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WHAT DRIVES WAVES IN INFORMATION SYSTEMS? THE ORGANIZING VISION PERSPECTIVE

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Abstract

Waves of fashionable ideas shape the practice and research of information systems (IS). What forces drive idea waves in IS? This research takes the first step to empirically study IS idea waves in inter-organizational communities through the lens of organizing visions. Introduced by Swanson and Ramiller (1997), an organizing vision is a focal community idea for applying information technologies in organizations. Each organizing vision is produced and sustained through a discourse whose popularity often runs a wave-like lifecycle. By studying the discourse promoting enterprise resource planning (ERP), I examine the influence of four forces on the upswing phase of an organizing vision discourse wave: (1) a business problematic highlighted by discourse, (2) the early market for an IS innovation, (3) core technologies, and (4) the collapse of old organizing visions in a problem domain. A better understanding of the relationship between key forces and organizing vision development will help both practitioners and researchers monitor and relate to the exciting waves in our field.

Keywords: IS innovation, organizing vision, IS fashion, discourse, enterprise resource planning.

> We are not interested in *a* wave and we certainly aren't going to believe that any particular wave is *the* wave. We are interested in *wave generators*.
> — John L. King[1]

INTRODUCTION

New information technologies (IT) are emerging endlessly. When new IT are applied in organizations, not only are new hardware and software installed, but also new roles and work processes are incorporated in new forms of information systems (IS). In this way, IS innovations arise. Grand ideas abound in the IS field to describe, for example, how the IS innovation works, what benefits and costs it brings, and how it should be implemented. Typically, most of these ideas can be identified by unique labels, or *buzzwords*, such as groupware, e-business, and peer-to-peer computing (P2P). As technologies come and go, the ideas often run wave-like lifecycles. No wave lasts very long, so waves of ideas are frequently linked to fashions, fads, or hype, which sounds trivial, irrational, and false. For this reason, both IS practitioners and researchers try to stay away from the faddish waves, let alone bother to seriously study the waves of fashionable ideas.

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[1]Keynote speech at the Twenty-First International Conference on Information Systems (ICIS), "We Were Right and They Were Wrong," December 11, 2000, Brisbane, Australia.

Ironically, nobody in IS can escape from fashionable idea waves. For example, in order to compete in the $3.2 billion customer relationship management (CRM) software market,[2] vendors collect ideas from CRM implementers to improve their products. Chief information officers (CIOs) look in the trade press for ideas on change management for their multi-million-dollar enterprise resource planning (ERP) projects. In 1999, hundreds of business schools were pondering whether to offer separate degree programs in e-commerce to satisfy demands from their hundreds of thousands of students, the future managers. Numerous IS assistant professors generate and consolidate an abundance of creative ideas, hoping to help practitioners with knowledge management (KM) as well as to get tenure for themselves.

Indeed, ideas matter. Ideas shape the diffusion of innovations among organizations (Abrahamson 1991; Swanson and Ramiller 1997). In our field, we know little about how waves of ideas are created, what forces drive the waves, why some waves are big while others small, how the ideas evolve, and how we can, if at all, predict the next big idea wave in IS. Furthermore, both practitioners and researchers need to monitor and relate to the waves of IS ideas for practical reasons. For practitioners, by innovating with the right IT early on, they might achieve competitive advantages for their organizations. IS researchers, striving to uncover the lessons learned in managing IT, periodically face the challenge of which information system to study. Therefore, it is useful to ask: What forces are driving waves of ideas in information systems?

Swanson and Ramiller are among the earliest IS researchers to study ideas shaping IS innovations. They used the term "organizing visions" to refer to ideas for applying IT in organizations. Their organizing vision theory is particularly useful to this study because the theory describes how waves of organizing visions are produced and shaped by several institutional forces in heterogeneous, inter-organizational communities. In this study, through the lens of organizing vision, I look for the empirical evidence of "wave generators" for ideas promoting a major IS innovation: enterprise resource planning (ERP).

THEORIES

According to Swanson and Ramiller (1997), an organizing vision is a focal community *idea* for applying information technologies in organizations. Organizing visions shape the diffusion of IS innovations in three ways. First, a vision *interprets* the innovation's purpose. Second, the vision develops the underlying rationale to *legitimate* the innovation. Third, the vision helps *mobilize* the entrepreneurial and market forces to support the material realization of the innovation.

