is the five-year window of the sample. Perhaps it was too narrow to capture ongoing theoretic debates due to the length of time from when an idea occurs to authors until it appears in print including study design, data collection, analysis, writing, review, and publishing processes. However, we are attempting to quantify theoretic diversity, regardless of how the theories were developed and became acceptable to be used in IS Journals.

VI. CONCLUSIONS

The number of theories identified, the large percentage of theories cited only one time, and the small percentage cited multiple times illustrate the substantive extent of theoretical diversity in IS research. Clearly, no dominant theory exists. Also, much published research is focused on identification or description of phenomena.

Information System researchers should continue the tradition of theoretical diversity tempered by the guidelines of disciplined methodological pluralism. Indeed, this seems the only path forward capable of addressing the broad range of phenomena facing IS practitioners and researchers.

In future work, IS researchers should attempt to understand the influence of theoretical diversity on the IS discipline by evaluating the theories used in IS in

terms of theoretical ideals. If those theories are found to be consistent with theoretical ideals then we might conclude the theoretical diversity has a beneficial influence on progress of the discipline. That is, many quality theories that are "fine-tuned" provide for better progress than one quality theory that is "too general."

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