



IT innovation adoption by enterprises: Knowledge discovery through text analytics

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ABSTRACT

Enterprise adoption of information technology (IT) innovations has been a topic of tremendous interest to both practitioners and researchers. The study of technological, managerial, strategic, and economic factors as well as adoption processes and contexts has led the field to become a rich tapestry of many theoretical and conceptual foundations. This paper provides a comprehensive multi-disciplinary classification and analysis of the scholarly development of the enterprise-level IT innovation adoption literature by examining articles over the past three decades (1977–2008). We identify 472 articles and classify them by functional discipline, publication, research methodology, and IT type. The paper applies text analytic methods to this document repository to (1) identify salient adoption determinants and their relationships, (2) discover research trends and patterns across disciplines, and (3) suggest potential areas for future research in IT innovation adoption at the enterprise level.

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1. Introduction

Adoption of information technology (IT) innovations has been a topic of significant interest to researchers and practitioners over the past three decades (e.g. [18,53,56]). Broadly, there are two complementary perspectives on IT innovation adoption: the first and more frequently examined perspective includes the adoption of IT innovations by the individual user. Often referred to as the bottom-up view, individual IT innovation adoption research has focused on user characteristics, behavioral motivation, and contextual elements. Enterprise IT innovation adoption on the other hand focuses on the firm and firm-level characteristics.¹ This perspective has gained particular interest due to enterprises' increasing dependence on IT as well as some highly publicized successes and failures over the past two decades. Consequently enterprise-level IT innovation adoption studies have focused on why, how, and under what conditions enterprises have succeeded or failed

in adopting and implementing IT innovations. These issues have been examined for a wide range of different IT innovations, including enterprise information systems, electronic commerce, database management systems, network and telecommunications infrastructure, computer hardware, enterprise architecture components, and business productivity applications, among many others. As a result, previous studies have identified drivers and inhibitors, explored the influence of important technological, individual, organizational, strategic, economic, and managerial, and environmental factors, and examined key processes and stages associated with the adoption of IT innovations.

Because IT touches upon virtually all aspects of an enterprise's value chain, researchers have drawn on theories, frameworks and models from a variety of complementary academic reference disciplines such as information systems, computer science, economics, organizational sciences, marketing, and strategic management. In doing so, enterprise adoption research has thus become a rich tapestry of a plethora of theoretical and conceptual foundations.

Despite arguments that research within this domain is exhausted, enterprise adoption of IT continues to be a topic of interest to decision makers, managers, vendors, and users alike. Practitioners have argued that within corporate IT, the pace of technology change has increased so significantly that executives who do not embrace IT innovations at some level risk ending up behind the competition. Indeed, in today's global and competitive environment, IT innovations can provide enterprises with the ability to streamline and transform their organization, create new forms of organization, provide enhanced collaboration capabilities, generate new competitive advantages, and potentially enable them access to new industries and markets [7,15,58].

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¹ Unquestionably, there is a strong relation between individual and enterprise adoption of IT innovations. Many IT innovations are often first adopted by individuals and later assimilated into the organization. As a result it is not surprising that there is large body of research examining individual IT innovation adoption. Interested readers are referred to [27] W. R. King and J. He, "A meta-analysis of the technology acceptance model," *Information and Management*, vol. 43, pp. 74–755, 2006, [32] P. Legris, J. Ingham, and P. Collette, "Why do people use information technology? A critical review of the technology acceptance model," *Information & Management*, vol. 40, pp. 191–204, 2003, [57] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: toward a unified view," *MIS Quarterly*, vol. 27, pp. 425–478, 2003. for extensive reviews.

However, IT innovation adoption strategies must be carefully evaluated and balanced as IT budgets are tightening. Consequently, with the continuous emergence of IT innovations, there will be not only a need but also an opportunity to understand and study how and why enterprise adoption occurs, what contextual factors have changed, what fundamental value IT innovations can deliver, and in what ways they align or transform corporate strategy. As a result, we anticipate that IT innovation adoption research will continue to proliferate.

The objective of this paper is not to suggest new theories or propositions concerning enterprise adoption of IT innovations, as there is no lack of these. Given the vast nature and diversity of the enterprise adoption literature, there is also no attempt made to offer a comprehensive recitation of research findings or methodologies. The purpose is, rather, to provide a sufficient assessment of the current state of enterprise adoption research by providing a comprehensive classification and analysis of the scholarly development of the literature. Our work differs from previous literature review and meta-analytic studies in several ways [25,27,59]. While IT innovation adoption is predominantly a phenomenon studied by information systems researchers, it is a complex topic that touches upon a plethora of issues central to other disciplines, including operations management, strategy, marketing, and organizational behavior. Consequently, examination of solely IS publications would not provide an accurate and holistic reflection of IT innovation adoption research [59]. In contrast to earlier review studies, this paper therefore does not focus only on IS studies or research in a single discipline, but examines all relevant academic disciplines.