Unlike IS innovations that take up material resources, organizing visions, essentially mental images or ideas, are produced and sustained through a discourse in an inter-organizational community often composed of technology vendors, consultants, journalists, (potential) adopters, and academics, all united by a common interest in shaping the vision. Members of the discourse community employ numerous outlets (e.g., newspapers, magazines, books, speeches, advertisements, etc.) to promulgate their ideas. The ebb and flow of an organizing vision's discourse map the popularity wave of the vision, and consequently discourse serves as the key vehicle to study idea waves.

From the *beginning* of an innovation's diffusion, community members collectively develop an organizing vision in order to make sense of the innovation. Thus, the popularity wave of the vision is conjectured as a function of several cognitive indicators including the vision's distinctiveness, intelligibility and informativeness, plausibility, and perceived practical value (Swanson and Ramiller 1997). By definition,[3] any wave comprises an upswing phase and a downswing phase. Organizing visions more distinctive, informative, plausible, and practically valuable, are more likely to develop along a steeper upswing curve than visions less so. Over time, a vision's distinctiveness, informativeness, plausibility, and perceived practical value will decline as the innovation is routinized or abandoned. A downswing seems inevitable. For this reason, the wave's *upswing* phase and its driving forces are particularly interesting and thus will be the focus of this study.

Studying relatively transitory collective beliefs about fashionable management techniques, management fashion theorists, provide relevant insights for this study because, first, fashions are about beliefs and ideas; second, fashions are relatively transitory and run wave-like lifecycles; and third, the management fashion market, in which fashion suppliers produce fashions to satisfy demands of fashion consumers, is analogous to the inter-organizational communities that produce organizing visions. In the

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[2] International Data Corporation (IDC), "Customer Relationship Management Market Forecast and Analysis, 2000–2004," Document #22401, June 2000.

[3] According to *Webster's Ninth New Collegiate Dictionary* (Merriam-Webster Inc. 1990), a *wave* is "something that swells and dies away" (pg. 1333).
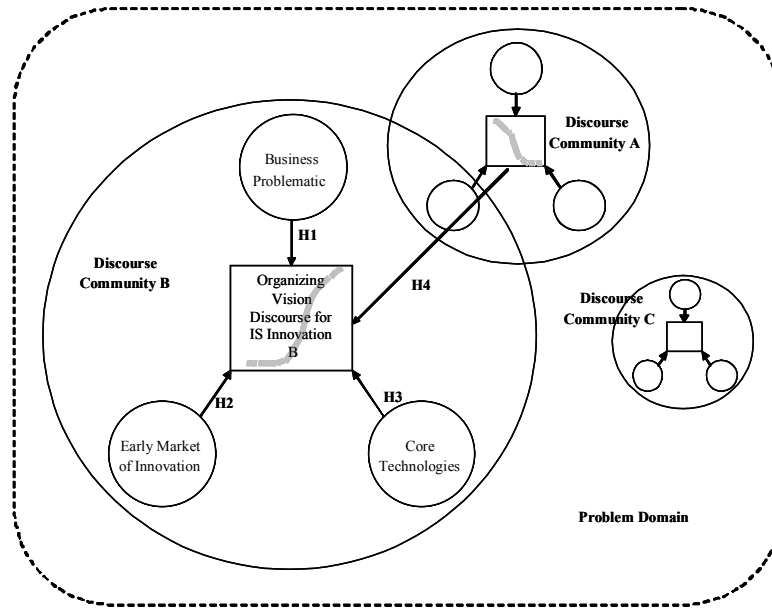
Figure 1. Hypothesized Drivers of Organizing Vision Discourse

following, four vision drivers will be proposed based on the organizing vision and management fashion theories. Figure 1 provides a graphical overview.

According to the organizing vision theory (Swanson and Ramiller 1997), a *business problematic* (difficult business predicament shaped by forces largely outside the vision's generative community) defines a vision's fundamental currency and relevance because the innovation is argued to be a response to the problematic. Interestingly, the notion of business problematic is well related to the performance gap concept in management fashion theory (Abrahamson 1996; Abrahamson and Fairchild 1999). A performance gap is the discrepancy between the levels of performance managers in organizations aspire to and the levels they actually attain. Management fashion theory posits that only the performance gaps brought to managers' collective attention by management discourse can trigger a management fashion. Together, these arguments suggest Hypothesis 1: *Discourse highlighting a widespread business problematic drives an organizing vision promoting an IS innovation as the solution.*

