



Invited Review

Enterprise resource planning: Developments and directions for operations management research

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Abstract

Enterprise resource planning (ERP) has come to mean many things over the last several decades. Divergent applications by practitioners and academics, as well as by researchers in alternative fields of study, has allowed for considerable proliferation of information on the topic and for a considerable amount of confusion regarding the meaning of the term. In reviewing ERP research two distinct research streams emerge. The first focuses on the fundamental corporate capabilities driving ERP as a strategic concept. A second stream focuses on the details associated with implementing information systems and their relative success and cost. This paper briefly discusses these research streams and suggests some ideas for related future research.

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1. Introduction—The many views of ERP

Speculation on the future development and success of enterprise resource planning (ERP) is the topic of many popular press articles. These articles, typically written by individuals associated with the ERP companies, are often focused on the merits of the featured software. Unfortunately, in order to distinguish the merits of alternate packages, these same authors find it useful to introduce new terms designed to emphasize potential appeal.

In reality many of these “new” terms do not actually represent new concepts, but simply the re-packaging of existing ideas. The end result of accepting and disseminating these new terms into general discussions on the topic only leads to increased confusion over time.

A case in point is the variability with which the term “ERP” itself has been used over the last decade. The fundamental benefits of ERP systems do not in fact come from their inherent “planning” capabilities but rather from their abilities to process transactions efficiently and to provide organized record keeping structures for such transactions. Planning and decision support applications represent optional additions to the basic transaction processing, query and report capabilities included with a typical system.

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Such a realization often comes as a surprise to academics and practitioners alike, having anticipated greater decision support intelligence to be built into ERP packages. This is particularly salient when they discover that simple time series based techniques are used for forecasting or basic trial-and-error techniques are used for master scheduling. Even slightly more advanced techniques (i.e. auto-regression forecasting and linear programming approaches) are typically not part of standard package installations.

Ambiguity about the term ERP has also led to a relatively limited line of research in the area. Most ERP research to date has involved exploratory surveys, targeting common and ubiquitous issues like “cost”, “time” and “success”. They have also tended to focus on only the initial issues confronting ERP practitioners, such as vendor selection and package implementation (Davenport, 1998). Studies on usage and extendibility for operational and strategic benefit have been much less common, regardless of the fact that such issues most likely represent the motivating long-term rationale behind adoption in the first place.

Although the exploratory focus may be interpreted as problematic, perhaps one of the most crippling constraints on the growth of ERP research has been the mere fact that “getting the system to run” often dominates discussions with companies. Consider the operational challenges associated with supporting literally thousands of users, potentially located in many different sites, all accessing a single integrated database. The computer hardware and network technology is complex and the tasks required to keep these operating often becomes the focus of information system practitioners. This complexity may be one of the reasons why attempts to link benefits to ERP investments have proven so difficult.

Because of this difficulty, business academics that associate ERP systems with “software”, rather than “concepts”, may be inclined to simply disregard the role of ERP systems in research and educational settings. Along these lines, some faculty see the teaching of ERP topics as more the role of corporate “trainers” than academic educators. Likewise, many researchers have viewed the ability to provide contributions in the area of

ERP research as relegated to programmers and human–computer interaction specialists.

Still others believe the ERP age has passed. Buzzwords like “B2B”, “B2C”, and “CRM” and just about anything else preceded by an “e-” seem to have taken center stage. Yet ironically, each of these new terms at their most basic levels represent extensions of ERP systems to the customer, as far as physical distribution capabilities are concerned, and to the supplier with regards to purchasing applications. So are researchers in danger of missing the big picture on these new ideas? Possibly. Is it too late to make up for lost time? A realistic understanding of the role that ERP systems now play in major international corporations, and their continued diffusion among small and medium firms over the last few years, suggests that the answer is clearly “No”.

However, in attempting to study the appropriateness of such extensions researchers must come to terms with the capabilities of the larger systems that support them. Otherwise we risk encountering inconsistencies of the type that lead to perpetuation of the infamous “productivity paradox” (Brynjolfsson and Hitt, 1996; Brynjolfsson, 1993). This “paradox” was originally cited to describe the difficulty of linking investments in IT to productivity levels. By focusing on traditional interpretations and metrics of productivity, which by their nature provide only limited views on firm success, many early searches for such linkages were not only theoretically unfounded but also not surprisingly fruitless. A later focus on alternative views on productivity growth and more logically structured measures of IT usage ultimately provided much more in-depth understandings of the strategic concepts supported by the IT and the mechanisms through which benefits could be observed (Brynjolfsson, 1998; Caruso, 1999).

Ultimately researchers should keep in mind that ERP systems and these new extensions do not simply represent add-on tools that assist businesses with fleeting tasks. On the contrary, ERP systems represent corporate infrastructures, much in the same way that physical highway systems do. As corporations and academics gain increased experience with how this infrastructure impacts business decisions in their disciplines, research into

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