A second key difference of this study is the application of text analytic methods to identify, explore, and evaluate the rich literature on enterprise adoption of IT innovations. Traditionally, literature reviews required manual identification, evaluation, and coding of relevant text sources. The resulting process is extraordinarily resource-intensive; consequently, researchers often limit the scope and scale of their analysis. Often times, review studies focused their assessments on title, abstracts, and keywords of research articles only, which has been identified as a clear limitation for comprehensive analysis of a topic domain [59]. More recently, it has been argued that text mining techniques could significantly improve literature assessments as they enable researchers to examine both structured and unstructured full-text data more rapidly and accurately [16]. In this paper, we harvest this power by using a full-text mining approach to extract key phrases and information, identify central themes, and apply concept linking.

Lastly, a key difference of this paper is the examination of over three decades of IT innovation adoption research. In contrast to most previous review studies, which limited their analysis to five to ten-year time spans, we provide a comprehensive picture of the scholarly development and trajectory of research and are thus able to identify important longitudinal trends in enterprise-level IT innovation adoption topics, methods, drivers, inhibitors, and contexts.

The remainder of this paper is structured as follows. Section 2 describes the research methodology and text mining technique used to conduct the multi-disciplinary literature classification and analysis. Section 3 presents the results of the study. Research implications are discussed in Section 4. The paper concludes in Section 5.

2. Method

The study of enterprise adoption of IT innovations is not confined to a single discipline. As such, the identification of relevant studies becomes quite cumbersome and requires an integrative literature analysis approach. We combine manual identification, extraction, and coding of articles with full-text analytics to automatically extract key terms and discover research patterns. An overview of our research approach is shown in Fig. 1.

2.1. Data sources

A preliminary scan of the literature reveals several complementary research streams that examine enterprise adoption of IT innovations. In order to simplify the classification of the relevant literature, we used a combination of previously identified supporting discipline subject areas to consolidate and group the various publication outlets into five broad research streams (see Table 1) [34,35].

Given the increasingly growing base of studies across these five categories, we conducted an extensive search of the literature by searching several comprehensive online databases. These included ABI/INFORM, Academic Search Elite, ACM Digital Library, Emerald Fulltext, IEEE Xplore, Science Direct, and the Social Science Citation Index (SSCI). In those cases where online access was not available, a hardcopy of the article was obtained through the university library and interlibrary loan systems.

It should be noted that our study focused on highly ranked journals as identified in previous studies and ABS rankings [1,20,34,39,45]. We decided not to include conference proceedings, books, book chapters, theses, dissertations, and articles from the popular and trade press due to the commonly accepted belief that scholarly, peer-reviewed journals tend to be the best outlets for disseminating new knowledge [17,39]. A complete list of journals included in our literature analysis, categorized by research stream, is shown in Table 2.

2.2. Inclusion criteria

The literature search was based on a number of different descriptors adapted from the Barki keyword classification scheme, which is commonly used to classify studies in the management information systems (MIS) and technology management literature [5,6]. These descriptors included: “Information Technology Adoption (EL05)”, “IS Implementation (FD)”, “Diffusion of Innovation (DD0502)”, “IS Planning (EF)” and “Strategic Planning (AF0406).” While additional descriptors could have been used, the authors believe that these descriptors sufficiently describe and capture the breadth of potential topics associated with the study of enterprise adoption of IT innovations.

The timeframe of our analysis is 1977 to 2008. The starting date of 1977 was chosen based on the first occurrence of an article [62], to the best of the authors' knowledge, specifically addressing the issue of enterprise adoption of IT innovations. Our time period is more comprehensive than any other study on integrating findings on IT innovation adoption. Most studies have used a short, 1, 5 or 10-year span. We argue that a broader time horizon enables a much richer longitudinal comparison of studies and a more accurate evaluation of the scholarly development and evolution of the field.

The full text of each article was reviewed by the authors to eliminate those articles that did not meet the selection criteria. The selection criteria for article inclusion were as follows:

- *Articles focused solely on the adoption of IT innovations.* This eliminated those studies that considered organizational innovations, such as processes, methodologies, managerial philosophies and strategies; non-IT innovations, such as manufacturing technologies; and administrative innovations in general
- *Articles with the enterprise, organization, or firm as the focal unit of analysis.* This eliminated a substantial body of research that focused primarily on individual (e.g. end-user, consumer, customer, etc.) and group (e.g. team, community, etc.) adoption of IT.
- *Studies published in one of the six functional categories and associated leading journals,* as these were considered the most likely outlets for relevant and rigorous enterprise adoption research.
- *Studies based on rigorous research methods.* Each of the included studies had to be based on rigorous research methods to ensure validity, consistency, and quality. This eliminated editorial notes, research notes, and executive overviews.

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