Swanson and Ramiller contended that *commerce*, especially the trading in an *early market* of an IS innovation's applications, among community members gives particular impetus to the development of the organizing vision, reflecting shared knowledge and belief systems gained through commercial exchanges. Similarly, management fashion theory states that the adoption of a management technique prompts management-knowledge suppliers to produce more discourse promoting this technique (Abrahamson 1991). Even so, it is important to note that an organizing vision in turn demystifies the innovation and then empowers early adopters to implement and the hesitant early majority to adopt the innovation.[4] Beyond the early history, the market impact is increasingly replaced by a reciprocal relationship between the innovation's market and organizing vision discourse. Taking all of this into account, I raise Hypothesis 2: *The early market of an IS innovation drives the upswing of an organizing vision discourse promoting the innovation. However, the market impact decreases over time.*

Organizing visions are ideas about organizational application of information technologies. New IT can be "an important driver in the production of organizing visions" (Swanson and Ramiller 1997, pg. 467). Relentless emergence of technology *core* to the IS innovation constantly pushes the community for rounds of sense-making. To test this claim, I raise Hypothesis 3: *An IS innovation's core technologies drive an organizing vision discourse promoting the innovation.*

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[4]Rogers (1995, pg. 262) suggested five adopter categories: innovators, early adopters, early majority, late majority, and laggards. After adopting an IS innovation, an organization may not immediately implement it, opening a lag between adoption and implementation, termed an "assimilation gap" by Fichman and Kemerer (1999).

With respect to the relationship between visions, organizing vision theory stresses the notion of *problem domain*, where similar visions addressing similar business problematics may overlap, blend, or clash with each other. A related notion in management fashion theory is the management fashion *niche*, the recurrent source of demand for new discourse promoting fashionable management techniques (Abrahamson and Fairchild 1999). Because each niche has a finite carrying capacity in terms of the number of fashions it can sustain, the collapse of an old fashion triggers the rise of a new fashion in the same niche. To assess this, I bring up Hypothesis 4: *The downswing of an old organizing vision drives the upswing of a new vision discourse in the same problem domain.*

To summarize, Figure 1 portrays a snapshot of a hypothetical problem domain, hosting three organizing visions for three IS innovations, A, B, and C. Innovation A is relatively old and its organizing vision discourse is declining. Innovation B is current and its vision discourse is rising to its full ascendancy. Innovation C is emerging. The organizing vision for innovation B is the focus here. The vision is developed in a heterogeneous inter-organizational community (discourse community B). This community may overlap with other communities that develop related visions. As hypothesized, the upswing phase of vision discourse for innovation B is driven by (1) a widespread business problematic highlighted by discourse, (2) an early market of innovation B, (3) core technologies underlying innovation B, and (4) the downswing of the vision discourse for innovation A.

METHODS

As the organizing vision theory is relatively new, a discourse study of a specific organizing vision can be useful to assess and refine the theory for future large-scale tests. I chose to study the organizing vision for enterprise resource planning (ERP) mainly because the vision is relatively current and the stakeholders have significant interests in the sizable ERP implementation and maintenance market. Discourse researchers often count the number of articles on particular subjects to trace changes in the popularity of discourse on particular topics (Kabanoff and Abrahamson 1997). Because vocal data can be biased due to observation limitations, I focus on written discourse, specifically, on articles under particular subjects in the ABI/Inform Global database, which has provided abstracting and indexing for over 1,500 periodical publications since 1971. To measure the volume of ERP discourse, I counted articles listed under the "Enterprise Resource Planning" subject heading for each publication each year. The first article on ERP appeared in ABI/Inform in 1991 and the volume was increasing until 1999, so I believe that a nine-year window (1991-1999) would be sufficient to map the upswing of the ERP organizing vision.

For Hypothesis 1, the widespread business problematic that ERP systems were designed to solve is the fragmentation of information in large business organizations (Davenport 1998). To see how much this problematic was highlighted by discourse, I counted articles about information fragmentation in ABI/Inform. Additionally, plagued by legacy systems neither Year 2000 (Y2K) nor Euro compliant, many companies have found it much easier to replace their legacy systems with Y2K- and Euro-compliant ERP solutions (Minahan 1998). To investigate the influence of these two problematics on the ERP vision, I counted articles under subjects of "Year 2000" and "Euro." For Hypothesis 2, I chose to use annual sales data for ERP software. For Hypothesis 3, the core technologies for ERP include client/server architecture, graphical user interface (GUI), fourth generation languages (4GL), and relational database management systems (RDBMS) (Wylie 1990). So I counted articles on these four subjects. Hypothesis 4 is about the relationship between organizing visions in the same problem domain. ERP's problem domain has been continuously evolving. ERP software grew out of the older manufacturing-planning software—MRP II (manufacturing resource planning)—but has markedly expanded its functionality. Consequently, I counted articles on MRP II, closely related innovations such as electronic data interchange (EDI) and business process reengineering (BPR), as well as decision support systems (DSS) and total quality management (TQM), which may broadly share problem domain with ERP.

