Cross-Fertilization of Knowledge: The Case of MIS and its Reference Disciplines

STU WESTIN
MATTHEW ROY
CHAI K. KIM

University of Rhode Island

This study examines the characteristics of cross-fertilization of knowledge of MIS and its related disciplines. The examination is conducted from the perspective of two significantly different models of scientific development. These are the internalist model and the externalist model. Citation data is used to develop a cross-fertilization network of scientific disciplines. The patterns of knowledge-sharing among the disciplines are studied. MIS and its reference disciplines are analyzed in terms of the degree to which they remain open to the ideas of other fields. Results indicate that the patterns of cross-fertilization vary greatly among these scientific fields. This suggests that no one model of scientific development serves to describe adequately MIS and its related disciplines. The status of MIS as a scientific discipline is discussed. The authors argue that the multifaceted nature of MIS should be re-conceptualized as progress from multiple directions.

Whether a discipline is viewed as a rather tightly knit “community of scientists” (Kuhnian view) [Kuhn, 1970], or as a more diffuse “intellectual community” (as enunciated by Whitley) [Whitley, 1984], what seems certain is that scientists communicate and share ideas among themselves. This communication may occur within a single discipline, between different disciplines, or both. The evolution of a scientific discipline can be studied in terms of the pattern and nature of communication, or the cross-fertilization of knowledge that occurs among scientists. The purpose of this study is to examine the characteristics of cross-fertilization of intellectual product of MIS and its related disciplines. The cross-fertilization network developed herein should provide researchers and scholars with a clear picture of the uses and sources of intellectual product in their discipline, which in turn may affect the future development of these disciplines.

Theoretical Background

Traditionally, two major models of cross-fertilization have been dominant in philosophy of science and sociology of knowledge literature. They are the so-called “internalist” model and the “externalist” model. Kuhn [1970], Hagstrom [1965], Cole & Cole [1973], and other internalists view the scientific consensus as relatively autonomous and independent of external factors. To them, the mode of change in science derives from within rather than from without a discipline.

Scientists within a discipline are likely to be
primarily concerned with communicating among themselves to the exclusion of the exchange of ideas from outside. Knowledge generated from within a discipline is considered to provide most that is necessary to solve the problems of that discipline. Largely on its own, a discipline identifies problems and the methods for solutions. It sets priorities on different research problems relatively independent of the impact of other disciplines. Hence, a discipline is viewed as being composed of clearly defined research areas whose communication is more or less restricted to the members of that discipline.

By contrast, Merton [1970], Bernal [1971], Nagi & Corwin [1972], Whitley [1984] and other externalists maintain that many of the factors of scientific change in content and method originate from outside the discipline. For instance, they recognize the impact upon science of the governmental, economic, military, and religious institutions in society. To them, a discipline is open to the ideas from other fields. Instead of seeing a discipline as a collection of well defined research areas (the internalist view), it is seen as a diverse network of interacting researchers; its research ideas are seldom viewed as originating solely from one specific research area.

It is obvious that these two theses are based on two significantly different models of science and scientific development. The internalist view is based on the notion of science as a set of activities practiced by a cohesive group or groups of scientists who have a clear knowledge of the prevailing, rigid boundary of their field. The fact that interaction is primarily limited to scientists within the field or faction suggests that any ideas that challenge the present, prevailing consensus are unwelcome, if they are allowed to be heard at all. Therefore, implicit in this view is the notion that the scientific consensus provides a convenient force for excluding ideas that may challenge this version of the reigning concord.

In this conception, a scientific discipline allows only one consensus to reign during the period of what Kuhn called “normal science.” New paradigm, according to Kuhn, implies “a new and more rigid definition of the field. Those unwilling or unable to accommodate their work to this scientific consensus must proceed in isolation or attach themselves to some other group” [Kuhn, 1970, p. 19]. This is the reason that some philosophers of science view Kuhn’s model of science as being too restrictive or monistic [Banville & Landry, 1989].

Those contending the externalist view appear unconcerned about the existence or development of a paradigm, if they even accept the notion of a paradigm. They are primarily interested in examining the nature of interaction among researchers, whatever their background disciplines might be.

To externalists, it is unnecessary for scientists to agree upon one dominant consensus which guides their scientific activities. Internalists, on the other hand, demand conformity. If the internalist view of science is seen as monistic, then the externalist view can be characterized as pluralistic.

Research Questions

The above discussion gives rise to several questions concerning the nature and extent of the interaction among groups of researchers. To what extent are the efforts and energies of scientists in a discipline driven by the work of colleagues in the same field? To what extent are they influenced by activities in other (reference) disciplines? Which fields engage in cross-fertilization of knowledge, and how does this cross-fertilization form a knowledge-sharing network structure? This same line of inquiry can be raised with respect to the discipline of MIS — the focus of the present study.

This paper addresses the following research questions:

1. What are the reference disciplines of MIS, and what, in turn, are their reference disciplines?
2. What are the characteristics of cross-fertilization of knowledge among this set of disciplines? In other words, what is the structure of the knowledge-sharing network in which MIS exists?
3. Which of the two models of cross-fertilization of knowledge (internalist or externalist) provides a better description of MIS and its reference disciplines?

Citation data provide a means for investigating the nature of formal communication among scientists. Consequently, citation data are utilized to shed insight into these questions.

Citation Data for Studying Formal Communication Among Scientists

Citation analysis has emerged as an important technique for studying science in the past thirty years. This bibliometric analysis became feasible with the inception of the Institute for Scientific Information in
Related Content

The Effects of Investments in Information Technology on Firm Performance: An Investor Perspective
[www.igi-global.com/article/effects-investments-information-technology-firm/62841?camid=4v1a](www.igi-global.com/article/effects-investments-information-technology-firm/62841?camid=4v1a)

How to Successfully Manage an IT Department under Turbulent Conditions: A Case Study
[www.igi-global.com/chapter/successfully-manage-department-under-turbulent/44560?camid=4v1a](www.igi-global.com/chapter/successfully-manage-department-under-turbulent/44560?camid=4v1a)

ACEnet: Facilitating Economic Development Through Small Business Electronic Commerce
Craig Van Slyke, France Belanger and Marcy Kittner (2001). *Pitfalls and Triumphs of Information Technology Management* (pp. 1-20).
[www.igi-global.com/chapter/acenet-facilitating-economic-development-through/54271?camid=4v1a](www.igi-global.com/chapter/acenet-facilitating-economic-development-through/54271?camid=4v1a)

Analyzing the Influence of Web Site Design Parameters on Web Site Usability
[www.igi-global.com/article/analyzing-influence-web-site-design/1281?camid=4v1a](www.igi-global.com/article/analyzing-influence-web-site-design/1281?camid=4v1a)