The dependent variable is the yearly ERP article count for each publication. Independent variables are grouped in four categories (Table 1) to represent the four drivers of the ERP vision. Five control variables are used to partial out publication-specific factors. The dependent variable is lagged one year behind all independent and control variables to infer causality.[5] Because most of the variables are numbers of occurrences (counts), a count regression model—negative binomial regression—will be used to analyze the data (Cameron and Trivedi 1998).

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[5]Theoretically, the rate at which each publication publishes articles on ERP is hypothesized to be influenced by the four drivers in the community. From the viewpoint of each publication, the reasonable topic selection period may actually be much shorter than the time it takes to write the selected articles. Therefore, I am considering using shorter lags than one year.

Table 1. Descriptive Statistics of Variables Used in Negative Binomial Regression

Variables	Mean	Std. Dev.	Association with DV
Dependent Variable (DV)			
1 Annual ERP article count for each publication	5.77	14.66	
Control Variables (CVs)			
2 Publication circulation	101,171.00	141,973.40	Non-Significant
3 Publication age	45.97	33.75	(-)***
4 Academic publication (dummy: 1=academic; 0=non-academic)	0.08	0.27	(-)**
5 Publication frequency	19.57	15.04	(+)***
6 US publication (dummy: 1=US; 0=non-US)	0.79	0.41	(+)**
Independent Variables (IVs)			
Business Problematics			
7 Annual article count for IS fragmentation problems	121.70	39.28	(+)*
8 Annual article count for Y2K	1,247.98	766.84	(+)*
9 Annual article count for Euro	398.54	277.97	Non-Significant
Early ERP Market			
10 Annual worldwide ERP software revenue (in billions of dollars)	7.95	2.31	(+)**
ERP Core Technologies			
11 Annual article count for client/server computing	511.92	353.70	(-)***
12 Annual article count for graphical user interface (GUI)	12.78	10.25	(-)**
13 Annual article count for fourth generation app. dev. language (4GL)	3.72	3.29	(-)***
14 Annual article count for relational database mgmt. systems (RDBMS)	6.10	5.36	(-)***
Old Organizing Visions			
15 Annual article count for manufacturing resource planning (MRP II)	71.48	47.38	Non-Significant
16 Annual article count for decision support system (DSS)	256.58	26.16	(-)***
17 Annual article count for electronic data interchange (EDI)	361.88	54.40	(-)***
18 Annual article count for business process reengineering (BPR)	461.71	197.08	(-)***
19 Annual article count for total quality management (TQM)	461.58	214.03	(-)***

Notes

1. Each independent variable was put separately in the negative binomial regression model in addition to control variables.

2. (-): negative parameter estimation; (+): positive parameter estimation; *: $p<0.05$; **: $p<0.01$; ***: $p<0.001$.

PRELIMINARY RESULTS

Between 1991 and 1999, 128 publications indexed by ABI/Inform published 1,538 articles on ERP. Figures 2 through 5 show overall pictures of the associations between the four drivers and the upswing of ERP discourse. Figure 2 shows that all three business problematics rose before the rise of ERP discourse. Figure 3 shows evidence that the ERP market led the upswing of ERP discourse. Figure 4 shows huge difference in the volume of discourse for various core technologies underlying ERP. Figure 5 shows most strikingly that several major organizing visions (BPR, TQM, DSS, and EDI) collapsed almost together between 1994 and 1996 before ERP discourse took off.

On average, as shown in Table 1, each publication published nearly six articles on ERP every year. The last column of Table 1 presents preliminary results of 13 negative binomial regression analyses. In every regression, all control variables were included, but only one independent variable was included. The yearly aggregation of data concealed much of the variations. Finer (e.g., quarterly or monthly) data will make it possible to test all independent variables in one regression model.

THE NEXT STEP AND EXPECTED CONTRIBUTION

Currently I am collecting quarterly data. The results of this study will show relative influences of the four drivers on the rise of the ERP vision. Significant drivers can be tested on other prominent IS organizing visions. A better understanding of the relationship between key drivers and organizing vision development will help both practitioners and researchers monitor and relate to the exciting waves in our field.
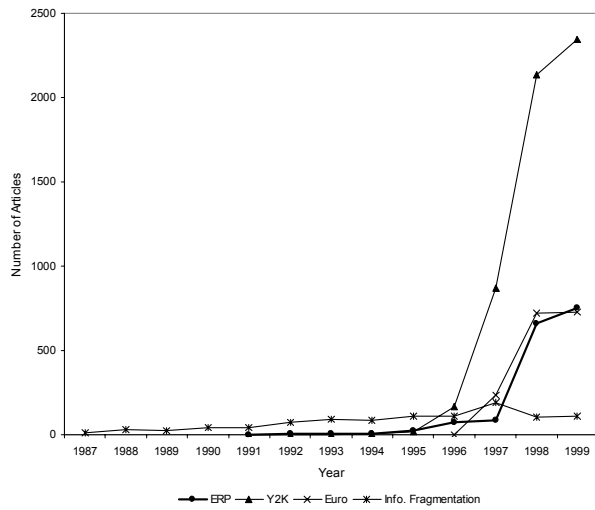
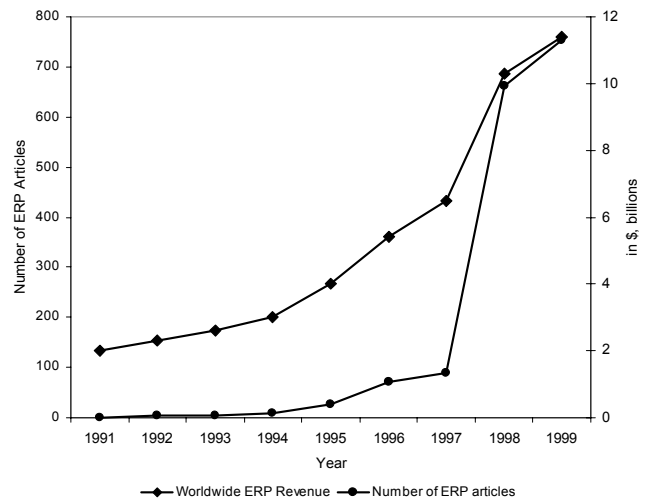**Figure 2. Article Counts of Business Problematics and ERP**
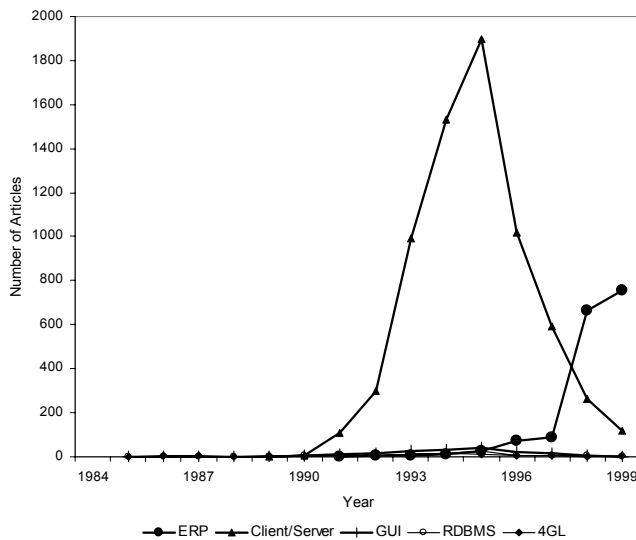

Figure 3. Worldwide ERP Revenue and ERP Article Count

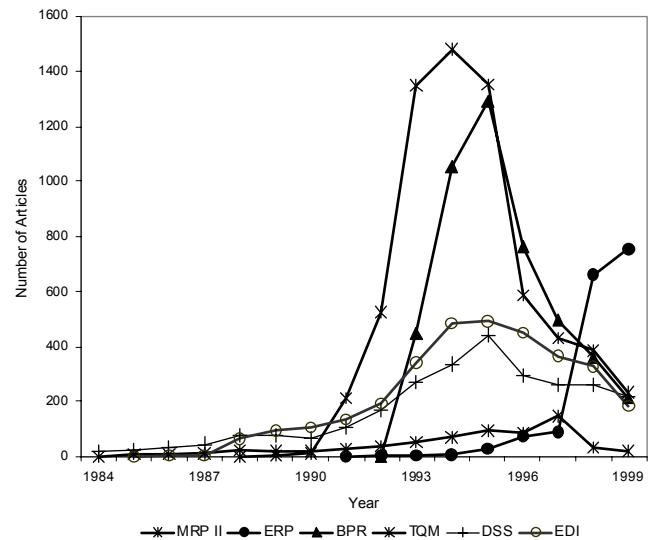**Figure 4. Article Counts of ERP and Its Core Technologies**

Figure 5. Article Counts of Old Organizing Visions and ERP

Acknowledgements

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